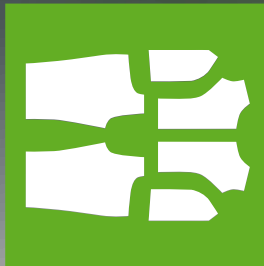




GRAFIS CAD





Textbook

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for GRAFIS CAD Patternmaking

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Appendix C**Installing and Setting up the Autonester****Appendix D****Installing and Setting up the plot manager**

Introduction

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The Grafis system

The Grafis CAD clothing construction includes first pattern development, grading and an industry standard marker making system. Patterns can be graded by application of the construction system or using grade rules.

During the styling process Grafis internally creates a record of the modification steps. The record can then be re-called to create other sizes automatically thus, eliminating incremental grading.

Grafis also records how patterns are derived from one another, capturing the interdependence of the pieces. Alterations made to one piece are automatically applied to all interdependent pieces.

Construction parameters can be applied during pattern development. This enables the user to comfortably modify already finished patterns by simply changing the construction parameters.

Prerequisites

The following are requirements for learning to use Grafis:

- basic knowledge in the use of computers, in particular the use of keyboard and mouse as well as working with files and folders and
- good knowledge of garment pattern cutting.

The application of Grafis can also be learned without knowledge of garment pattern cutting for example for use in the upholstery industry. Grafis replaces the user's pencil, ruler and set-square but not the pattern cutters' knowledge.

The Textbook and the training courses

This textbook is designed to allow for an autodidactic introduction to Grafis and/or can be used as teaching support material during Grafis training courses.

Training courses Grafis I and Grafis II are offered in Viersen/ Germany. Chapters 1 to 10 of the Grafis Textbook form the content of training course Grafis I. Chapters 11 to 17 of the Textbook are covered in Grafis II. Special emphasis is given to digitising of a style or nest and its further application when dealing with Chapter 16 "Grade Rule Grading".

All chapters of the textbook are available for download from the internet in English and German.

Outlook

Grafis can only be used at its optimum if the user is comprehensively trained. To further training, the Grafis Team continue to make available a free training version. Videos to accompany the Textbook are available on our website. Current information and downloads are published under www.grafis.de.

Viersen, April 2017

Chapter 1 Calling basic blocks

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1.1. Important rules for work with Grafis



Grafis measurements

Grafis works with the following measurements:

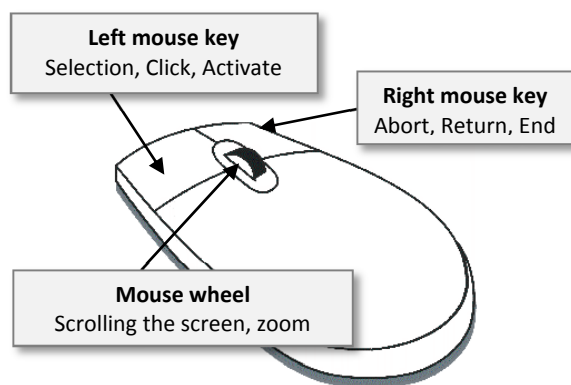
length distance radius	mm (millimetres)
body measures	mm (millimetres)
angle direction	degrees (right angle =90°)
area	mm ² (square millimetres)
per cent relative length	0-100%

Please note that all length and distance values are displayed and entered in millimetres.

Mouse keys in Grafis

In all texts of this book the symbols  and  are used for the left and right mouse button.

The **left mouse button** is the 'do-key' in Grafis and is used for selection, click and activating (Picture 1-1).



Picture 1-1

The **right mouse button** is the 'retreat key' and is used for abort / end of a function or return to the next higher level menu. The position of the cursor is of no consequence.

The **mouse wheel** is used for scrolling the screen and zoom.

Function key assignment

The function keys F1 to F12 are assigned special functions in Grafis. Here, an overview of the functions with reference to the chapter where they are explained in more detail:

	Function	chapter
F1	call context related help	3.2
F2	zoom screen content in / out	1.4
F3	move / rotate / flip parts and roll two parts	3.5 3.6
F4	refresh screen	1.4
F5	part positioning	3.1
F6	centre screen content	1.4
F7	Show / hide measurements	7.2
F8	Toggle between pieces in their original position and their position after dragging with <F3>	3.5
F9	Show/ hide pixel image	15.9
F11	calculator function for calculation of z values	12.2
F12	Display of called interactive constructions in the style	2.4

Further important rules

The **decimal symbol** is the point (.).

e.g.: 10.4 45.2° 67.9% 12.7cm²

Text and value entries are to be completed with <ENTER>.

To abort a text or value entry press <ESC>.

The data base is explained in detail in chapter 4.1. It is organised in Grafis as follows:

drives	according to hard and software A:,...,Z:
collection folders	folders and subfolders in \\Grafis\\Basis_d\\Kollekt
styles	saved as *.mdl files in the collec- tion folders or sub-folders
parts	max. 500 parts per style
objects	points, lines, texts, hatching, con- struction record, construction pa- rameter etc.

1.2. Starting Grafis

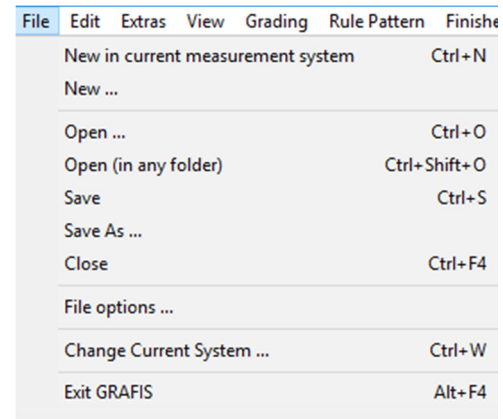
Step-by-step guide to starting Grafis

- ⇒ Click the relevant icon on the desktop or double-click onto **grafis.exe** in the folder \\Grafis
- ⇒ Open the *File* pull-down menu (Picture 1-2) and click on *New...* or *Open...*
- ⇒ Select the required measurement system
- ⇒ For the option *Open...*: Select drive and collection folder
- ⇒ For the option *Open...*: Double-click onto an existing style or enter a new style name in the *File name* field and press <Enter>.


The *Select measurement system* dialogue

The examples and exercises relate to the system *Optimass (Basis_A)*. The information also applies to all other measurement systems.

As soon as you have selected a measurement system, more information about it is displayed in the right part of the screen. The selected measurement



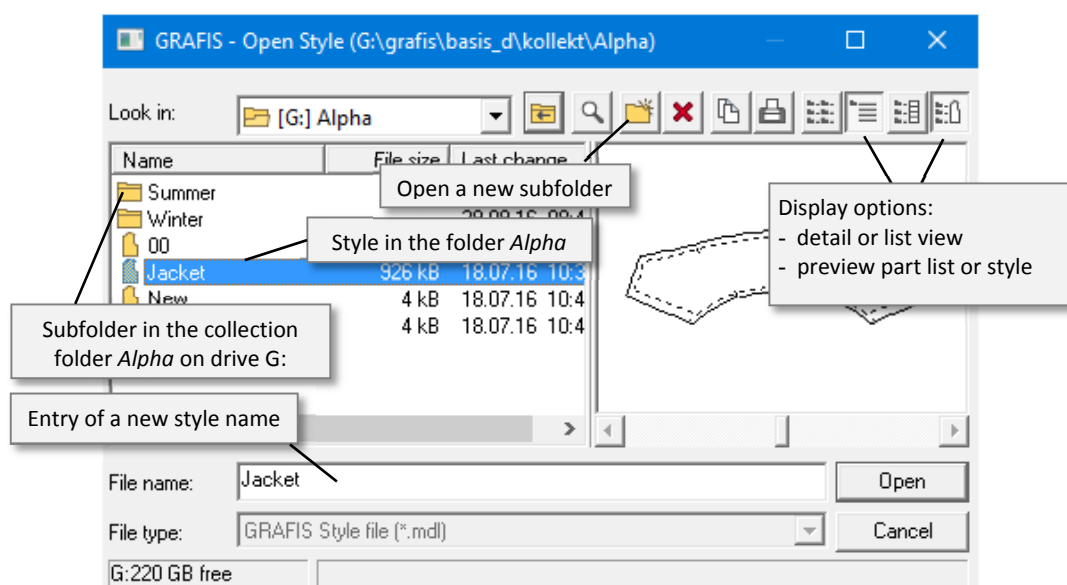
Picture 1-2

system is started by pressing <ENTER> or double click with  on the respective line or clicking *Select measurement system*.

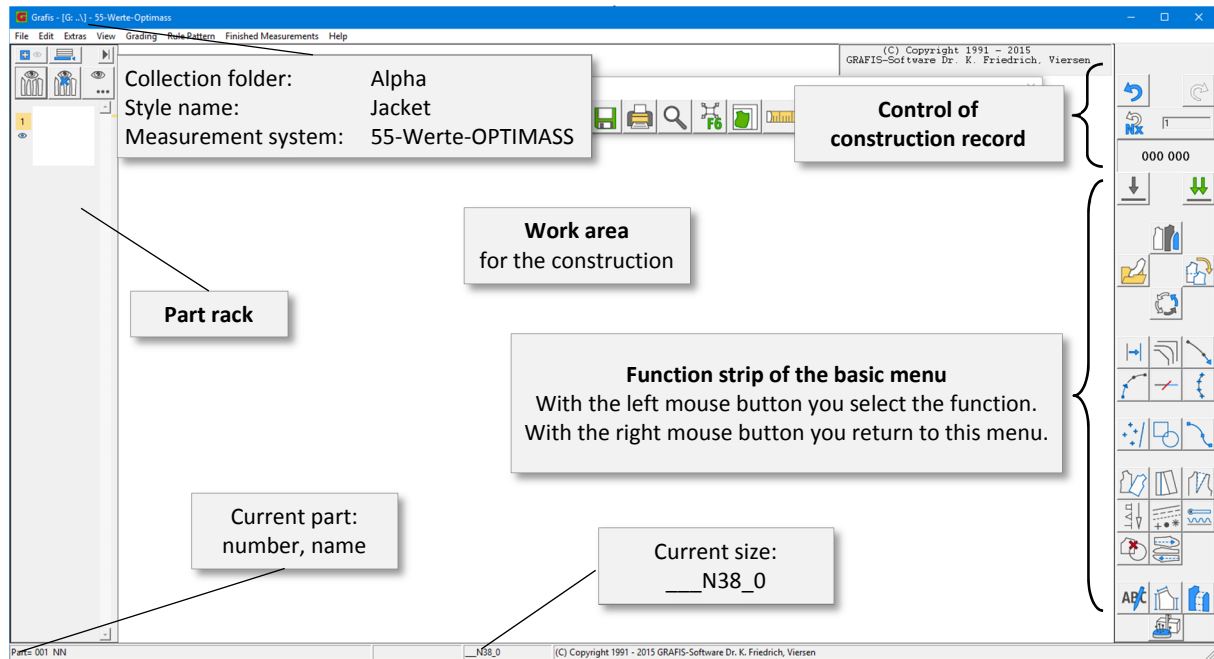
In the case of *Open...*, after having started a measurement system, the *Open style* dialogue appears (Picture 1-3).

The *Open style* dialogue

In the *Open style* dialogue first select the drive and then the required collection folder. Styles can be generated only in collection folders and their subfolders. The *File name* field remains blocked until a collection folder has been selected by double-clicking. Then, a new file / style name can be entered (Picture 1-3).



Picture 1-3



Picture 1-4

Create a new collection folder

Select the drive where the collection folder should be created. If applicable, go up one level to the parent folder with and then open the new folder with . The collection folder can be structured with up to 7 subfolders.

Delete styles and folders

The *Open Style* dialogue also permits deleting folders and styles. Select the folder or the style and click to delete . The style or the folder including all styles is deleted after a security check.

Note: If Grafis cannot delete the folder, there are further files situated within this folder.

Make regular backups of your styles and measurement charts from the beginning. This is the only way your data can be restored after a hard disk failure, for example.

Naming a new style

The name for a style or a folder may consist of the numbers 0...9, the letters A...Z and the special characters '-' [hyphen] and '_' [underscore].

The style name A03HGTRD would be correct. However, you should apply content relevant and systematic names as it is difficult to keep track of your styles, otherwise

Start Grafis and select *File* → *Open....* Open the new style 'Start' in the folder *Alpha*. Double-click on the folder *Alpha* and enter the style name 'Start'. After having clicked on *Open* or pressing <ENTER> the style is generated and can be edited.

The Grafis basic menu

The Grafis basic menu appears on screen (Picture 1-4). Compare it with your screen.

1.3. Calling basic blocks

When opening a new style, the first part is opened automatically in the part organisation and visible in the part rack.

Basic menu (extract)

reset ▪ restore record

N amount of reset

record counter

test run ▪ grading

part organisation

call basic blocks ▪ insert




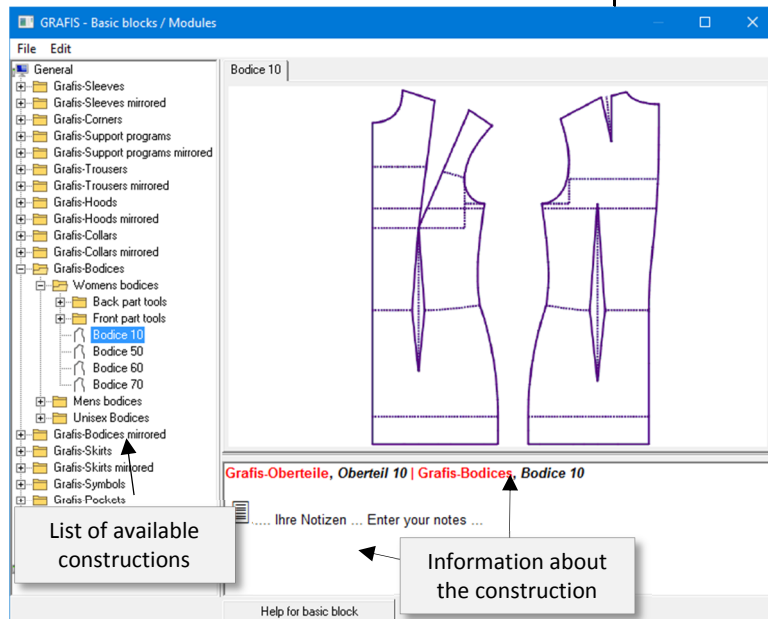
More detailed information about part organisation and the part rack can be found in Chapter 3 and in Chapter 14.

Step-by-step guide

- ⇒ In the basic menu: click *call*
- ⇒ Select the required basic block. Information will be displayed in text and images
- ⇒ Double-click the required construction to start it

The function *call*

All basic blocks available in the selected measurement system can be started with the function *call* .



	Function
F2	Zoom in/ Zoom out screen contents
F3	Drag/ turn parts towards one another and roll two parts (sections 3.5 and 3.6)
F4	Refresh screen
F6	Centre screen contents


The construction is not influenced by the changes to the screen display.

Move / Zoom with the mouse wheel

The screen display can be altered at any point with the mouse wheel. The following applies:

move up/down	wheel only
move right/left	<Shift>+ wheel
zoom	<Ctrl>+ wheel

Drag / Zoom

Patterns can be enlarged/ reduced in stages or moved on the screen with the *Drag/Zoom* function  in the *Edit* pull-down menu or from the toolbox. After having clicked Drag/Zoom a magnifying glass with the following functions appears:

enlarge	click left mouse button
reduce	click right mouse button
move	keep left mouse button pressed

Picture 1-5

Under *General* you can find constructions that can be called in a number of measurement systems. The section *Optimass (Basis_A)* contains constructions that can only be called in the current measurement system.

Calling a basic block



A selected basic block (Picture 1-5) is called by double-click.

Start *Grafis Bodice 50*. Your first basic block is displayed on screen. Before calling a different basic block click on *reset* in the basic menu. The previously called basic block is thus reset.

1.4. Alter the screen display

Overview



The patterns can be displayed on screen in scales from approx. 100:1 to 1:100. The setting is infinitely variable or can be controlled with certain values. The function keys F2, F3, F4, F6, the arrow keys and the mouse wheel are used for adjusting the screen display. They have the following significance:

Enlarging and reducing ensues with the magnifying glass as the centre. Click the relevant points or lines with . Reduce with  and move the mouse with pressed left mouse button.

Centre picture with <F6>

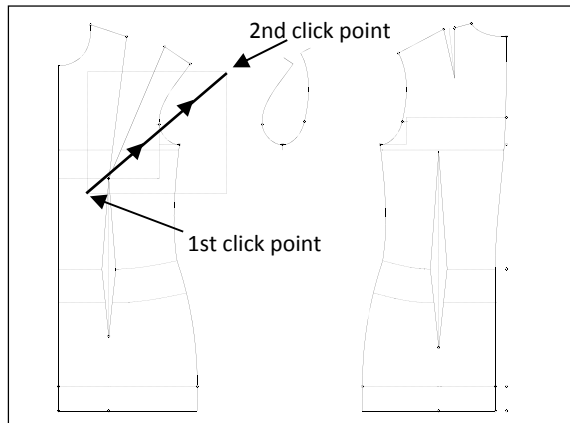
Pressing the <F6>-key automatically adjusts the scale and position of the whole construction to display all objects on the screen. The construction is centred on screen.

Zoom in with <F2>

Press <F2> to zoom into the screen contents. First click  in the lower left corner of the area to be enlarged. Move the mouse to open a rectangle. Extend the rectangle to the top right (Picture 1-6) and click again .

The rectangle content becomes the screen contents. Press the <F6>-key and your complete construction re-appears on screen.

Practise zooming in on various areas of your construction. Press <F6> after each zoom operation.



Picture 1-6

Move with arrow keys

Use the arrow keys to move the picture. The moving speed is increased by keeping the keys pressed down.

Reduce the construction and move the screen contents with the arrow keys.

Refresh screen with <F4>

The <F4>-key rebuilds the whole screen content. Identical objects lying on top of each other twice, four or six times cannot be seen on screen as they delete each other's image. Objects lying once, three or five times on top of each other can be seen. After pressing <F4> objects deleting each other's image are always displayed.

Please use this key from time to time as a means of control.

1.5. Quit Grafis

To quit Grafis select between the following in the pull-down menu *File*:

Save



Save the current state of the style under the current name.

Save as...

Save the current state of the style under a new name and/or a new drive (disk/ net drive) and/or a new folder.

Close



If the style has not been saved a security question appears.

1.6. Exercises


1st Exercise

Start the measurement system *Optimass (Basis_A)*, call the basic block *Bodice 10* and save the style as 'Bodice' in the collection folder *Alpha*.

Quit working on the style 'Bodice' via *File* → *Close*.

Open a new style with *File* → *New...*, call the basic block *Trouser 10* and save the style as 'Trousers' in the *Alpha* collection folder. Quit Grafis via *File* → *Exit Grafis*.

Start Grafis and open the style 'Bodice'. Close the style via *File* → *Close*.

Delete the styles no longer required in the *Open style* dialogue. Select the styles and click on .

2nd Exercise

Start Grafis and open a new style via *File* → *New...* Click on the *call* function in the basic menu, select different constructions and study the explanation for the constructions on the corresponding file cards.

3rd Exercise

In the measurement system *Optimass (Basis_A)* create the new style 'Start' and call different basic blocks (skirt, trouser, bodice) from the *General* section. After each call reset the record by clicking *reset*.

Chapter 2 Grading

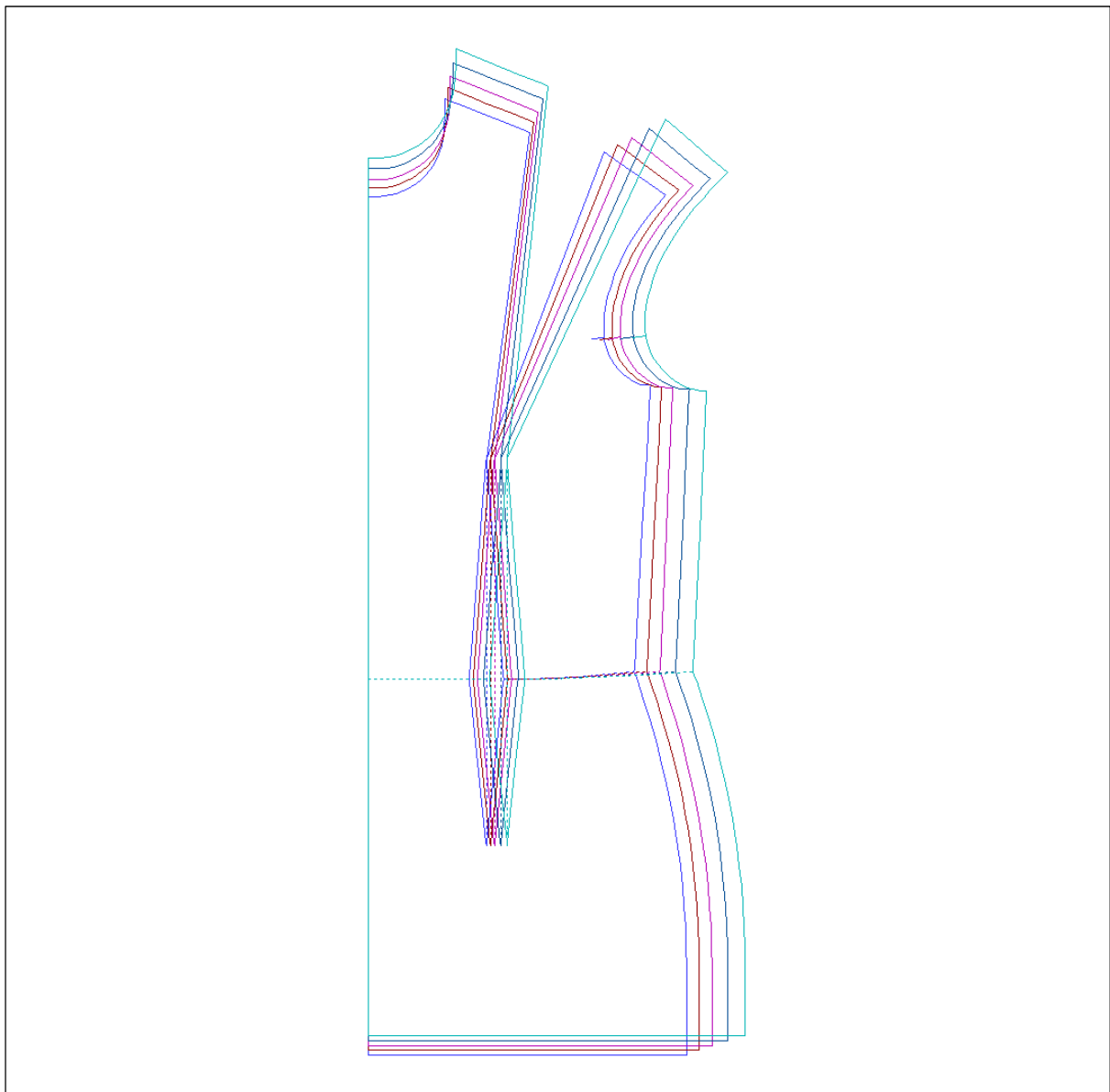
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In Grafis, first patterns are originally developed in the base size. All construction and modification steps are registered by imperceptibly creating a record.

This construction record can be recalled with other sizes, thus creating the patterns in the respective size automatically.



2.1 Measurement charts

Grading with measurement charts

Grafis works according to the same principle described in textbooks for pattern construction, using the computer. First patterns are created in three stages.

First stage: Generating measurement charts containing body measurements from official or company-specific measurement tables or measurements of specific individuals.

Second stage: On the basis of measurement charts, prepared basic constructions such as e.g. bodice, skirt, trousers, and sleeves are calculated. The basic constructions can be adjusted interactively according to fit, design and technological aspects.

Third stage: The basic constructions from stage two are the starting point for styling of the development patterns from which the production patterns will be derived.

Thus, the construction principle does not require grading increments. The basis for generating the first pattern in the different sizes are **measurement charts**. Each size is represented by a specific measurement chart.

Measurement charts in Grafis

Measurement charts are accessible at all times and can be generated for prepared standard sizes, own size runs as well as for specific individuals.

Each measurement chart is valid for a particular measurement system (e.g. measurement system for men, women or children). It is also possible to implement own measurement systems into Grafis. Selection of the measurement system ensues when starting Grafis, already (see section 1.2).


Grafis distinguishes between **standard measurement charts** and **individual measurement charts**. Standard measurement charts contain the measurements of prepared 'off-the-peg' sizes. The values and names of these charts cannot be altered. Individual measurement charts contain measured body measurements or body measurements of company-specific grade runs. Individual measurement charts can be altered at all times.

The designation of standard measurement charts always begins with '_'. The measurement chart ___N36_0 is the standard measurement chart for size 36 in the active measurement system. Please note the different indicators for figure types, such as prefix 'S' for short or prefix 'L' for long figure types in some women's measurement systems.

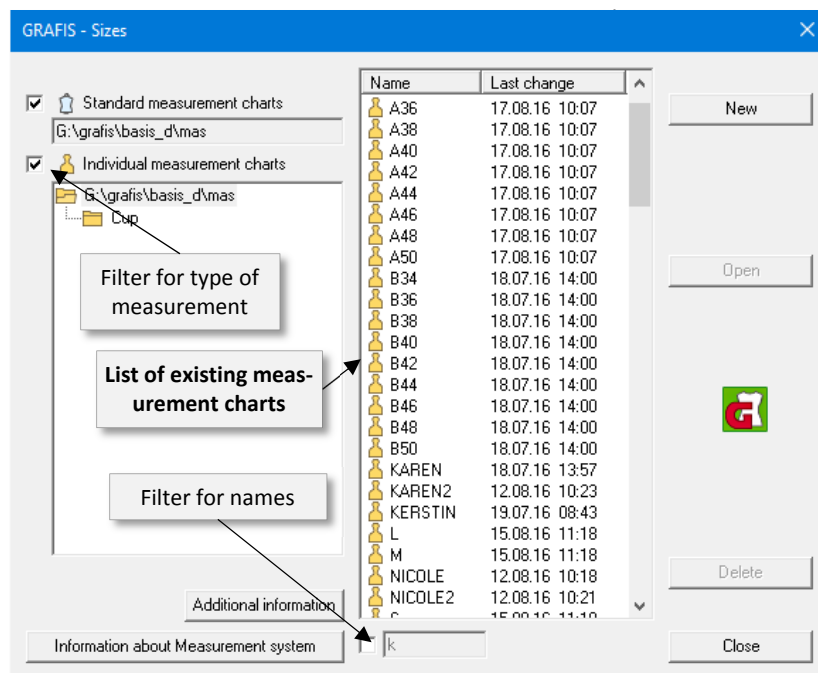
Each measurement chart is a single file, stored in the indicated folder on your computer. Measurement charts are not saved within the style. In particular, your individual measurement charts must be part of your regular data backup.

Measurement charts are edited in the *Edit measurement chart* dialogue (Picture 2-1), which is accessed

via the pull-down menu *Extras* →

Edit measurement charts. In the centre of the window, you can see the existing measurement charts. On the left hand side of the list you can decide which measurement charts are to be displayed. A filter for names of measurement charts can be found below the list. A number of measurement charts can be selected within the list. A context menu with functions for copying, cutting and deleting amongst other options can be opened with the right mouse button .

You can **display measurement charts** via the *Open* button. The type of display is different for one single measurement chart and a number of measurement charts.

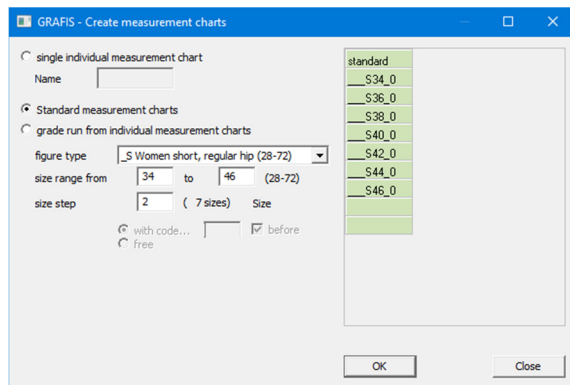


Picture 2-1

Generate standard measurement charts

Step-by-step guide

- ⇒ Extras → Edit measurement charts
- ⇒ Button New
- ⇒ Activate the option *standard measurement chart*
- ⇒ Select the figure type required
- ⇒ Enter the required size range and the size difference, Picture 2-2.
- ⇒ Button OK



Picture 2-2

Grafis automatically generates the standard measurement charts as they are required during grading.

Generating 'half-sizes', such as '_N41_0' or '_N39_0' is also possible. Simply adjust the settings for the size range and the size difference.

Generate an individual measurement chart

Step-by-step guide

- ⇒ Extras → Edit Measurement Charts
- ⇒ Button New
- ⇒ Activate the *single individual measurement chart* option
- ⇒ Enter the name for the measurement chart
- ⇒ Button OK
- ⇒ Edit the individual measurement chart by entering the measurements taken on the person into the table.

Generate an individual measurement chart according to the step-by-step guide. Enter the desired name for the measurement chart into the *Name* field, e.g. the name of the person or a customer number. The name can be a maximum of 8 characters long and must not begin with '_'. Having clicked on *OK*, the preliminary individual measurement chart is created. The window for editing the individual measurement chart opens (Picture 2-3 background). Now, the individual values must be entered.

	standard	Individual	Difference
	_N42_0	Karen	
01 IKö - Height	1690	1680	-10
02 u Br - Bust	960	960	0
03 u Ta - Waist	800	780	-20
04 u Ut - High Hip 8 cm below Waist	960	960	0
05 u Ge - Hip	1050	1090	40
06 IAc - Scye Depth	206	206	0
07 ITa - Nape to Waist Centre Back	410	410	0
08 IGe - Waist to Hip	200	200	0
09 IBr - Bust length HSP => BP	295	295	0
10 IVo - Neck to Waist over Bust	452	460	8
11 HB - Nape to Bust	375	375	0
12 HBT - Nape to Waist over Bust	528		
13 b Rü - Across Back	369		
14 b Ak - Acromion Width	392		
15 ISu - Shoulder Length	131		
16 b Ar - Scye Width	107		
17 b Vo - Across Bust	396		
18 w BA - Bust Suppression Angle	18		
19 w Su - Shoulder Angle	22		
20 u Ha - Base of Neck	382		
21 b Le - Front Waist Width	0		
22 b Vo o - Upper Across Bust	330		
23 Abst - Distance Bust p. => b Vo o	98		
24 IAr - Arm Length	604		
25 IDa - Acromion to Elbow	344		
26 u Da - Upper Arm Girth	308		
27 u Hg - Wrist	166		
28 u Kp - Head Girth	562		
29 ISe - Waist to Floor	1070		
30 ISi - Body Rise	290		
31 ISr - Inside Leg	780		
32 IKn - Waist to Knee	630		
33 w Ge - Seat Angle	6		
34 d Sp - Abdomen-Seat Diameter	256		
35 ISp - Crotch Length	696		

Filter name

Body measurements to be displayed

Constructions for which the body measurements are to be displayed at all times

Picture 2-3

Editing individual measurement charts

Having created a new individual measurement chart or opened a single individual measurement chart, the dialogue according to Picture 2-3 (background) appears.

Initially, all body measurements available in the current measurement system are displayed. Some measurement systems, such as Optimass contain a large number of measurements. The particular body measurement basic blocks apply only certain measurements. The measurements used by the respective basic block are listed in the help to the basic block. The basic block *Skirt 10* for example uses the body measurements hip, waist and waist to hip. The block *Skirt 30* is a finished measurement construction. It does not require body measurements but is adjusted interactively via break sizes.

Each user can set up his/her own **body measurement filter** (Picture 2-4) for ease of use. When setting up the filter (Picture 2-4 foreground) the measurements to be displayed are selected on the left. In addition, the Grafis basic blocks with which the user works can be selected on the right.

Create a body measurement filter 'all basic blocks' and activate all Grafis blocks. Thus, only the measurements required for this textbook will appear.

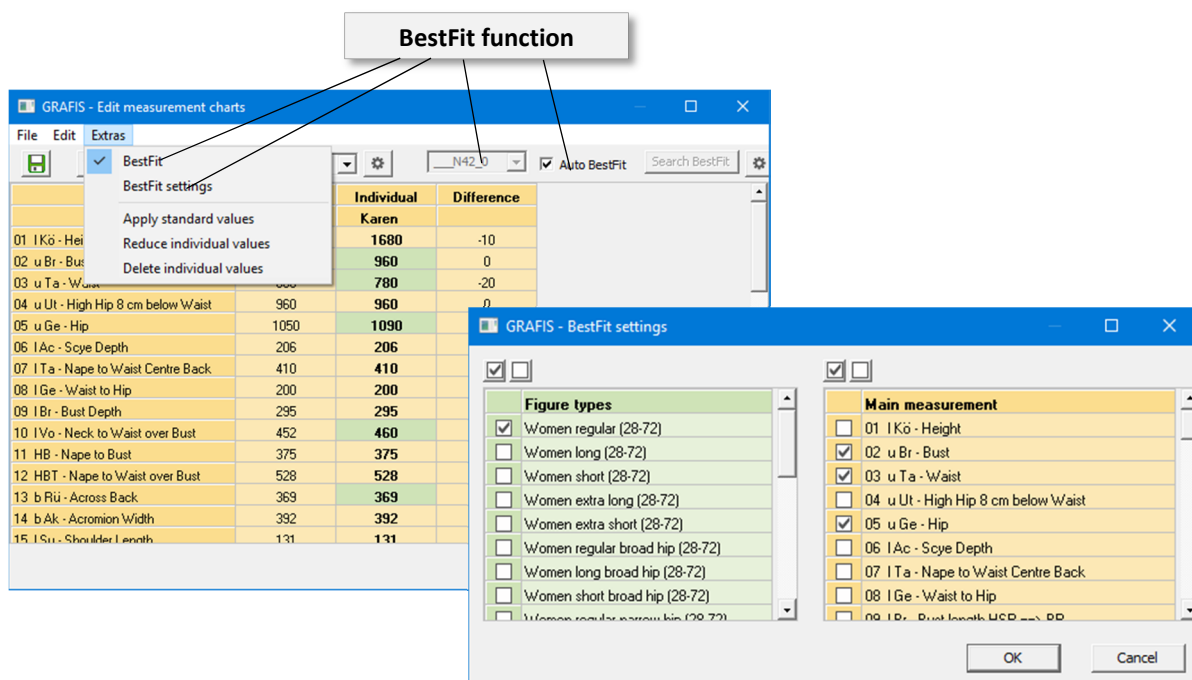
In the column *Individual* enter a few concrete measurements of a person. The column *Standard* remains unassigned. Before the measurement chart can be saved, the **nearest fitting standard measurement chart** must be selected.

Initially, the standard measurement chart is used for pre-assigning the measurements. Furthermore, it is of great significance when working with *x* values later on and for the use of interactive constructions. First, deactivate the switch *Auto BestFit* and select a suitable size from the combo box on the left. The column *Difference* shows the difference between the measured and the pre-set values. Select a different size and then, decide on a suitable size.

For automatic search of a fitting standard measurement chart, use the **BestFit** functions (Picture 2-4). Open the *BestFit settings* and on the left, select the figure types in which a standard measurement chart is to be searched. First, select only the figure type for normal sizes. Only when you actually work with styles for different figure types or for example with men's sizes in Optimass, select one or more different figure types, here. On the right hand side of the window you can activate the main measurements for *BestFit*. On the basis of these measurements, Grafis attempts to suggest a matching standard measurement chart.

The switch *Auto BestFit* can be active during entry of body measurements. After each value entry, a suitable size is searched automatically. If the switch is not active, start the search with the button *Search BestFit*.

If you want to search for a suitable size yourself, deactivate *Auto BestFit* and set up the standard measurement chart manually, as described.



Picture 2-4

You can enter or edit measurements in an individual measurement chart at any time. Double-click on the measurement chart in the list of available measurement charts (Picture 2-1) displays it according to Picture 2-3.

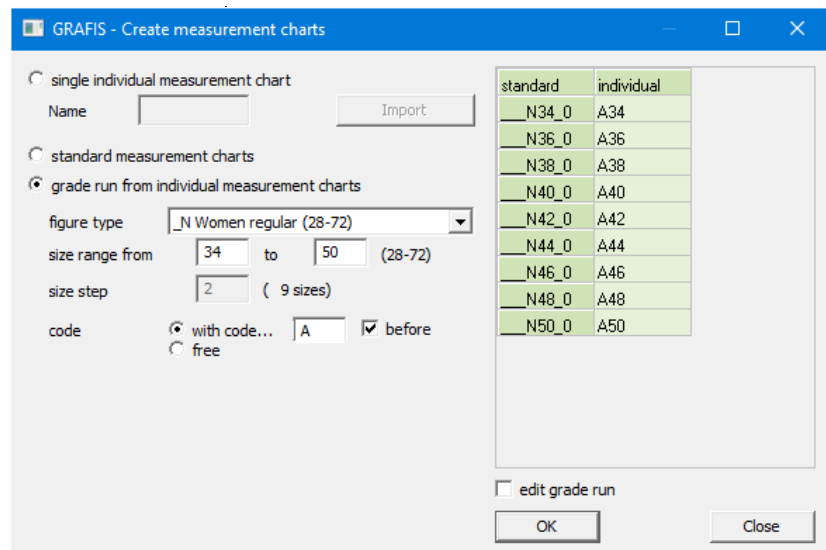
NB: all length measurements must be entered in mm! The values displayed in bold apply.

Alteration to the basic block/ pattern will become effective after recalculating the construction. This ensues by clicking on *test run* or *grading*.

Generating an individual grade run

Step by step guide

- ⇒ Extras → Edit measurement charts continue with Create
- ⇒ Activate *grade run from individual measurement charts* and select the required figure type
- ⇒ Set up size range and size distance
- ⇒ Enter designation, e.g. 'A'. The designation can be placed before or after the number. Alternatively, with *free* a free designation can be given, for example for the size designations XS, S, M, L, XL.
- ⇒ Continue with OK. The individual measurement charts of your grade run are offered for editing according to Picture 2-6.



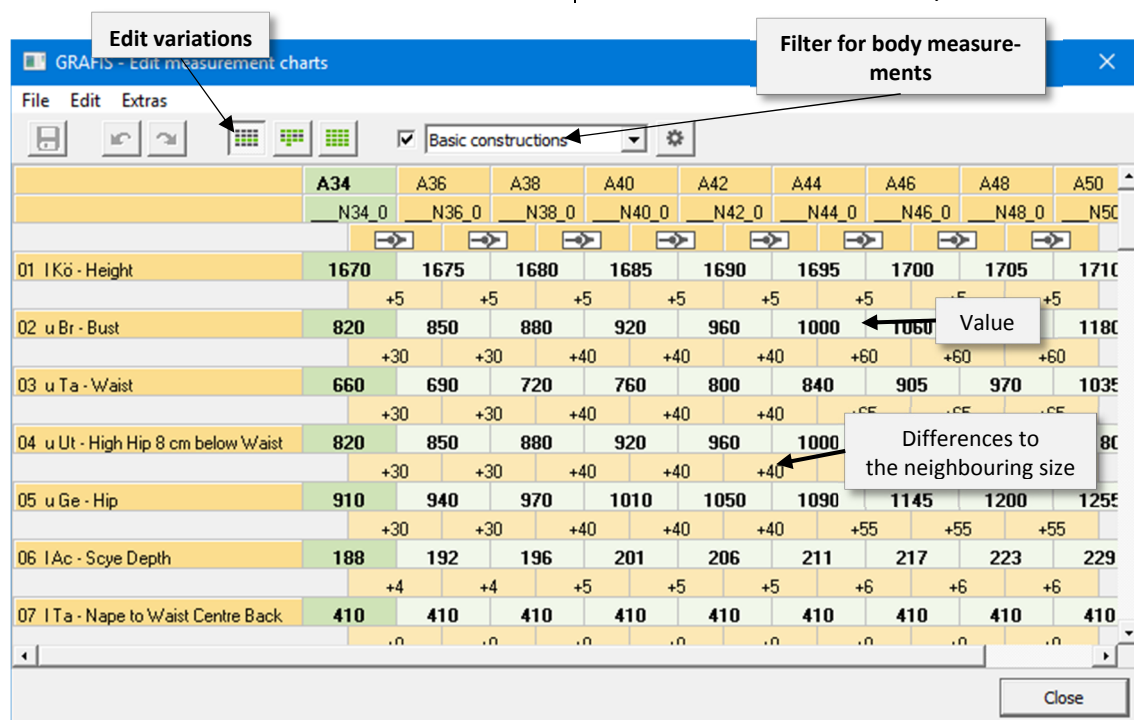
Picture 2-5

There are three **edit variations** (Picture 2-6):



- **Edit measurements and display differences**
- **Edit measurements of the base size and edit differences**
- **Edit measurements**

Use the first variation **edit measurements and display differences** (Picture 2-6), to enter body measurements one after the other. The differences to the neighbouring sizes are calculated automatically after each entry.

Use the second variation **edit measurements of the base size and edit differences** (Picture 2-7) if you want to change a body measurement by a fixed amount across all sizes or if you want to enter the



Picture 2-6

base size and the differences. The changes are applied to the sizes linked together. The link is symbolised by the respective symbol  or  in the third row and can be altered by clicking.

The third variation **edit measurements** is the shortest view in which all body measurements are entered one after the other.

The **TAB** - key jumps to the entry for the next size. The **Enter** - key jumps to the entry of the next body measurement. Altered values are marked in red. The red marking is reset after saving. Alterations can be undone and reinstated.

Set up an individual grade run according to Picture 2-7. Both grade runs contain 5 sizes each based on the figure type *_N women regular*. The two grade runs differ in their distances between body measurements and their values of the respective base size 40.

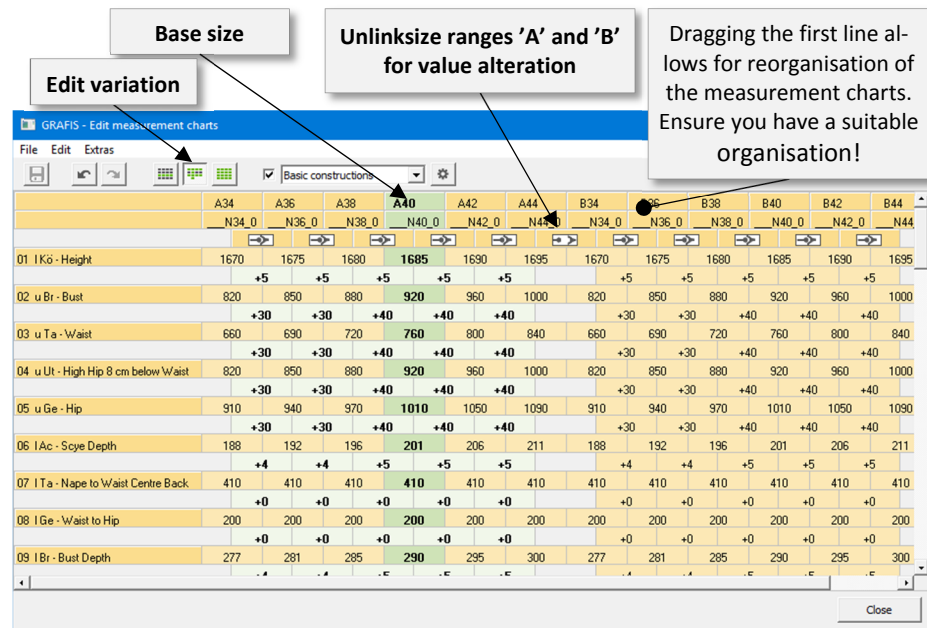
To generate the table in Picture 2-7, both size runs have to be set up separately according to Picture 2-5 with a size range between 36 to 44 respectively. In the dialogue *Edit measurement charts* (Picture 2-1) select all ten measurement charts A36 to A44 and B36 to B44 and click on *Open*. The measurement charts are organised according to their standard measurement charts. Select the second editing variation and activate the body measurement filter *all basic blocks*. Now, organise the sizes in the order shown by dragging in the first line. Then, unlink the two grade runs so that alterations apply to one grade run only.

Exercises

1st Exercise

Generate an individual measurement chart for Mrs BERGER in the OPTIMASS measurement system using **BestFit**. Edit the following measurements taken of Mrs BERGER:

- bust: 925mm
- hip: 960mm
- waist: 710mm.



	A34	A36	A38	A40	A42	A44	B34	B36	B38	B40	B42	B44
01 I Kö - Height	1670	1675	1680	1685	1690	1695	1670	1675	1680	1685	1690	1695
02 u Br - Bust	820	850	880	920	960	1000	820	850	880	920	960	1000
03 u Ta - Waist	660	690	720	760	800	840	660	690	720	760	800	840
04 u Ut - High Hip 8 cm below Waist	820	850	880	920	960	1000	820	850	880	920	960	1000
05 u Ge - Hip	910	940	970	1010	1050	1090	910	940	970	1010	1050	1090
06 I Ac - Scye Depth	188	192	196	201	206	211	188	192	196	201	206	211
07 I Ta - Nape to Waist Centre Back	410	410	410	410	410	410	410	410	410	410	410	410
08 I Ge - Waist to Hip	200	200	200	200	200	200	200	200	200	200	200	200
09 I Br - Bust Depth	277	281	285	290	295	300	277	281	285	290	295	300

Picture 2-7

Generate individual measurement charts for Mrs MEIER and Mrs SCHULZE and alter various values such as bust, hip, shoulder.

Delete the measurement charts of Mrs MEIER and Mrs SCHULZE.

2nd Exercise

Generate an individual grade run in the OPTIMASS measurement system (Basis_A) for the figure type *_S Women short, regular hip*, size range 34 to 44, size distance 2 and the prefix 'Test'. Mark the size Test38 as base size in the overview. Use the second variation **edit measurement of base size and edit differences** to edit the measurements. Alter the differences for the bust to 35mm between sizes 34 and 40 and the hip to 45mm. Then, save the individual grade run.

3rd Exercise

Generate an individual measurement chart for Mr. Muller in the OPTIMASS measurement system (Basis_A) using **BestFit**. Create a **measurement filter** which shows only trouser measurements. In the **BestFit settings** define search for mens figure types only. Edit the following measurements taken of Mr. Muller:

- hip: 900mm
- waist: 670mm
- thigh: 555mm

2.2 Size Table

Calling the size table

Calling this menu ensues via *Extras* → *Size Table*. Open the size table and read the explanations in Picture 2-8.

The contents of the size table


With each style a size table is saved. The first position of the size table shows the measurement chart used for pattern development, the **base size**. In the Opti-mass measurement system (Basis_A), size N38 is entered automatically. The user can enter a different measurement chart as base size at any point, even an individual measurement chart. All other measurement charts required for the style are entered into the other positions of the size table.

Pattern development ensues on the base size. Grading means automatic application of the registered construction record to the activated measurement charts contained in the size table. Automatic re-construction is possible because Grafis has registered all construction steps and repeats those with other measurement charts.

Entry and alteration in the size table

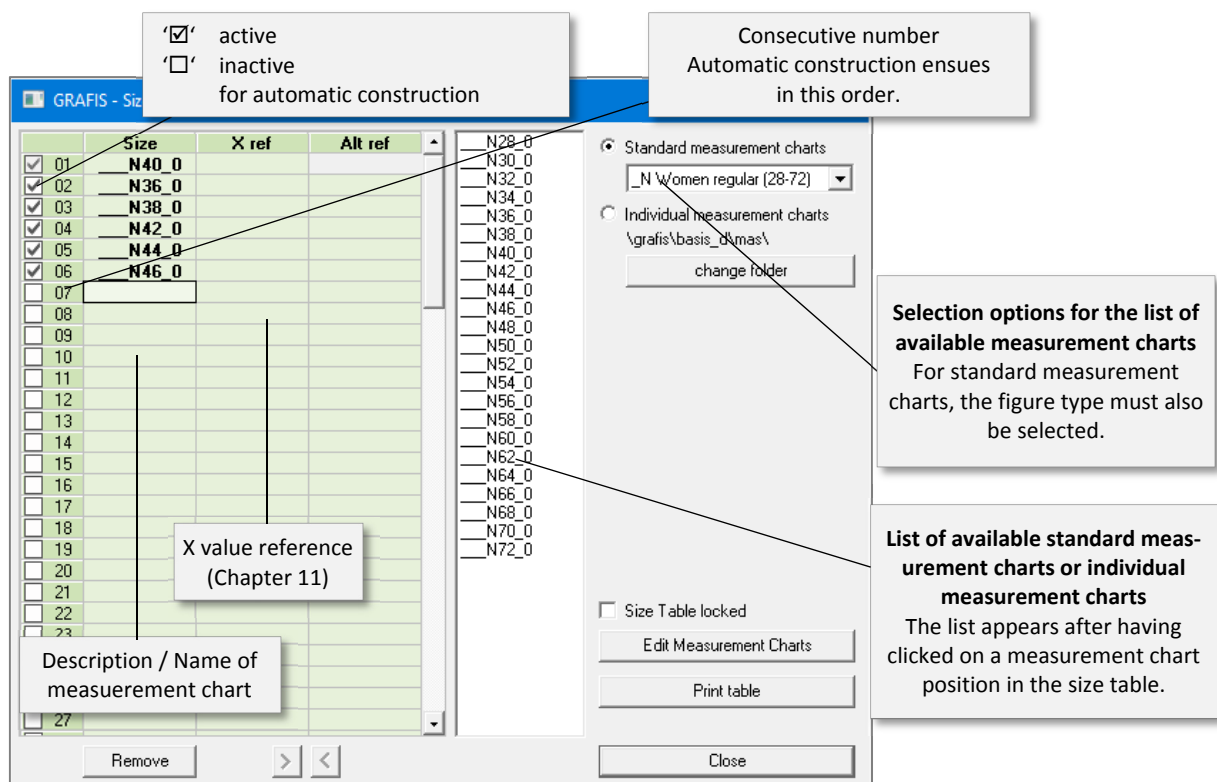
To **insert a measurement chart**, click on the desired position in the column of measurement charts. A window appears to the right of the size table showing all available standard measurement charts and all available individual measurement charts.

If you want to insert standard measurement charts into the size table, activate the option **standard measurement charts** and select the desired figure type. The option **individual measurement charts** lists all available individual measurement charts. In case the required individual measurement chart does not appear in the list, it has to be created, see section 2.1.

Then, click on the measurement chart to be entered into the size table. The current line for entry automatically moves one position downwards so that entry can continue without interruption. A number of measurement charts can be selected and transferred at the same time. Using the right mouse button  terminates entry.

To **remove measurement charts** from the size table select the measurement chart or a number of measurement chart with <Shift> or <Ctrl>. Clicking on the *Delete* button or using the key removes the measurement chart(s) from the size table but not from the list of available measurement charts. The measurement chart can be re-entered in the size table to be available for grading.

As not all measurement charts in the size table are to be graded each time, a **selection option** is integrated in Grafis. The measurement charts to be graded are marked with '☑' (activated) in the size table. By clicking you can toggle between activated '☑' and deactivated '☐'.



Picture 2-8

A **simple operation** is offered by dragging the mouse with pressed left mouse button. Thus, entries in the size table can be copied quickly to the next position. This applies to the symbol '☑' and empty measurement chart positions.

Edit measurement charts displays all measurement charts of all sizes contained in the size table in the form of a table.

Exercise

In this exercise, a size table similar to Picture 2-8 is to be generated.

After having opened a new style the size table contains size N38 as base size. Enter size N36 onto the second position. Click the second position in the measurement chart column. The window with all available measurement charts opens to the right. Select the measurement chart type *Standard measurement charts* and the figure type *_N women regular*. Click on the sizes '___N36_0' and '___N38_0'. The measurement charts appear on the 2nd and 3rd position of the size table. Click ☐ to terminate the process.

Toggle between active and not active for these measurement charts by clicking on the position number '☑ 02' a few times.

Now select the 4th position and select the sizes '___N42_0' to '___N46_0' from the list of measurement charts on the right with the left mouse button pressed down. Select the figure type *_S women short, normal hip* for short sizes and transfer the sizes '___S36' to '___S46' to the following positions. Select all short sizes and remove them from the size table.

Now arrange the other measurement charts displayed in the size table as you have just learned. Have all measurements of the sizes in the size table displayed with *Edit measurement chart*.

2.3 Grading with measurement charts

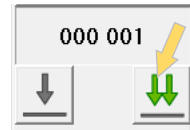
Grading in Grafis

In Grafis grading is an **automatic similar construction**. All construction steps of the base size are repeated with the measurement charts to be graded. During construction the succeeding similar construction is to be considered, already. Construction with Grafis thus does not become more difficult but more elegant and more interesting.

Start grading

Grading is started with: *Basic menu* → *grading*.

Only sizes entered into the size table and activated will be graded.



Create a size table according to Picture 2-8 and call the *Bodice 10*. Start *grading*. The bodice construction appears on your screen in the sizes N36 to N46.

The base size always appears in blue on a white screen or in yellow on the black screen!

Enter the short sizes '___S36' to '___S46' into the size table and deactivate the sizes already graded. Start *grading* and your screen displays all previously graded sizes plus the short sizes. Alteration in the size table lead to grading of further sizes but not to deleting already graded sizes. To refresh the screen *test run* or a different record function from the basic menu must be started. Then you can grade anew.

Exercise

Activate all measurement charts in the size table and grade.

Activate the base size and the short sizes, only in the size table and grade. Start *test run* from the basic menu and then *grading* again. On the screen you can see the basic block in the base size and the short sizes.

Start other basic blocks and grade them. Reject the graded basic blocks by clicking *reset* in the basic menu. Change the size table also.

Note

It is to be recommended to use grading from time to time during construction as a test. A number of extreme measurement charts should be activated in the size table, e.g. N36, N46 and N54.

This allows you to check the construction steps as you go and avoids having to reset at a later date.

2.4 Adjust interactive construction

Step-by-step guide

- ⇒ Call construction (see section 1.3)
- ⇒ Activate construction with double-click or from the overview with <F12> or by right click to the contour and selection in the context menu
- ⇒ Set options for the construction
- ⇒ Activate drag areas and adjust the construction; use raster and also compare

Menu for interactive constructions

load shape ▪ save shape

break sizes

raster

+/-magnet ▪ +/-ruler

+/- comments ▪ +/-options ▪
+/-values
+/-measurements ▪ set measure-
ments

+/-compare ▪ set compare

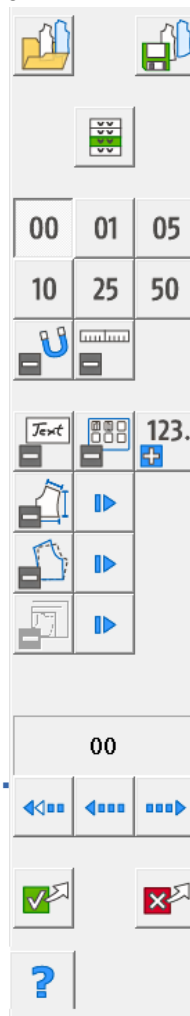
+/-stack ▪ set stack

alteration steps

original state ▪ undo alteration step ▪
redo alteration step

end ▪ abort

help for construction

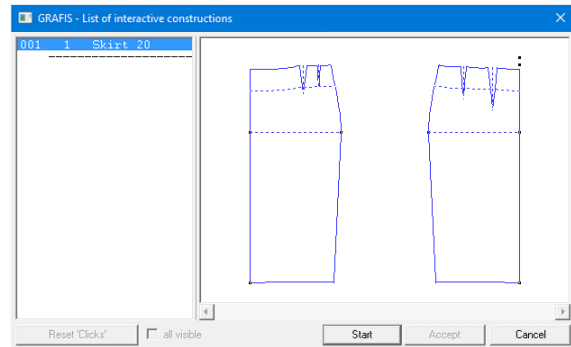


Activate construction

All constructions loaded into the style can be activated with either

- double-click on the respective construction or
- <F12> in the list of interactive constructions (Picture 2-9).
- right click to the contour and selection in the context menu.

The list of interactive constructions (Picture 2-9) contains all constructions called into the style and the number of the part into which they were called. They are listed according to part numbers.



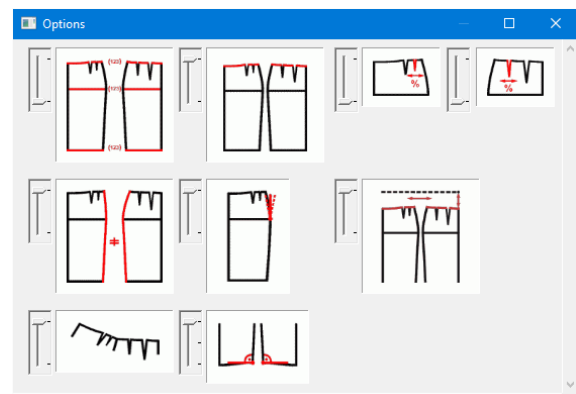
Picture 2-9

The window on the right contains a preview of the selected construction. A construction is activated with double-click or selection and *Start*.

Set options

After having activated a construction the menu for interactive constructions appears.

There are a greater or smaller number of options available for each construction. The list of options (Picture 2-10) opens by switching to *+options* in the right menu.



Picture 2-10

The options window can be resized as required. A scroll bar appears at the edge of the window if not all options are visible. The active option is highlighted (Picture 2-10 top left). Using the arrow keys, the mouse wheel or altering the slider to the left of the image alters the active option. A different option is selected by clicking.

The alteration of an option is immediately applied to the construction behind. We recommend working with a reduced option window so that you can follow the alterations to the construction.

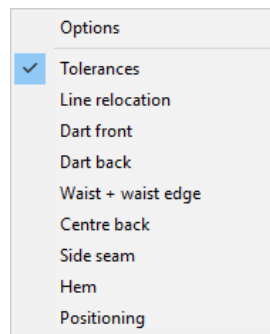
Exercise

Open a new style and call the basic block *Skirt 20* into part 001. Activate the construction. Set the following options (Picture 2-10):

- contour identical side seams
- adjust waist at side seam: yes
- link hem direction at side seam

Drag areas

Each construction has one or more drag areas. The drag areas are selected via the context menu which opens with right mouse click. The drag areas were introduced to give greater control so that not too many points can be altered at the same time. After having activated an interactive construction the first drag area is active. It is indicated by a tick mark in the context menu (Picture 2-11).



Picture 2-11

Drag points

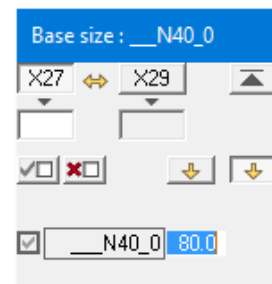
In the drag area small red points appear at the construction. With these so-called drag points the construction can be altered interactively. Close to a drag point a symbol at the cursor indicates how this drag point can alter the construction. The following symbols may appear:

	The drag point is moved ...
	free
	in x direction only
	in y direction only
	free, symmetrical
	in x direction only, symmetrical
	in y direction only, symmetrical
	free, asymmetrical
	in x direction only, asymmetrical
	in y direction only, asymmetrical
	The curve is altered ...
	free
	symmetrical
	asymmetrical

	The angle is altered ...
	free
	symmetrical
	asymmetrical
	The point slides along a line.

A drag point is activated by clicking. The point additionally marked with a green rectangle is the **active drag point**.

The **value window** (Picture 2-12) contains the values for the active drag point. Only one or two size-dependent values can exist per drag point. Two values exist only if the point with cursor can be moved free in x and y direction.



Picture 2-12

Dragging a point

Each drag point can be altered

- interactively by dragging the point or
- by entering a value directly into the value window.

When dragging a point interactively the **raster** can be switched on. Click on one of the numbers 00 01 05 10 25 25 in the menu on the right. The value attached to the drag point behaves according to the selected raster. To deactivate the raster set it to 00.

With **+values** the value is displayed at the cursor during dragging.



Switch to **+compare** to show a comparison with the state of alteration at the last click of **set comparison** or the original state.



By clicking <= or >= you can **undo alteration steps** or **redo** them. The state '00' corresponds with the original state



Save/ load shape

Clicking **save shape** saves the current adjustments of the construction as a shape. Clicking



load shape opens the list of available shapes for the construction. Shapes are saved with date, time, computer name and user name. Double-click opens a different shape from the list.

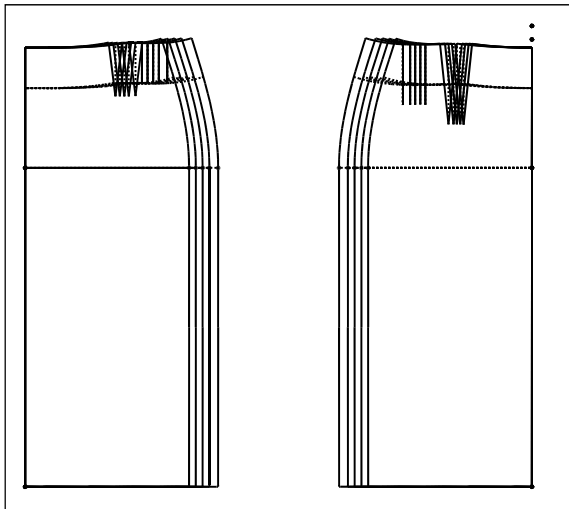
Exercise

Adjust the following on the prepared *Skirt 20*:

- the skirt length to 650mm in the *Line relocation* area
- close the 2nd dart in the *Dart front* area
- close the 2nd dart in the *Dart back* area
- the side seam adjustment to 0mm in the *Hem* area

Save the adjusted shape and the style as 'Straight skirt'. It will be the basis for exercises in the following chapters.

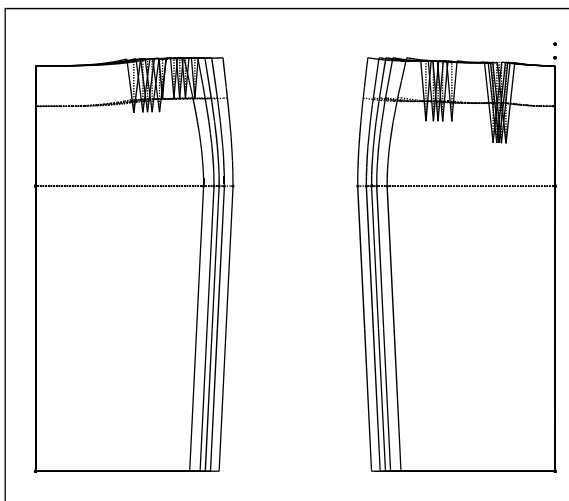
Grade the construction in the sizes N38 to N46. The result is shown in Picture 2-13.



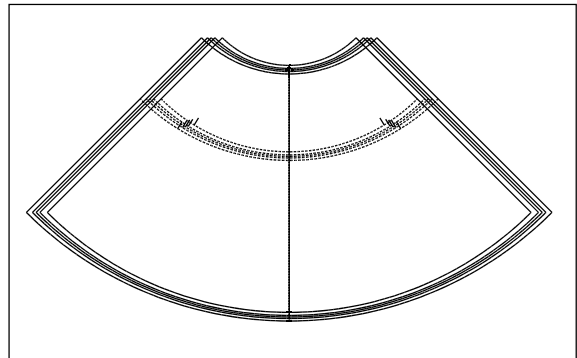
Picture 2-13

2.5 Exercises**1st Exercise**

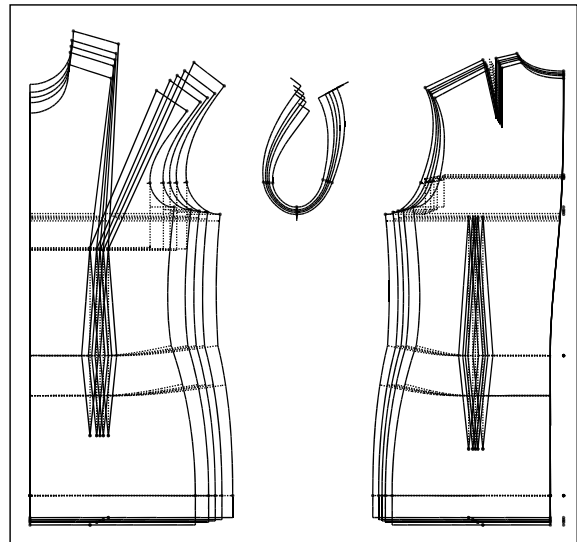
Grade the basic block *Skirt 20* in the sizes N38, N40, N42, N44 and N46.

**2nd Exercise**

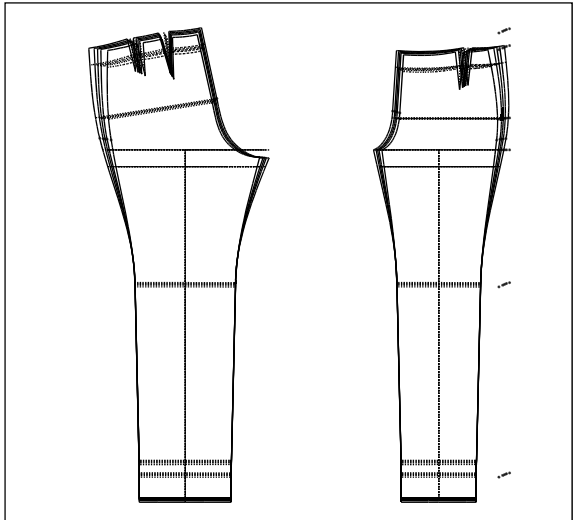
Grade the basic block *Skirt 10* in the sizes N38, N40, N42, N44 and N46.

**3rd Exercise**

Call the basic block *Bodice 10* and grade in the sizes N38, N40, N42, N44 and N46

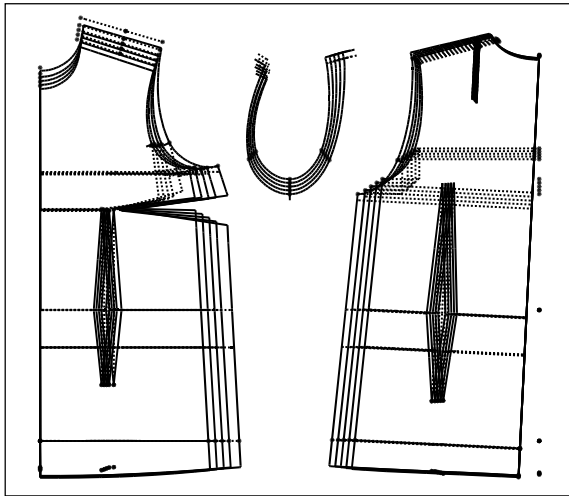
**4th Exercise**

Grade the basic block *Trouser 10* in the sizes N38, N40, N42, N44 and N46.



5th Exercise **'Shirt blouse'**

Open a new style, call the basic block *Bodice 10* into part 001 and activate it. Set the following options:



- centre back fold
- straight side seam
- bust dart in side seam
- link hem direction at side seam
- 4 segments

Adjust the following in the *Tolerance horizontal+vertical* area:

- tolerance at bust: 100mm
- tolerance at hip: 100mm
- tolerance at across bust: 15mm
- tolerance at across back: 15mm
- tolerance at shoulder width: 10mm

Adjust the following in the *Bust dart* area:

- loosen armhole by 20mm

Adjust the following in the *Shoulder dart* area:

- close shoulder dart

Adjust the following in the *Neckline* area:

- increase neckline by 5mm at shoulder, centre front and centre back

Adjust the following in the *Shoulder* area:

- relocate shoulder by 10mm to the front

Save the adjusted shape and the style as 'Shirt blouse'. It will be the basis for exercises in the following chapters.

6th Exercise **'Bodice with vertical panel seams'**

Open a new style, call the basic block *Bodice 10* into part 001 and activate it. Set the following options:

- centre back fold
- position shoulder dart as bust dart
- position waist dart back relative to waist
- length waist dart to hem
- link hem direction at side seam
- panel seam in the back: yes
- 8 segments

Adjust the following in the *Tolerance horizontal+vertical* area:

- tolerance at bust: 60mm
- tolerance at waist: 55mm
- tolerance at hip: 60mm
- tolerance at across bust: 10mm
- tolerance at across back: 10mm
- tolerance at shoulder width front/back: 10mm

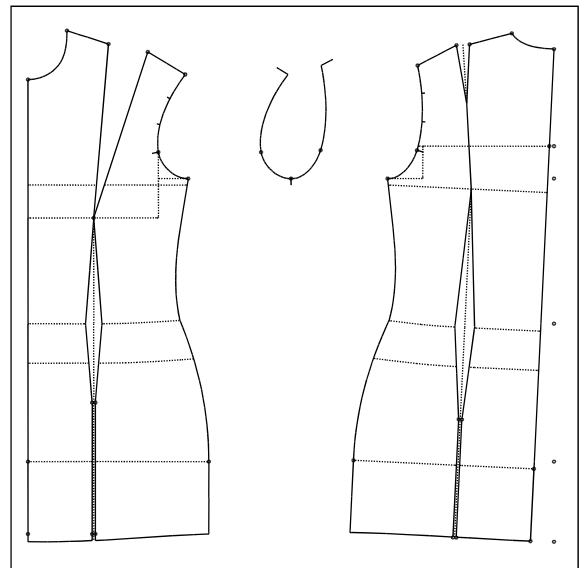
Adjust the following in the *Line relocation* area:

- length to 750mm

Adjust the following in the *Bust dart* area:

- position dart at 50% of shoulder seam
- loosen armhole: 5mm

Save the adjusted shape and the style as 'Bodice with vertical panel seams'. It will be the basis for exercises in the following chapters.

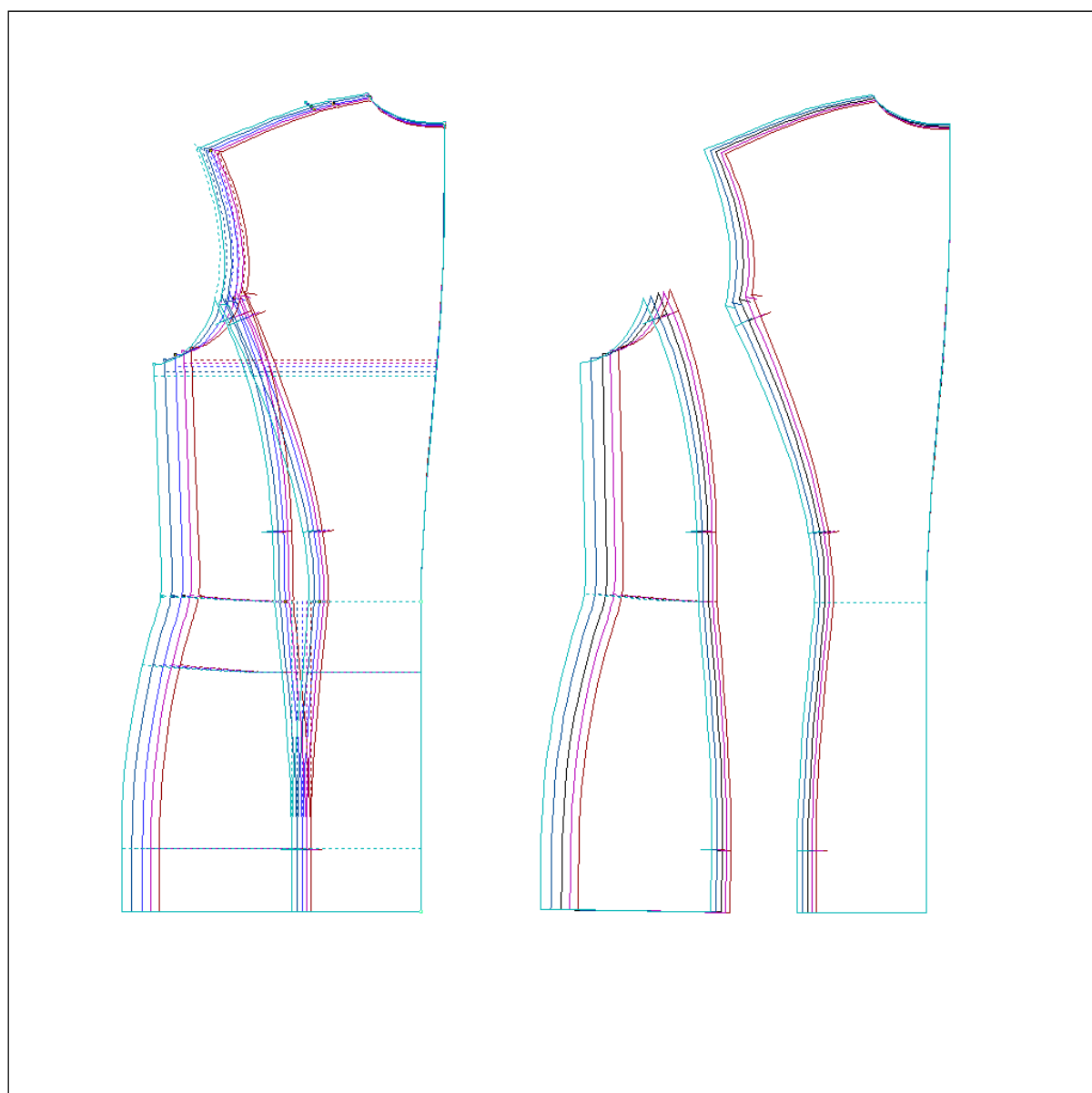


Chapter 3 Extracting pieces and pattern output

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3.1 Extracting pieces



Style development with Grafis ensues in three stages:

- Call and adjust the basic block
- Develop a draft with all required design elements
- Derive the production patterns such as front, back, waistband, facings, lining etc.

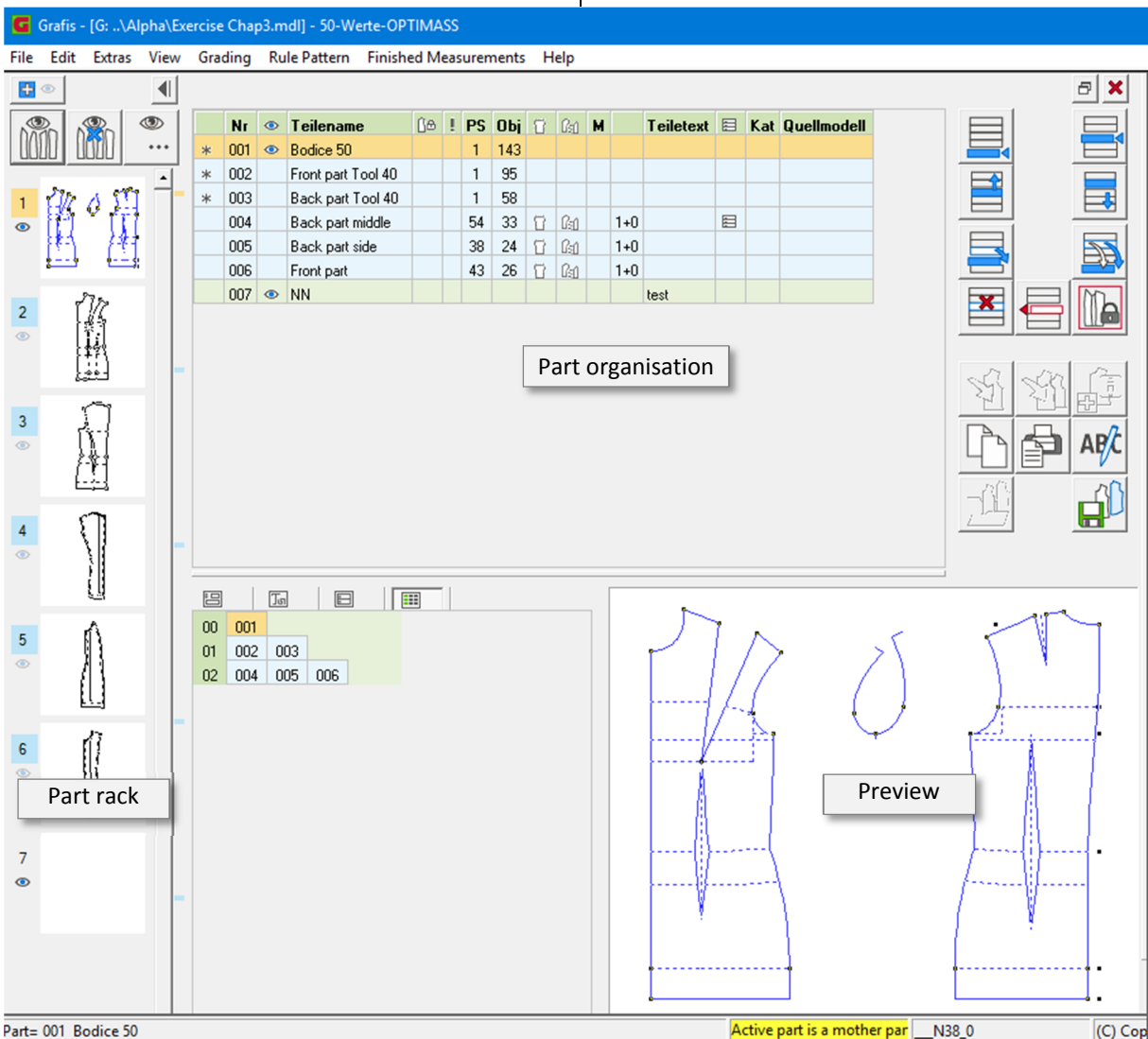
The parts from these developmental stages are connected so that alterations to the basic block are applied to the draft pattern and thus, to the production patterns.

This section initially deals with the extraction of pieces. More detailed explanation on part organisation and hereditary automatic can be found in Chapter 14.

Objects of up to 10 parts can be inserted into each part.

Step by step guide

- ⇒ Open *part organisation* via: *part rack* → Button or *basic menu* → *part organisation* or *Extras* → *Part organisation....* (Picture 3-1)
- ⇒ Create new parts with *open new part*
- ⇒ Enter/Edit the name of the selected part with *edit part name* or after double-click on the part name
- ⇒ Click to activate the part into which objects (points, lines) are to be inserted. The active part is highlighted in colour.
- ⇒ Show part(s) from which lines and objects are to be inserted into the active part and remove all other parts.
- ⇒ Quit the *part organisation* dialogue with
- ⇒ *Basicmenu* → *insert*

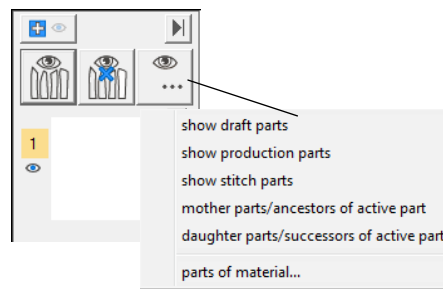


Picture 3-1


Part rack menu (extract)

Show invisible parts ▪ open part organisation
show all parts ▪ hide all parts ▪ show parts ...

1st part active and visible



Double-click on the first part and enter the name 'Bodice 50'. Name the second part 'Front 40' and the third part 'Back 40' in the same way. To label the other parts use a function from the menu on the right.


- ⇒ Select the type of object to be inserted by activating *points*, *lines* or *parts* below *select object*:
- ⇒ Click objects in the inactive parts displayed in black on white screen.
The inserted objects appear in a different colour (red) and, after having pressed <F5> removed from the donor part.
- ⇒ Click on *without transformation* inserts the objects into the active part. Only then, will the inserted objects appear in the blue colour of the active part and can be modified.
- ⇒ Press  to return to the basic menu.


Open and label parts

Create a new style 'Jacket', call *Bodice 50* and click on *part organisation* in the menu on the right. The dialogue *part organisation* shown in Picture 3-1 opens. Initially, only part 001 with the temporary name 'NN' is available. By clicking on **open new part** in the menu on the right you can create further parts in this list. The active part is highlighted and a preview of the part appears below in the window. Open seven further parts.

First, select part 004 and then, click on **edit part name** and enter the texts one after the other according to Picture 3-1. As opposed to editing with double-click, the line of text for the next part opens automatically after pressing <ENTER>. Abort text entry with <ESC>. Parts can be deleted or removed from this list with the functions *delete* and *remove*. *Delete* means that all record steps are reset; *remove* means the part is removed from the list.

The part list also contains other important information. The character '*' in front of the part number indicates that this part is a mother part. A **mother part** has successor parts that are affected by alterations to the mother part. Further information can be found in Chapter 14.



The icon  signifies that the respective part is visible on the screen. Clicking this symbol in the part list or the part rack toggles between the part being visible or not visible. The active part, selected by the bar, is always visible. You can switch **all parts invisible** by clicking on *hide all*. You can make **all parts visible** by clicking on *show all*. Removed parts are no longer visible on screen but have not been deleted.

To **quit** the *part organisation* click the right mouse button  or click on a function of the basic menu. The selected part is then available for editing. If the

respective part is a mother part, a warning message appears in the status bar at the bottom of the screen.

During construction the active part is always displayed in blue on a white screen.

In the basic menu all visible parts can be activated by clicking. It is not necessary to open the part organisation menu to activate a part!

Now select part 002 'front part 40', mark part 001 'Bodice 50' with '' for visible and quit part organisation with . You are back in the basic menu. The basic block is visible but displayed in black.

Partorganisation menu (extract)

Lock/ unlock window ▪ close

open new part ▪ insert part

move part up ▪ move part down

duplicate part ▪ duplicate part to...

delete part ▪ remove part ▪ reduce part

call all ▪ hide all ▪ call production pieces▪ call part ...

insert reference ▪ update reference ▪ +/-part information

copy ▪ print ▪ text

call module ▪ save module



Call the construction *Front part 40* from the call list under *Grafis-Bodices* → *Womens bodices* → *Front part tools*.

The front and back part tools can either be bound onto *Bodice 10, 50, 60, 70* or onto *Bodice 80*. *Bodice 50* has already been called into part 001. Now, the *Back part 40* is to be called into part 003 and also to be linked to *Bodice 50*. Activate part 003 in the part list and leave part 001 visible. Call the construction *Back part 40* from the call list under *Grafis-Bodices* → *Womens bodices* → *Back part tools* and bind it onto *Bodice 50* with a single line click, also. In the following section, lines and points from part 003 'back part 40' are inserted into part 004. Activate part 004 in the *part rack*, switch part 001 to invisible and parts 002 and 003 to visible.

Insert objects/ extract objects from another part

The following important rules apply when inserting objects:

1. To insert an object the part into which the objects are to be inserted must be active.
2. The part from which objects are to be extracted must be visible on screen but inactive.
3. Objects can only be inserted from parts with a lower part number into parts with a higher part number.

Insert menu

Insert objects

points ▪ lines ▪ parts

reset single ▪ reset all

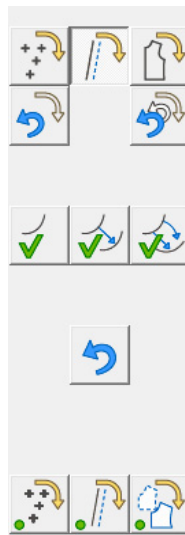
deposit objects

without transformation ▪ move ▪ turn and move

reset

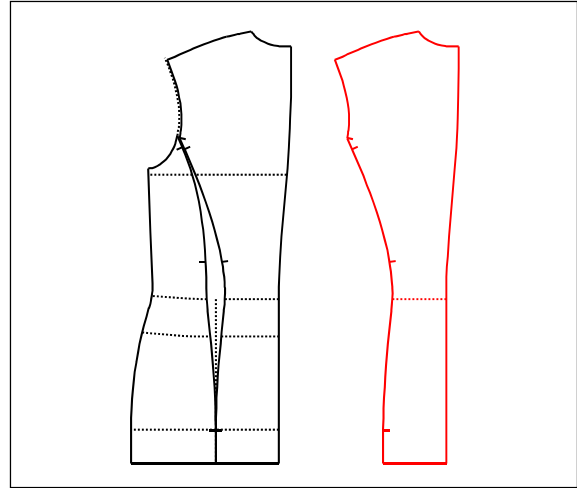
Tools Insert

points ▪ lines ▪ part




Open the insert menu by clicking onto *insert* in the menu on the right.

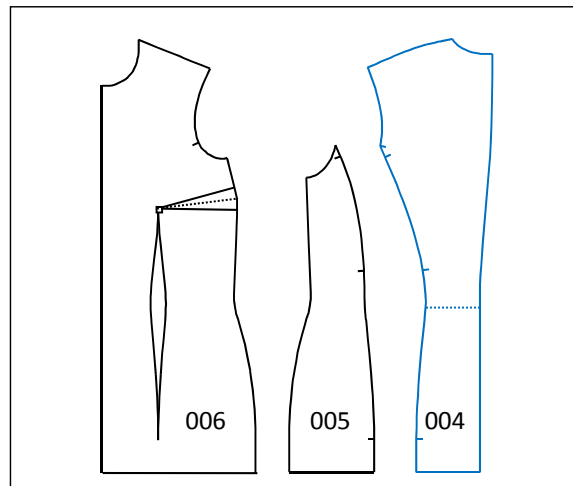
Activate the object type *lines* by clicking. Now click the lines required for finishing the back pattern (Picture 3-2). The clicked lines appear red or purple and are positioned to the side of the donor part after pressing <F5>.



Picture 3-2

The <F5> key arranges all visible parts of a style in a rectangle.

Then, swap to the object type 'points' by clicking on *points* and insert also any other points required. The selected objects are inserted after clicking *without transformation* in the *deposit objects* section. Quit the insert menu with .



Picture 3-3

Continue with parts 005 and 006 in the same way (Picture 3-3). Activate the next part in the part list, hide part 004 'back centre', keep parts 002 and 003 visible and so on.

In the basic menu the following applies:



- **clicking an inactive part** → **activates this part**
- **dragging an inactive part** → **removes this part to the background memory.**

3.2 When help is needed

Overview

- ⇒ Constant help in the instructions window or the status line (Picture 3-4)
- ⇒ Context related help via the <F1>-key or via the pull-down menu *Help* → *context*.

Constant help

Constant help is given in the instructions window or the status line where the next steps required are explained. The instructions window is located in the top right corner of the working area. The status line makes up the lower border of the Grafis screen (see Picture 3-4). Click *transformation*  in the basic menu. Read the instructions and close the *transformation* menu with .

Context related help

Context related help can be found by pressing the <F1>-key or via the pull-down menu *Help* → *Context*. The relevant textbook chapter opens.

All contents of the help function can be obtained with *Help* → *Help topics*.

Exercise

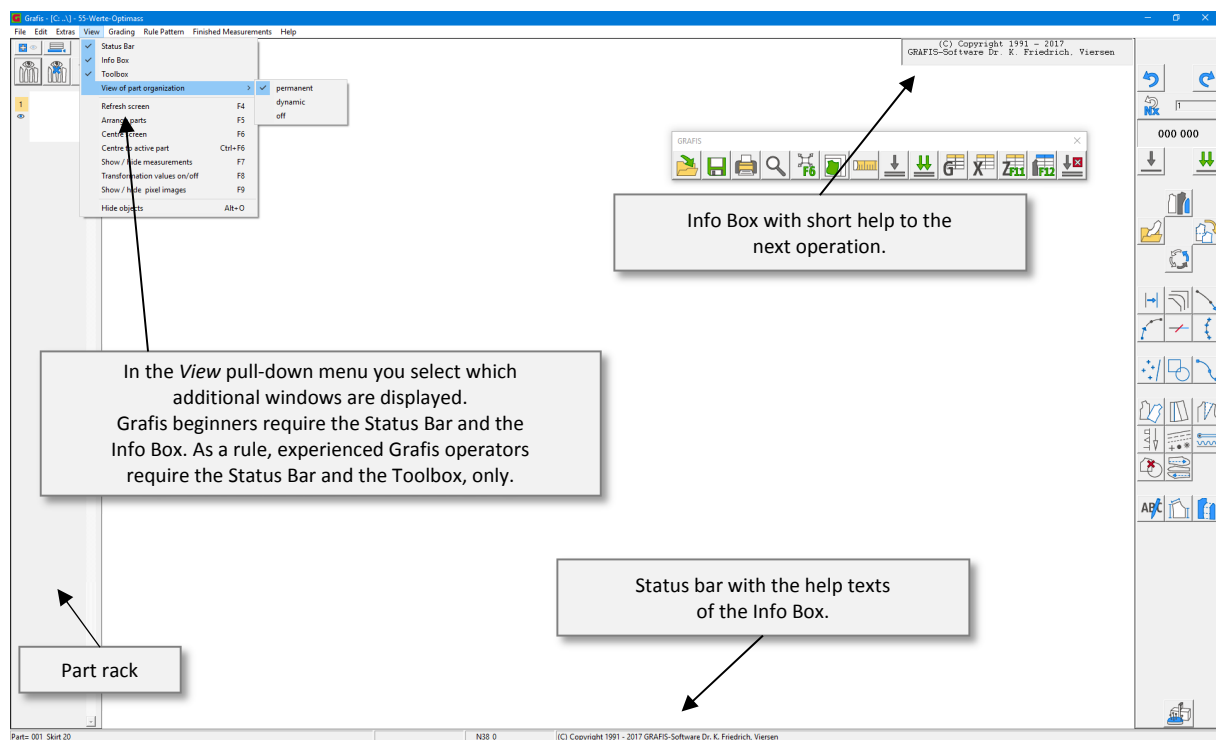
Open the *delete* menu in Grafis by clicking on *delete* in the basic menu. Press <F1>. The textbook chapter on the subject Delete opens.

3.3 Pattern output

Clipboard



Grafis supports the Windows clipboard for processing patterns in other Windows applications. The function *Copy (clipboard)* in the *Edit* pull-down menu copies the visible contents of the Grafis screen to the clipboard. The contents of the clipboard can be inserted into other Windows applications such as Word, Paint or Excel to create further material about the style or teaching material for example. Grade a basic block in 5 sizes, centre with <F6> and copy the graded nest to the clipboard via *Edit* → *Copy (clipboard)*. Now start a different Windows application (e.g. Paint) and insert the contents of the clipboard into this application. Process the graded nest by changing the line colour, fill in the shapes or add annotation for example.



Picture 3-4

Output to plotter/printer



Output of patterns to plotters (drawing devices) or printers ensues via the *Plot/Print* menu. A special feature of the pattern output function in Grafis is the automatic wrap. It allows for quick output of full size patterns to small scale printers by dividing the pattern into partial pictures which can be joined subsequently.

The *Plot/Print* menu is opened via the *File* → *Plot/Print...* pull-down menu or from the toolbox.

Plot/Print menu

printer/ plotter setup

enlargement

adapt enlargement

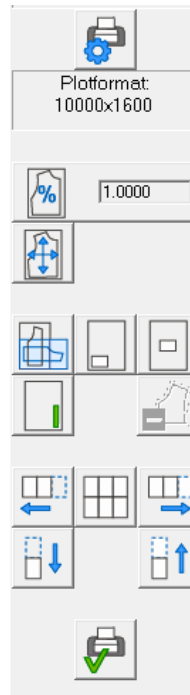
portrait/landscape ▪ place frame ▪
centre frame

text position ▪ +/- seam allowance

horizontal wrap ▪ automatic wrap

vertical wrap

start output



Preparation of plot picture

- ⇒ Set up or change the plotter/printer (plotter type, paper format,...)
- ⇒ Click *centre frame* and press <F6> to get an overview
- ⇒ Adjust the following settings:
 - portrait or landscape
 - plot scale with *enlargement*
 - activate the automatic wrap
 - position the plot frame with *align/centre* and/or dragging
- ⇒ Position the frame text

Output of plot picture

- ⇒ *Start output* (plot picture is generated internally)

Change plotter/printer

The selected output device is displayed under *plot device*. The extensions mean:

to LPT1 to File

direct output to the parallel port LPT1
a file with control information for the output device is generated

(WIN) (DOS)

output to a device with Windows driver
output to a device without Windows driver

(Winspool) The control information is sent to a device attached to the USB port. The Windows driver is used to spool the vector data to the device. Please note that not every driver can perform this function.

For the following exercises, a Windows-installed A4 printer is sufficient. Further information can be found in the Appendix of the Grafis help function.

The plot format

The measurements of the active format are displayed in millimetres under *plotformat*. The other plot formats of your output device can be adjusted via the *Plotter/Printer Setup*.

The plot frame on your screen corresponds with the printable area of your output device. The content of the plot frame is printed. Press the <F6>-key to display the plot frame as well as the plot picture.

Selection of portrait or landscape

Clicking *portrait/ landscape* toggles between portrait and landscape.

Selection of plot scale

The plot scale is adjusted by entering the scale factor in the *enlargement* line. The pattern will be reduced/enlarged for output according to this scale. The scale factors mean the following:

1.0 scale 1:1
0.5 scale 1:2
0.25 scale 1:4 etc.

Adjust to scale 1:2 by entering 0.5 into the field below *enlargement* (click, type, <ENTER>) and press the <F6>-key. You will notice that the plot frame now covers a greater area of the pattern. Repeat with other scales. Change also between portrait and landscape.

The **adapt** option adjusts the scale so that the whole screen content fits the plot frame. Use this option only for scaled printouts and sketches as it alters the scale!

The scale can also be entered in the *Plot file* dialogue, which is accessed via *plot device change*.

Position the plot frame

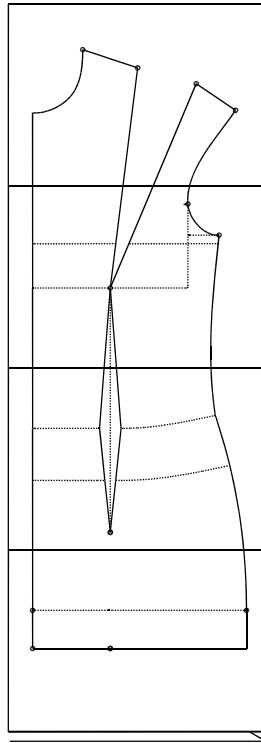
Positioning the plot frame ensues either by dragging (cursor on plot frame, press left mouse button and move mouse) or via clicking on the menu functions *align* or *centre*. Practise these options! *Align* always positions the pattern at the lower right edge of the frame, optimised for plot output.

Centre positions the plot frame centred over the plot image. Use *align* for full-scale plots and *centre* for scaled output in A4. Practise positioning the plot frame in conjunction with format and scale changes.

Activating automatic wrap

The automatic wrap is useful for output of full size patterns to devices with small format, i.e. A4 printers. A raster is superimposed onto the pattern (Picture 3-5 and Picture 3-6) and each field is output separately. The partial pictures can then be joined together frame by frame. The raster is generated or eliminated by clicking *horizontal wrap* or *vertical wrap*. *Automatic wrap* adjusts the number of raster so that the complete pattern lies within the raster.

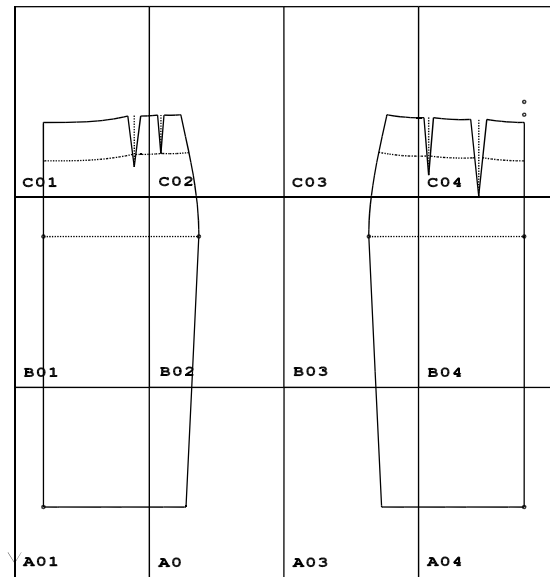
Practise the automatic wrap in conjunction with adjustment of plot scale, portrait/landscape and positioning of the plot frame. Apply scale 1:1 also and press the <F6>-key from time to time.



Picture 3-5

Positioning the frame text

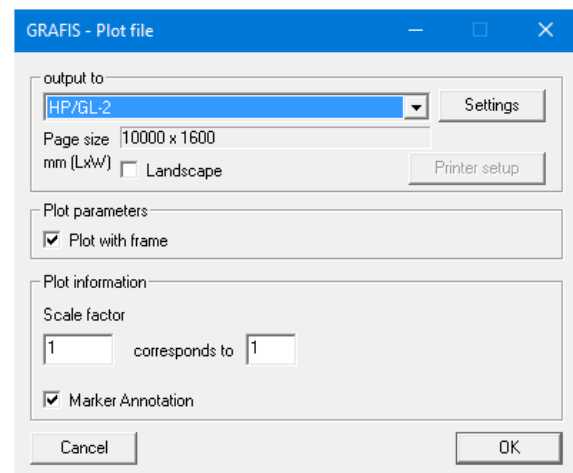
A standard annotation at the plot frame can be output with the picture for easy identification of the plot, especially on partial pictures when using automatic wrap. It contains collection and style name, part number and field co-ordinates (Picture 3-6). By clicking on *text position* the text is positioned at the left, right, upper or lower edge of the plot frame or it is not visible. Position the text at the left plot frame.



Picture 3-6

Select with/ without plot frame

Clicking on *printer/plotter setup* opens a dialogue with further plot options (Picture 3-7). Activating *plot with frame* outputs the frame on the plot. This option should be active for output with wrap.



Picture 3-7

Detailed information on the *Settings* and *Print options* dialogues including details on how to set up plotters/ printers can be found in the appendix.

Output of plot picture

Clicking on **start output** transmits the control information directly to the attached output device (printer/plotter) for output as an image or in partial images. Naturally, the output device must be on-line.

Output to file

Output to file is required if your plots

- are to be output onto a plotter not directly attached to your computer and not accessible via a network or
- are to be transferred into a text or drawing software as HPGL files.

Plot to file is only possible for printer/plotters without windows driver. If the target for the *plot device* in the menu on the right is not yet displayed as to *File:*, open the *Grafis – Plot file* dialogue via *printer/plotter setup*. Select the plotter, click on *Settings*, activate the *Edit* button, set the option *connected to* to *FILE* and accept the settings. To generate HPGL data select the *HPGL-2* plotter.

If output to file is active, the control information is saved in one or more files (for automatic wrap). After initiating *start output*, you are requested to enter a file name.

Grafis is not required for output of plot files to a plotter inland or abroad. It is important that the control information was generated especially for this plotter. For example, plot files generated with the 'Algotex (to FILE)' setting can only be read by an Algotex plotter.

To transfer the file to the plotter click on *Start / Run...* and enter

```
copy C:\test.plt com2:
```

in the *Open* dialogue.

C:\test.plt must be the complete path to the plot file including the name of the plot file. com2: must be the port to which the plotter is connected. The copy command cannot be used for output to USB ports.

Exercises

1st Exercise

Output the basic block *Skirt 20* in size 40 in full scale to an A4-printer. Use *+frame* and frame text to be able to join the partial pictures frame by frame afterwards.

2nd Exercise

Output the following basic blocks onto A4 paper:

- *Trouser 10* in scale 1:2
- *Bodice 10* in scale 1:3
- *Bodice 20* in scale 1:5

If you know how to use Word for Windows or Corel-Draw, import the plot pictures into these systems via the clipboard for processing.

3.4 Stack



The *stack* menu

The *stack* menu is opened via the *Extras* → *Stack* pull-down menu or from the toolbox. With the functions of this menu, the graded stack of a part can be stacked at a construction point or the point of a line. The **outlay** function spreads all sizes next to one another in the order in which they are listed in the size table. The outlay is reset with repeated stacking or *test run*.

Stack menu

stack point

direction point

set recorded stack point

delete recorded stack point

outlay



Step-by-step guide




Stack at a construction point or point of a line:

- ⇒ Select *stack point* and click the stack point in the construction
- ⇒ If required: determine direction point in the same way

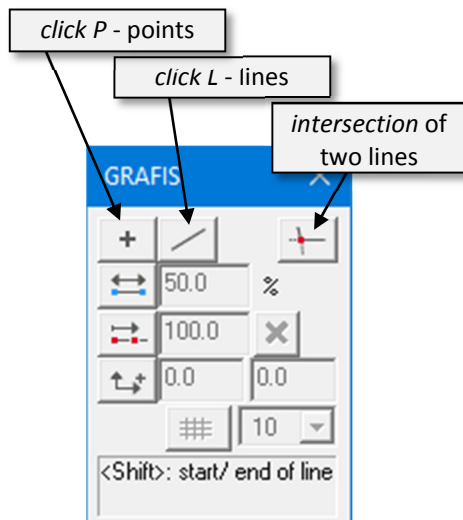
Set stack point

Having selected *stack point* opens the sub-menu point construction, which is explained in detail in Chapter 6. To learn about the stack function, only the options shown in Picture 3-8 of this sub-menu will be explored.

With the option

-  (**click p**) of the point construction, the cursor can select only points of the construction as stack points,
-  (**click l**) of the point construction, only lines can be clicked,
- **click l and <Shift>** you can select the starting point or the end point of a line,
-  (**intersection**) of the point construction, the intersection of two lines is set as the stack point by clicking the two lines one after the other.

- The most used option is **free mode**. In the *free mode*, **no** button of the point construction menu is pushed in. This mode is a combination of *click p*, *click l*, *click l* and **<Shift>**.

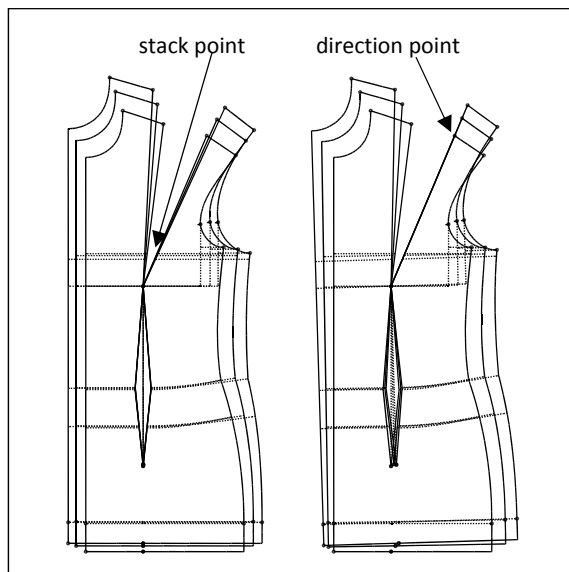


Picture 3-8

To stack a graded part first, activate *set stack point*, select a suitable option from the sub-menu point construction and then, click the required stack point of the construction, see Picture 3-9 left.

Set direction point

Having stacked a part at a particular point, a direction point can be determined. The patterns remain stacked at the stack point. The sizes of the part are rotated about the stack point so that the direction from stack point to direction point is identical in all sizes, see Picture 3-9 right.



Picture 3-9

Recorded stack point

With the function *Set recorded stack point* a point can be selected as the stack point for the active part. Stacking always ensues at the end of the grade run. Activating *Delete recorded stack point* displays the current stack point. Clicking deletes it.

Exercise

Grade the basic block *Bodice 10* in the sizes *_N36* to *_N48* and stack the part:

- with *click p* at the bust point,
- with *click l* and **<Shift>** at the upper end of the centre front,
- with *intersection* at the centre front at bust line level,
- in *free mode* at the sleeve pitch and then, again at the bust point.

Align the piece at the right bust dart line. Then, stack it at the shoulder/armhole corner and align it in relation to the front pitch.

3.5 Drag, rotate, flip parts



<F3> or the pull-down menu *Edit* → *Drag/rotate parts* opens the *drag/rotate* menu. Here, parts can be dragged, rotated or flipped to one another. Rolling parts, explained in the following section 3.6, is also controlled via this menu

The part to be moved is to be clicked. A drag cursor in form of a crosshair with circle appears offering the following functions:

Drag

Click inside the circle and drag with the left mouse button pressed down.

Rotate

Click outside the circle and rotate with the left mouse button pressed down.

Flip (mirror)

Click the symmetry axis about which the part is to be flipped (mirrored).

Additional functions

After having clicked on a part, the following functions are also available:

Scale

Adjust the display scale by clicking

- | | |
|---------|-------------------------------|
| 1 : 0.2 | for 5 times enlargement |
| 1 : 1 | for scale 1:1 (original size) |
| 1 : 3 | for 1/3 scale |
| 1 : 5 | for 1/5 scale |
| 1 : 10 | for 1/10 scale |

The current scale is indicated immediately below this button.

NB: The function keys **<F2>**, **<F4>** and **<F6>** are still active.

Drag/Rotate menu <F3>

drag/rotate activate ▀
 set drag cursor ▀
 set drag cursor to point

roll see section 3.6

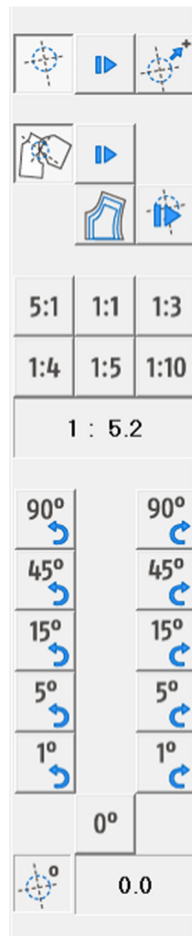
select scale

current scale

rotate part

nil the direction of the part

current direction of the part

**Direction**

Rotating the drag cursor in degrees by clicking the relevant button in the *rotate part* section. The current rotation is indicated immediately below this button.

Nil rotation of the part

Reset the rotation of the part to nil.

Set drag cursor

The drag cursor can be reset with the sub-menu point construction, see explanation in the previous section.

Set drag cursor to point

The part is moved to a constructed point of another part with the drag cursor.

Drag another part

After pressing the drag cursor can be moved quickly to another part and dragged immediately.

End

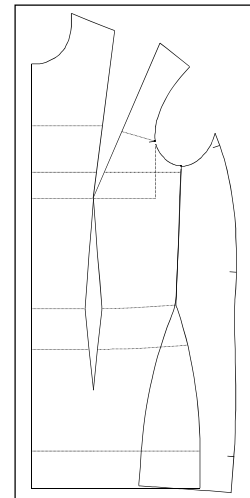
Dragging is terminated with 2x .

The <F8> function key switches between 'parts in original (construction) position' and 'parts in transformed working position'.

Exercise

Place parts 001 and 004 from the exercise in section 3.1 together at the armhole/ side seam corner and rotate one of the parts so that you can check the continuation of the armhole (Picture 3-10). Move, rotate and flip other parts also. Quit the *drag/rotate* menu with .

Press also the <F8> key. The parts have now been returned to their original position. Pressing <F8> again shows the parts as previously positioned. With <F5> all parts are arranged in a rectangle. Now press <F8> again.



Picture 3-10

3.6 Rolling Parts

Roll parts along one another can also be found in the *drag/rotate* menu, accessed via the <F3> key or via the pull-down menu *Edit* → *Move parts*, see section 3.5.

Roll parts in Drag/rotate menu <F3>

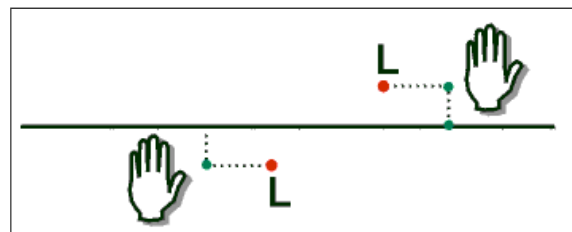
drag/rotate see section 3.5 ▀

activate roll ▀ set roll

select size for roll ▀
 set new start point for roll

**The Right principle**

With the right principle not only the objects are determined when clicking the line/curve but a direction in which the object is to be used for the instructed construction.





Picture 3-11

Grafis supports the operator with the so-called 'right principle cursor' which also contains a direction indicator, see Picture 3-11.

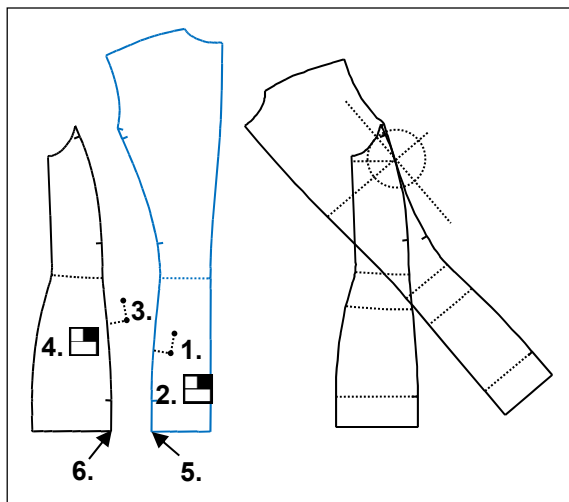
Set roll

Step-by-step guide:

- ⇒ Select *set roll* from the menu
- ⇒ Click one or more roll lines in the part to be moved. The roll direction must be considered and communicated to the system with the help of the right principle.
- ⇒  terminates line selection in the part to be moved.
- ⇒ Click one or more roll lines in the part to remain stationary. Here, the roll direction must also be communicated.
- ⇒  terminates line selection in the stationary part.
- ⇒ Determine start point for rolling in the part to be moved.
- ⇒ Determine start point for rolling in the stationary part.

Exercise concerning roll

Roll the panel seams of parts 004 and 005 from the exercise in section 3.1 along another. Carry out the exercise according to the above step-by-step guide and consider the click succession in Picture 3-12.



Picture 3-12

Having correctly determined the roll lines and the start points, the drag cursor appears on part 004. Rolling ensues via dragging the drag cursor. Flip is possible even during rolling.

Adjust roll

With *set new start point for roll* new start points can be selected. Setting new start points is useful where ease has been included and the line sections are to be checked one after the other. In the example in Picture 3-12, set the two intersections with the waist lines as new start position for roll.

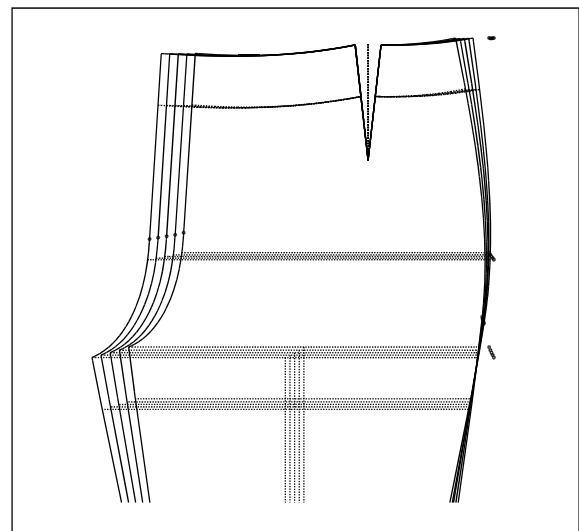
Roll ensues in the base size only. Occasionally, other sizes are to be checked as well as the base size. Activate *select size for roll*. All sizes in which both parts are available will be offered. Select a size and roll.

Switching to the drag mode from section 3.5 is possible via *activate drag/rotate*. Switching from the drag mode back to the last set roll mode is possible via *activate roll*.

3.7 Exercises

1st Exercise

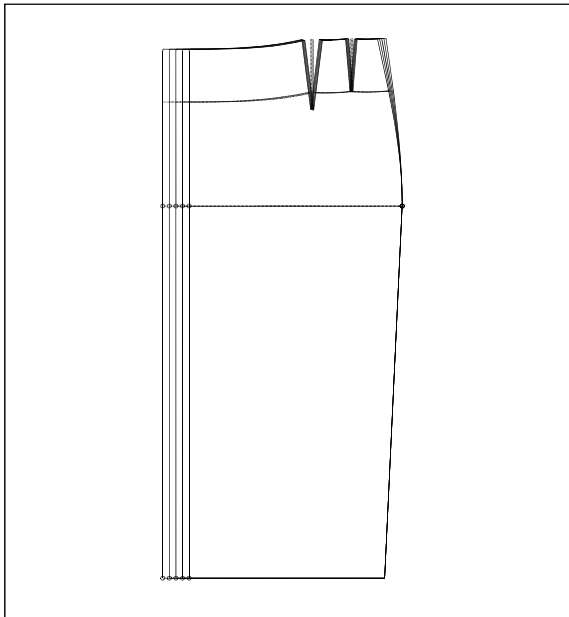
Grade the basic block *Trouser 10* in the sizes 38 to 46 and stack the pattern at the dart apex of the trouser front.



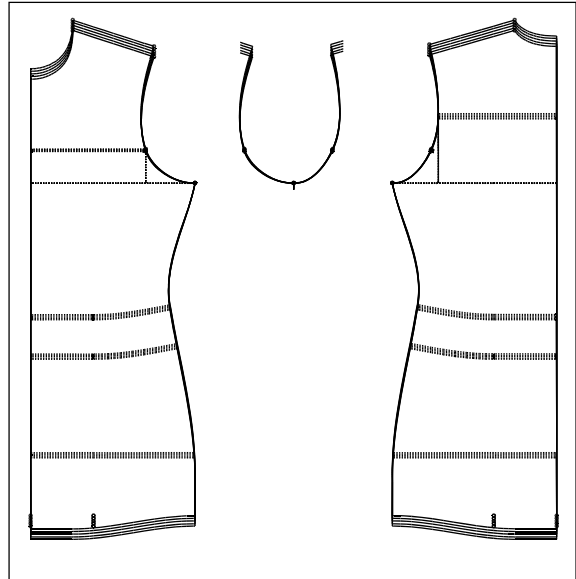
Print the shown trouser front full size onto A4.

2nd Exercise

Grade the basic block *Skirt 20* in the sizes 38 to 46 and stack at the hip point of the skirt front. Output the pattern onto A4 in reduced scale.

**3rd Exercise**

Grade the basic block *Bodice 20* in the sizes 38 to 46 and stack at the side seam / armhole corner point. Print the pattern in 1:4 scale onto A4 paper.



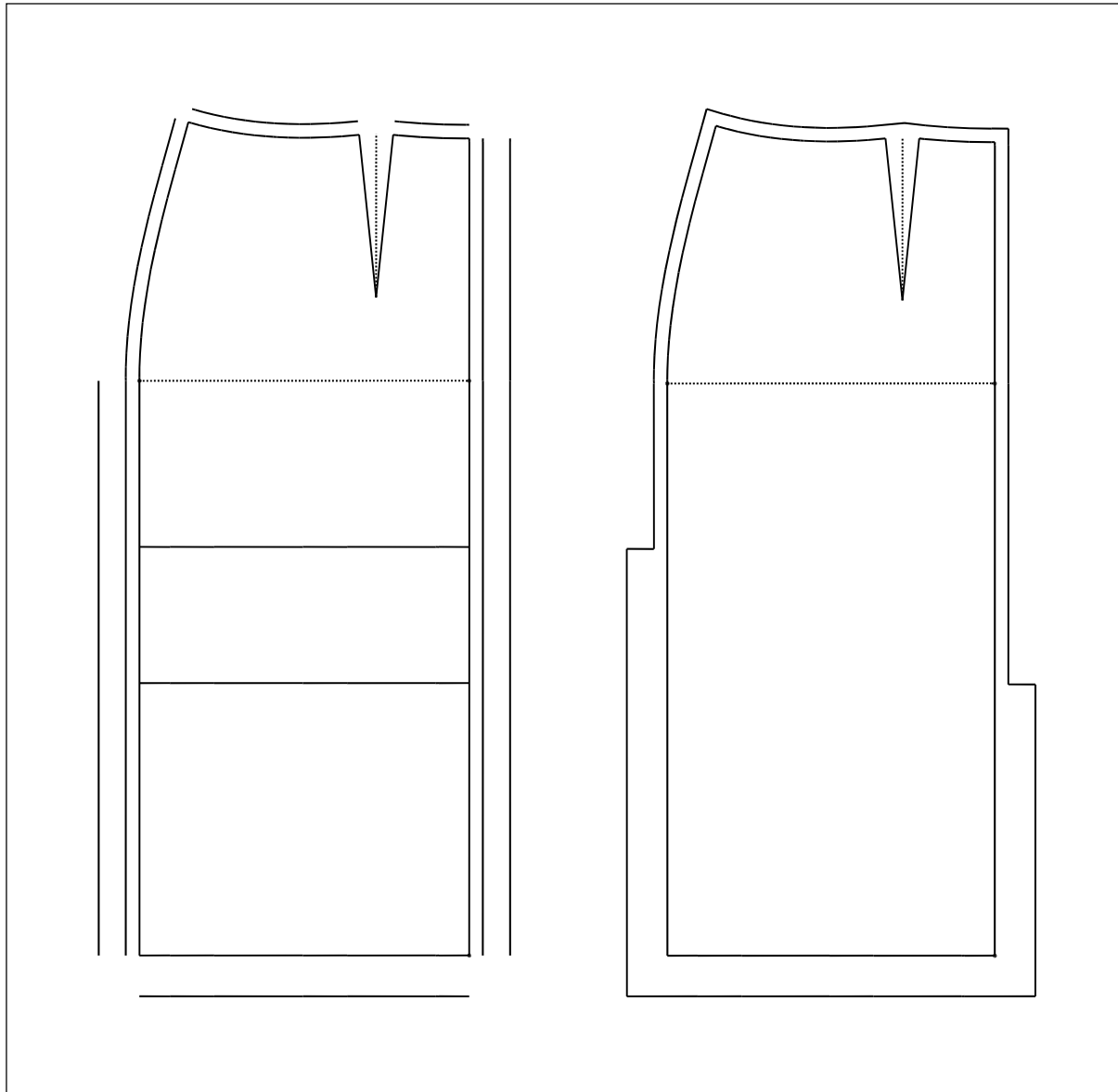
The basic block Bodice 20 is prepared for finished measurement construction. Only the vertical measurements are taken from the measurement charts. The horizontal measurements are adjusted interactively according to finished measurement lists. Further information on size-dependent adjustment of interactive constructions can be found in Chapter 13.

Chapter 4 Create and alter perimeter

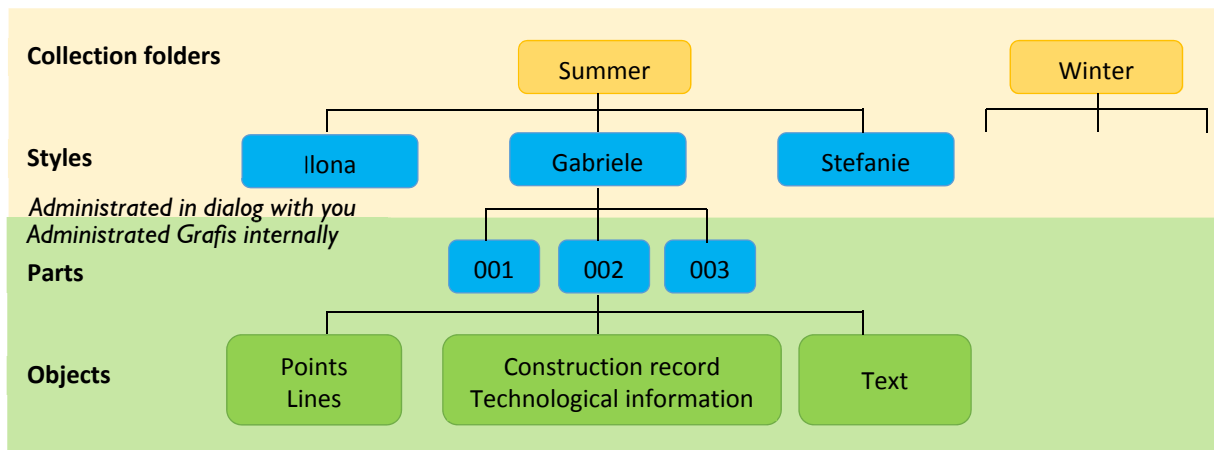
©Friedrich: Grafis – Textbook, Edition 2017

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4.1 The Grafis-data structure



Picture 4-1

The data structure

In Grafis construction data is organised according to collection folders, styles and parts (Picture 4-1). The number of folders and styles is unlimited. However, it is advisable to transfer styles no longer required to CD ROM or the network or to delete them.

It is important to know which styles are saved in which folder. Create an overview list for yourself.

Each style can contain up to 500 parts which will be named by Grafis with a 3-digit number. The parts consist of objects, e.g. points, lines and texts. The dialogue to open or delete styles opens automatically after having selected a measurement system or via *File* → *Open*.

4.2 The construction record

Purpose of the construction record

Grafis saves the construction and modification steps during pattern development in the base size by imperceptibly writing a record. The operator has the option of calling the construction record with other measurement charts and thus, creates a similar construction for these sizes. Incremental grading is omitted.

The construction record is similar to the notepad of an attentive student who notes down each of the teacher's steps and can then recreate the construction with different measurements.

Indication of record steps, test run

The number of recorded construction steps is constantly indicated in the basic menu in Grafis with two blocks of **record counters** containing three numbers respectively. The block on the right indicates the number of construction steps recorded so far. The

left group of numbers indicates the record step at which *test run* was last activated.

Test run starts the run through the construction record. It can also be run in a step-by-step mode. Immediately after having selected *test run* press the <S> key once. Pressing the space key shows the following construction steps one after the other. Press <S> again to quit the step-by-step mode.



Basic menu (extract)

Construction record of the active part...

reset ▀ restore

reset N steps

record counter

test run ▀ grading

Reset the construction record

The *reset* function resets the construction record by one step. If a larger number of reset steps is required, click on *reset N steps* and enter the number of steps to be reset. The construction record is automatically reset.

As soon as you detect a mistake in your construction, reset the construction record back to the error and resume construction without the mistake. Please do not try to 'patch up' your construction as following construction steps may be affected inadvertently. Correcting mistakes in time avoids errors during automatic construction (grading).

If you have reset too many steps, you can go back to the state before deleting the record steps with the function *restore*.

Exercise

Call the basic block *Skirt 20*, click on *reset*. The screen is empty as calling a basic block already counts as a construction step. You can now call a different basic block. This is the quickest way to view various basic blocks.

Call two more basic blocks, resetting the record by one step each time. All functions of the basic menu from call onwards are record functions. They are recorded internally in the system.

4.3 Geometrical basics

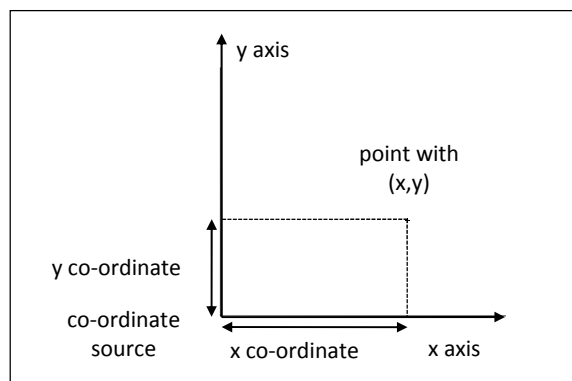
The co-ordinate system

The co-ordinate system is used for the description of point positions on a plain. In clothing construction the plain is comparable to the paper on which the pattern is designed.

All points on the plain relate to an agreed source (a starting point). The x and y axis run through this point in a right angle towards one another. Unless otherwise stated, the x axis runs horizontally, the y axis vertically (Picture 4-2).

X and y co-ordinates of a point

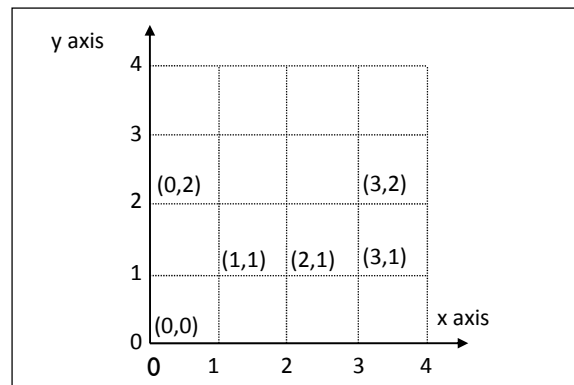
The position of a point is clearly defined by its distance to the x and y axis. The distance to the y axis is the x co-ordinate of the point, the distance to the x



Picture 4-2

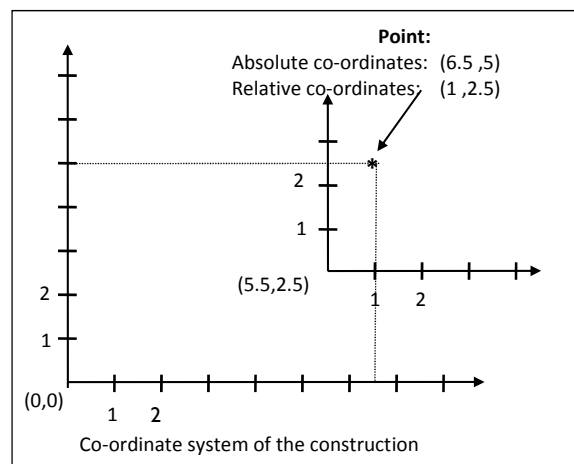
axis is the y co-ordinate of the point (see Picture 4-2). A minus in front of the x co-ordinate places the point to the left of the y axis. The y co-ordinate is negative if the point lies below the x axis. A point is clearly defined by stating (x,y) (Picture 4-2).

Picture 4-3 shows a few points and their respective co-ordinates.



Picture 4-3

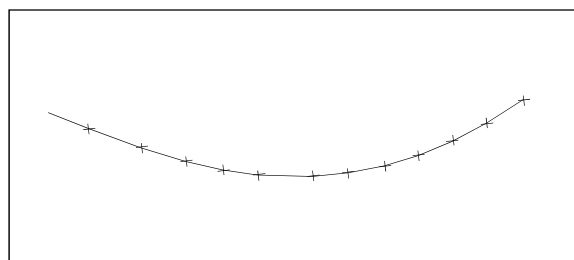
The position of a point can also be defined **relative** to another point in the construction. In Picture 4-4 the new point of reference is point (5.5,2.5). The absolute co-ordinates of the point result from its relative co-ordinates and the co-ordinates of the point of reference.



Picture 4-4

Polygon

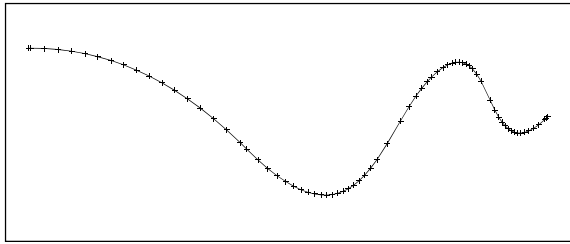
All lines, circle arcs and curves are displayed as polygons in Grafis. A polygon consists of a number of points connected by straight lines (Picture 4-5). As a rule, the fulcrums of the polygon are not visible.



Picture 4-5

With the function *raster0* (section 5.2) they can be made visible as points if necessary.

The fulcrums of a circle arc have the same distance between one another. The fulcrums of a curve are denser in the bends (Picture 4-6).

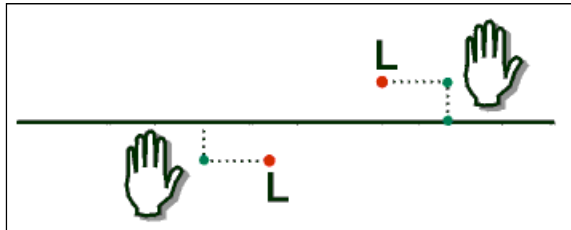


Picture 4-6

The right principle

For certain construction steps the beginning and end of a line have to be determined. The line receives a direction.

For this purpose the right principle was introduced. Grafis supports the operator with the so-called 'right principle cursor' which also contains the direction indicator (Picture 4-7).



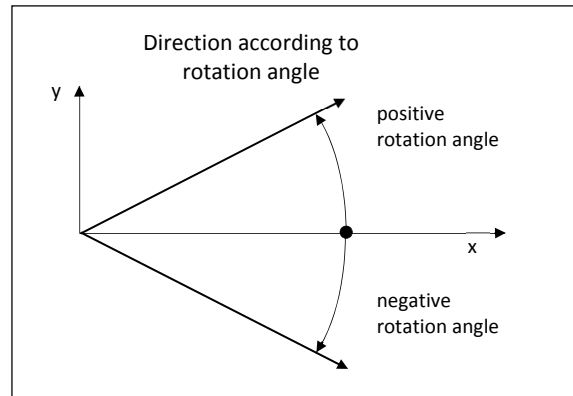
Picture 4-7

To illustrate the right principle imagine the line/curve to be clicked as the central reservation of a road. The required direction of travel is communicated to the system by clicking the line. This relates to driving on the right side of the road, only. The right principle and its application is explained in detail in the chapter 4.

Angle definition

Definition of angles is required for rotation transformations, determination of direction in certain curve points or construction of lines. The following rules apply (Picture 4-8):

1. The definition of angles ensues from the positive x axis - if no other reference is present. This agreement is important for definition of points through their distance to the source and their direction.
2. A positive rotation angle creates anti-clockwise rotation, a negative angle results in clockwise rotation.



Picture 4-8

4.4 Deleting objects



The delete menu

The *delete* menu is activated via *Basic menu* → *delete*. Single objects (points, lines/curves, texts) can be deleted by clicking; several objects within a rectangle to be drawn up can be deleted in one operation.

Delete menu

delete single...

points ▪ lines ▪ texts

delete inside rectangle...

points ▪ lines ▪ all

texts

delete inside rectangle...

notch symbols ▪ inner symbols ▪ seam lines

reset





Step-by-step guide

- ⇒ Activate the object type to be deleted under the required option (*delete single* or *delete inside rectangle*)
- ⇒ Click the objects or draw up rectangle

Delete single

To delete individual objects the type of objects under *delete single* is to be activated and the object to be deleted is to be clicked. This is the object nearest to the cursor, marked by a fine thread and coloration.

Delete inside rectangle

To delete several objects in one operation first, the type of object is to be selected under *delete inside rectangle*. All objects of this type **completely** lying within a rectangle to be drawn up will be deleted. The rectangle is drawn up by clicking  the corner of the area to be deleted, moving the mouse and clicking  the opposite corner.

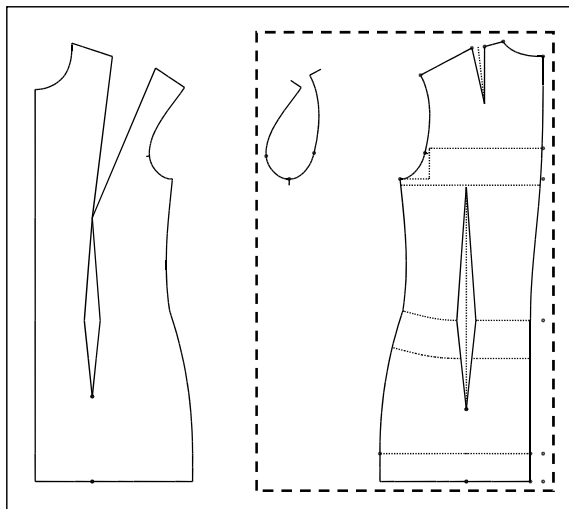
When deleting several objects the objects lying completely within the rectangle are deleted only!

With *reset* you can reset the last deletion step.


Please note that deleting is a construction step and will be performed automatically during *test run* or *grading*. Start both functions from the basic menu. One or more deletion steps can also be reset by re-setting the construction record.

Exercise on deleting

Call the basic block *Bodice 10* and delete all dashed lines and all points in the front individually.




Picture 4-9

Click  the point or the line to be deleted. A fine thread to the cursor indicates the nearest point. If a different point is deleted, the thread cursor did not indicate the point to be deleted. If a different object is deleted, a different type of object was active. To correct click *reset* and repeat deleting.

Delete all lines and points of the back and armhole with *delete inside rectangle: all*, see Picture 4-9.

Click a corner of the area and move the mouse. A rectangle opens that you can draw up as shown.

Click  and the points within the rectangle are deleted. If different points are deleted you opened the rectangle over a different area. To correct click *reset* and repeat the steps.

Exercises

1st Exercise

Call the basic block *Skirt 20* and delete

- all points in the skirt front
- reset
- all lines in the skirt back
- reset
- the complete skirt front
- reset
- the complete skirt back.

Reset the construction record to 000 in the basic menu.

2nd Exercise

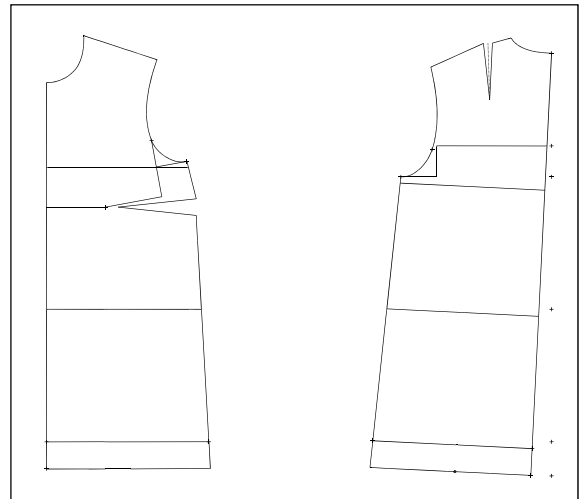
Call the basic block *Bodice 10* and delete the complete back. Centre the front with <F6> on the screen.

3rd Exercise

As opposed to the 2nd exercise, now delete the whole front and centre the back on screen.

4th Exercise

Call the style 'Shirt blouse' from Chapter 2 Section 2.5 (Picture 4-10) and delete individual lines and points. Then, reset the record and delete all lines of the front and all points of the back.



Picture 4-10

4.5 Parallels

4.5.1 Interactive tools and non-interactive functions

Up to Grafis Version 9, only **non-interactive menu functions**, in the following called 'functions', were available within the software. From Grafis Version 10, **new interactive tools** for the construction of parallels, raster, link and curves have been introduced.

The main differences are as follows:

- Point of entry of parameters
When using the functions, the required parameters, such as distance of a parallel or the number of raster points, must be entered first. Then, the relevant objects can be clicked. When working with interactive tools, the objects are clicked first and then, the parameters are adjusted interactively.
- Speed of processing
The functions are processed faster than the interactive tools during grading. This difference is markedly noticeable when grading curves using processors of less than 1GHz frequency. On faster computers, these differences are hardly obvious.
- Subsequent alterations
When working with functions, x values (see Chapter 11) can be introduced as parameters. Only with the application of x values can functions be altered subsequently. Tools, however, can be altered interactively by double-clicking on the relevant objects or via the <F12> list at any time.
- Listing in the <F12> list of constructions
All tools are listed in the <F12> list of constructions in the order of use. The functions do not appear in this list.

Recommendation: If you are certain that the use of a function for the respective construction operation will obtain the required result, you should apply this function. This way, you avoid too many unnecessary entries in the <F12> list and thus, reduce the processing time for grading.

All buttons with direct access to tools are indicated by a small green dot. Further tools can be accessed via the 'tools' button in the menu on the right at the very bottom if required.

4.5.2 The parallel menu

Application of parallels

Parallels are significant for the construction of

- overlap and button catch
- turn-ups on jackets, coats and trousers
- seam allowances and hem and others.

Parallel menu

fixed distance values for parallel function

distance value

Un-parallel

distance value 1

distance value2

+/- copy ▪ +/- chain ▪
+/- move symbol

reset

Parallel 10 ▪ Parallel 20

start the tool automatically

The construction of parallels ensues with the parallel menu from the basic menu. This menu contains the parallel function as well as the *Parallel 10* tool and the *Parallel 20* tool.

As a rule, the **parallel function** is used, possibly with the application of x values. The **Parallel 10** tool is useful if the distance of a parallel is to be different at starting point and final point, e.g. for the seam allowance of the crotch seam.

4.5.3 The parallel function

Step-by-step guide

- ⇒ Select distance or enter special distance value in the menu
- ⇒ Select *+/-chain*
- ⇒ Select *+/-copy*
- ⇒ Click the line/curve to which a parallel is to be generated

Determine distance value

If the required distance (in millimetres) is listed in the menu, click the respective button. Otherwise, a specific value has to be entered in the *distance value* field followed by <ENTER>. The point is the decimal sign.

A distance value already entered can be reactivated by clicking the *distance value* button.

Un-parallel

The function un-parallel constructs a new line with the distance to the original line changing evenly along the course of the line. The distances at the beginning and end of the line are set. The un-parallel applies only to individual lines, not line sequences.

Significance of *+/-chain* and *+/-copy*

If *+chain* is set the parallel is generated not only for the clicked line/curve but for all lines and curves connected with the clicked line. Clicking *chain* activates or deactivates this option.

The switch *+/-copy* determines whether the original line remains existent (*+copy*) or not existent (*-copy*). Toggle by clicking ☐ on this button.

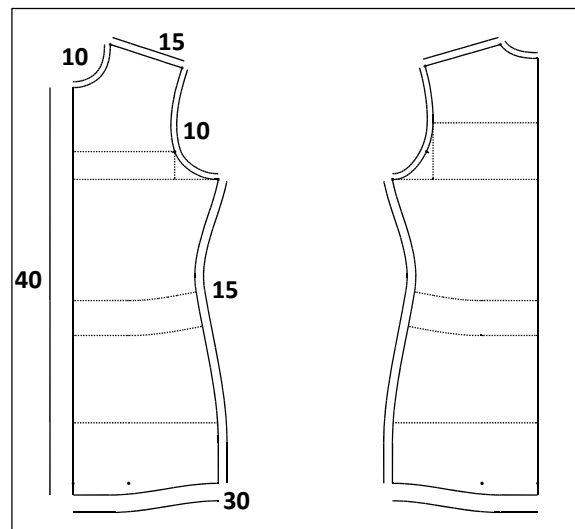
Direction for parallel generation

Clicking decides on which side of a line/curve the parallel is generated. The parallel is generated in the direction from which the line/curve is clicked. Therefore, click **next to** the line and not on the line!

Attention! If identical objects are lying on top of each other 2, 4 or 6,... times they cannot be seen on screen as they delete their respective image. If they lie on top of each other 3, 5,... times they are visible. When practising the *parallel* function for the first time this is a common mistake. After <F4> even objects deleting each other's image are displayed. If you cannot see a new parallel straight away, press <F4>. Make sure that points or lines are never placed on top of one another by using reset or delete.

Exercise on creating parallels to single lines

Call the basic block *Bodice 20* and construct the seam allowances displayed (Picture 4-11):

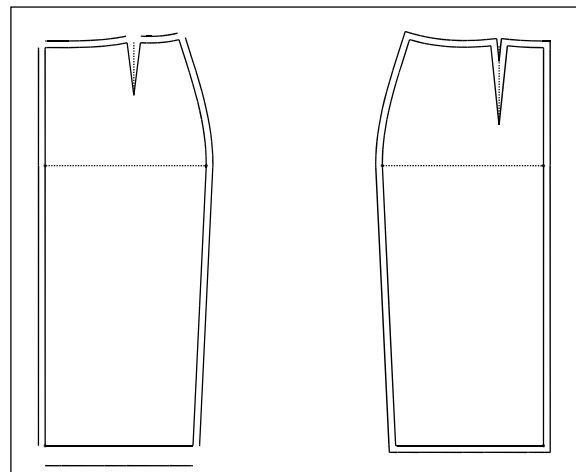


Picture 4-11

- neck and armhole: 10mm
- shoulder and side seam: 15mm
- hem 30mm
- overlap centre front 40mm

Exercise on creating parallels with *chain*

Call the basic block *Skirt 20* and construct a parallel of 10mm to the complete perimeter of the skirt back (Picture 4-12). Set *+chain*. Construct a single parallel of 10mm or 30mm at the hem of the front skirt. Set *-chain* beforehand.



Picture 4-12

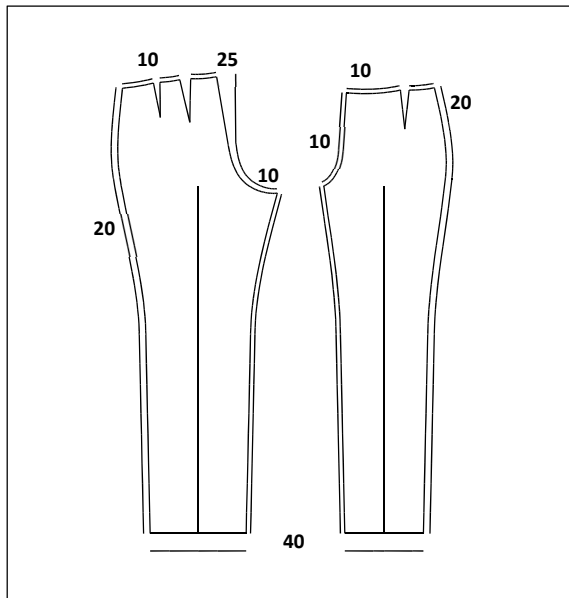
4.5.4 The Parallel 10 tool

Step-by-step guide

- ⇒ Call *Parallel 10*
- ⇒ Click on the line/curve to which the parallel is to be constructed
- ⇒ Double-click on the new parallel and adjust starting distance and end distance interactively

Exercises for the creation of parallels with *Parallel 10*

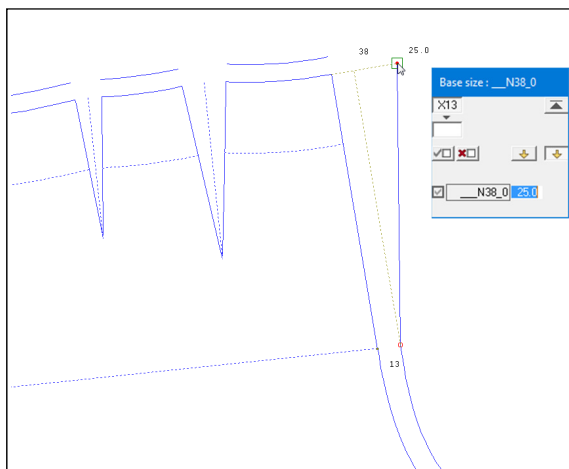
Call the basic block *Trouser 10* and construct the seam allowances indicated Picture 4-13) with the function *Parallel 10*:



Picture 4-13

- waist, side seam, internal leg seam: 10mm
- crotch seam: 10mm

Construct the crotch seam with the *Parallel 10* tool and adjust it interactively, see Picture 4-14.



Picture 4-14

4.5.5 The Parallel 20 tool

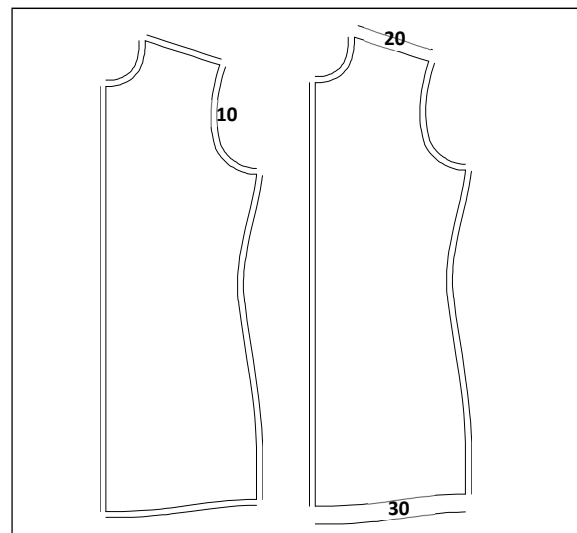
Step-by-step guide

- ⇒ Call *Parallele 20*
- ⇒ Click several lines/curves, to which the parallels are to be constructed
- ⇒ Double click on once of the new parallels and adjust the distance interactively.

You can adjust all parallels to one distance and then assign an additional distance to single lines/curves. You optionally adjust every parallel separately.

Exercise for the creation of parallels with *Parallel 20*

Call the basic block *Bodice 30* and construct the seam allowances with *Parallel 20*. Adjust the distance interactively to 10 mm. Then change the distance for the shoulder to 20 mm and for the hem to 30 mm (Picture 4-15).

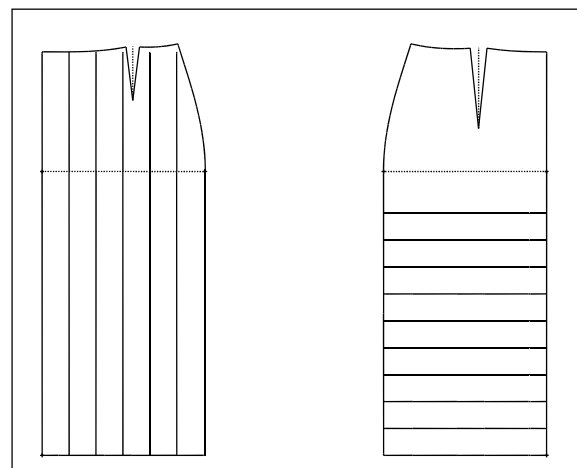


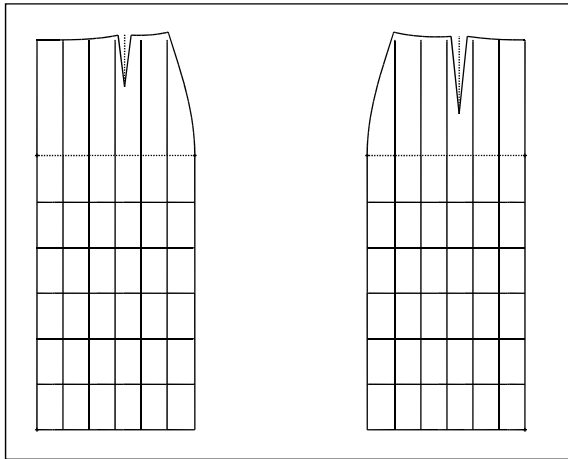
Picture 4-15

Exercises

1st Exercise

Call the style 'Straight skirt' from Chapter 2 Section 2.4 and create parallels at a distance of 40mm from the centre front and further parallels at a distance of





40mm from the hem in the skirt back and further parallels of 70mm respectively from the hem.

4.6 Corners

The *Corners* menu

The construction of corners ensues with the *corners* menu from the basic menu. This menu contains the functions corner, straight line, curve and circle as well as various interactive corner tools.

Corners menu

corner

reset

corner with curve ▪ corner with circle
▪ corner with line

Co-ordinated corner with curve ▪
Co-ordinated corner with circle

U corner ▪ Co-ordinated U corner

Mirror corner ▪ mitred corner ▪
vent corner

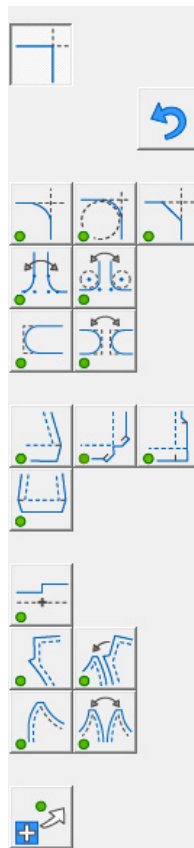
Hem corner

Stepped corner

Angle corner ▪ Co-o. Angle corner

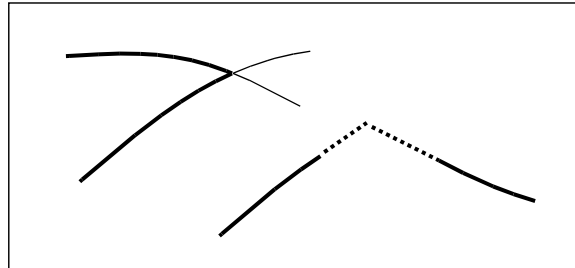
Tapered corner ▪ Co-o. Tapered corner

start the tool automatically



Initial options for the *corner* function and the interactive *Corner 40* tool

A corner is built of two lines/curves which do not need to intersect but may have more than one intersection (Picture 4-16). Before each corner construction, the relevant objects are extended (internally) by 500mm at the beginning and end. Thus, corners outside the objects can be constructed. If Grafis de-



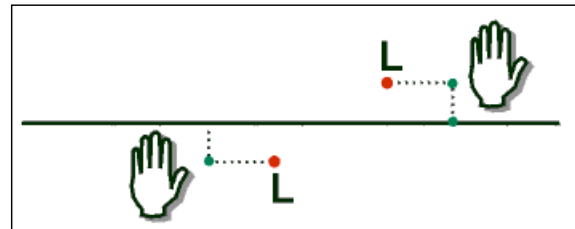
Picture 4-16

tests more than one corner on curves they are indicated and the one required has to be clicked.

The right principle

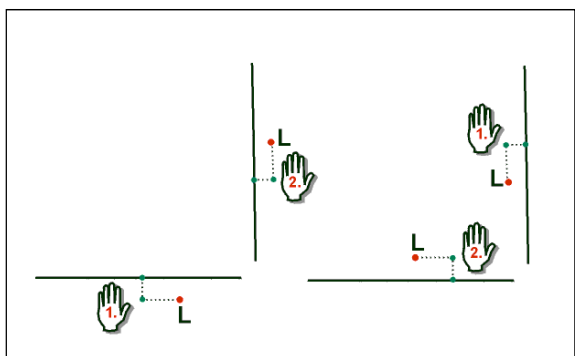
For the construction of corners the *right principle* must be followed when clicking the objects, section 3.6.

With this principle not only the objects are determined when clicking the line/curve but a direction in which the object is to be used for the instructed construction. The first object is to be clicked so that you



Picture 4-17

are driving towards the requested corner, the second click must be driving away from the corner, see Picture 4-17.



Picture 4-18

The right principle is very powerful. Grafis supports the operator with the so called 'right principle cursor' which also has the direction indicator, see Picture 4-18

For illustration of the right principle imagine the line/curve to be clicked as the central reservation of the motorway. The construction of corners resembles driving onto a motorway junction. You are driving along the first line towards the junction and then turn onto the second motorway.

The direction of travel is determined by clicking the lines, following the right principle. The stretches of motorway you are driving remain existent, the others are deleted.

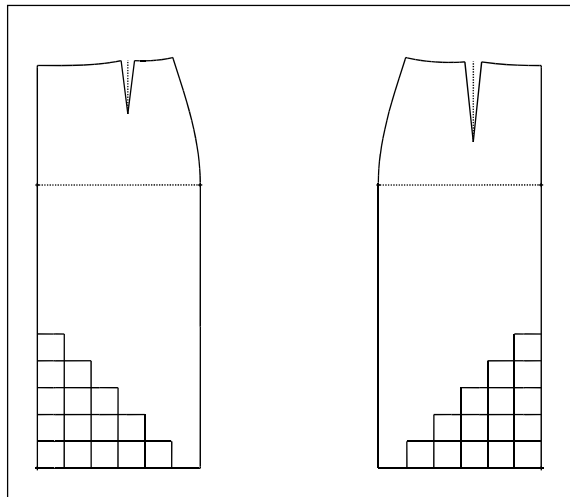
The corner function

Step-by-step guide

- ⇒ Activate *corner*
- ⇒ Click two lines, following the right principle

The *corner* function creates a corner directly from the intersection of the two objects.

Call the style 'straight skirt' from Chapter 2 section 2.4 and create 5 parallels of 40mm to the centre



Picture 4-19

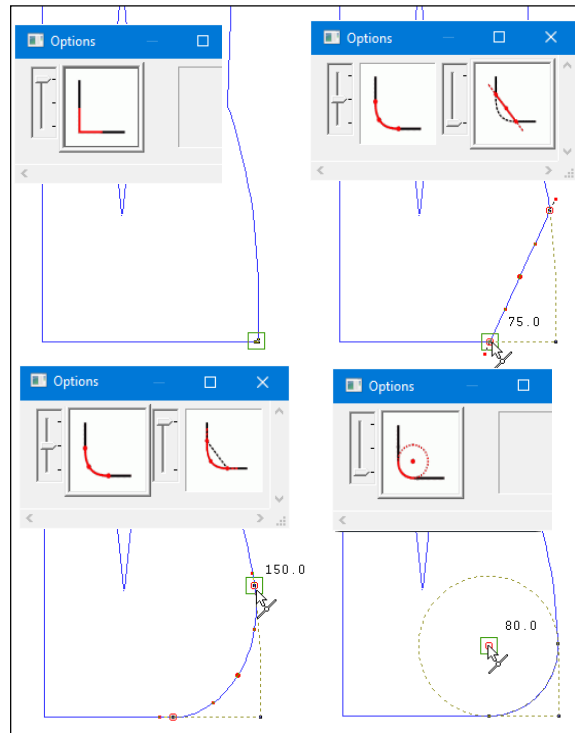
front, centre back and to the hem respectively. Then, create the depicted pattern (Picture 4-19) with the use of the *corner* function.

The interactive *Corner 40* tool with the options *curve*, *circle*, *straight line* and *corner*

Step-by-step guide

- ⇒ Call *Corner 40 with curve*
- ⇒ Click on two lines, following the right principle
- ⇒ Double-click on the new corner
- ⇒ Adjust the options of the corner
- ⇒ Interactively design the corner

Call the basic block *Bodice 10* and created a corner at the side seam/hem with the *Corner 40* tool (Pic-

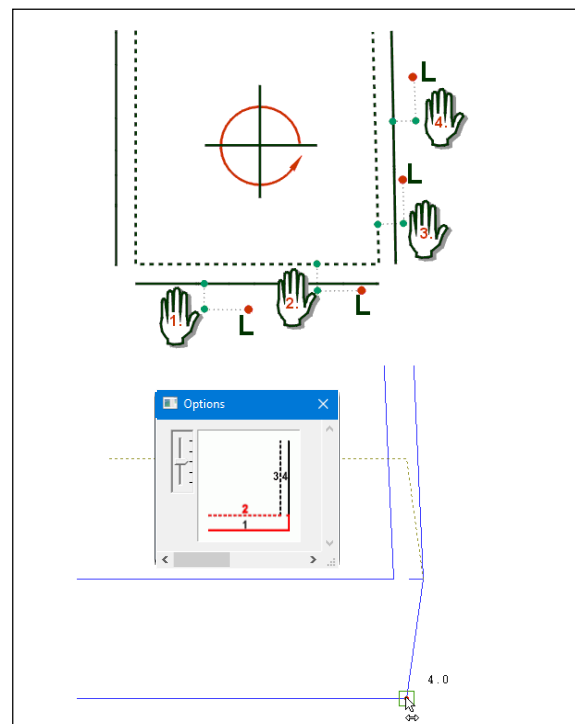


Picture 4-20

ture 4-20). One after the other, adjust the corner interactively to a curved corner, a straight line corner and a circle and grade.

The interactive *Mirror Corner 10*

As opposed to the corner function and the *Corner 40* tool, this corner requires four lines: the two stitch lines and the two seam allowance lines.



Picture 4-21

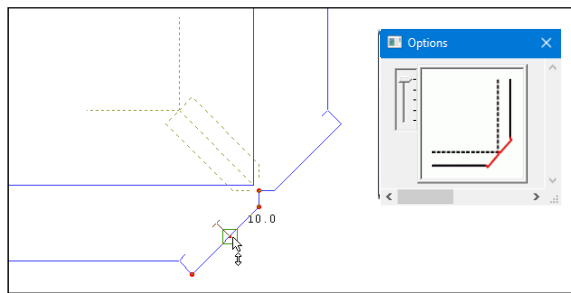
Step-by-step guide

- ⇒ Call *Mirror Corner 10*
- ⇒ Click on the four lines, following the right principle in the clicking order shown in Picture 4-21: **allowance – seam – seam – allowance**.
- ⇒ Double-click on the new corner
- ⇒ Adjust the options for the corner
- ⇒ Interactively design the corner

Call the basic block *Bodice 10* and construct a hem allowance of 40mm and a seam allowance of 10mm. Create a mirrored corner at the side seam/hem with the *Corner 10* tool (Picture 4-21).

The interactive Mitred Corner 20

Step-by-step guide and order of clicking **allowance – seam – seam – allowance** are identical to *Mirror Corner 10*.



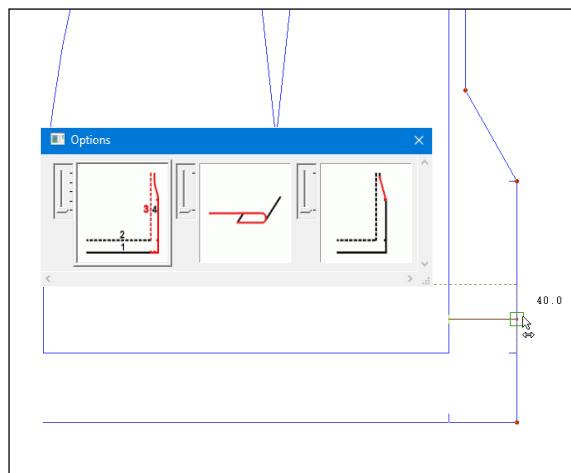
Picture 4-22

Call the basic block *Bodice 10* and construct a seam allowance and hem allowance of 40mm. Create a mitred corner at the side seam/hem with the *Corner 20* tool (Picture 4-22).

The interactive Vent Corner 30

Step-by-step guide and order of clicking **allowance – seam – seam – allowance** are identical to *Mirror Corner 10*.

Call basic block *Bodice 10* and construct a hem allowance of 40mm and a seam allowance of 10mm at the

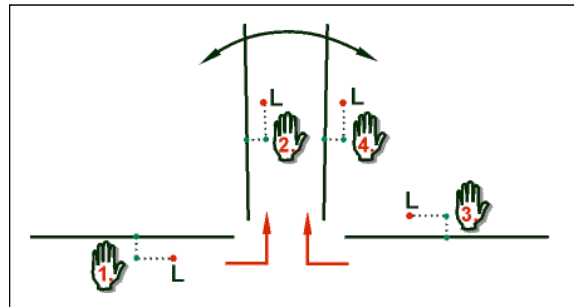


Picture 4-23

centre back. Create a vent corner at the centre back/hem with the *Vent Corner 30* tool (Picture 4-23).

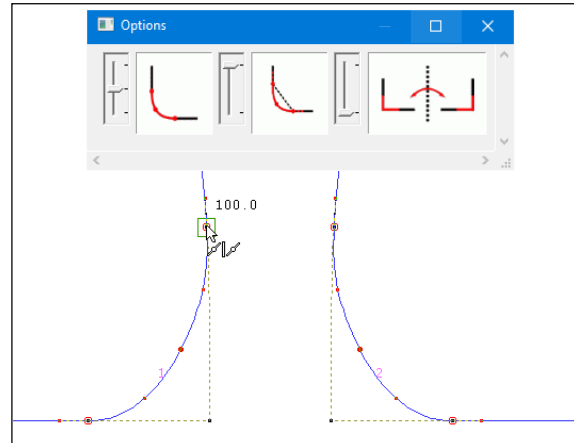
The interactive Co-ordinated Corner 50

With *Corner 50* two corner constructions of the same part are adjusted towards one another. The step-by-step guide is identical to *Corner 40*. The order of clicking depends on the position of the corners to one another. Detailed information can be found on the *Attach* file card in the *call* function under *Grafis-Corners*. Of the total of 3 click variations available, we will introduce only the most commonly used click variation here, see Picture 4-24 and Picture 4-25.



Picture 4-24

The first clicked corner has a higher priority than the corner clicked second. Alterations to the first corner apply to both corners. Alterations to the second corner apply to the second corner, only. Therefore, adjust the first corner and then, adjust any asymmetry at the second corner.



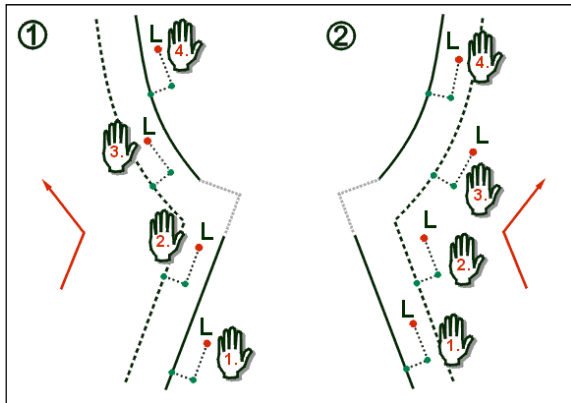
Picture 4-25

The interactive Angle Corner 60

The step-by-step guide is identical to *Mirror Corner 10*. The order of clicking **allowance – seam – seam – allowance** is similar to *Mirror Corner 10*. First, it is imperative to click on the allowance line to be extended. Both click variations are shown in Picture 4-26.

Use this corner for corners not to be co-ordinated on symmetrical pieces for example, e.g. neckline, shoulder seam or centre back seam.

Call the basic block *Bodice 10* and construct a seam allowance of 10mm. Create an angled corner at the

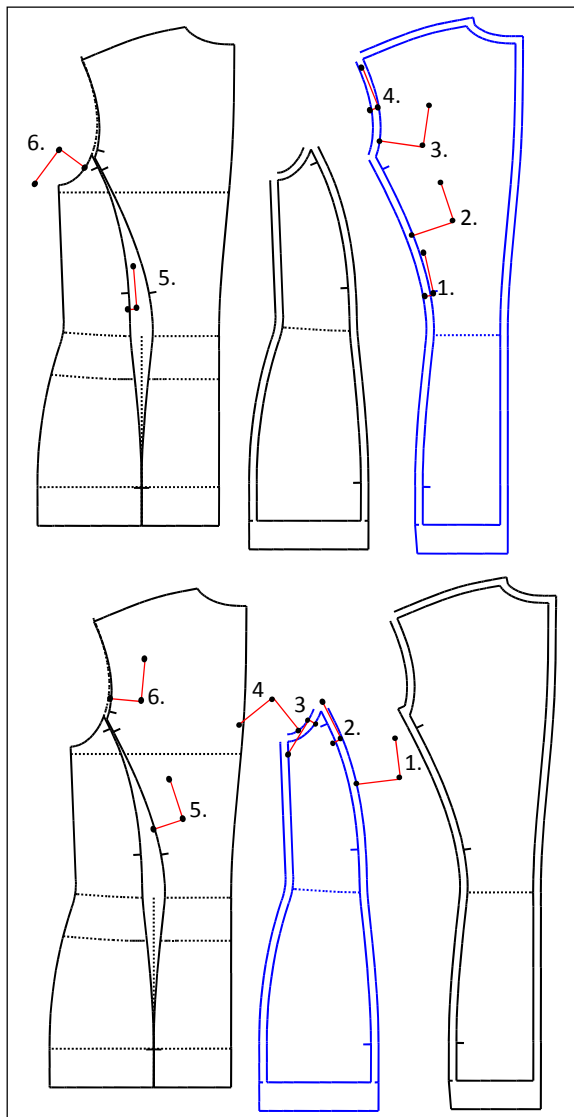


Picture 4-26

shoulder/armhole with the *Corner 60* tool (Picture 4-26).

The Co-ordinated angle Corner 70

If two angled corners are to be sewn together, they must be adjusted towards one another. The co-ordination should ensue via a joined mother part so that



Picture 4-27

no unnecessary dependencies are created. Therefore, in addition to the active part, make the mother part visible, also. The order of clicking is **allowance of seam to be sown first – seam – seam – allowance** and then in the mother part corresponding **seam to be sown first – seam** of the relevant corner.

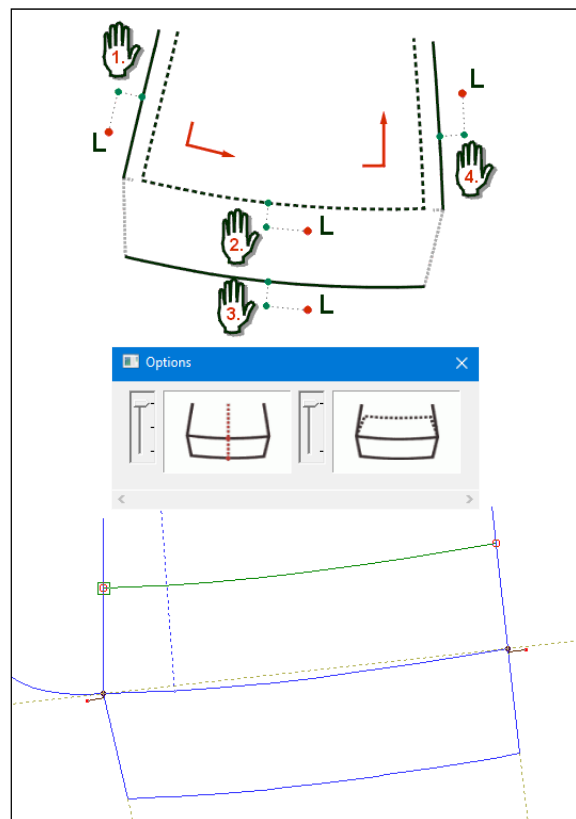
Now the corner can be shaped interactively. Via the options you can switch between angle corner and cut corner. If the option angle corner is selected, the length of the angle corner can be shortened interactively from the top or the bottom. This value is not updated automatically for both corners but must be adjusted separately for each corner by user.

This value is not updated automatically on both corners but must be adjusted for each corner separately.

Call the style from Chapter 3 section 3.2 and construct a seam allowance of 10mm and a hem allowance of 40mm in the back side panel. Close the corners at the hem with *Corner 10*. The corner at the armhole is to be co-ordinated with the centre back panel. Make the back part 40 visible in the part organisation. Construct the corner with the *Co-ordinated angle Corner 70* (Picture 4-27).

The interactive Hem Corner 80

The click sequence is **seam allowance – hem – hem**



Picture 4-28

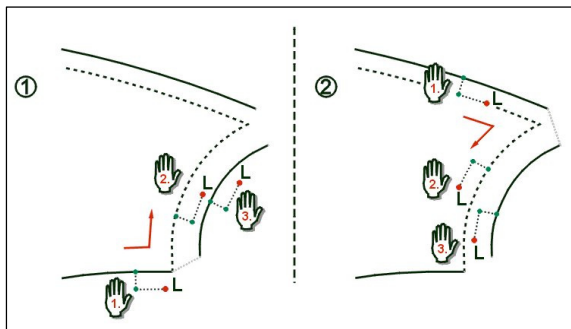
allowance – seam allowance, see Picture 4-28. It is important that the seam lines are a continuous

curve. Alternatively, the side seam can be clicked directly instead of the seam allowance. In this case, the notches will not be visible.

The inside turn up can be made visible with the second option. It is created as a parallel to the hem.

The interactive *Slant Corner 90*

As opposed to the previous corners, this corner requires three lines: one stitch line and the two seam allowance lines.



Picture 4-29

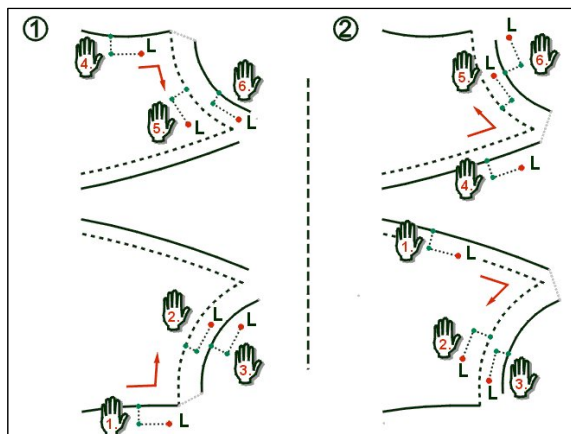
Step-by-step guide

- ⇒ Call *Slant Corner* via tool button.
- ⇒ Click on the three lines, following the right principle in the clicking order: **allowance–allowance–seam or allowance –seam–allowance**, see Picture 4-29.
- ⇒ Double-click on the new corner
- ⇒ Interactively design the corner.

The interactive *Co-ordinated slant Corner 100*

Step-by-step guide

- ⇒ Call *Co-ordinated slant Corner*
- ⇒ Click on the six lines, following the right principle in the clicking order shown in Picture 4-30:
corner 1:
allowance–seam–allowance,
corner 2:
allowance–seam–allowance,
- ⇒ Double-click on the new corner
- ⇒ Interactively design the corner.

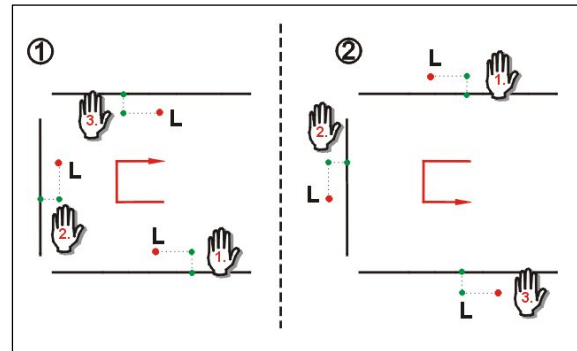


Picture 4-30

As Corner 50 the first clicked corner has a higher priority than the corner clicked second. Alterations to the first corner apply to both corners. Alterations to the second corner apply to the second corner, only. Therefore, adjust the first corner and then, adjust any asymmetry at the second corner.

The interactive *U-shaped corner 110*

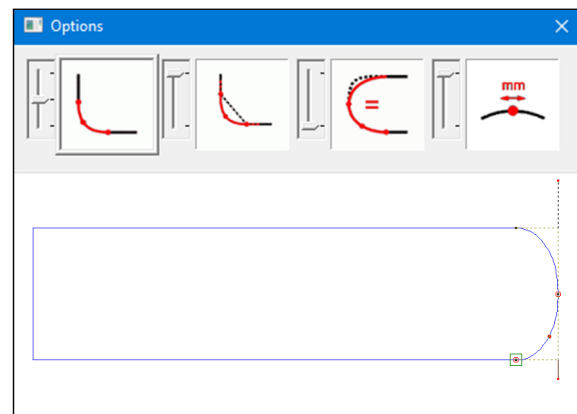
This corner requires three clicks: **Seam – seam – seam**. Clicking inside or outside is of no consequence



Picture 4-31

Step-by-step guide

- ⇒ Call u-shaped corner
- ⇒ Click on three lines, following the right principle in the click sequence **seam – seam – seam**, see Picture 4-31.
- ⇒ Double-click on the new corner
- ⇒ Interactively shape the corner.



Picture 4-32

The *u-shaped corner 110* is used for example for treating edges of belts and bartacks, Picture 4-32.

The interactive co-ordinated u-shaped corner 120

The two click variations are displayed in Picture 4-33.

Step-by-step guide

Call *co-ordinated u-shaped corner 120* via the tool button

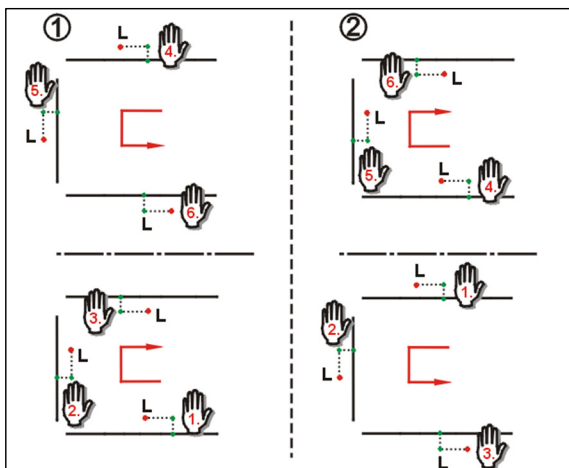
⇒ Click on six lines following the right principle in the click sequence according to Picture 4-33:

Corner 1: **seam – seam – seam**

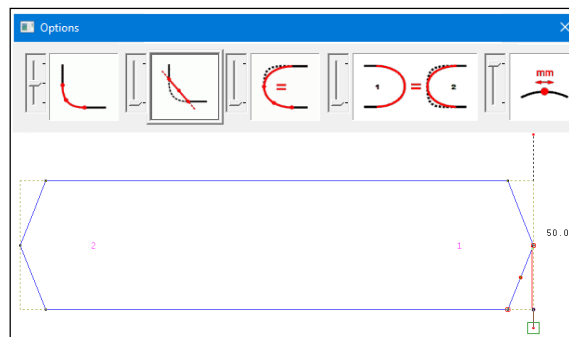
Corner 2: **seam – seam – seam**

⇒ Double-click on the new corner

⇒ Interactively shape the corner.



Picture 4-33

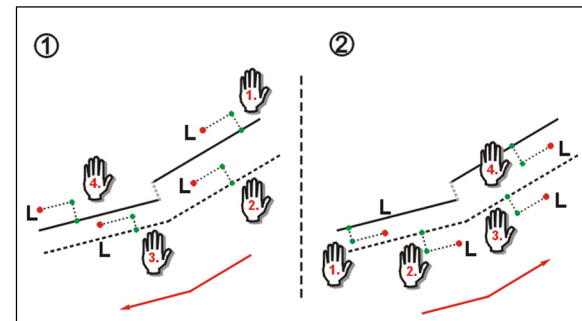


Picture 4-34

With this corner also, the first clicked corner has a higher priority over the second clicked corner Picture 4-34. Modifications made to the first corner apply to both corners. Modifications made to the second corner apply to the second corner only. Therefore, adjust the first corner first and then, adjust any desired asymmetry to the second corner.

The interactive stepped corner 130

The step-by-step guide is identical to *mirror corner 10*. The click sequence is **seam allowance – seam – seam – seam allowance**. It is imperative to click on the seam allowance line first. The two click variations are displayed in Picture 4-35.



Picture 4-35

Step-by-step guide

⇒ Call *Stepped corner 130*

⇒ Click the four lines following the right principle in the click sequence according to Picture 4-35:

seam allowance – seam – seam – seam allowance

⇒ Double-click on the new corner

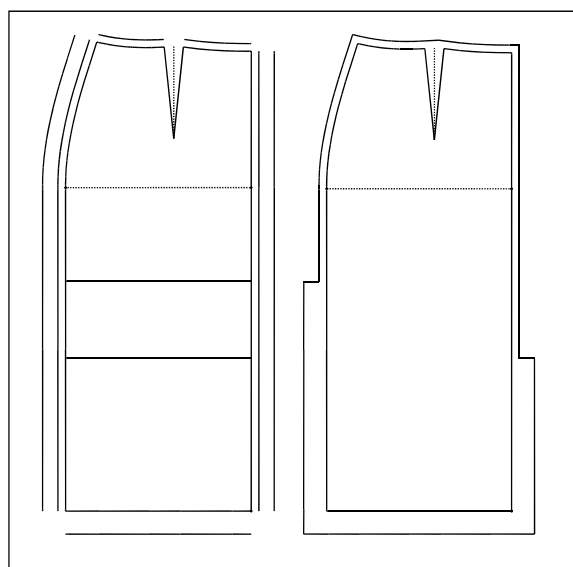
⇒ Interactive adjustment of the corner

4.7 Exercises

1st Exercise

Call the style 'Straight skirt' from Chapter 2 Section 2.4, delete the skirt front and construct the following parallels:

- vent height centre back: 200mm
- vent height side seam: 300mm
- seam allowance waist, side seam and centre back: 10mm
- vent width: 30mm
- hem: 30mm



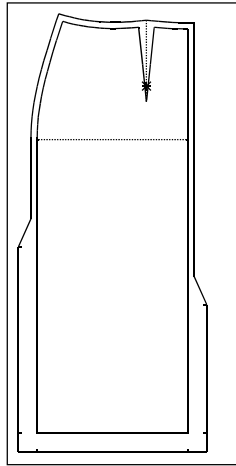
Close the corners and grade the skirt in various sizes.

2nd Exercise

Call the style 'straight skirt' from chapter 2 section 2.4, delete the front skirt and construct following parallels:

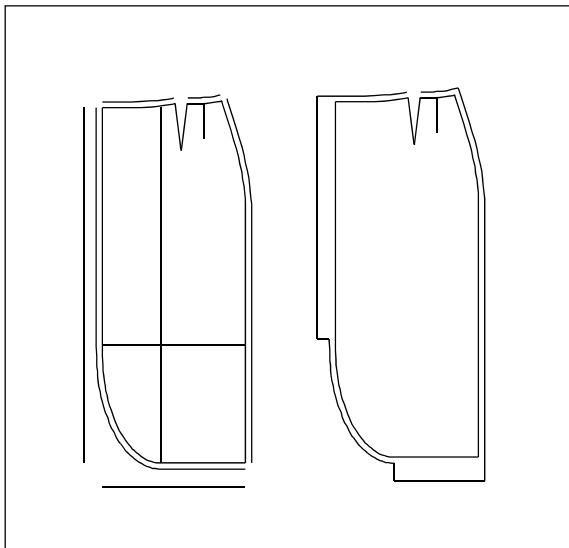
- tolerance waist, side seam and centre back with 10mm
- hem extension 30mm

Construct the vent with the *Corner 30* tool like exercise 1 and adjust the shape of the vent interactive.

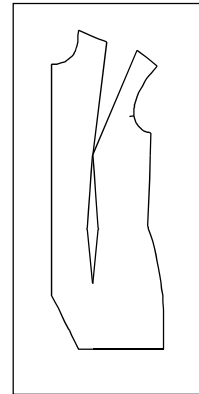
**3rd Exercise**

Call the style 'straight skirt' from Chapter 2 section 2.4, insert the lines of the front skirt into a new part in the part organisation and construct the following:

- seam allowance of 10mm
- parallel to the hem with *Parallel 10*
- parallel to the centre front CF with *Parallel 10*
- curve at the CF with *Corner 40*; The curve is to start 200mm from hem at the CF and end 100mm from CF at the hem.
- overlap of 30mm at CF with *Parallel 10* tool.

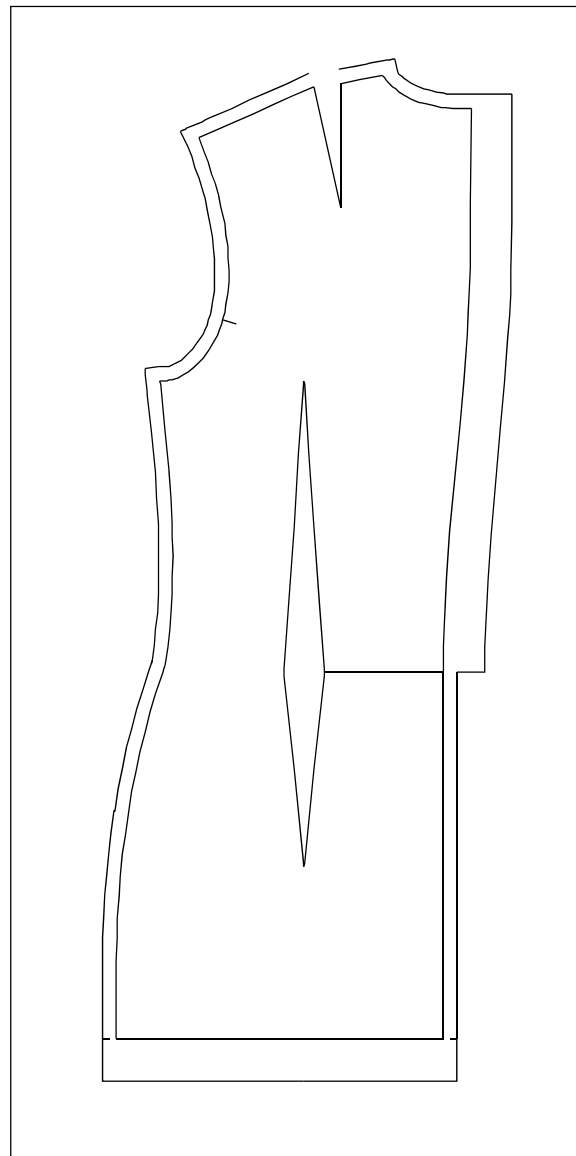
**4th Exercise**

Call the construction *Bodice 50* and construct an angle at the CF/hem. Use *Corner 40*. The angle is to start 120mm from the hem at the CF and end 60mm from the CF at the hem.

**5th Exercise**

Call Bodice 50 and insert the objects of the back into a new part in the part organisation.

Construct a seam allowance of 10 mm to the shoulder, the armhole, the side seam and the centre back from the waist. At the centre back down to the waist and at the hem construct a seam allowance of 30 mm. Close the corner at the centre back with the

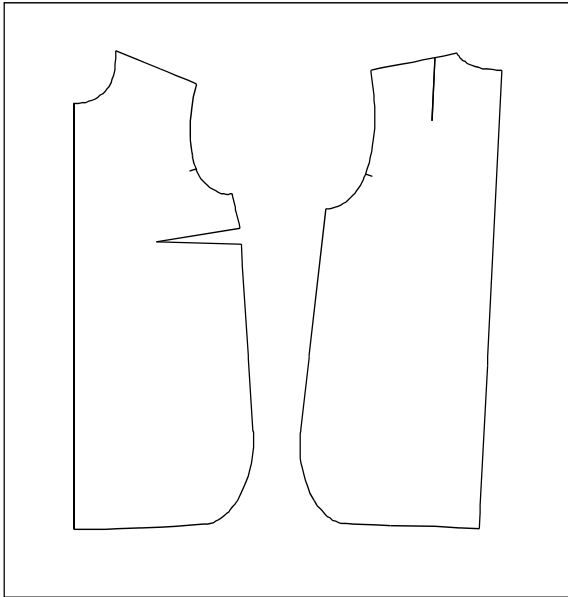


stepped corner, as displayed. As the hem corner requires a continuous seam and hem line, close the hem corner at the side seam and the centre back with mirror corner 10, all other corners are closed with the angle corner.

6th Exercise

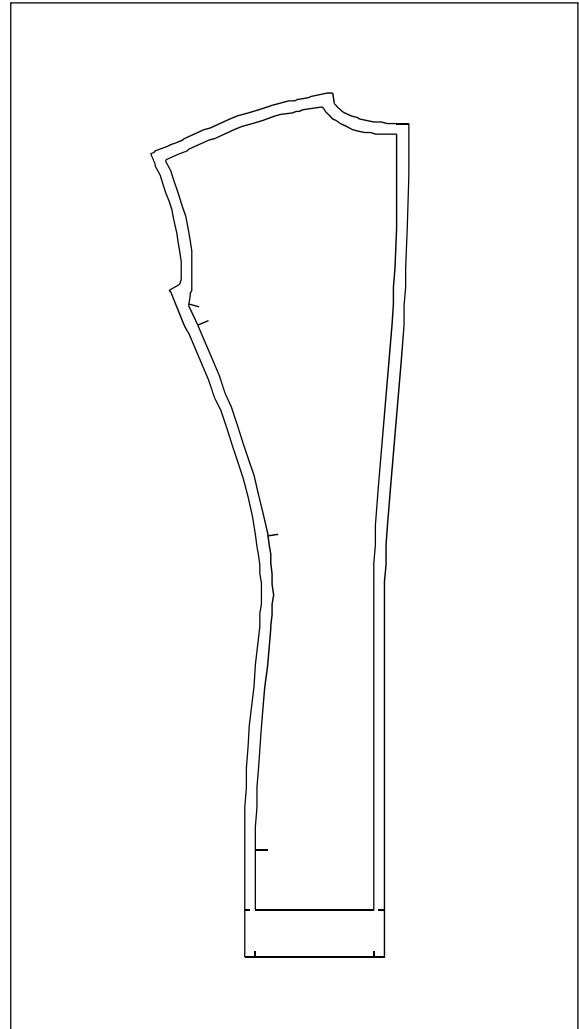
Call the style 'shirt blouse' from Chapter 2 section 2.5, insert the lines of the front and back into a new part in the part organisation.

Construct a curved hem using the *Co-ordinated Corner 50*. Adjust the corners interactively. Then, switch the options to corner with straight line and corner with circle respectively.



7th Exercise

Call the style from Chapter 3 section 3.1 and construct a seam allowance of 10mm and a hem allowance of 40mm to the back with the *parallel* function. Close the corners at the hem with *Hem Corner 80*. All other corners are to be closed with the *Angle Corner 50*.

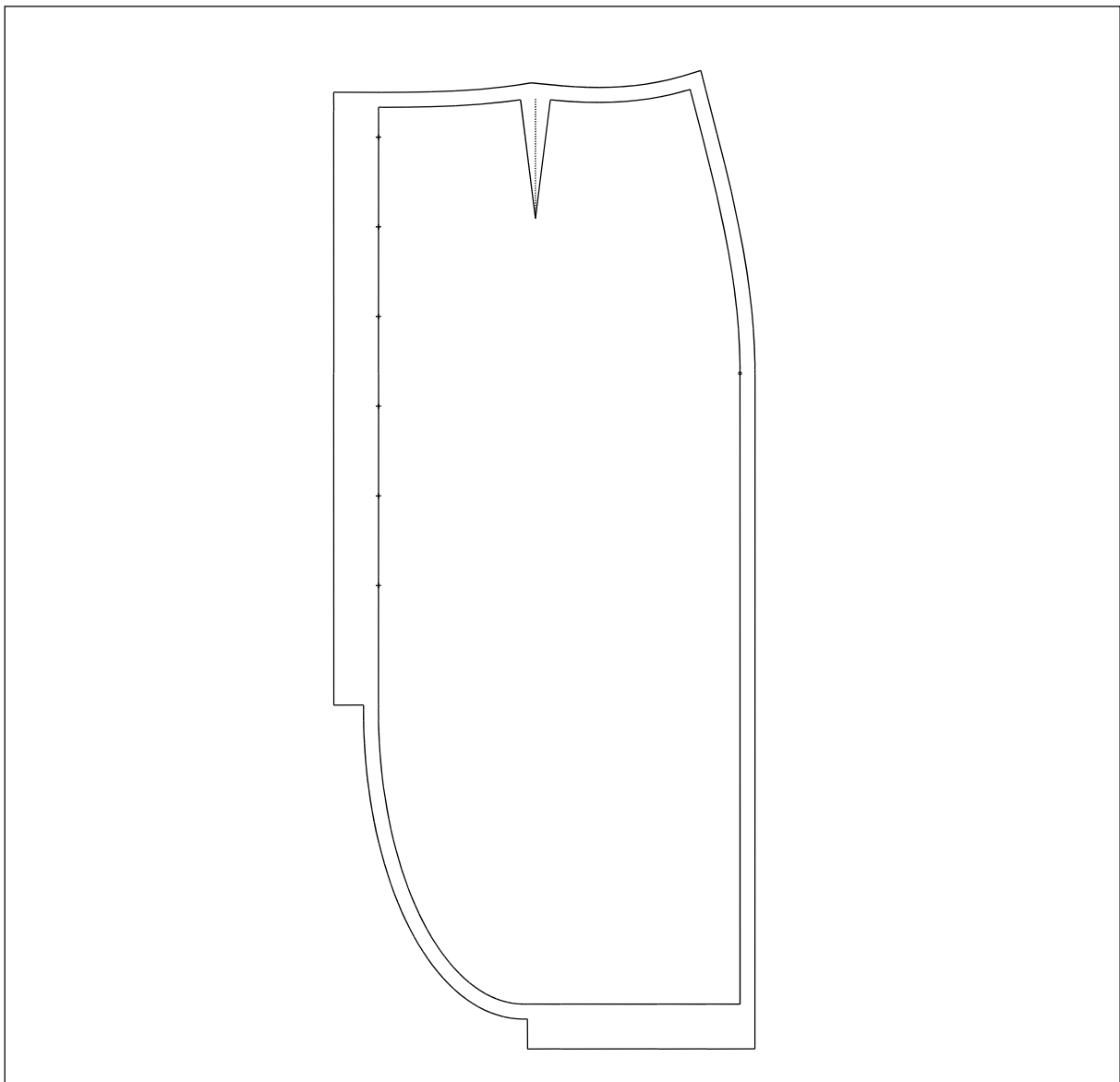


Chapter 5 Easy line functions

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Content

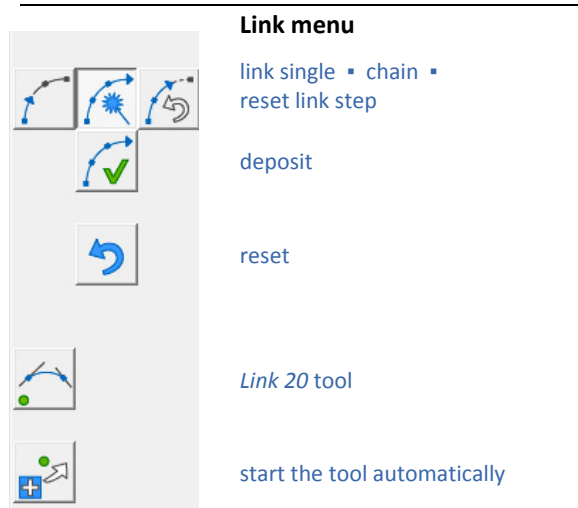
5.1	Linking lines	56
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5.1 Linking lines

The *link* menu

The *link* menu is opened from the basic menu. It allows for the linking of lines or the joining of lines by a curve.



Linking lines (connect with each other)

Step-by-step guide

- ⇒ Activate the option *single* or *chain*
- ⇒ Click the lines to be linked following the right principle
- ⇒ Correction (several possible) by clicking *reset link step*
- ⇒ Terminate linking with *deposit*

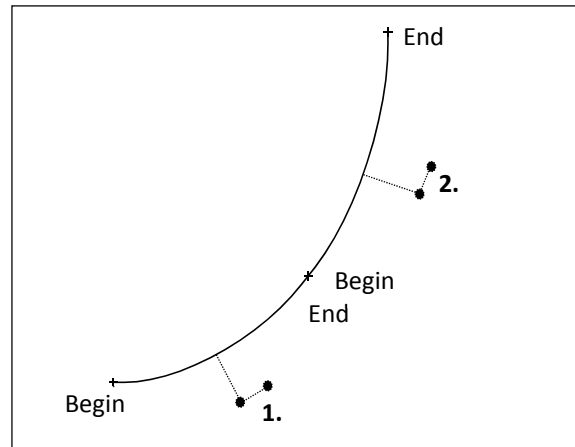
The top four buttons are used for linking lines by bridging the gaps between the lines with a straight line.

Linking lines is required when two or more lines are supposed to be treated as one during further construction steps.

First you have to choose between the options *single* or *chain*. With *chain* all tangential lines (without kink) will be linked automatically in one operation. At the beginning, the simpler option *single* is recommended.

Reset link step resets the individual linking operations step-by-step. The link operation is terminated only with *deposit* and treated as one construction step in the record.

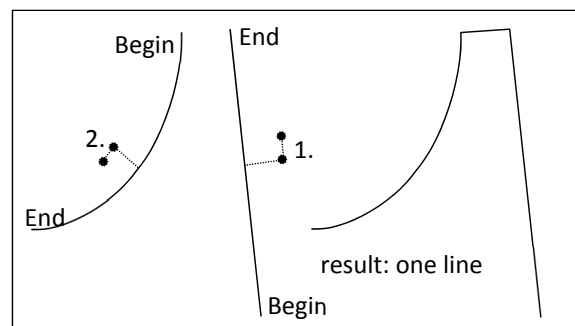
The end of the already linked lines (= basic line) is linked to the beginning of the clicked line. For the determination of direction the right principle applies.



Picture 5-1

Picture 5-1 shows the linking of two lines with *single* or *chain*. Beginning and end of the lines are determined by the right principle. For further information read the explanations in sections 4.6.

Picture 5-2 shows linking of two lines which are not touching with a straight line. Here, also, the right principle is to be followed.



Picture 5-2

Further functions

With *reset* the last construction step can be undone.

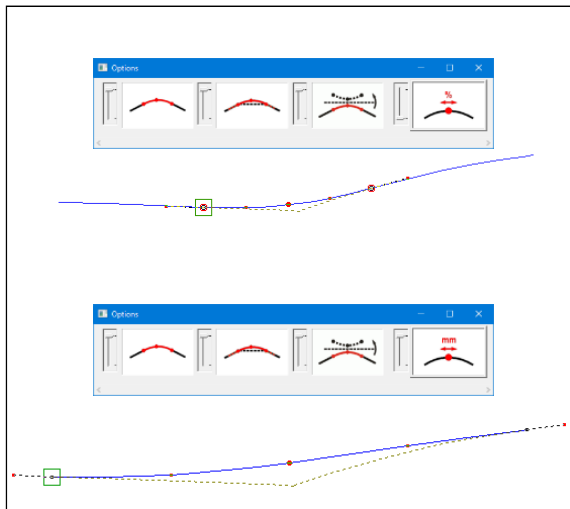
The interactive link tool *Link 20*

Step-by-step guide

- ⇒ Call *Link 20* tool
- ⇒ Click on the two lines to be linked or click on two positions of a line to be shaped, following the right principle
- ⇒ Construct the start and end point.
- ⇒ Double-click on the new continuous line
- ⇒ Adjust the options
- ⇒ Interactively design the curve

The options define

- whether start/end of the connecting piece is to be moved along the original lines or whether one/both of the original lines are to be replaced completely (Picture 5-3),
- whether the basic direction of the connecting piece at beginning/end is identical to the original lines or free and
- whether the base points can be moved in mm or in %.



Picture 5-3

The shape of the connecting piece and the additional directions at its beginning/end can be interactively adjusted, see explanations in the following section.

The interactive co-ordinated link tool *Link 30*


With *Link 30* two lines are connected and synchronized twice simultaneously.


The connecting piece of the first two lines has a higher priority than the second connecting piece. Alterations to the first connecting piece apply to both connections. However, alteration to the second connecting piece apply to the second connection only. Therefore, adjust the first connecting piece first and then adjust the required asymmetry for the second connection.

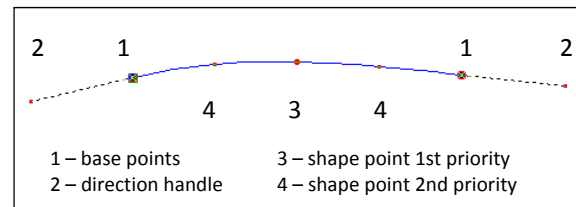
Adjusting an interactive curve using the example of the tool *Link 20*

The same principles apply to the adjustment of curves in all interactive constructions. These principles are now explained using the example of tool *Link 20*, see also Picture 5-4

Base points '1' are positioned at the beginning and end of the curve, marked by a point and a red circle.

If the cursor takes the shape  at these points, they can be moved along the corresponding line.

Dashed extensions with little points at the beginning/end of the curve are **direction handles '2'**. If the cursor takes on the shape  at these points, the direction can be dragged.



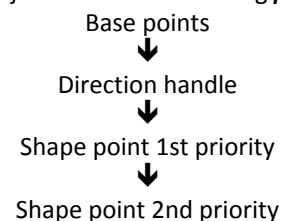
Picture 5-4

There are one or three shape points between two neighbouring base points:

- one **shape point 1st priority '3'**, displayed as a slightly larger red point and
- possibly two **shape points 2nd priority '4'**, displayed as small red points.

The position of the shape points is controlled via two values: a value in percent for the position of an imaginary line between the two base points and a second value for the distance to the imaginary line. The second value is usually measured in millimetres. The zero position of the shape points is normally 50% and 0mm.

The above objects have the following **priorities**:



Priority means that the objects of lower priority are changed with the alteration of objects of higher priority, but not the other way around. Moving base points alters the position of the shape points and results in direction changes, if the direction depends on the base point.

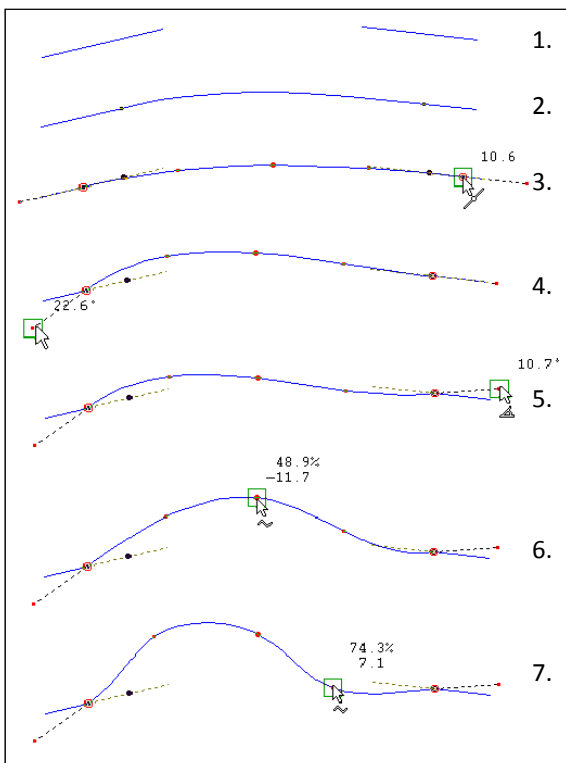
Important: Always start adjusting the objects with the highest priority.

If these principles are applied to the tool *Link 20*, the following step-by-step guide for adjusting the connecting piece is recommended (Picture 5-5):

1. Initial state: It is possible to link two lines or to design a single line in a particular area.
2. The *Link 20* tool is called. The two small black points indicate beginning and end of the new linking piece. These are exactly the positions, which were clicked.

3. The two base points at beginning and end of the section can be moved along the original line.
4. and 5. The required curve direction is adjusted at both base points.
6. The shape of the curve is roughly adjusted with the shape point 1st priority.
7. The shape of the curve can be finely adjusted with the shape points 2nd priority.

If you want to adjust an interactive curve subsequently, first set the shape points back to the zero position by selecting raster 10 for example and dragging the points to 50% / 0. Then, set the raster value back to 0 or 1 and adjust the curve to your requirements. Always start with the objects of the highest priority.

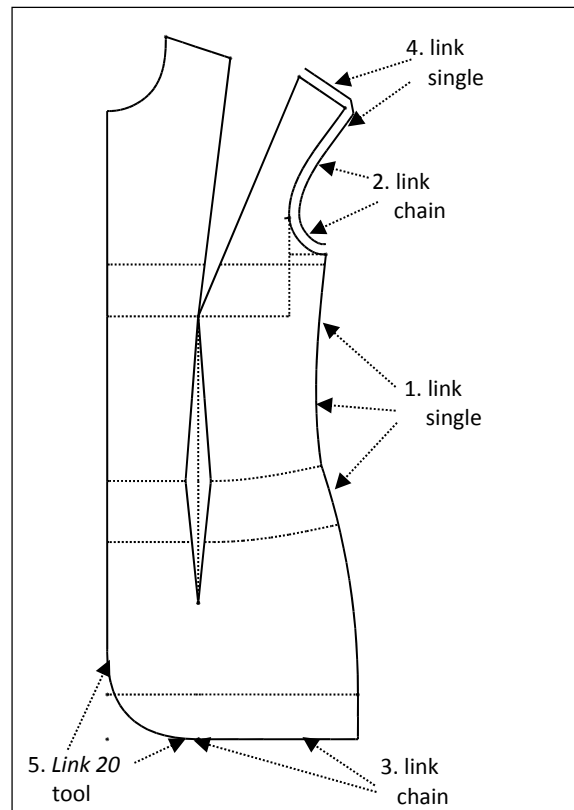


Picture 5-5

Exercises

1st Exercise

Call the basic block *Bodice 10*. Create parallels to the



Picture 5-6

armhole and the shoulder with 10mm distance. Link the following lines (Picture 5-6):

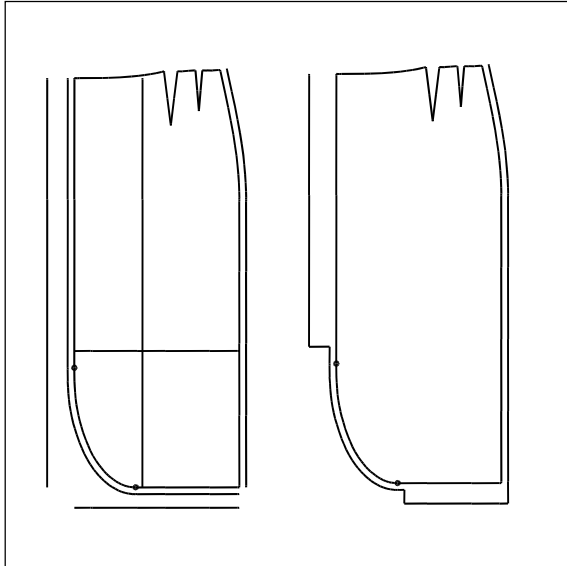
- the side seam with *link single*
- the armhole with *link chain*
- the hem line with *link chain*
- the parallels to armhole and shoulder with *link single*
- the centre front with the hem with the *Link 20 tool*

Always click on the right side of the line in the direction of travel. If you have made an error, click *reset link step* (several times if required) and then, continue. Terminate linking by clicking *deposit*

2nd Exercise

Call the basic block *Skirt 20* and create the following parallels

- 30mm from the hem outside
- 40mm from the centre front outside
- 100mm from the centre front inside with the tool *Parallel 10*
- 200mm from the hem inside



Picture 5-7

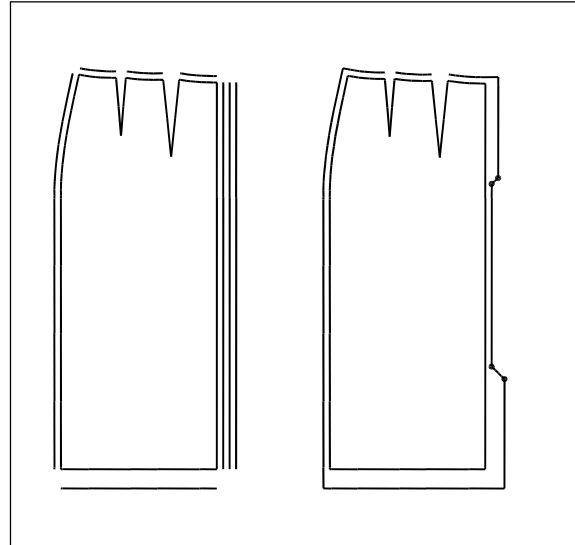
Link the centre front and the hem with the tool *Link 20* and construct further parallels of 10mm to the hem and the centre front on the outside respectively. Then, construct the displayed corner with the function *corner* (Picture 5-7).

3rd Exercise

Call the basic block *Skirt 20* and adjust a straight side seam interactively. Construct the following parallels:

- 30mm to the centre back to the outside for vent width
- 20mm to the centre back to the outside for concealed zip
- 10mm to the side seam, centre back and waist for seam allowance

Construct the displayed corners and then, link the centre back with *Link 20* according to Picture 5-8. Adjust the corners and the linked connections interactively. Grade in different sizes.



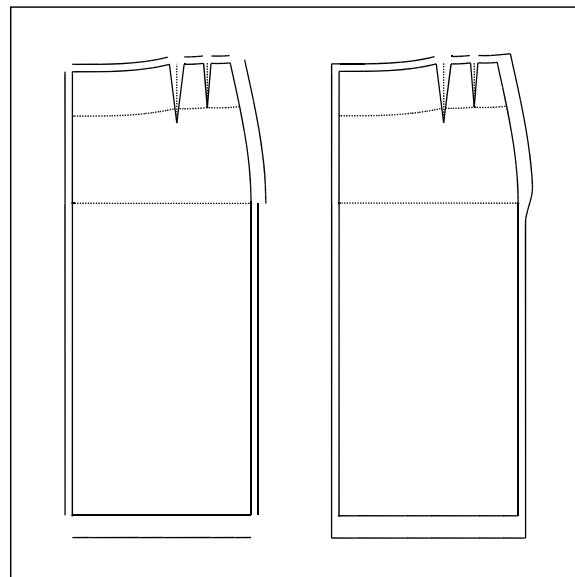
Picture 5-8

4th exercise

Call the basic block *Skirt 20* and adjust a straight side seam interactively. Construct the following parallels:

- 10mm to the centre front, waist and side seam from hem to hip
- 30mm to the hem
- 20mm to the side seam from waist to hip

Link the side seam with the *Link 20* tool and close the other displayed corners with the *corner* function (Picture 5-9). Adjust the linked connection interactively.



Picture 5-9

5.2 Raster

The *raster* menu

The *raster* menu offers functions for the construction of point sequences. The point sequences are generated along a line.

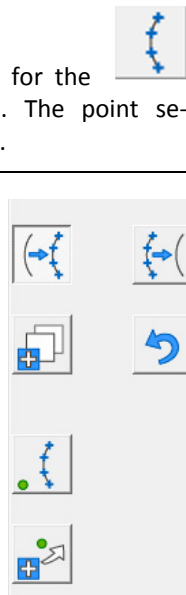
Raster menu

rastern 0 ▀ convert to line

+/-copy ▀ reset

Raster 20 tool

start the tool automatically



The functions *raster 0*

In Grafis each line is a polygon (see section 4.3). With *raster 0* the fulcrums of a line are displayed. On a straight line this would be the starting and final point. An example for a curve is shown in chapter 4.3.

Step-by-step guide

- ⇒ Activate the *raster 0*
- ⇒ Set +/-copy
- ⇒ Click on the line, following the right principle

Convert to line

The *convert to line* function is the reverse function to the *raster* functions. Activating *convert to line* and clicking a point sequence creates a line from the point sequence. Here, also the +/-copy switch applies.

+/-copy, reset

With the +/-copy switch you decide whether or not the original object remains existent. When changing a line into a point sequence with

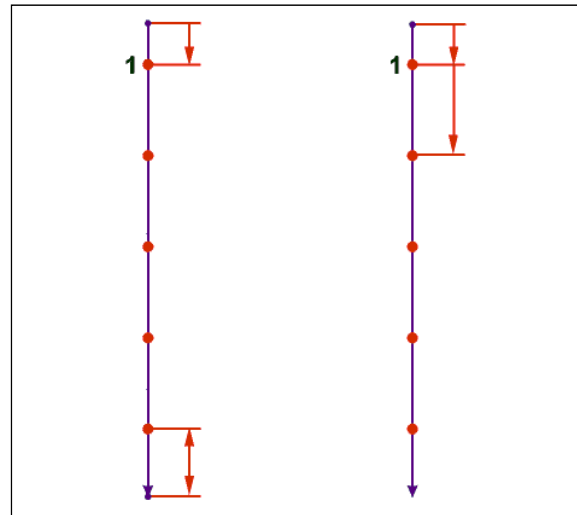
- +copy both line and point sequence are existent,
- copy only the point sequence is existent.

With *reset* the last construction step is undone.

The interactive *Raster 20* tool

Step-by-step guide

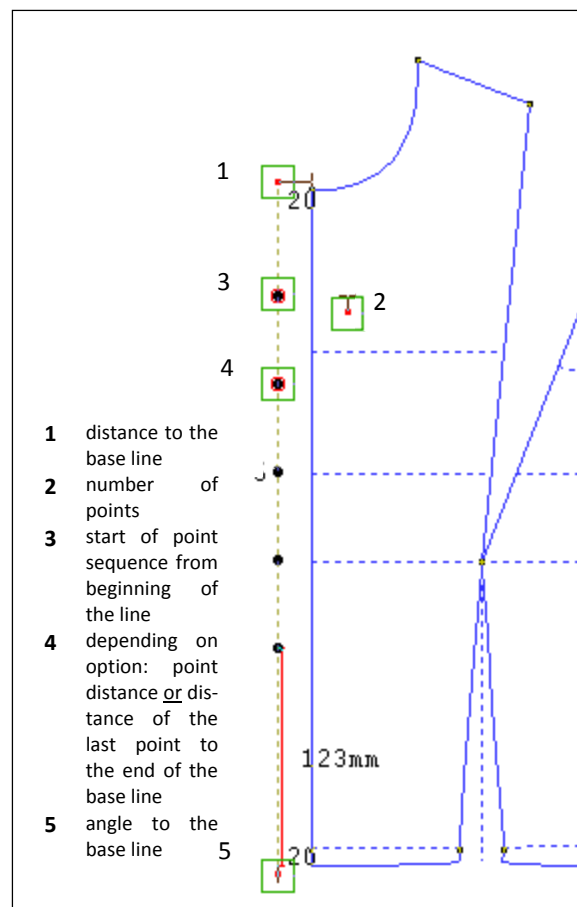
- ⇒ Call *Raster 20* tool
- ⇒ Click on a line
- ⇒ construct the start and end point
- ⇒ Double-click on the new point sequence
- ⇒ Adjust the options
- ⇒ Interactively design the point sequence (Picture 5-10).



Picture 5-10

With the *Raster 20* tool point sequences are constructed, which can be adjusted subsequently regarding position and number of points.

The only option of this tool (Picture 5-10) decides whether the point distance is determined by the position of the last point or vice versa.



Picture 5-11

Exercises

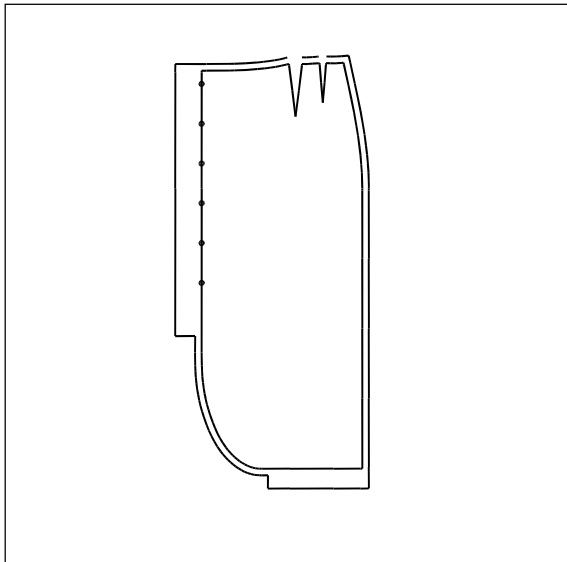
1st exercise

Call the basic block *Bodice 10* and construct the following in the front:

- The fulcrums of the neckline. Set the switch to *+copy* to retain the original line.
- A total of five equally distributed points on the outer shoulder.
- A total of 8 points for buttons. The 1st point is situated 20mm from the neckline. The last button is placed at a distance of 180mm from the hem.

2nd exercise

Call the basic block *Skirt 20* or the exercise from section 5.1 and construct a button stand at the centre

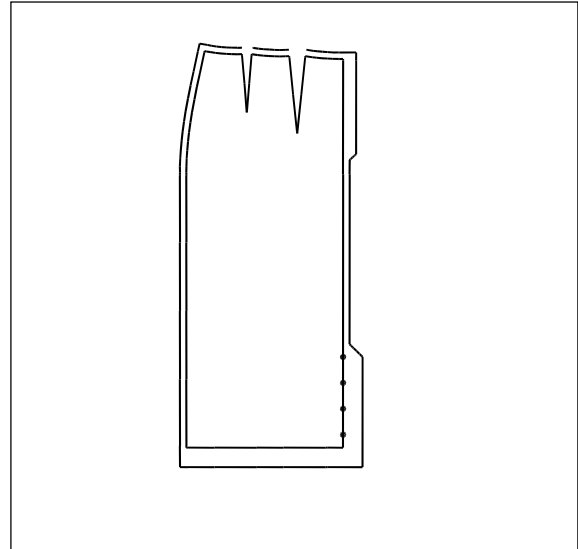


Picture 5-12

front with the *Raster 20* tool. The first button is to be situated 20mm from the waist. A total of 6 buttons with a distance of 60mm are to be placed, see Picture 5-12.

3rd exercise

Call the basic block *Skirt 20* or the third exercise from section 5.1 and construct a button stand on the centre back from the hem. The first button is to be placed 20mm from the hem. A total of 4 buttons with a distance of 40mm are to be positioned, see Picture 5-13.



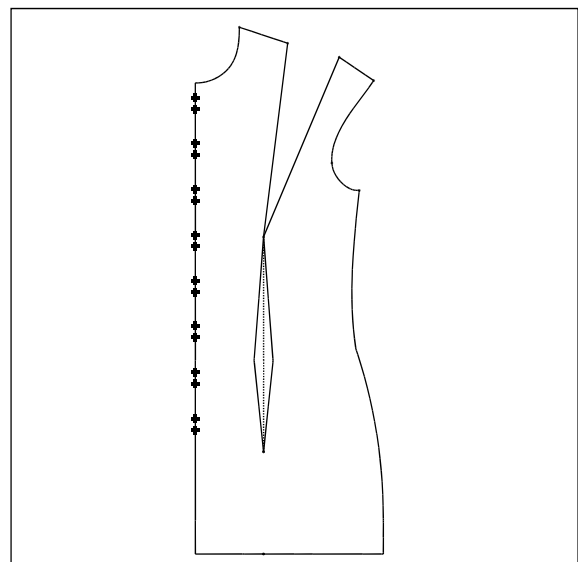
Picture 5-13

4th exercise

Call the basic block *Bodice 10* and place paired buttonholes on the centre front. A total of 8 button pairs are to be created with a distance of 60mm between the pairs. The first button is positioned 20mm from the neck on the centre front. The distance between the two buttons in a pair is 15mm (Picture 5-14).

Construct the paired buttonstand with two point sequences and the following settings with the *Raster 20* tool:

- distance to the top 20mm 35mm
- number of points 8 8
- distance 60mm 60mm



Picture 5-14

5.3 Lengthening and shortening lines

The *lengthen* menu

The *lengthen* menu contains functions for lengthening and shortening lines at the ends (*linear*). These functions are especially significant for the adjustment of line lengths such as side seams, body seams and crotch seams.



Lengthen menu

lengthen to...

length

lengthen by...

length

reset



Step-by-step guide

- ⇒ Enter the *length* value for the alteration under *lengthen by* or *lengthen to*
- ⇒ Activate *lengthen by* or *lengthen to*
- ⇒ Click the line to be altered, following the right principle

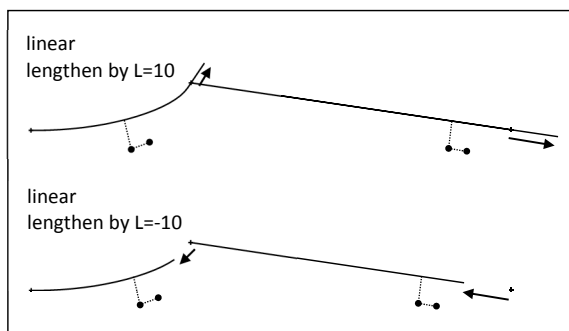
Type of length alteration

With *linear* the line is lengthened straight at its end or shortened along the line (Picture 5-15). The end of the line is determined according to the right principle when clicking.

Lengthen to and lengthen by

With *lengthen to* a line is lengthened *linear* to the pre-set length. The required length is pre-set accurately.

With *lengthen by* a line is lengthened (positive value) or shortened (negative value) *linear* by a given amount, see Picture 5-15.

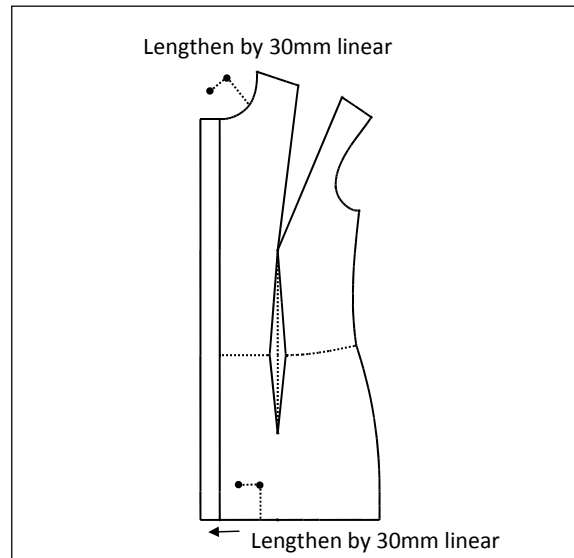


Picture 5-15

Exercises

1st exercise

Call the basic block *Bodice 10* and construct a parallel of 30mm to the centre front. Lengthen the neckline

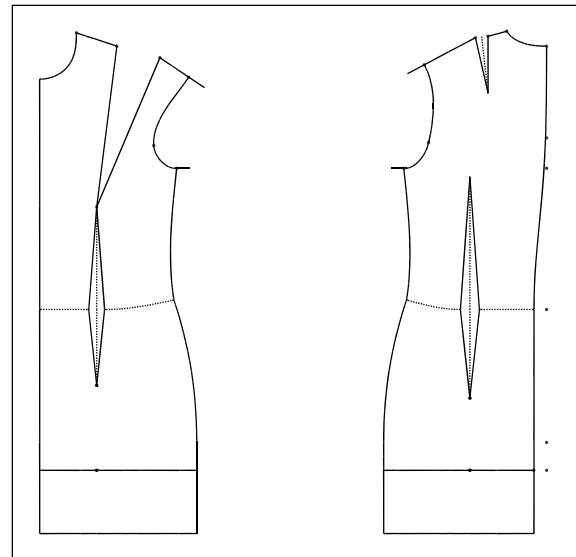


Picture 5-16

and the hem line linear by 30mm. Follow the right principle when clicking (Picture 5-16).

2nd exercise

Call the basic block *Bodice 10* and construct a parallel of 100mm to the hem lines.



Picture 5-17

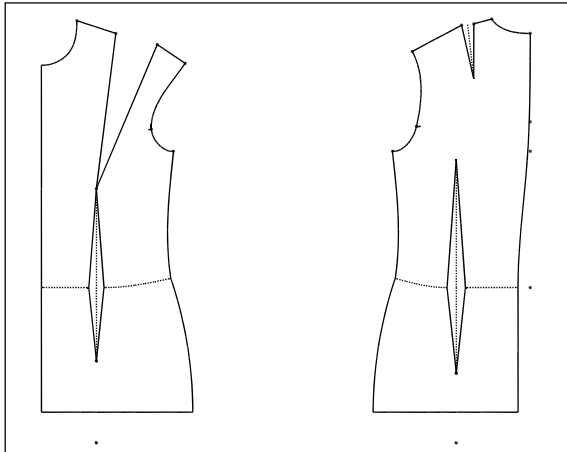
Then, lengthen

- the shoulder by 30mm
- the armhole by 20mm
- the centre front, centre back and side seam by 100mm

Follow the right principle when clicking (Picture 5-17).

3rd exercise

Call the basic block *Bodice 10* and shorten the centre front, centre back and the side seams by 50mm. Use *lengthen linear by -50* and follow the right principle when clicking (Picture 5-18). Then, move the hem line by 50mm with the *parallel* function using *-copy*.



Picture 5-18

5.4 Cut, 'cut on' and separate lines

The *separate* menu

Cutting and separating lines can be called from the basic menu via *separate*.

Separate divides a line into two lines which touch at the separation position and can be processed individually. If the cut mark switch is set to *+cut mark* the separation position is marked by a large point.

Cut shortens or lengthens a line up to the intersection. Lengthening is called 'cut on'. *Reset* resets the last separation or cutting operation respectively.

separate ⇒ 2 Lines

cut/cut on ⇒ 1 Line

The separate/cut position can be determined in three different ways.

Step-by-step guide

Separate or cut at a cutting line

- ⇒ Define/construct a cutting line with *click cutting line* or *cutting line from point*
- ⇒ Activate *separate* or *cut*
- ⇒ Adjust *+/-cut mark*
- ⇒ Click lines to be separated or cut

Separate in a corner

- ⇒ Activate *separate in corner*
- ⇒ Adjust *+/-cut mark*
- ⇒ Click the corner in which the lines are to be separated outside

Separate menu

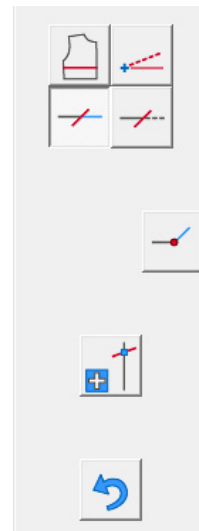
click cutting line ▪
cutting line from point

separate ▪ *cut*

separate in corner

+/-cut mark

reset

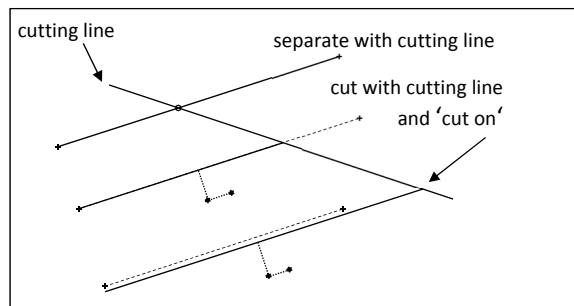


Separate/cut at a cutting line

Separating or cutting with a cutting line is the accurate option. First, a cutting line is to be determined. One or several lines can be separated or cut with it. The top four buttons of the *separate* menu relate to *separate with cutting line*.

First, the cutting line is to be defined. Grafis offers two options:

1. With *click cutting line* an existing line is determined as cutting line.
2. With *cutting line from point* the first point of the cutting line is constructed and the other point is defined freehand by moving the mouse.



Picture 5-19

The current cutting line is displayed in a different colour. Whether to cut or separate with this cutting line is determined by activating the appropriate function *cut* or *separate*.

1. With *separate with cutting line* the clicked line is divided at the intersection with the cutting line provided the two lines intersect. Practise this option with *+cut mark*. The separation position is marked by a point and thus easier to recognise.

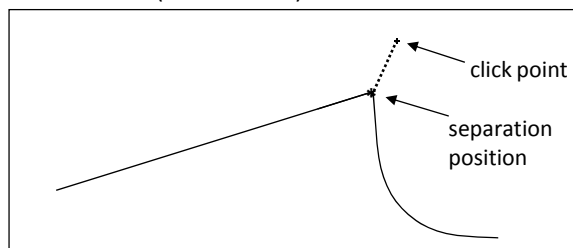
2. With *cut with cutting line* the part of the line beyond the cutting line in respect to the click position disappears. The click point defines the part of the line to remain existent. Result of this operation is one line, only.

It is not absolutely necessary for the cutting line and the line to be cut to intersect. A line ending before the cutting line is lengthened up to it when cutting with cutting line. This is known as 'cutting on' amongst Grafis operators. 'Cutting on' is possible to a maximum of 500mm.

The different options are depicted in Picture 5-19

Separate in a corner

This function separates a continuous line in a corner. The respective curve is to be clicked on the outside as Grafis separates at a point where an imaginary lightning would strike (lightning principle). As a result a small arrow is shown at the separation position for a short while (Picture 5-20).



Picture 5-20

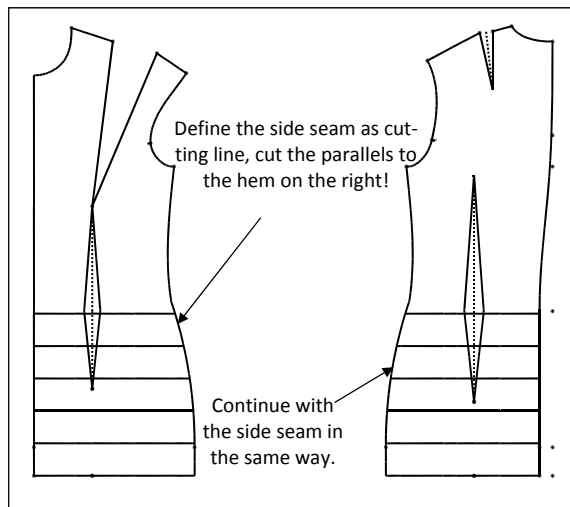
Further functions

The *cut mark* switch decides whether or not a marker is to be set when separating lines. As a rule, use *+cut mark*, as it is easier to recognise the separation position. A cut mark is a point with the attribute *big point* (see section 7.6). The cut markers can be deleted as points.

Reset can undo the last construction step.

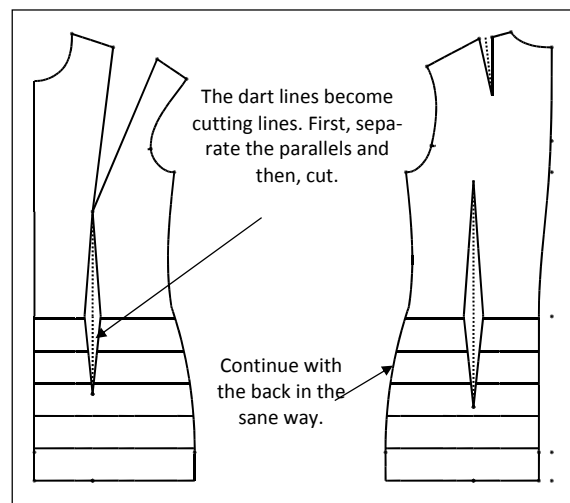
Exercise

Call the basic block *Bodice 10* and construct 5 parallels each to the hem at a distance of 50mm. Cut the parallels along the side seam (Picture 5-21). Please



Picture 5-21

note that clicking defines the side for cutting off. Errors can be corrected with *reset*. Continue and remove also the pieces of the parallels from the dart.



Picture 5-22

Define the first dart line as the cutting line and separate initially. Then, define the other dart line as the cutting line and cut (Picture 5-22).

5.5 The tool Front edge 30

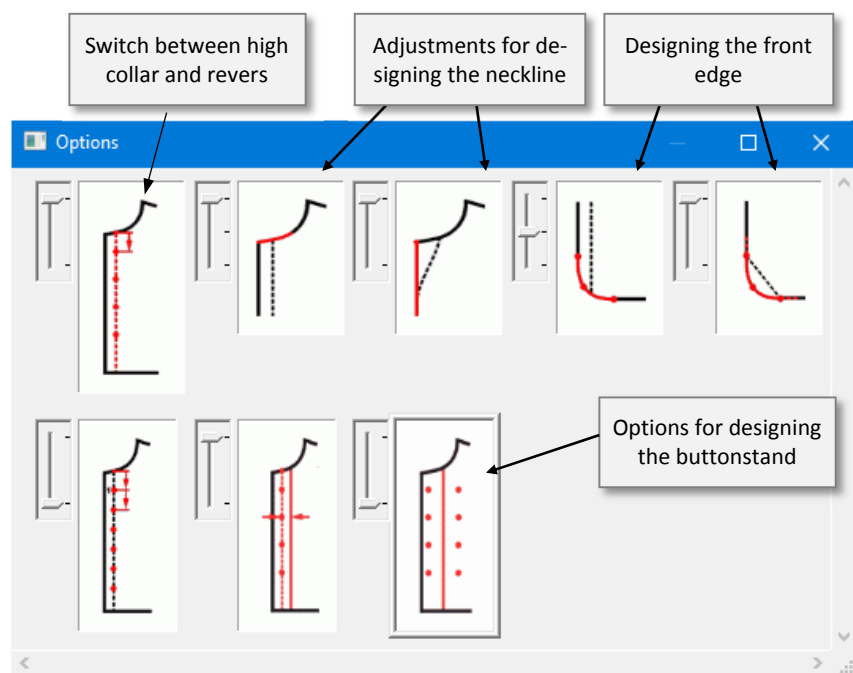
All three front edge tool variations require three or four lines:

- the neck line
- a continuous line for the centre front
- a hem line and
- a reference line for the revers point

The tool *Front edge 30* is suitable for high collars and for revers collar constructions.

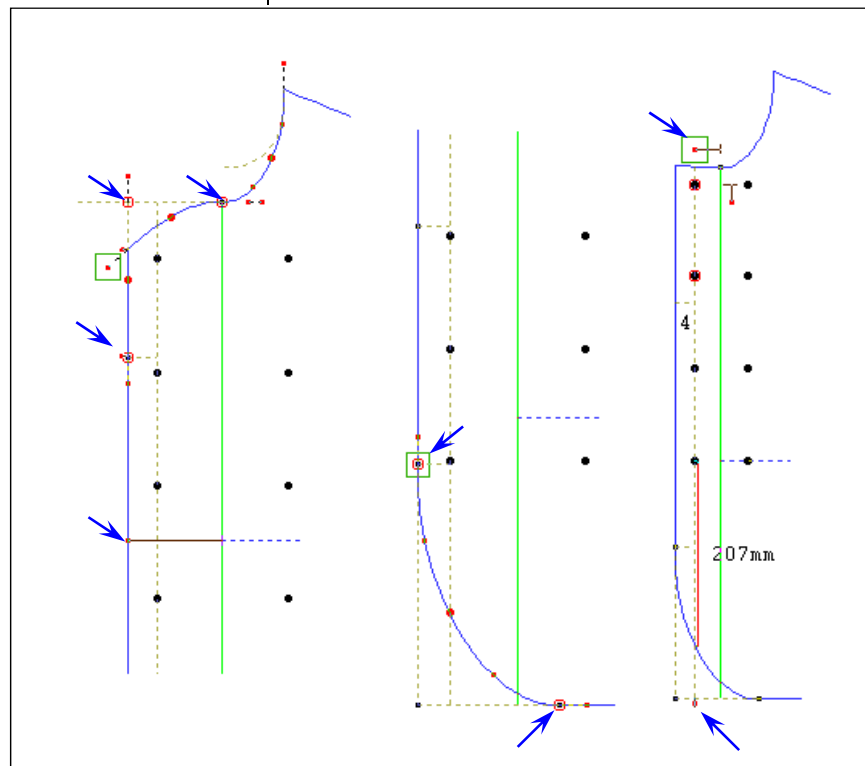
Call *Bodice 50* and interactively shorten the hem. Then, call the tool *Front edge 30* from the *Grafis-Support programs*. Click exactly on the requested lines, following the right principle. If you require this construction for the right front panel of an **asymmetrical style development**, call the front edge from *Grafis-Support programs (mirrored)*.

First, the options must be adjusted (Picture 5-23). The first option, high collar or revers construction, is important. This option defines the buttonstand construction, starting at the neckline or at the clicked reference line. Only in case of a high collar construction, further options for shaping the neckline are available. The options for designing the buttonstand are similar to the interactive *Raster 20* tool. A further option for double-breasted fronts is available. After all options have been adjusted, the interactive adjustments in the three drag areas ensue.

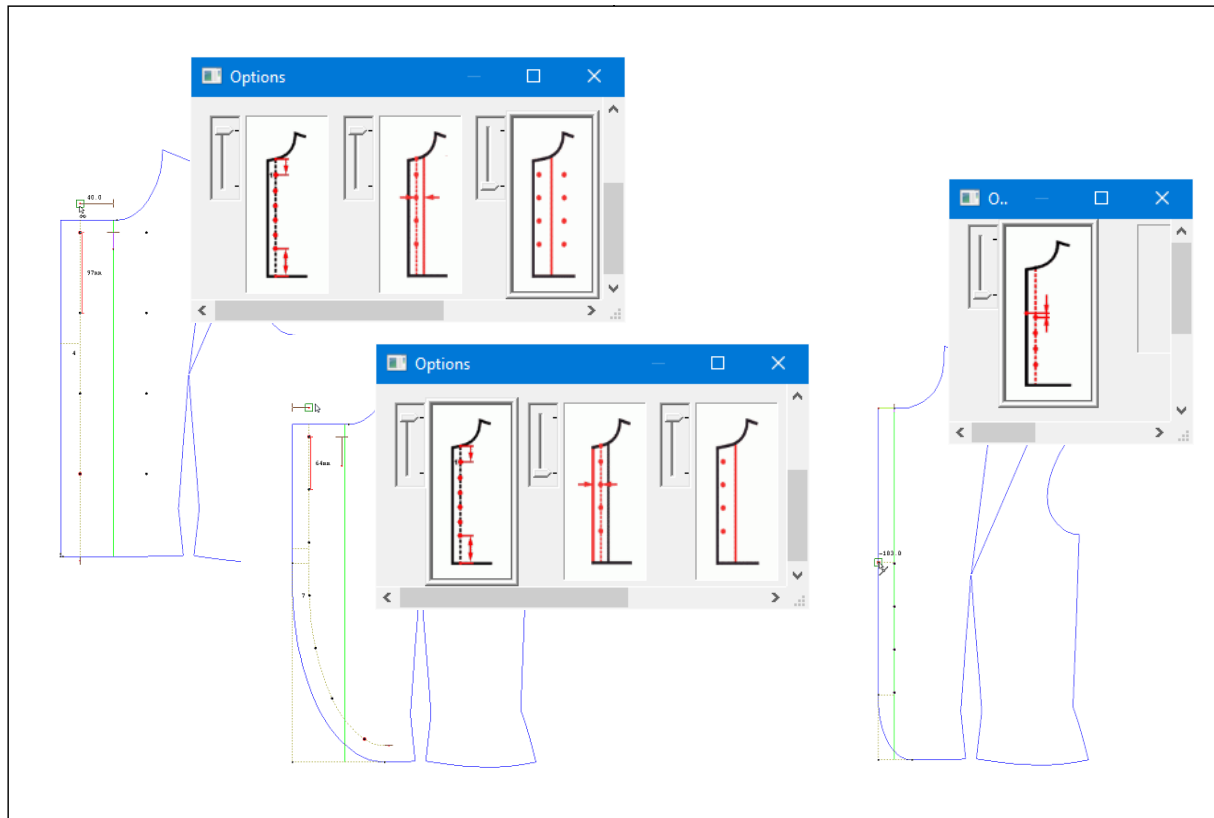


Picture 5-23

In the first drag area *Overlap* (Picture 5-24 left) the indicated drag points define the corner points for the contour. All other drag points help adjusting the curves, see section 5.1. In the second drag area *Front point* (Picture 5-24 centre) the indicated points define the contour.



Picture 5-24



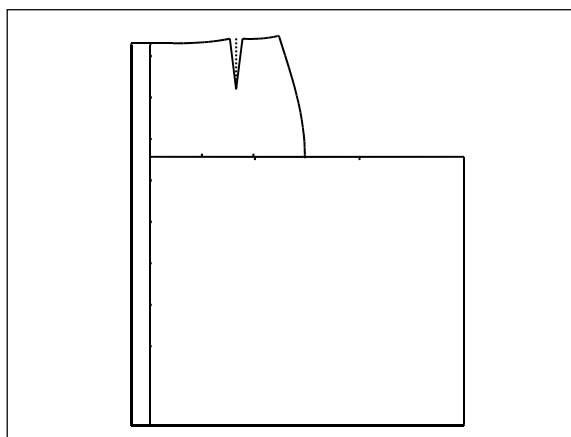
Picture 5-25

All other points help designing the curve. In the third drag area *Buttons* (Picture 5-24 right) the indicated points define the position of the button stand. The bottom point can adjust the button stand at an angle. All other points are as in *Raster 20* tool. Adjust the front edges displayed in Picture 5-25 interactively.

5.6 Exercises

1st Exercise

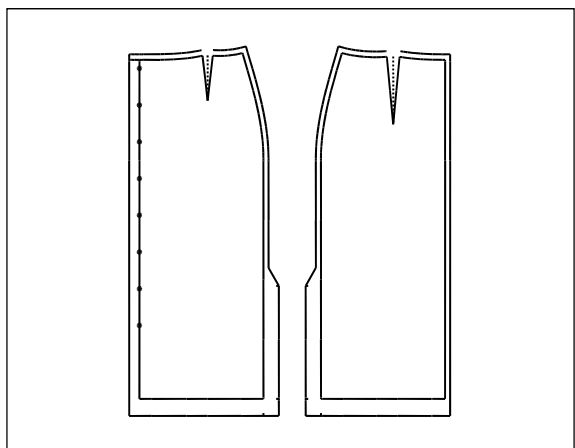
From the basic block *Skirt 20* construct a skirt with gathering. Call *Skirt 20* and insert the lines of the front skirt into a further part in the part organisation. Construct a parallel of 30mm for the overlap. Lengthen the hip line and hem line by 250mm. Move the side seam by 250mm with *parallel* using *-copy*.



Then, construct a button stand on the centre front. A total of 6 buttons are to be set. The first button is positioned 20mm from the waist and the last button 100mm from the hem. Set the gathering symbols once you have worked through Chapter 7.

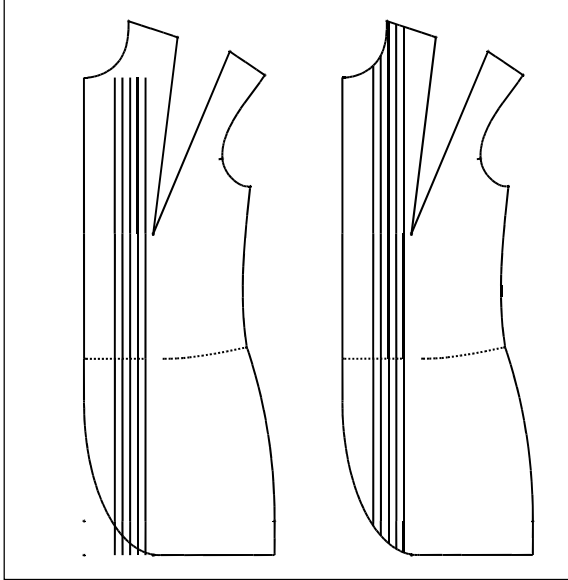
2nd Exercise

From the basic block *Skirt 20* construct a skirt with vent in the side seam and an overlap with button stand. The vent height is 200mm, vent width is 30mm, overlap and hem are 30mm and all seam allowances are 10mm. The first button is to be positioned at 20mm from the waist. A total of 8 buttons with a distance of 65mm are to be placed.



3rd Exercise

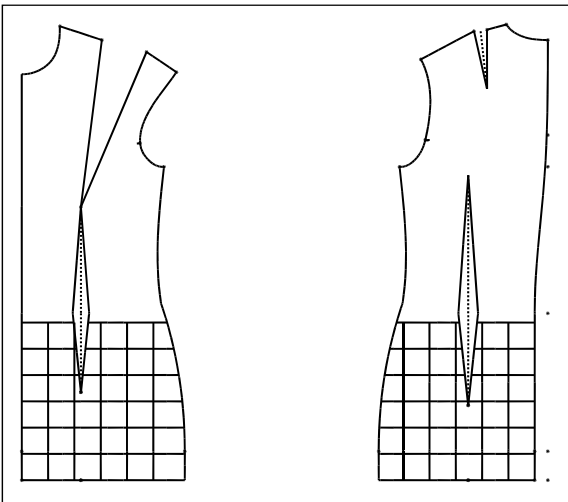
Construct five pin-tucks in the front of basic block *Bodice 10*. First, delete the waist dart. Create the first parallel at a distance of 40mm to the centre front. The other four pin-tucks should be positioned at a distance of 10mm from the first pin-tuck. Link the neckline with the shoulder with *link single*. This gives you a continuous cutting line. Construct the cut away



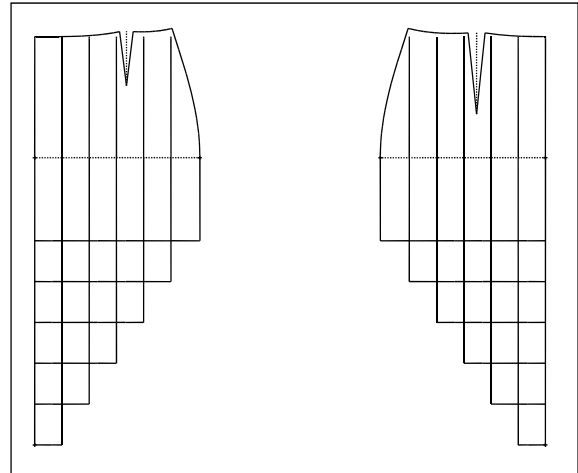
with the tool *Link 20*. Cut the parallels at the hem, the neckline and at the shoulder with the *separate* function.

4th Exercise

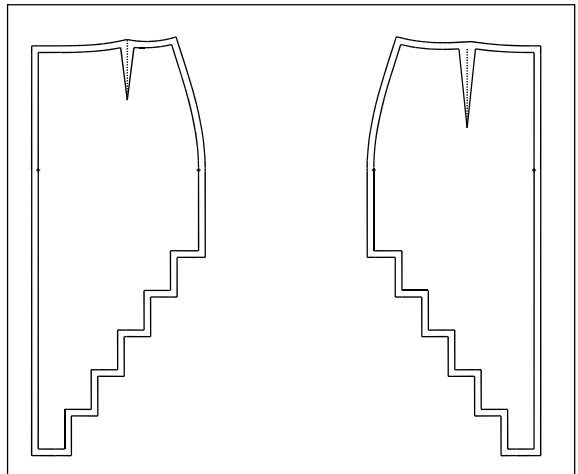
Call the basic block *Bodice 10*, link the hem lines in the front and in the back and create a parallel of 40mm to the centre front, centre back and the hem. Cut the parallels at the side seam and at the waist darts. Use the *separate* function.

**5th Exercise**

Open the style 'Straight skirt' from Chapter 2 Section 2.4. Construct five parallels at a distance of 70mm to the hem and five further parallels at a distance of 40mm to the centre front and centre back. Create the displayed pattern with *corners*.

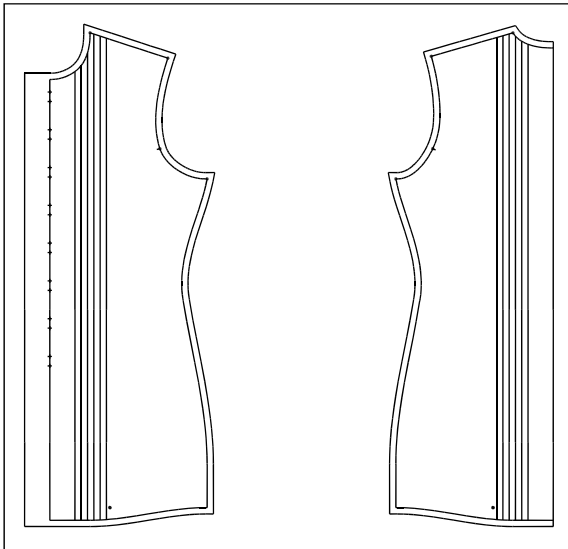


Construct a seam allowance of 10mm and close the perimeter with *link* (waist) and *corners*.



6th Exercise

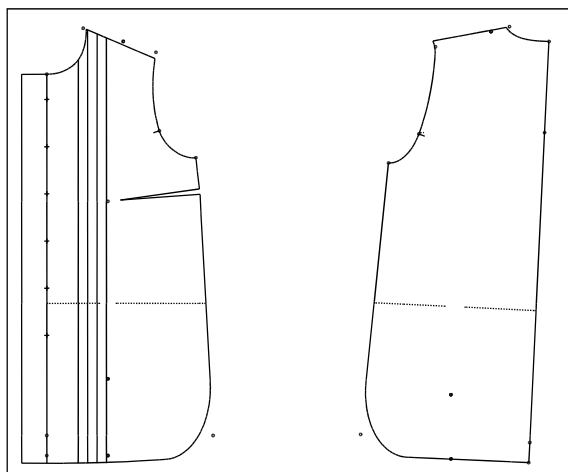
Call the basic block *Bodice 20* and construct parallels to the centre front and centre back at a distance of 40mm to the inside and further five parallels at a distance of 10mm to the new parallel lines. Cut the parallels at the hem, neckline and at the shoulder. Construct an overlap of 40mm to the centre front and the displayed seam allowance of 10mm with the tool *Front edge 30*. Close the perimeter with the *corners* function.



Adjust the position of the buttons of *Front edge 30* to create 8 buttons with a distance of 60mm respectively. The first button is positioned 20mm from the neckline. The other points are generated with the *Raster 20* tool using the following parameters: 8 buttons, distance 60mm, 35mm from neckline. This results in a point pair with a distance of $35\text{mm} - 20\text{mm} = 15\text{mm}$, see also 4th exercise in section 5.2. Close the perimeter with *corners*.

7th Exercise

Open the style 'Shirt blouse' from Chapter 2 Section 2.5 and delete the points on the centre back, the waist dart and the auxiliary lines. Link the lines of the

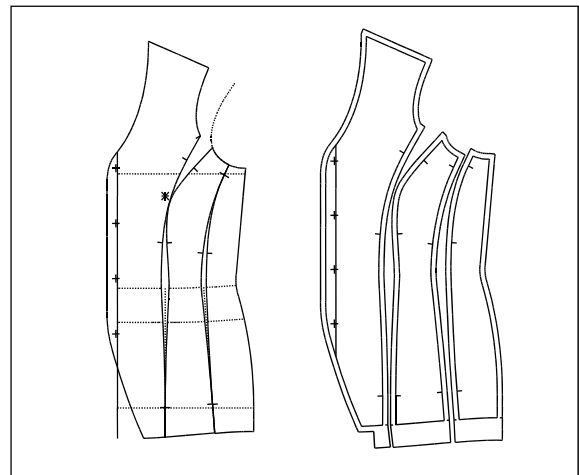


shoulder, the armhole, the side seam, the hem and the centre back with *link single* respectively. Create a co-ordinated corner (120/80mm) with the *Corner 50* tool. Construct a sequence of 6 points on the centre front, starting 40mm from the neckline at a distance of 75mm between points. Create parallels for pin-tucks. The first pin-tuck is to be positioned 50mm from the centre front. The other pin-tucks are placed at a distance of 15mm. Cut the pin-tucks at the neckline and the shoulder. Construct an overlap of 40mm and close the corners of the overlap.

Save the style as 'Blouse with pin-tucks'.

8th Exercise

Call the basic block *Bodice 50*. Open a new part in the part organisation and call the *Front part 20* tool into the new part. Switch the options to princess seam. Construct an overlap with the tool *Front edge 30* and adjust an overlap breadth of 20mm and a one button line with 4 buttons. The distance for the opening is 120mm from the base neck line.



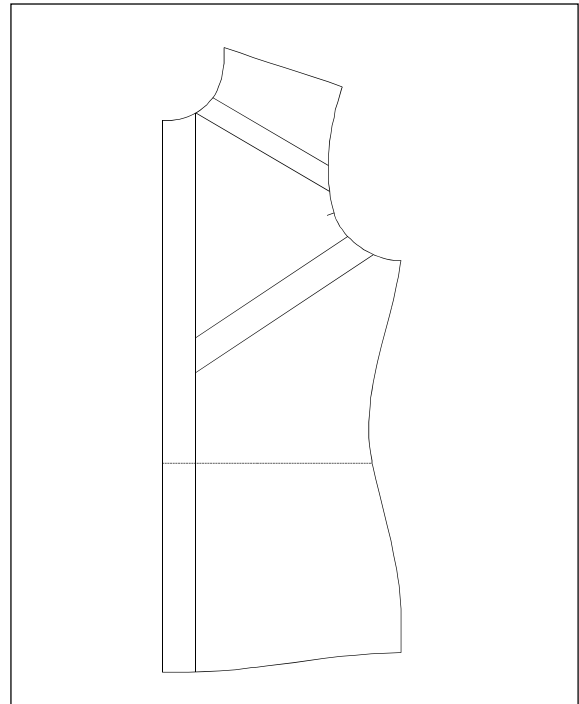
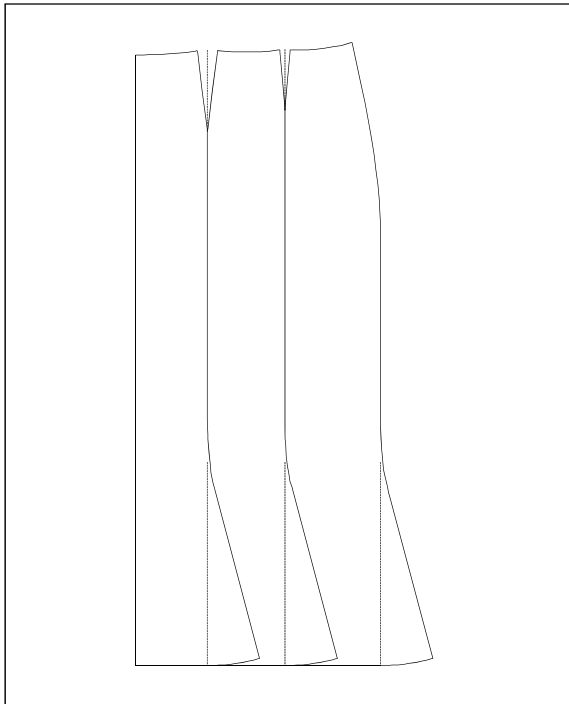
Adjust the shown (pictured) front point in the tool *Front edge 30*, whereas you start with the option adjustment. Insert the pattern pieces into new parts of the part organisation and construct the seam and hem allowance with the functions *parallel* and *corner*.

Chapter 6 Point, line and direction construction

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6.1 Line construction in conjunction with the sub-menu point construction

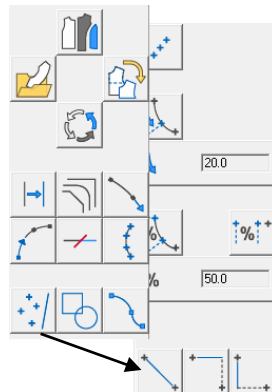
Grafis works with the construction objects *point* and *line*. For the construction of these objects, the sub-menus point and direction construction are of particular significance. The sub-menu point construction is explained in the following using the example of line construction with *line from point to point*.

Line from point to point

Step-by-step guide

- ⇒ *points and lines*
- ⇒ Activate *line from point to point*
- ⇒ Construct the first point
- ⇒ Construct the second point

This function constructs a line between two points. Having called the function, the sub-menu point construction opens for the construction of starting and final point.



It is not necessary to attach the line to existing point objects! The position of starting and final point of the line is determined with the point construction sub-menu.

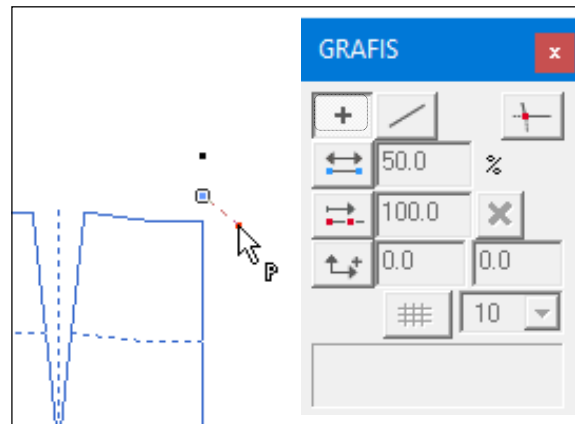
Significance of point construction

Point construction determines the position of the point in the base size and all other sizes.

Therefore, it is important to reflect for each construction step which option of the point construction is the most appropriate for the specific step. On a line of 100mm length, points constructed at 20% and 20mm are placed at exactly the same position. When the length of the line changes, the two points are positioned at different locations.


6.1.1 Point construction with click p, click l, free-hand and the free mode


Construct line on existing points with *click p*

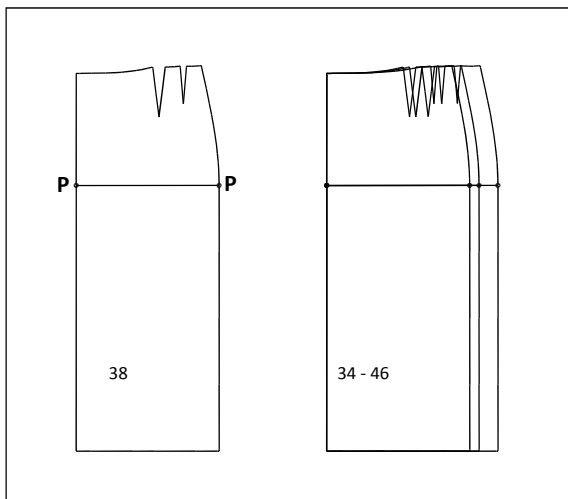


Picture 6-1

Step-by-step guide

- ⇒ *points and lines* → *line from point to point*
- ⇒ Activate  (in the following *click p*)
- ⇒ Click on the first point
- ⇒ Click on the second point

During grading, a point set with *click p* is always attached to the clicked point. Activate *click p* and move the cursor over the pattern. A fine thread originating from the cursor (thread cursor) and a green circle mark the position for the new starting or final point of the line after . In this case, the thread cursor points at existing points, only, see Picture 6-1.




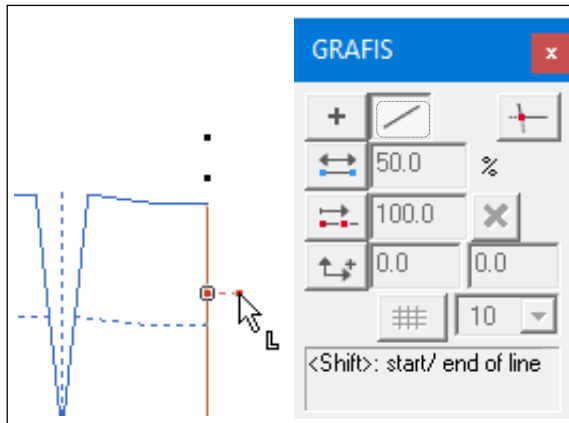
Picture 6-2

Construct a line from the hip point to the centre front with *click p* and grade in sizes 34, 38 and 46 (Picture 6-2).

Construct a line on existing lines with *click l*

Step-by-step guide

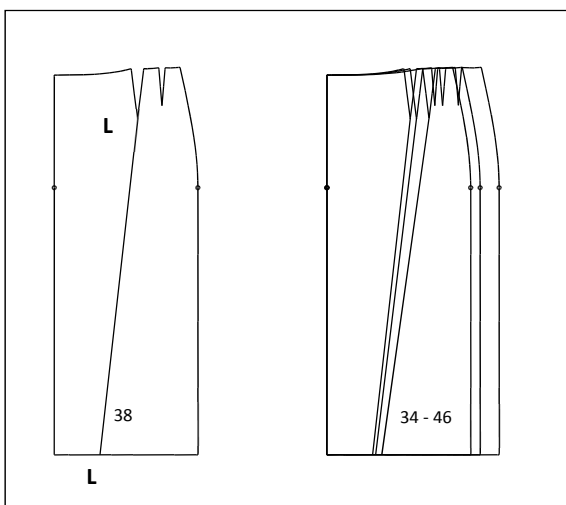
- ⇒ *points and lines* → *line from point to point*
- ⇒ Activate  (in the following *click l*)
- ⇒ Click on the first point
- ⇒ Click on the second point



Picture 6-3

With *click l* a point is constructed on a line, at the position on the line closest to the cursor. During grading, this point is moved **relative to the length of the line**. With this type of construction, it is important to check the base line: it should not be linked unnecessarily across corners. A point on the side seam is graded differently if the side seam is linked with the hem. In this case, the point is graded relative to the length of the linked side seam and hem.

Activate *click l* and move the cursor over the pattern. The thread cursor will point to the nearest line, respectively. The colour of the line also changes, see Picture 6-3. **Pressing <Shift> selects the starting point or final point of the line.**



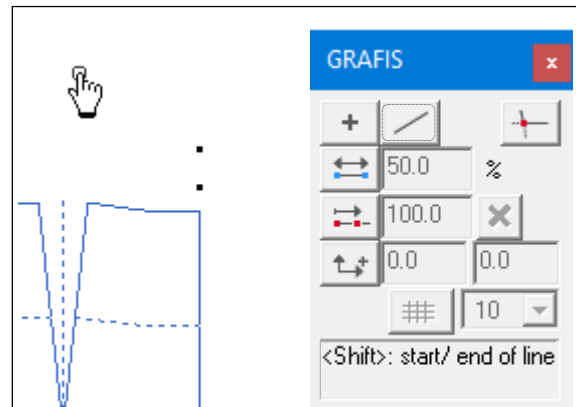
Picture 6-4

Construct a line from the end of the dart to the hem. Set the starting point using the <Shift> key. Grade in sizes 34, 38 and 46 (Picture 6-4).

Construct a line in the free mode and with *freehand point*

Step-by-step guide

- ⇒ *points and lines* → *line from point to point*
- ⇒ Deactivate an active button if applicable, Picture 6-4
- ⇒ Click the first point
- ⇒ Click the second point

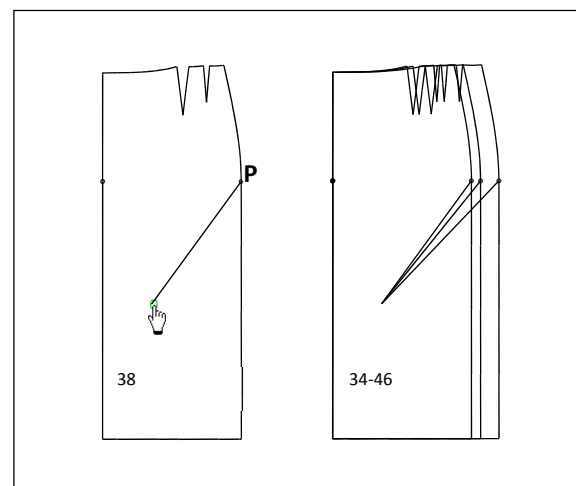


Picture 6-5

The free mode is active if no button is pressed in the dialogue. In the free mode, the point constructions *click p*, *click l* and *freehand point* are active, simultaneously. The point constructions *click p* and *click l* have already been explained. A *freehand point* can be set as soon as the cursor has taken on the shape



. *Freehand points* are placed in the same position for all sizes. *Freehand points* should be avoided and used under special circumstances, only as they contain no grading information.



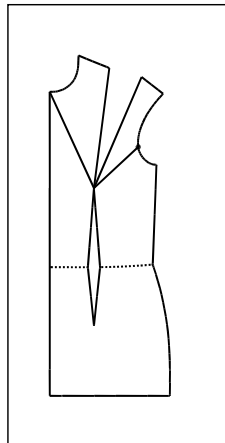
Picture 6-6

Set the free mode (see Picture 6-5) and construct a line according to Picture 6-6. The starting point is set onto the hip point with *click p* in the free mode and the final point is set as a *freehand point*. Grade in sizes 34, 38 and 46 (see Picture 6-6).

Exercises on point construction with click p, click l and the free mode

1st Exercise

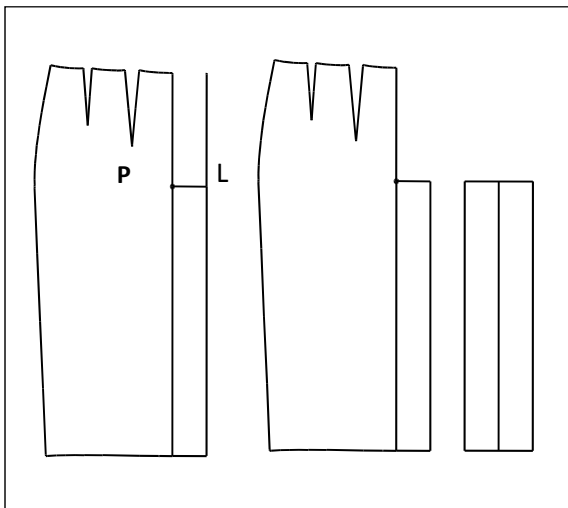
Call the *Bodice 50* and construct a line from the bust dart to the front pitch. Use the free mode for the point construction with <Shift> or directly with *click p*. Construct a second line from the centre front/neckline to the bust dart. Use <Shift> in the free mode. Grade in sizes 38 to 46.



Picture 6-7

2nd Exercise

Call the *Skirt 20* and construct an inverted pleat with a depth of 60mm in the centre back using *parallel* and *line*

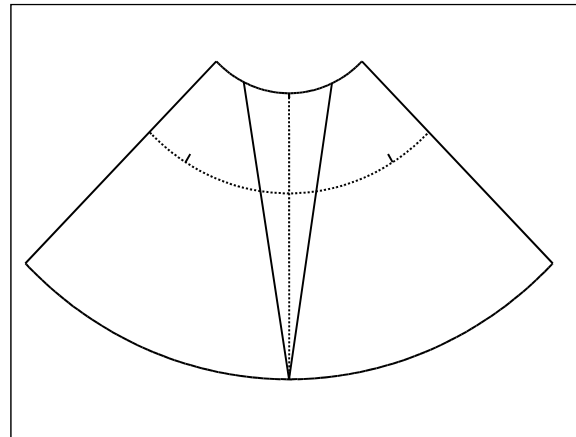


Picture 6-8

from point to point and a separate pleat back, see Picture 6-8.

3rd Exercise

Call the *Skirt 10* and construct two panel seams starting at the waist, ending at the corner side seam/hem. Use the free mode or *click l*, directly in conjunction with <Shift> for the point construction. Grade in sizes 38 to 46, see Picture 6-9.




Picture 6-9

6.1.2 Point construction with relative length and partial length

Construct a line onto an existing line with *relative length rlg*

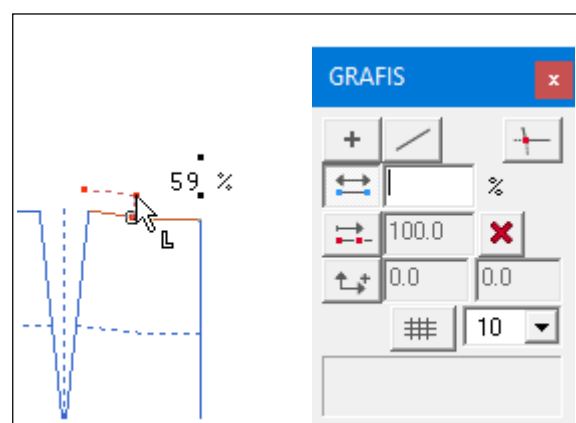
The variation *relative length rlg* generates a point at the relative length of a line. The relative length in % relates to the total length of the line. The right principle must be followed when clicking the line, as the relative length is measured from the beginning of the line.

Step-by-step guide

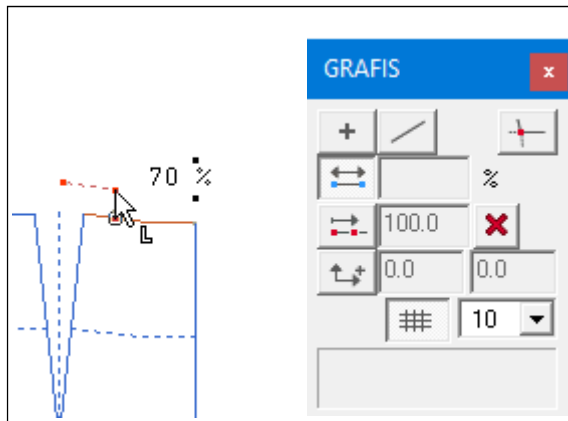
- ⇒ *points and lines* → *line from point to point*
- ⇒ Activate  (in the following *click rlg*)
- ⇒ Click on the first point
- ⇒ Click on the second point

Setting a point at a relative position can ensue in three different variations:

1. Free value, no raster

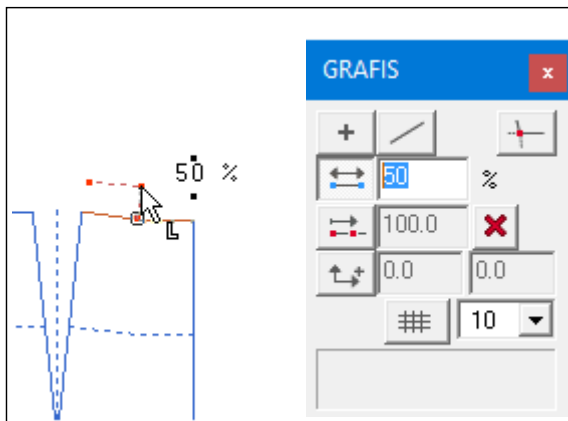


Picture 6-10


2. Free value, with raster

Picture 6-11

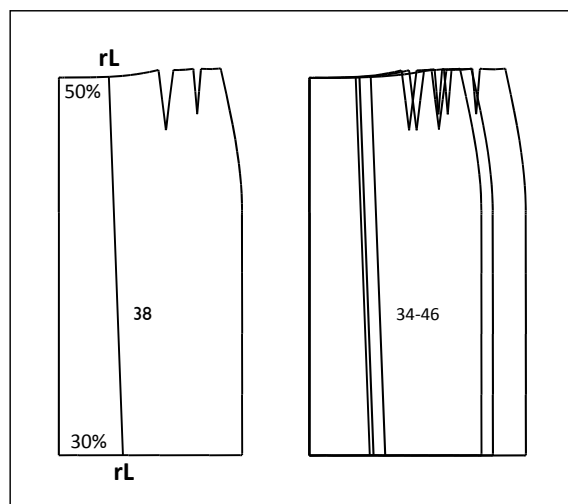
3. Fixed entered value



Picture 6-12

X, g and z values can be entered as *rlg* (see Chapters 11 and 12). A fixed entered value can be deleted with .

Construct a panel seam with *line from point to point* (Picture 6-13). The panel seam starts at the waist at 50% of the first part of the waistline from the centre front and ends at the hem at 30%. Grade in sizes 34, 38 and 46.




Picture 6-13

Construct further panel seams using the three variations introduced above.

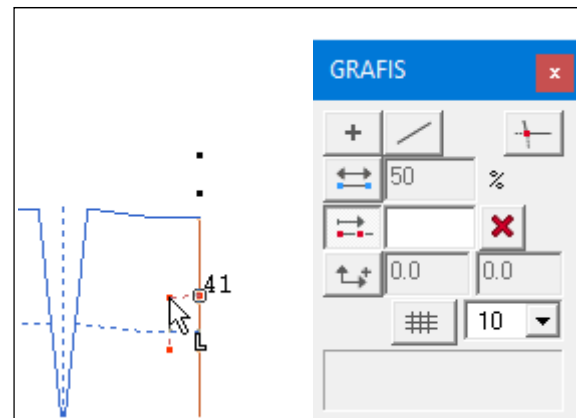
Construct a line onto an existing line with partial length *plg*

As opposed to *click rlg*, *click plg* generates a starting/ final point at the partial length of a line. Here also, the right principle must be followed as the partial length is measured from the beginning of the line. The length is displayed at the cursor.

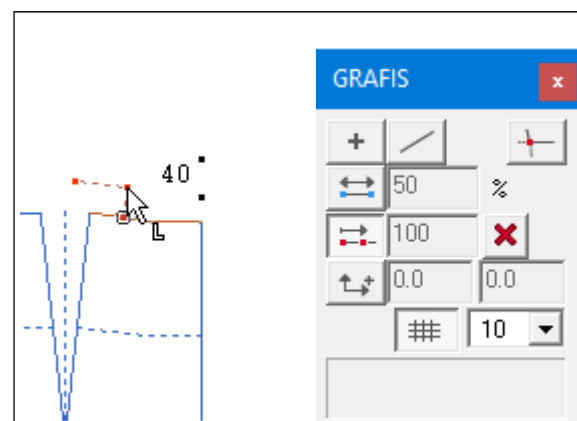
Step-by-step guide

- ⇒ *points and lines* → *line from point to point*
- ⇒ Activate  (in the following *click plg*)
- ⇒ Click on the first point
- ⇒ Click on the second point

Setting a point at a partial length ensues in three different variations, as with *click rlg*:

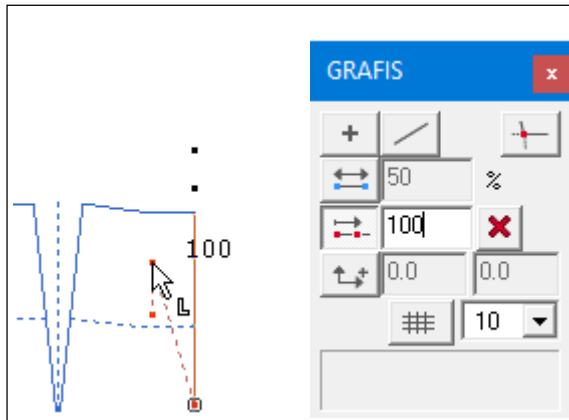
1. Free value, no raster

Picture 6-14


2. Free value, with raster

Picture 6-15

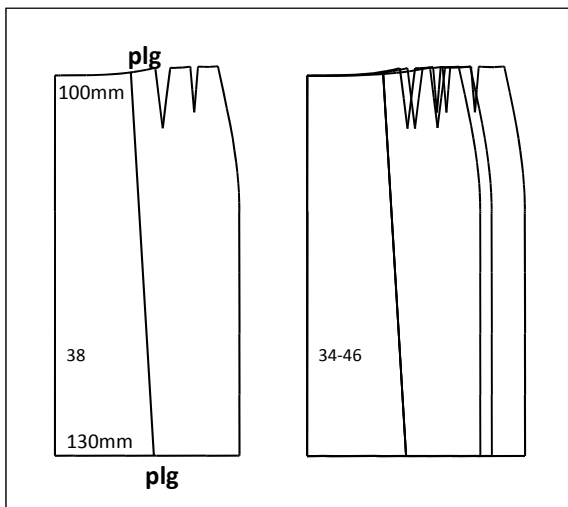
3. Fixed entered value



Picture 6-16

X, g and z values can be entered as *plg* (see Chapters 11 and 12). A fixed entered value can be deleted with .

Construct a panel seam in the basic block *Skirt 20* with *line from point to point*. The panel seam starts at the waist at 100mm from the centre front and ends at the hem at 130mm from the centre front. Grade in sizes 34, 38 and 46 (Picture 6-17).



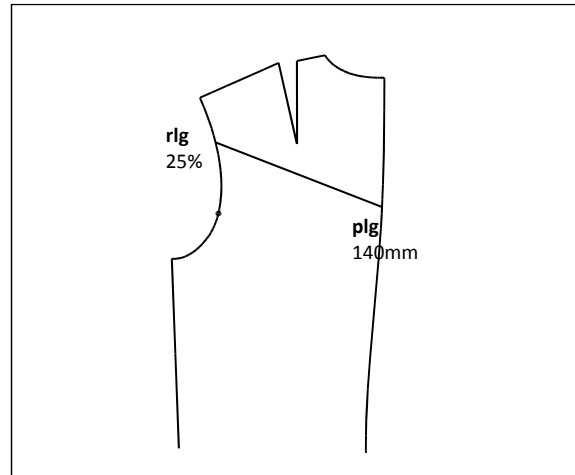
Picture 6-17

Construct further panel seams using the three variations introduced above.

Exercises on point construction with *click rlg* and *click plg*

1st Exercise

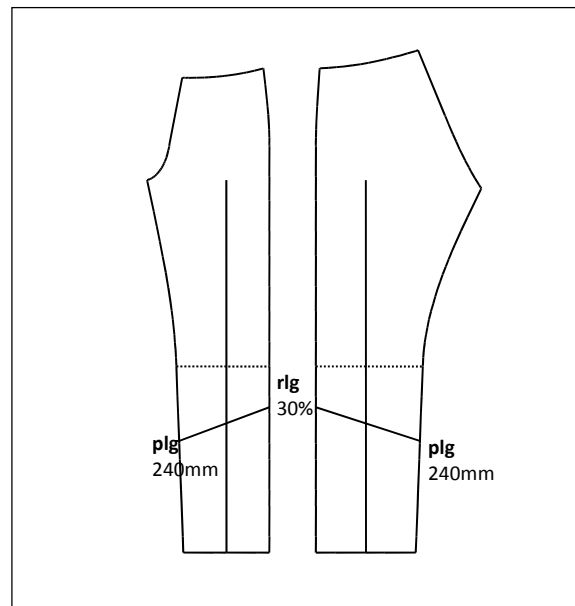
Call the *Bodice 50* and construct a yoke in the back. The yoke starts at 25% of the armhole from the shoulder and ends at the centre back at 140mm from the neck. Use *click rlg* and *click plg* for the point construction. Grade in sizes 36 to 46.



Picture 6-18

2nd Exercise

Call the *Trouser 60* and construct a panel seam in the front and back trouser leg. The panel seam starts at inside leg seam at 240mm from the hem and ends at the side seam at 30% from the hem. Use *click rlg* and *click plg* for the point construction. Picture 6-19. Grade in sizes 36 to 46.




Picture 6-19

6.1.3 Point construction with intersection

Construct a line with the intersection of two lines

Step-by-step guide

- ⇒ *points and lines* → *line from point to point*
- ⇒ Activate  (in the following *intersection*)
- ⇒ Construct the first point
- ⇒ Construct the second point

Using *intersection* generates a starting/final point at the intersection of two lines or curves. The lines and/or curves are to be clicked one after the other. The cursor displays \times_1 when the first line is to be clicked and \times_2 when the second line is to be clicked. The first clicked line is highlighted in colour. During stage \times_2 , a green circle appears when touching the second line at the point of intersection created after \times_1 . An intersection is also constructed if both lines intersect only in their extension of 500mm maximum. Ensure that the lines will actually intersect after grading. If the 500mm limit is exceeded, a warning appears.

Construct a line from the end of the dart to the corner point centre front/hem with *line from point to point*. Construct starting and final point with *intersection*. Grade in sizes 34, 38 and 46 (Bild 6-20).

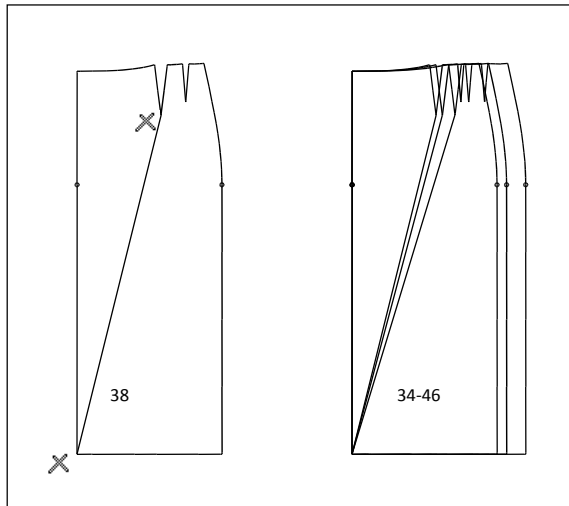
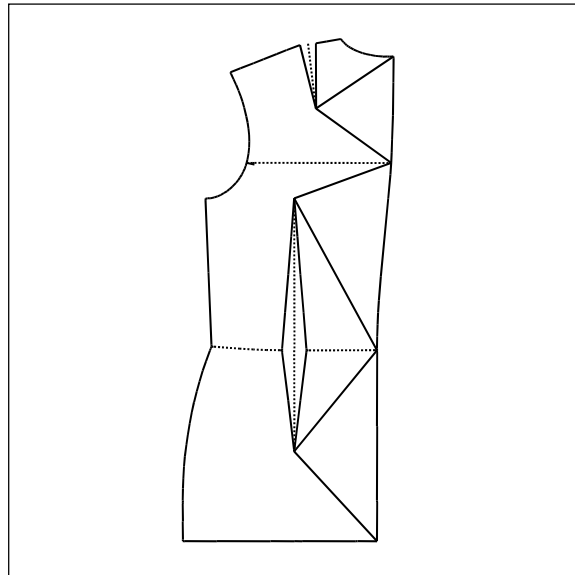


Bild 6-20

Construct further panel seams with *intersection*.

Exercises on point construction with *intersection*

Call the *Bodice 50* and construct panel seams in the back according to Picture 6-21.



Picture 6-21


Set the starting and final points with *intersection*. Grade in sizes 36 to 46.

6.1.4 Point construction with xy co-ordinates

Construct a line with xy co-ordinates

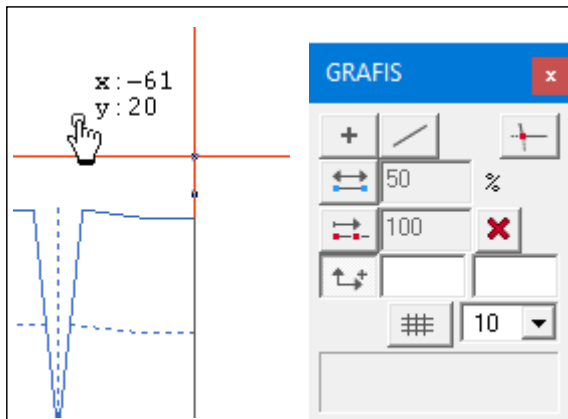
The position of xy points relates solely to the co-ordinate origin, see section 4.3. The points are not linked to any objects of the construction. They remain in the same position during grading. xy points should be used for 'zero run constructions' in conjunction with construction parameters, only (see Chapters 11 and 12).

Step-by-step guide

- ⇒ *points and lines* → *line from point to point*
- ⇒ Activate  (in the following xy point)
- ⇒ Construct the first point
- ⇒ Construct the second point

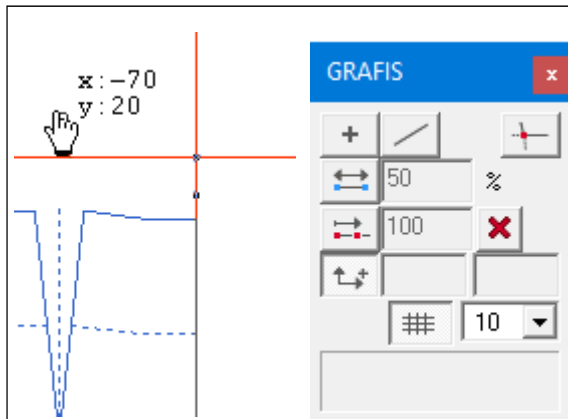
Setting a point at absolute co-ordinates can ensue in three different variations as for *click rlg* and *click plg*:

1. Free value, no raster



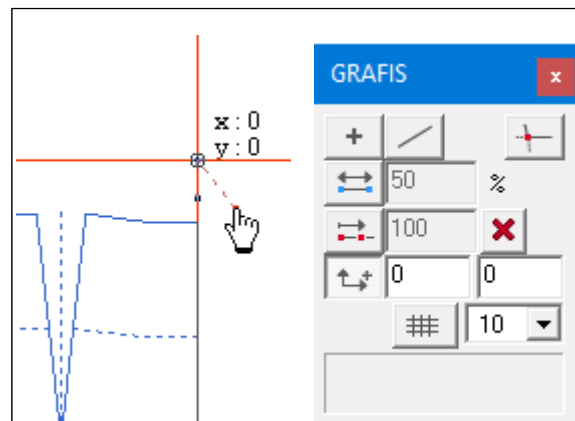
Picture 6-22

2. Free value, with raster




Picture 6-23

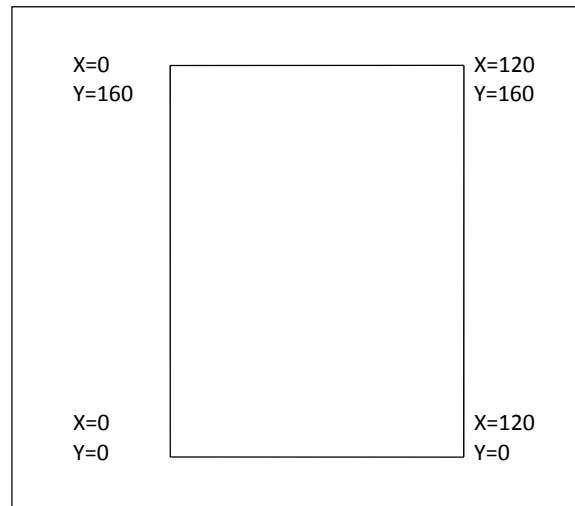
3. Fixed entered value



Picture 6-24

X, g and z values can be entered as *x and y co-ordinate* (see Chapters 11 and 12). A fixed entered value can be deleted with .

Construct a rectangle of 120mm width and 160mm height with *line from point to point*. The lower left corner point is to be the co-ordinate origin. Use the raster. Grade in sizes 34, 38 and 46 (Picture 6-25).



Picture 6-25

The rectangle will have the same position and same measurements in all sizes. Grading information can be related with the use of construction parameters (Chapters 11 and 12).

6.2 Point construction

The *points and lines* menu

The *points and lines* menu can be called from the basic menu, directly. The *points and lines* menu contains four options for the construction of a single new point. Indirectly, new points can also be created from existing points via move, turn or mirror transformations, see Chapter 10.

Points and lines menu (extract)

single point

point at a distance to a base

point on a line (short: p+d on l)

distance value

point between two points on

a line (p+rel+p on l) ▪ point

between two points (p+rel+p)

relative value



6.2.1 Single point

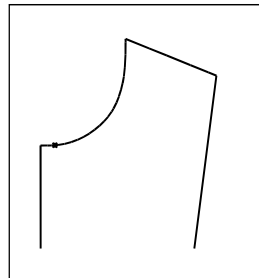
Step-by-step guide

⇒ *points and lines*

⇒ *single point*

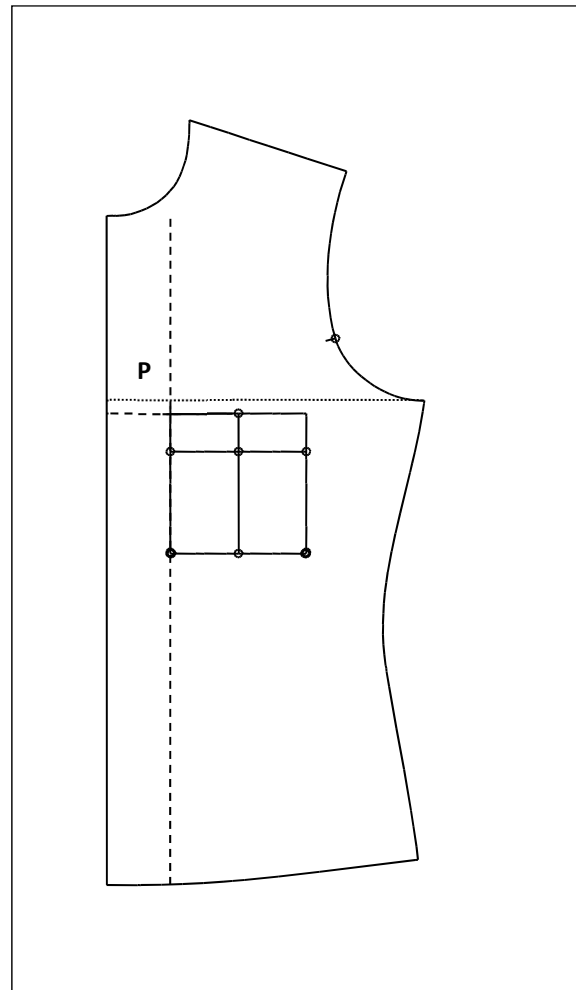
⇒ Construction of the point with the point construction sub-menu

Call the *Bodice 50* and construct a point on the front neckline at a partial length of 10mm from the centre front for the collar position, Picture 6-26.



Picture 6-26

Call the *Bodice 30*. Construct a parallel to the bust line and to the centre front with the *Parallel 10* tool. Set the parallel interactively to 50mm. Construct a point at the intersection of the two parallels. Then, delete the two parallels. The parallels remain interactively adjustable even after deletion via <F12>. Call the *Pocket 10* and bind the pocket to the constructed point, Picture 6-27.



Picture 6-27

6.2.2 Point at a distance to a base point on a line

Step-by-step guide

⇒ *points and lines*

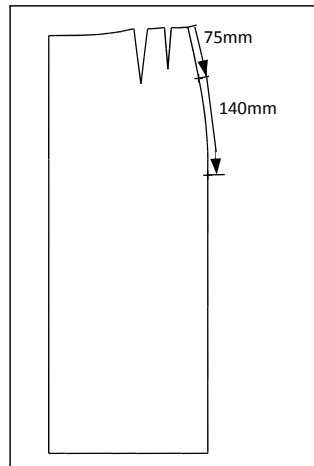
⇒ Enter the *distance value*

⇒ Activate the function *Point at a distance to a base point on a line* (short: p+d on line)

⇒ Construct the base point with the point construction sub-menu

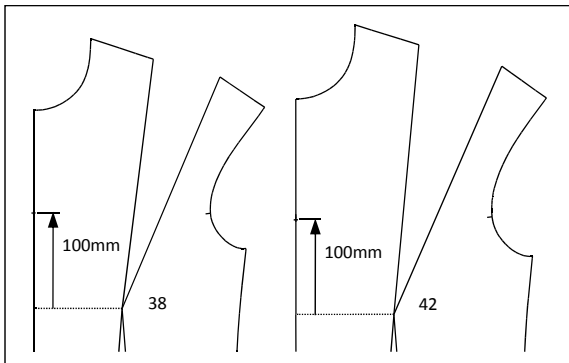
This function constructs a new point on an existing line with a fixed distance to an existing point. The entered distance is measured along the line and considered also during grading. The right principle must be followed when clicking the line.

In Picture 6-28 two new points were constructed for a pocket in the side seam of *Skirt 20*, using *single point* and *p+d on line*. The first point on the side seam is constructed as a single point at a partial length of 75mm. Activate the menu option *single point* in the *points and lines* menu and construct the point at 75mm with *click tlg*.



Picture 6-28

For the second point first enter the distance value 140. Clicking on *p+d on line* opens the point construction sub-menu for selection of the base point. Use the free mode or *click p*. Then, the base line is to be clicked, following the right principle. The right principle defines the direction in which the distance is to be measured.



Picture 6-29

If the base point is not positioned on the base line, the construction starts at its perpendicular point to the base line. In Picture 6-29 the bust point is the base point. The new point is constructed at a distance of 100mm from its perpendicular point onto the centre front.

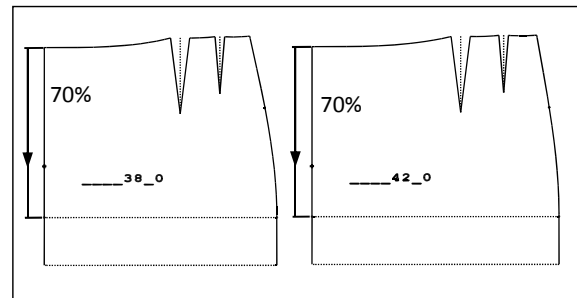
6.2.3 Point between two points on a line

Step-by-step guide

- ⇒ *points and lines*
- ⇒ Enter the *relative value*
- ⇒ Activate the function *point between two points on a line* (short: *p+rel+p on l*)
- ⇒ Construct the first base point
- ⇒ Construct the second base point
- ⇒ Click the base line

The new point is constructed on the base line at a relative position between two base points. The distance between the base points is measured along the line.

As opposed to the example in Picture 6-28 the new points in Picture 6-30 were constructed at a relative length position. For the point on the centre front enter the *relative value* 70. in the *points and lines* menu. Clicking on *p+rel+p on l* opens the sub-menu point construction to define the two base



Picture 6-30

points between which the new point is to be constructed. Click the waist point and then the hip point on the centre front with *click p*. With this succession you define that the distance is measured from the waist. After having clicked the base line, (here: centre front) the new point is constructed. Should the base points not be placed on the base line, their perpendicular points onto the base line are used.

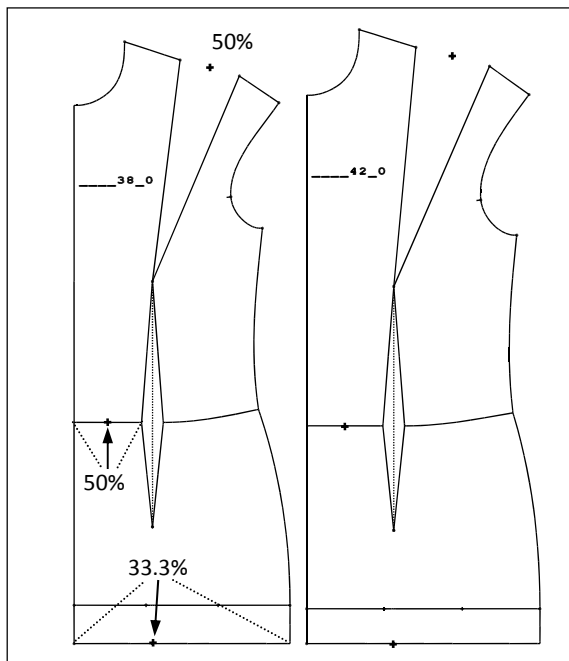
6.2.4 Point between two points

Step-by-step guide

- ⇒ *points and lines*
- ⇒ Enter the *relative value*
- ⇒ Activate the function *point between two points* (short: *p+rel+p*)
- ⇒ Construct the first base point
- ⇒ Construct the second base point

The new point is constructed at a relative position between two base points. No base line is required. The position is determined relative to the first base point.

In Picture 6-31 three new points are constructed with the function *p+rel+p* in the basic block *Bodice 10*. For the bisector of the bust dart enter the *relative value* 50. After having clicked on *p+rel+p* and the two final points of the dart line, the new point is constructed. The centre point on the waist line of the front was placed in the same way. The third point is constructed by first linking the hem line and then, defining the *relative value* as 33.3.



Picture 6-31

Clicking on *p+rel+p* and the end points of the hem line constructs the point. The succession in which the points are clicked determines the direction from which the 33.3% are measured.

6.3 Line constructions

The *points and lines* menu

The different construction principles for the creation of line objects with the functions of the *points and lines* menu form the subject of this section. A further line construction in conjunction with direction construction is the subject of the following section.

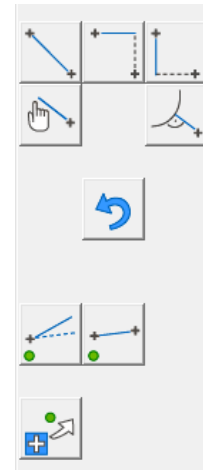
Points and lines menu (extract)

- line from point to point ▀
- horizontal line ▀
- vertical line
- freehand line from point ▀
- perpendicular onto a line

reset

Line 10 tool ▀ Line 20 tool

start the tool automatically



6.3.1 Line from point to point and *Line 20* tool

This principle has already been used to explain the sub-menus point construction in section 6.1.

Step-by-step guide

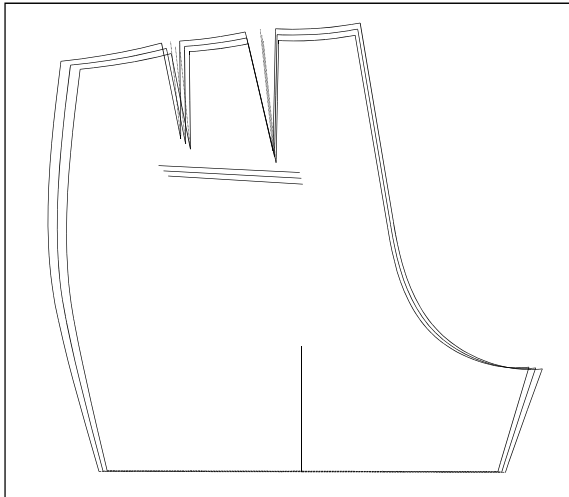
- ⇒ *points and lines*
- ⇒ Activate *line from point to point*
- ⇒ Construct first point
- ⇒ Construct second point

With *line from point to point* a line is constructed between two points. After having called this line construction the sub-menu point construction is opened for construction of the starting and final point of the line.

6.3.2 Line 20 tool

The *Line 20* tool also constructs a line from point to point. However, as opposed to the function *line from point to point* this line can subsequently be moved interactively and if required it can even be released from its base line.

In the trouser back of *Trouser 10* construct a line for the pocket mouth using the tool *Line 20*. Construct the line starting at the endpoints of bisector of the two darts respectively. In the options of *Line 20*



Picture 6-32

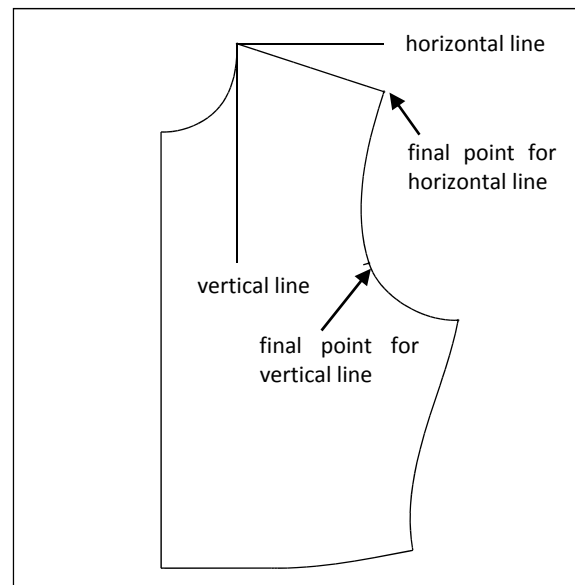
switch the option 'release base points' to permitted. Now move the base points interactively by 20mm away from the dart points and lengthen the lines in both directions by 20mm. Then, grade in the sizes N40, N42 and N44, see Picture 6-32

6.3.3 Horizontal and vertical lines

Step-by-step guide

- ⇒ Activate the function *horizontal line* or *vertical line*
- ⇒ Construct the starting point of the line
- ⇒ Determine auxiliary point for calculation of the final point

The functions *horizontal line* and *vertical line* construct horizontal or vertical auxiliary lines. After having activated the respective function the starting point of the line is to be defined and then a second point is to be determined for calculation of the final point. For calculation of the final point with *horizontal line* the x co-ordinate of the second point is applied, with *vertical line* the y co-ordinate is used.



Picture 6-33

In Picture 6-33 the following was constructed in basic block *Bodice 20*

- a horizontal auxiliary line from the corner point neck/ shoulder to the final point of the shoulder and
- a vertical auxiliary line from the corner point shoulder/neck to the front pitch.

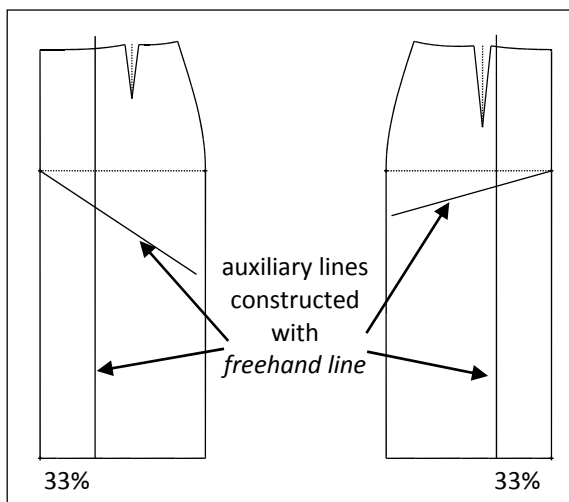
Having clicked *horizontal line*, the corner point neck/ shoulder is clicked in the free mode with <Shift> and then, the end point of the shoulder or the front pitch is clicked with *click p* or again with <Shift>.

6.3.4 Freehand line from point

Step-by-step guide

- ⇒ Activate the function *freehand line from point*
- ⇒ Construct the starting point
- ⇒ Determine the final point freehand

This function creates a line with a fixed length in any direction. Length and direction are constant throughout all sizes. *Freehand line* is particularly suitable for horizontal, vertical or oblique auxiliary lines. In Picture 6-34 a total of four lines were constructed with *freehand line*. After having activated *freehand line* the starting point of the line is to be defined with the point construction sub-menu. Length and direction of the line can then be determined by moving the cursor freehand. The preferred directions horizontal and vertical act like a magnet, the line ‘jumps’ to these directions.



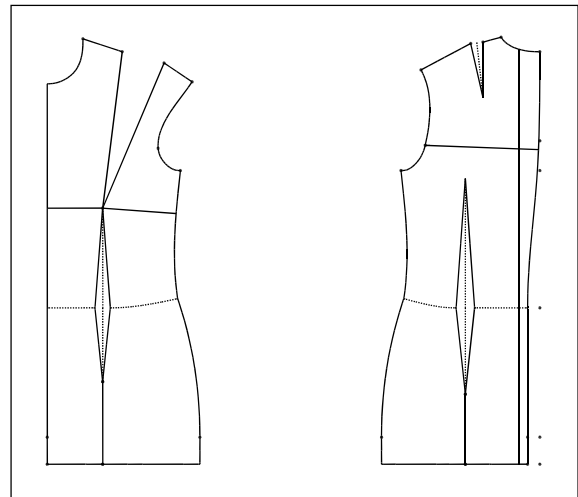
Picture 6-34

Construct all lines depicted in Picture 6-34 in the style ‘Straight skirt’ from Section 2.4. The lines can be extended to the side seam or cut off at the waist with *separate*. Grade sizes 40 and 44.

6.3.5 Perpendicular onto a line

Step-by-step guide

- ⇒ Activate the function *perpendicular onto a line*
- ⇒ Construct the starting point
- ⇒ Click the line onto which the perpendicular is to be dropped



Picture 6-35

With *perpendicular* a perpendicular is dropped from a point onto a line. After having activated the function *perpendicular* the starting point is to be determined, first. Then the line onto which the perpendicular is to be dropped must be clicked. The perpendicular takes on a right angle to the clicked line.

Construct the perpendiculars in basic block *Bodice 10* shown in Picture 6-35:

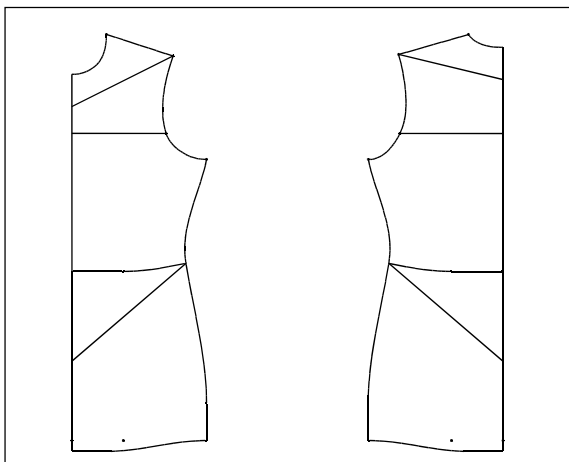
- the perpendicular from the bust point onto the centre front
- the perpendicular from the bust point onto the side seam
- the perpendicular from the darts onto the hem in front and back
- the perpendicular from the back pitch to the centre back and
- the perpendicular from 50% of the neckline onto the hem.

Exercises

1st Exercise

Call the basic block *Bodice 20* and construct the following lines, see Picture 6-36:

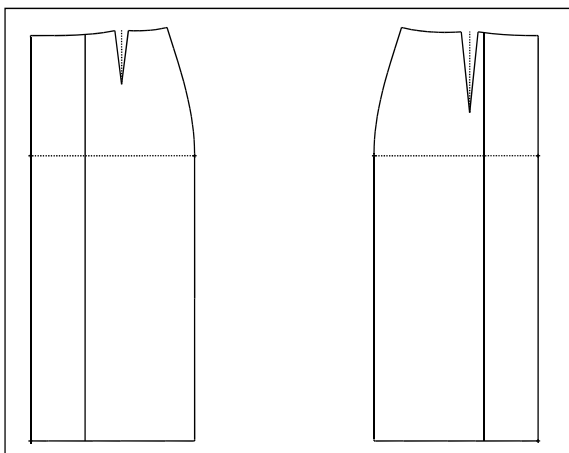
- from the corner shoulder/armhole onto the centre front, measured 60mm from the neck
- from the corner shoulder/armhole onto the centre back, measured 60mm from the neck
- the perpendicular from the respective pitches onto the centre front and centre back
- from the intersection of the side seam and the waist to the centre of the lower sections of the centre front and centre back. Note: the centre front and centre back are separated at the waist.



Picture 6-36

2nd Exercise

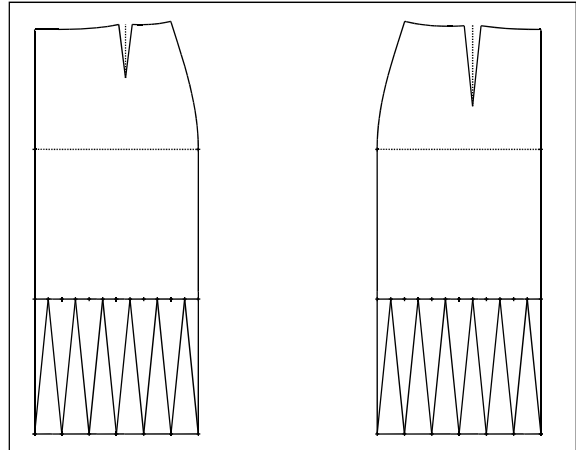
In the style 'Straight skirt' from Section 2.4 construct vertical panel seams starting at 33.3% of the hem, measured from the centre front or centre back. Use the function *freehand line* and cut the two lines at the waist, see Picture 6-37.



Picture 6-37

3rd Exercise

In the style 'Straight skirt' from Section 2.4 construct a parallel to the hem at a distance of 200mm respectively in the front and back skirt. Construct 7 equally distributed points on the hem and 13 equally distributed points on the parallels to the hem. Construct the lines according to Picture 6-38. Use the function *line from point to point*.

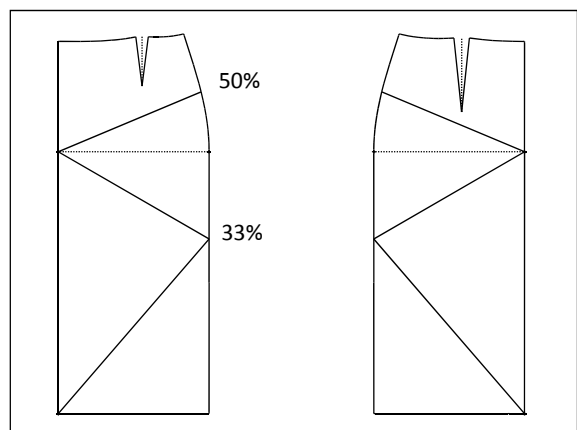


Picture 6-38

4th Exercise

In the style from section 2.4, construct the following lines:

- from the hip point on the centre front and centre back to the middle of the hip curve, respectively
- from 33% down the side seam, measured from the hip point, to the hip point on the centre front and centre back
- from 33% down the side seam, measured from the hip point, to the corner point hem/centre front and hem/centre back according to Picture 6-39.



Picture 6-39

6.4 Line with direction construction

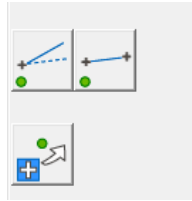
The interactive tool *Line 10* and the sub-menu *direction construction*

With the interactive tool *Line 10*, the user can create a line object with specific direction. The direction construction ensues via its own sub-menu, which automatically appears for other construction purposes, also, similar to the point construction sub-menu.

Points and lines menu (extract)

Line 10 tool ▪ *Line 20* tool

start the tool automatically



The direction construction sub-menu is required for the following operations for example:

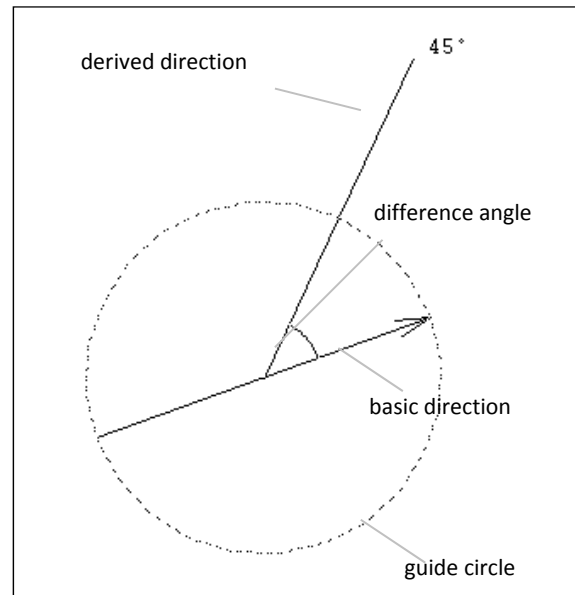
- construction of a line, to be adjusted parallel to another line,
- construction of curves and
- adjustment of symbols.

Step-by-step guide for *Line 10* tool

- ⇒ Call *Line 10* from the *points and lines* menu
- ⇒ Construct the base point
- ⇒ Adjust the line with the direction construction sub-menu (set base direction, adjust difference direction)
- ⇒ End the direction construction with the right mouse button
- ⇒ Interactively adjust the line (line length, possibly moving of base point, possibly altering the line direction)
- ⇒ End the interactive adjustment with *End* in the right menu

Explanation of the direction construction sub-menu

In Grafis, the direction construction is called automatically if required by the operation. The guide circle is an important element of the direction construction. It works like a protractor. The arrow inside the guide circle indicates the basic direction and corresponds with the base line of the protractor. The elements of the guide circle are shown in Picture 6-40.



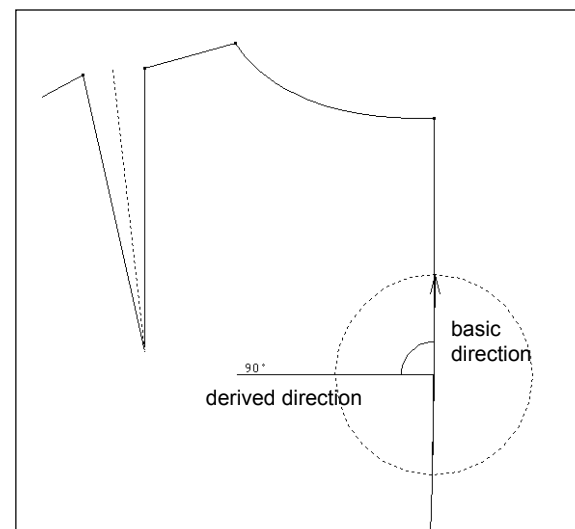
Picture 6-40

The direction construction ensues in two steps:

1. Set the basic direction
2. Set the difference angle

Exactly these steps are repeated during automatic grading. As a result the derived direction is constructed:

$$\begin{aligned} &\text{derived direction} \\ &= \\ &\text{basic direction} + \text{difference angle} \end{aligned}$$







Picture 6-41

In Picture 6-41 a line is constructed at a right angle to the centre back.

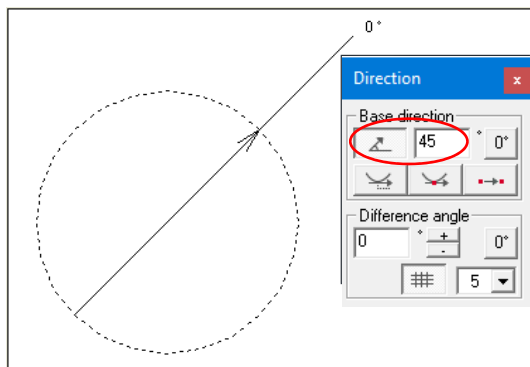
Setting the basic direction

Step-by-step guide

- Set a fixed direction in the entry field next to  or
- activate  and click on a line or
- activate  *line direction at the base point* and possibly selection of a base line or
- activate  and construct two points.

The basic direction is set with the upper group of functions in the direction dialogue. There are four construction principles available:

1. **Fixed direction**

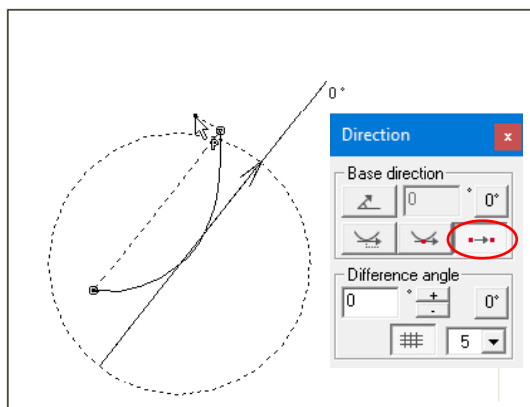


Picture 6-42

A fixed direction value in degrees can be entered into the field to the right of the button *Fixed direction*. Entry of x, g and z values is not permitted for the basic direction. Clicking on the button '0°' resets the basic direction to 0°.

2. **Direction at click point**

The basic direction is set parallel to a line/ curve to be clicked. The direction of the line/ curve at its click position according to the right principle

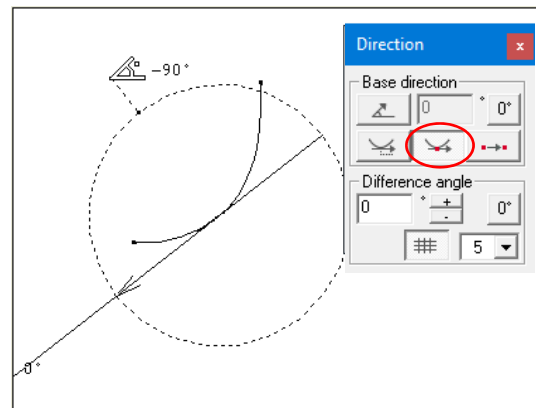


Picture 6-43

applies. Use the <Shift> key if the starting/ final direction of the line is required.

This function is active when opening the direction construction.

3. **Line direction at the base point**



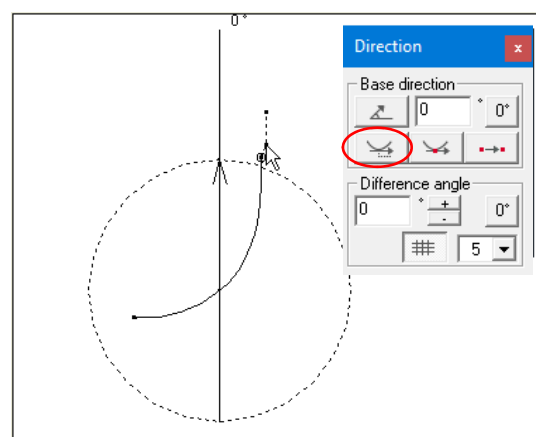
Picture 6-44

The basic direction is taken exactly at the base point of the guide circle from the nearest line. If more than one line are positioned in the vicinity, a prompt appears. In this case, the cursor is displayed as a question mark and the base line is to be clicked:



This function should be used for setting symbols and construction of curves to ensure that the basic direction is taken exactly where the curve or the symbol is attached.

4. **Direction from point to point**



Picture 6-45

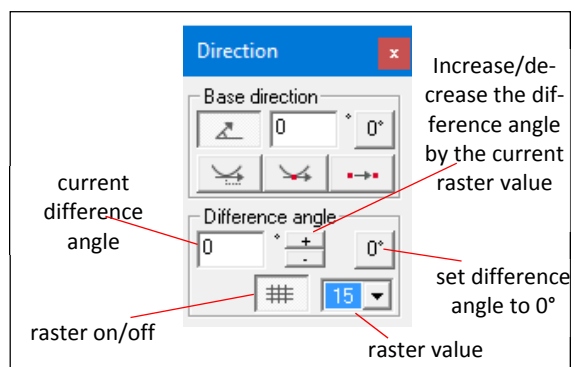
The basic direction is determined by the construction of two points. It is set parallel to the direction from the first point to the second point.

Setting the difference angle

After having set the basic direction, the derived direction is to be set. The derived direction, in the shape of a long line, first points in the direction of the basic direction (see Picture 6-40). It is changed by altering the difference angle to the basic direction. This process corresponds with measuring an angle on an adjusted protractor.

The difference angle is set with the functions in the lower section of the direction dialogue with the following options:

- Entry of difference angle or
- click on + and – next to the entry field or
- click on the guide circle with or without the use of raster.



Picture 6-46

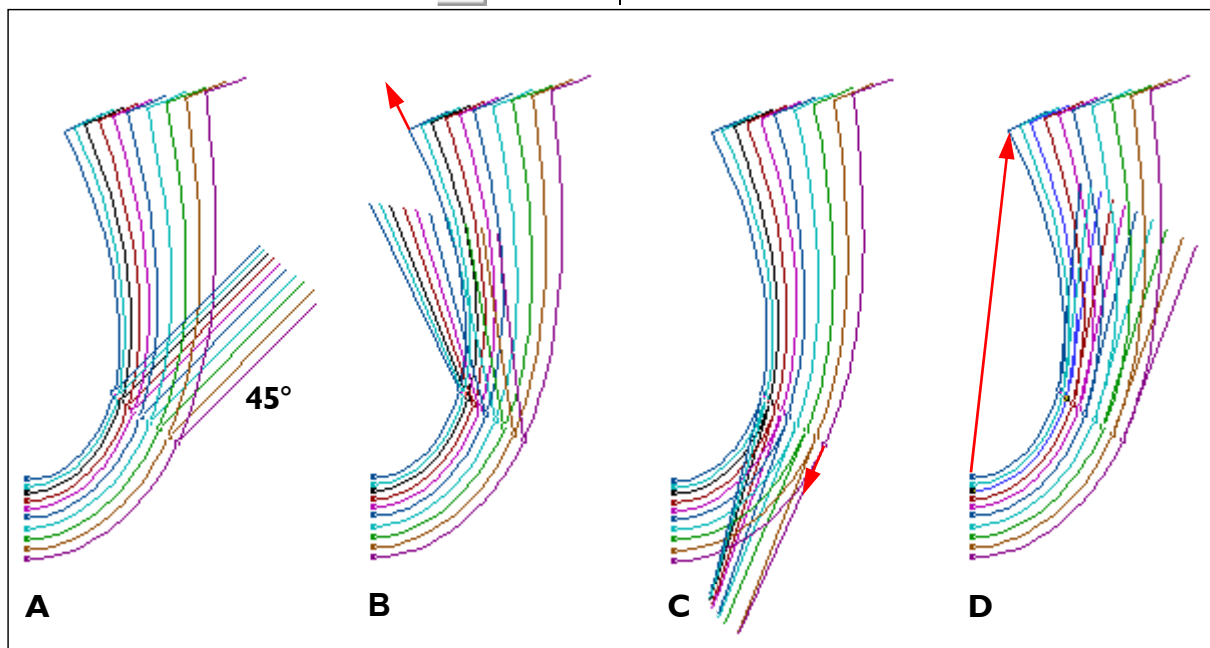
The difference angle is adjusted interactively by dragging the derived direction or by clicking the guide circle. If *raster* is active, the difference angle changes according to the set raster value. Entry of x, g and z values for the difference angle is permitted (see Chapters 11 and 12). Clicking on **0°** sets the

derived direction back along the basic direction. To quit the direction construction menu press **Esc**.

Demonstration of the basic direction

Call the basic block *Bodice 10* and construct lines one after the other with the tool *Line 10*. Use a different construction principle for the basic direction for each line. Grade in sizes 34 to 52, respectively.

- Using the interactive tool *Line 10*, construct a line with basic direction 45° and difference angle 0° (Picture 6-47 A). Grade.
- Using the interactive tool *Line 10*, construct a line. Determine the basic direction with *click I* onto the upper end of the armhole line, using the <Shift> key. The difference angle remains 0°. Grade (Picture 6-47 B).
- Using the interactive tool *Line 10*, construct a line. Activate the *base point* button. The difference angle remains 0°. Drag the base point interactively along the armhole line. Grade **Use 'line direction at base point' for setting notches with a difference angle of 90°. The notch always points at a right angle to the line independent of its position.**
- Using the interactive tool *Line 10* construct a line. The basic direction should correspond to the direction from start to end of the armhole line in all sizes (Picture 6-47 D). Activate *direction from point to point*. The first point is the point at the side seam. It can be clicked in the free mode. The second point is the upper end of the armhole line at the shoulder, selected using the <Shift> key. Drag the base point interactively along the armhole line. The difference angle remains 0°. Grade.

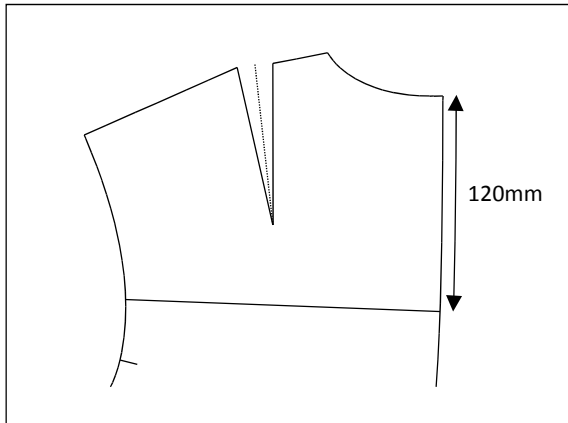


Picture 6-47

Exercise with interactive tool *Line 10* in conjunction with the difference angle

1st Exercise

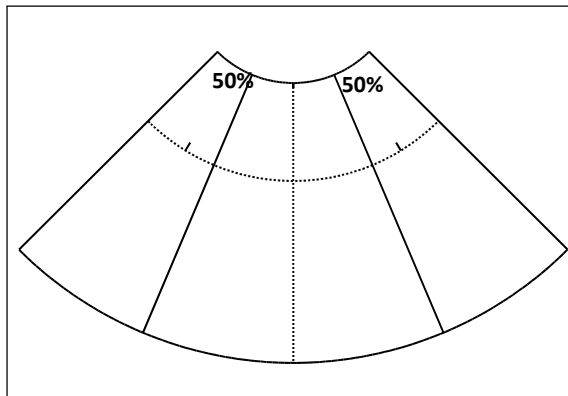
Call the *Bodice 50* and construct a yoke in the back. The yoke starts at a right angle to the centre back, 120mm from the neck. Extend the yoke line interactively to the armhole and then cut at the armhole (Picture 6-48). Extending the line is important as the regular intersection search for function *separate* searches up to 500mm extension. If the intersection is positioned outside this area, a warning appears.



Picture 6-48

2nd Exercise

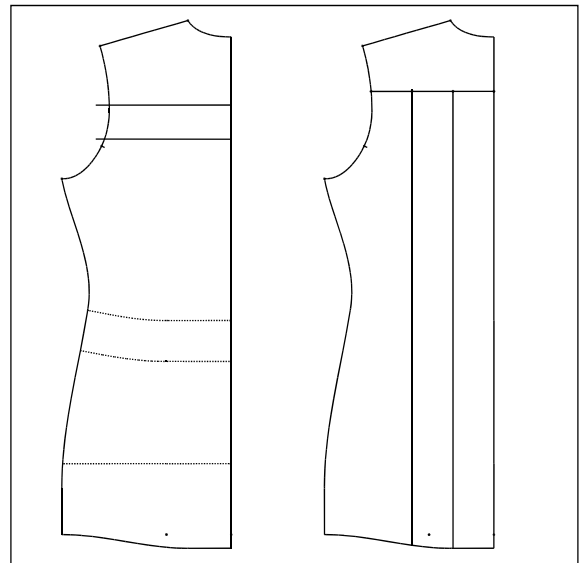
Call *Skirt 10* and construct two panel seams starting at 50% of the waist line respectively, adjusted at a right angle to the base point. Extend the lines to the hem and cut them at the hem (Picture 6-49).




Picture 6-49

3rd exercise

In the *Bodice 20*, construct a yoke at a right angle to the centre back (in the following CB), starting on the CB at 80mm from the neckline. Extend the line to the armhole and then, construct 4 evenly spaced points. Construct two spread lines parallel to the CB (Picture 6-50 right). Use the *Line 10* tool with a *length value* of 600 and click the starting point of the spread line in the free mode. Set the basic direction parallel to the CB with *direction at click point*. Follow the right principle and determine the basic direction neckline → hem.



Picture 6-50

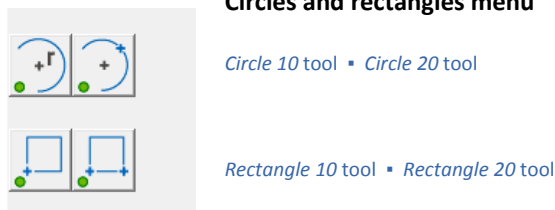
The derived direction equals the basic direction. Therefore, leave the difference angle at 0°, press  and the spread line appears on the screen. Grafis will repeat these steps in all sizes, so that the spread lines always run parallel to the CB. Cut the spread lines at the hem line.

6.5 Circle arcs



The *Circles and rectangles* menu

The *circles and rectangles* menu is called from the basic menu. It allows for construction of circles and rectangles.



Circles and rectangles menu

Circle 10 tool ▪ Circle 20 tool

Rectangle 10 tool ▪ Rectangle 20 tool

The Circle 10 tool

When calling *Circle 10*, the centre point and a basic direction for the circle are to be constructed. Radius and size of the circle segment can be adjusted interactively.

Step-by-step guide

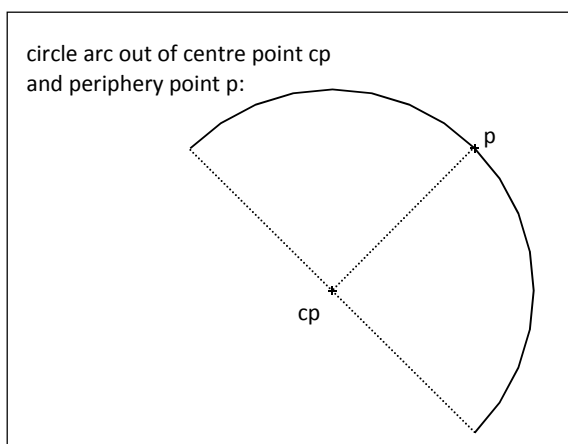
- ⇒ Click on *Circle 10* tool
- ⇒ Construct the centre point for the circle
- ⇒ Construct the base direction, in which the circle should be constructed.
- ⇒ Radius adjust interactively

Clicking *Circle 10* tool opens the sub-menu point construction with which the centre point for the circle can be determined. The basic direction for the circle is to be constructed with the direction construction sub-menu. The radius of the circle can be adjusted interactively.

The Circle 20 tool

Step-by-step guide

- ⇒ Click on *Circle 20* tool
- ⇒ Construct the centre point for the circle
- ⇒ Construct the periphery point



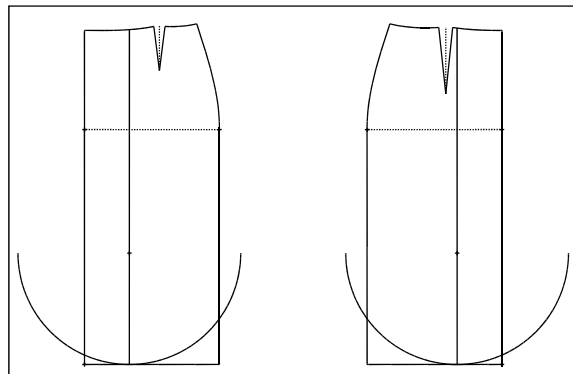
Picture 6-51

Clicking *circle 20* tool opens the sub-menu point construction with which the centre point for the circle can be determined and the periphery point can be

constructed. The clicked periphery point is exactly in the middle of the new circle arc. (Picture 6-48).

Exercise on constructing circle arcs

In the style 'Straight skirt' from Section 2.4 construct a panel seam at 33.3% from the centre front and the centre back, extend the lines to the waist. Then, construct a point on the panel seam 200mm from the hem. The two circle arcs are constructed with *Circle*



Picture 6-52

20. The centre point is the new point and the periphery point is the intersection between the panel seam and the hem, respectively.

6.6 Rectangles

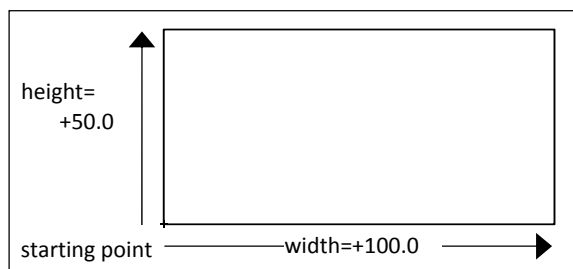
The *Circles and rectangles* menu

Construction of rectangles also ensues with the *circles and rectangles* menu, see section 6.5.

The tool *Rectangle 10* and *Rectangle 20*

Step-by-step guide

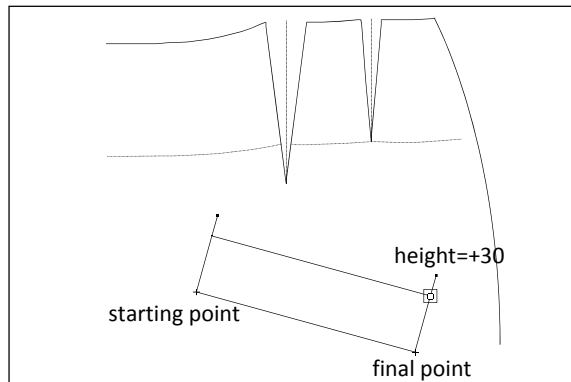
- ⇒ Click on *Rectangle 10*
- ⇒ Construct the starting point
- ⇒ Construct the base direction or the right lower corner of the rectangle
- ⇒ Enter the width and height or adjust interactively



Picture 6-53

When calling *Rectangle 10* the lower left corner and the direction of the base line are constructed. Height and width of the rectangle can be adjusted interactively (Picture 6-53).

When calling *Rectangle 20* the left and right corner of the rectangle are constructed. The width of the rectangle results from these points. The height of the rectangle is interactively adjustable (Picture 6- 54).



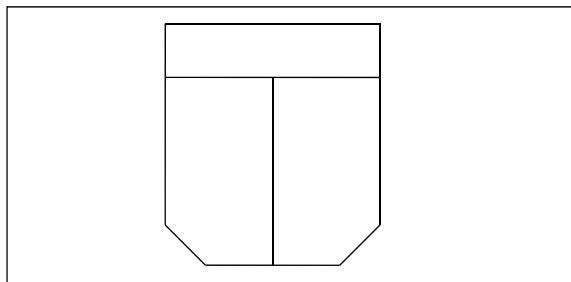
Picture 6- 54

Both interactive rectangles can be reshaped to a trapezium.

6.7 Exercises

1st exercise

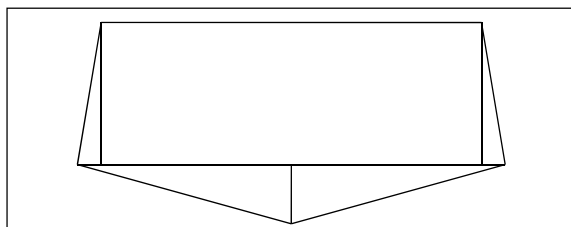
Construct a 160mm wide and 180mm high pocket. Create a corner with straight line at the two bottom corners with a distance of 30mm before and after



the corner. Construct a parallel of 40mm to the upper edge and drop a perpendicular from the centre of the parallel onto the bottom edge.

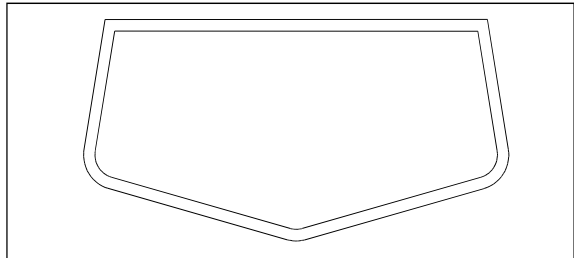
2nd exercise

Construct a pocket flap from a 160mm wide and 60mm high rectangle by lengthening the base line to the right and left by 10mm respectively. Construct an



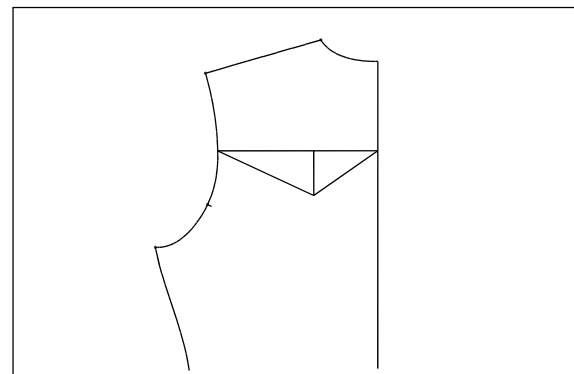
auxiliary line of 25mm length vertically downwards from the centre of the base line and construct the displayed auxiliary lines.

Complete the pocket flap as shown in the next picture by deleting the auxiliary lines, curving the corners with a radius of 10mm and creating a parallel of 5mm all the way around.



3rd exercise

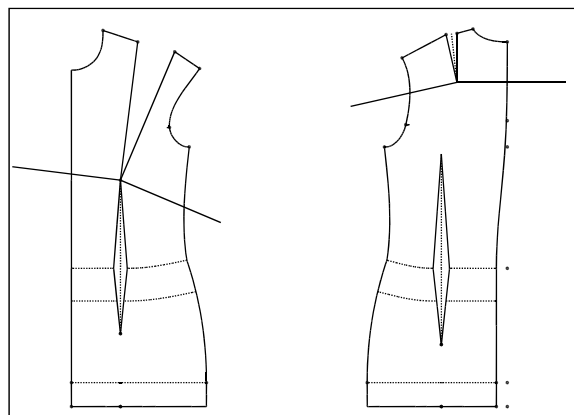
In the *Bodice 20* construct a yoke starting 100mm from the neck on the centre back. The line is to run at a right angle to the centre back. Cut the line at the armhole.



Construct a further line of 50mm length on the yoke, starting at 40% from the centre back. Construct the two other connecting lines.

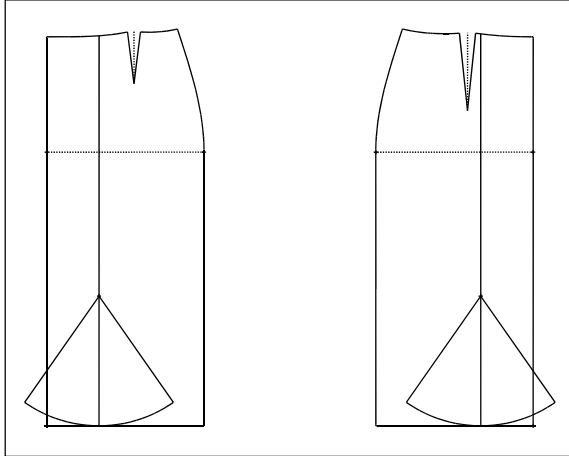
4th exercise

In *Bodice 10* construct the four lines shown at a right angle to the respective dart lines of bust dart and back shoulder dart.



5th exercise

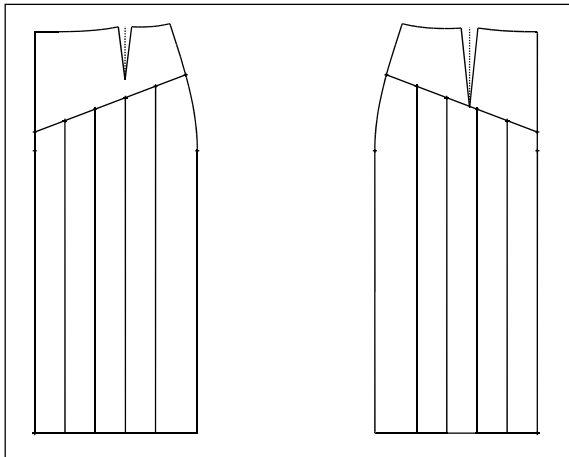
From the style 'Straight skirt' from Section 2.4 construct a skirt with separate godets. The godet height is 200mm from the hem. The angle of the godets is $\pm 35^\circ$ from the panel seams.



Use the interactive tools *Parallel 10*, *Circle 20* and *Line 10*. Thus, godet height and godet angle can be altered interactively at a later date.

6th exercise

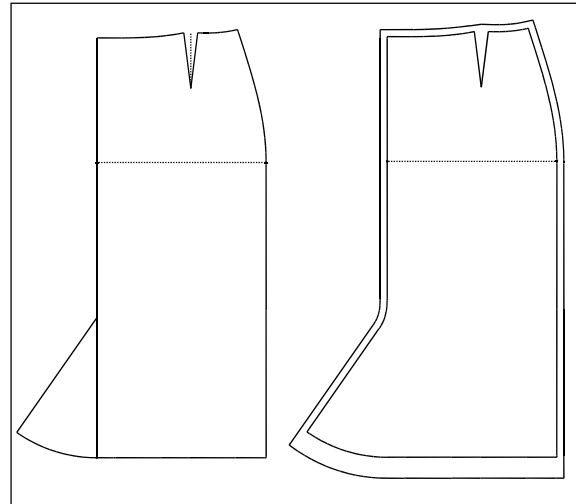
From the style 'Straight skirt' from Section 2.4 construct a skirt with spread lines. Construct an auxiliary line in the front skirt for a yoke, starting at 150mm on the centre front and ending at 80mm on the hip curve, measured from the waist. In the same way, the line in the back skirt is to start at 150mm on the centre back and to end at 80mm on the hip curve.



Create a total of 6 equally distributed points on the yoke line and drop perpendiculars from the four internal points onto the hem.

7th exercise

In the style 'Straight skirt' from Section 2.4 construct a grown-on godet at the centre front with a height of 200mm and an angle for the godet of 35° to the centre front. Link the godet and the centre front with *Link 10* tool. Construct a seam allowance of 10mm and at hem of 30mm. Close the corners.

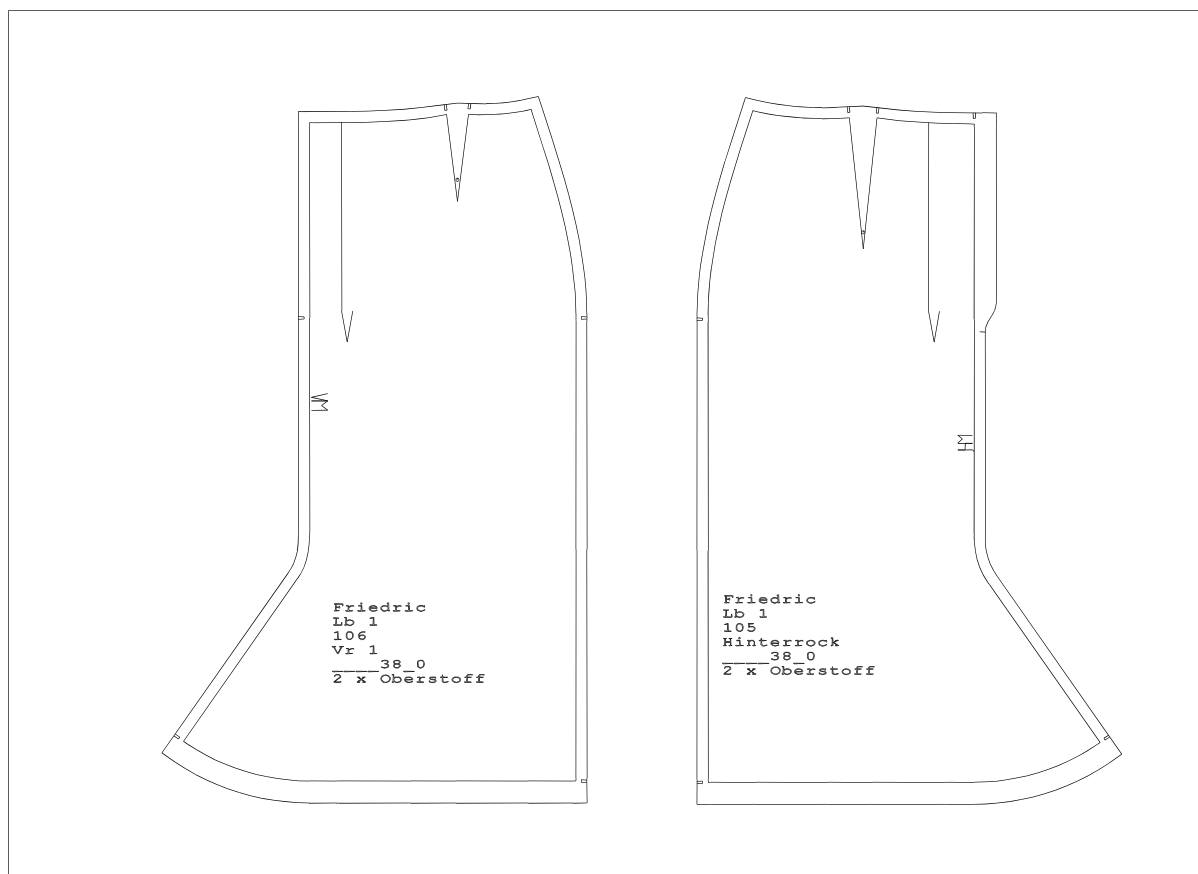


Chapter 7 Measurements and annotation

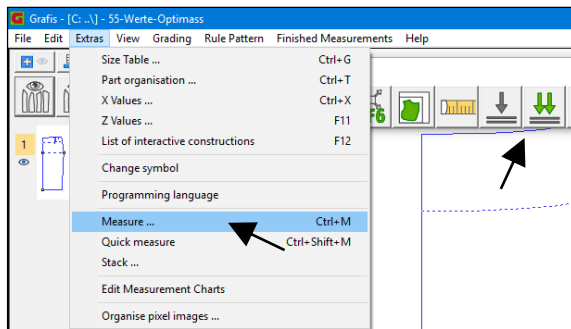
©Friedrich: Grafis – Textbook, Edition 2017

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7.1 The temporary measure



Picture 7-1

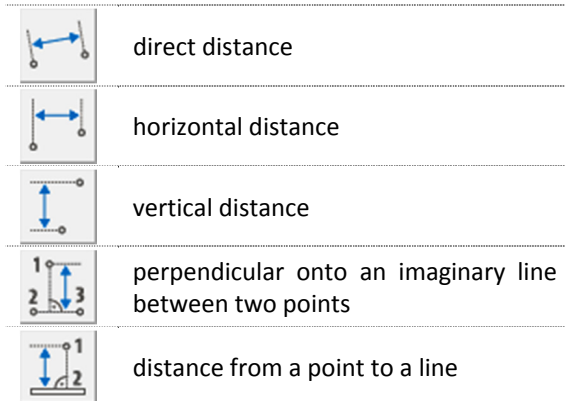
Temporary *measure* is opened via the pull-down menu *Extras*, with the shortcut <Ctrl>+M or via the toolbox (Picture 7-1). It is used for temporary measuring during pattern development. Grafis also offers a recorded measurement function, which is discussed in the next section.

Step-by-step guide

- ⇒ start *measure* from the *Extras* pull-down menu or from the toolbox
- ⇒ select a measurement type from the central block of functions
- ⇒ click on the objects of the construction
- ⇒ set the display options for the active measurement

Distance measurements

There are five distance measurements:

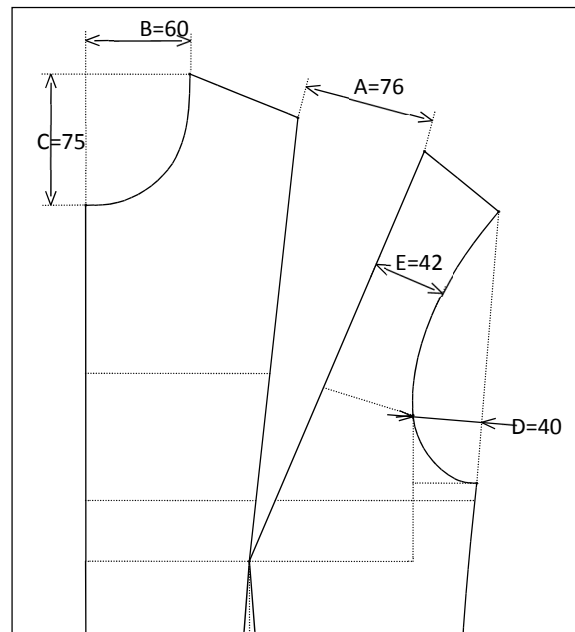


The different measurement type modes are well illustrated by the button symbols. The numbers indicate the order of clicking. When clicking, the sub-menu point construction opens automatically.

Measure the distance measurements indicated in Picture 7-2 on *Bodice 10*

- A - dart content of the bust dart
- B - neck width
- C - neck depth
- D - perpendicular distance from the sleeve pitch to the connection between shoulder point and side seam

E - distance from an arbitrary point on the armhole to the right bust dart leg

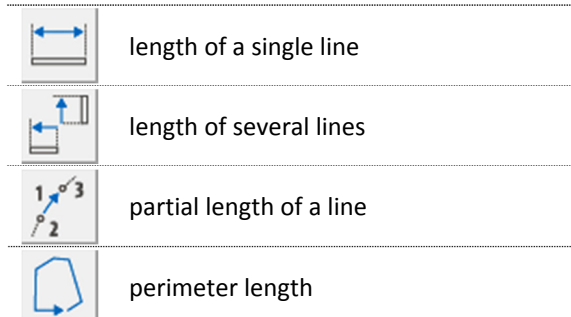


Picture 7-2

The position of each measurement can be altered by clicking and dragging. Close measure.


Length measurements

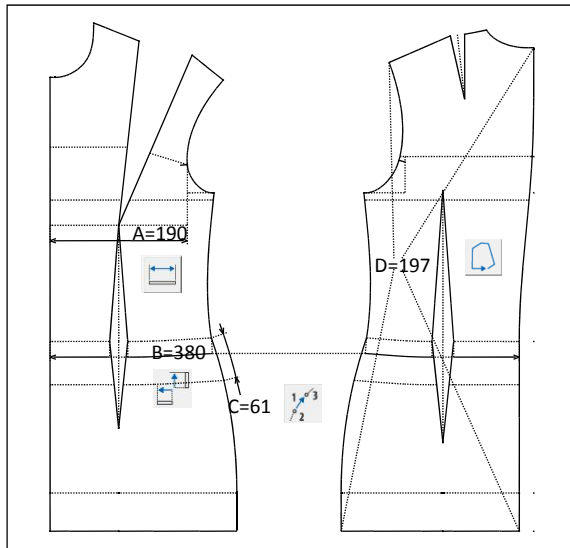
There are four length measurements:



Measure the length measurements indicated in Picture 7-3 on *Bodice 10*.

- A - length of front width
- B - total length of the four waist lines
- C - partial length of the side seam between waist and hip lines
- D - length of the perimeter lines of the back

When setting measurement B, length of the four waist lines, start with the line at the centre front and click the four lines underneath, see Picture 7-3. Alternatively, start with the centre back and click the individual lines above. As the number of lines is variable, the measurement is only shown after a right mouse button click . Position the measurements suitably. Then, close measure.



Picture 7-3

Area measurements

An area measurement can be set in two different ways:

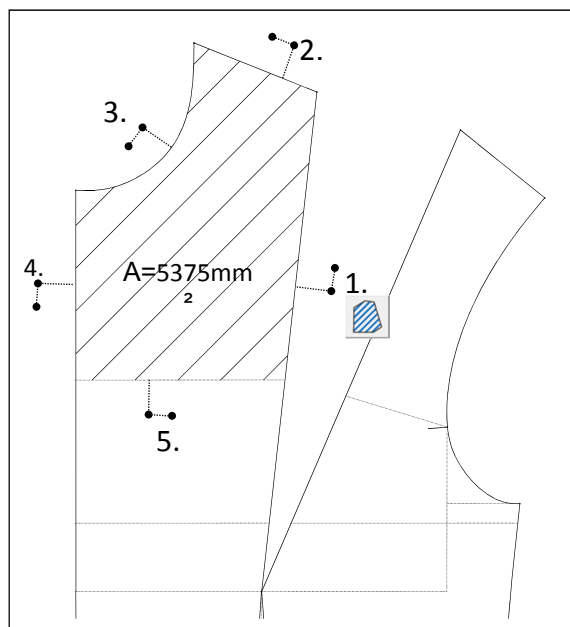


select single lines for perimeter of area



search lines for area perimeter automatically

Measure the area of *Bodice 10* depicted in Picture 7-4 by clicking the **single lines for the perimeter**.



Picture 7-4

Click the five lines from the outside in order. After having clicked the last line, press to set the measurement. A closed perimeter is created automatically from the clicked lines. Protruding lines are cut off. **The click point of the first line must be within**

the future perimeter contour! Until the measurement has been set with individual lines can be re-set with

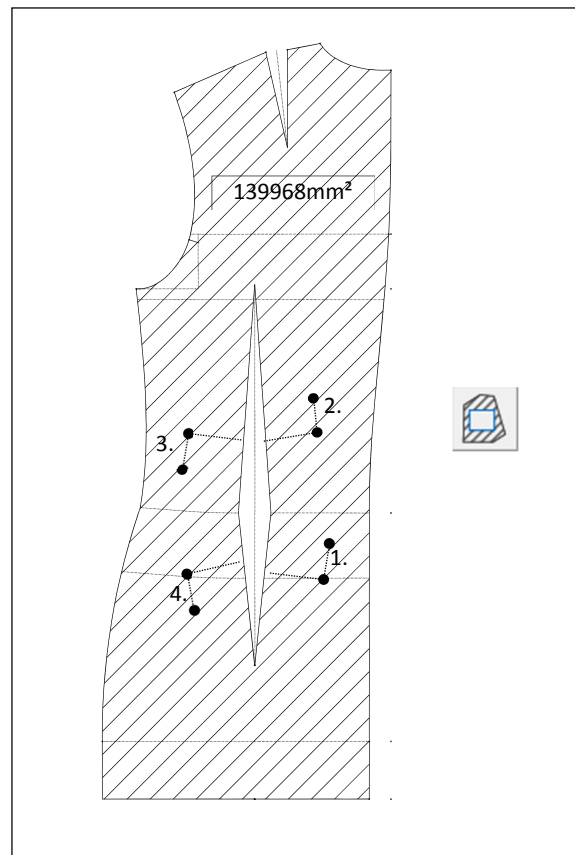


reset single lines

Measure the area of the front and back of *Bodice 10* using **search lines for area perimeter automatically** (no picture). sets the measurement.

Internal **partial areas** can be deducted from an area measurement. The partial areas must be marked before the measurement is set.

Measure the area of the back of *Bodice 10* without



Picture 7-5

the area of the waist dart. First, define the outer contour of the back. A new partial area to be deducted from the original area begins with

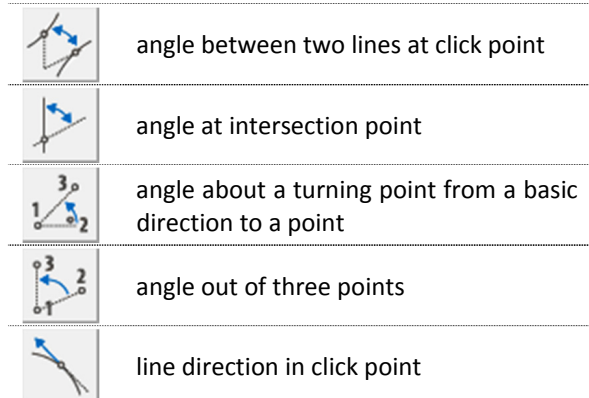


start new partial area

Then, click the four lines of the waist dart. Please note the order (Picture 7-5). Set the measurement with or define a new area to be deducted with **start new partial area**.

Angle measurements

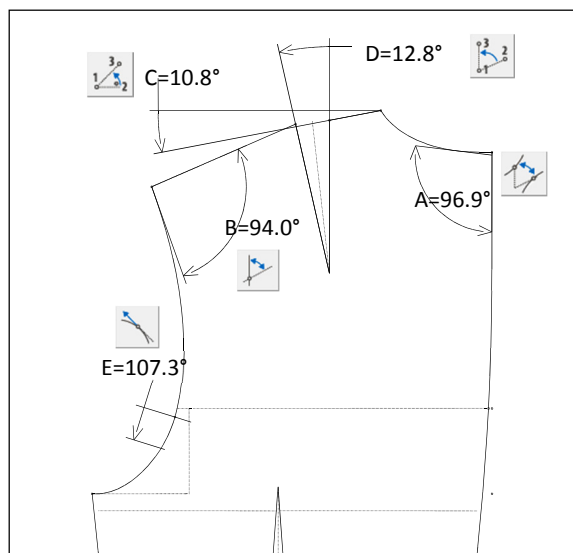
There are four angle measurements:



Measure the angles in *Bodice 10* shown in Picture 7-6.

- A - angle between back neck and centre back at 20mm from corner respectively
- B - angle between shoulder and armhole
- C - shoulder angle for back shoulder
- D - angle between dart legs of the shoulder dart
- E - direction of the armhole in the sleeve pitch; As there are two lines in the vicinity of this point, the desired line must be clicked after having defined the point.

The measurement type line direction in click point is useful if the construction direction /orientation of a curve or a line is needed.

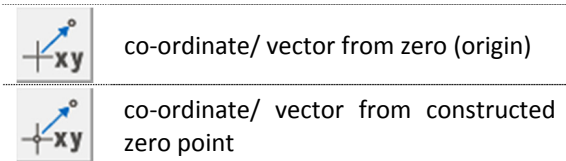


Picture 7-6

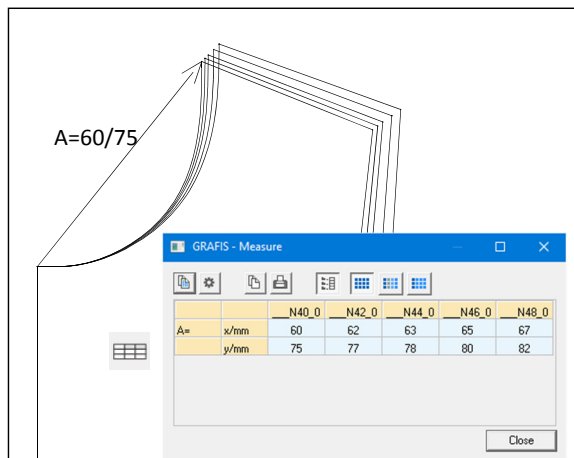
Co-ordinate/Vector measurements

The **co-ordinates/vector measurements** measure point co-ordinates relating to the co-ordinate origin or to another constructed point. The change of these point co-ordinates correspond to the **grade rules** in common grade rule grading.

A co-ordinate/ vector measurement can be set in two ways:

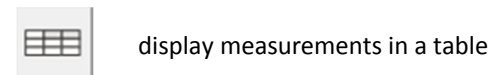


Grade *Bodice 10* in different sizes and stack it at the corner point neck/centre front (Picture 7-7). Set a measurement **co-ordinates from constructed zero point**. First, the zero point is constructed at the corner point neck/centre front. The second point is the corner point shoulder/neck. The x component of the measurement shows the width of neck and the y component indicates the depth of neck.



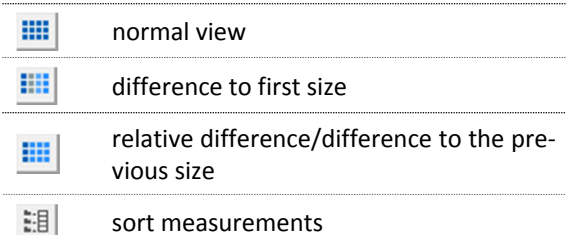
Picture 7-7

Display measurements in a table



All set measurements can be displayed in a table. Measurements of a graded stack are shown in all sizes. The table can be printed or copied to the clipboard.

There are three **display options**:



If a co-ordinate/vector measurement is set in a graded stack, the third display option shows the **grade rules** between the sizes.

Options for measurements

Clicking selects a single measurement. With <Ctrl>+A and <Ctrl> a number of measurements can be selected. deletes all selected measurements. The following display options can be chosen for selected measurements:

Dimension	normal or more number of decimals
<input checked="" type="checkbox"/> 0 <input type="checkbox"/> 0.0	
<input type="checkbox"/> 2x <input type="checkbox"/> 4x	display of normal, doubled 2x or quadrupled 4x value

In the pull-down menu *Settings* units for length/ distance and area can be selected amongst others.

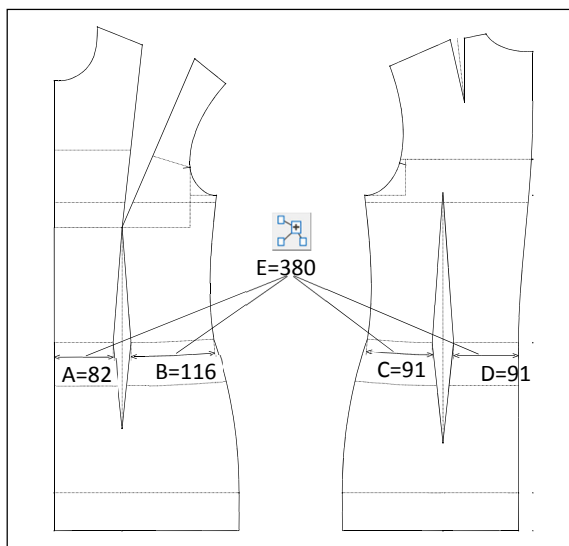
Set chain measurement

If a number of measurements are selected they can create a chain measurement:



create chain measurement from a number of selected measurements

Set four measurements for the length of the individual waist lines of *Bodice 10*. Select all four measurements with pressed <Ctrl> key and use the button *chain*. The measurement E is created as a sum of the four individual measurements, see Picture 7-8.



Picture 7-8

Now, select the four measurements A to D and set the tick for **2x**. The four individual measurements have been doubled. Thus, E now indicates the circumference.

De-activate doubling 2x for the individual measurements and select doubling 2x for measurement E only.

7.2 Finished measurements



The record function *dimension* sets measurements which are saved with the style as opposed to *measure* (section 7.1). Finished measurements are automatically calculated for all sizes and the results are stored in finished measurement tables. These are significant for creating style descriptions, finished measurement tables and other documentation. They can be plotted together with the pattern.

First, the record function *dimension* is discussed. The display of Finished Measurement Tables follows.

Set and alter measurements

The record function *dimension* can be found in the menu on the right. Finished measurements can be set in the active part. Manipulation of setting and alteration of the measurements is identical with manipulation of temporary measuring in section 7.1.

The following differences to temporary measuring apply:

- The display of the measurement text in the pattern has been optimised for plot output.
- Additional display options are available.
- The measurement can be assigned a measurement designation or measurement code at point of setting already. This designation will appear in the finished measurement table.
- All measurements are given consecutive measurement numbers at entry: M1, M2, M3,...




Display options

Alteration of the display options are applied to all selected measurements. The displayed state shows the setting of the first selected measurement.


Show/hide...

M02	measurement number, e.g. M01 or M07
=123	measurement value in the respective size
↔	measuring lines
CD	measurement code or individual description
ABC	measurement description

Settings


	flip measurement text about the measuring line
Dimension <input checked="" type="checkbox"/> 0 <input type="checkbox"/> 0.0 <input type="checkbox"/> 2x <input type="checkbox"/> 4x	accuracy and multiples of the value
Skirt length 	enter individual designation or select standard designation
10 (2-100)mm	measurement text height between 2 and 100mm
	retake single selected measurement

Measurement code and measurement text

Each measurement can be assigned a standard measurement designation, consisting of code and measurement text or an individual measurement designation with . Both code and measurement text appear in the finished measurement table.

When assigning a standard measurement description the measure group is to be selected, first. Then, select the measurement description. If *Show graphic* is checked a graphic - if available - with explanations about the measurement is opened. With double-click or <OK> the measurement description is accepted.

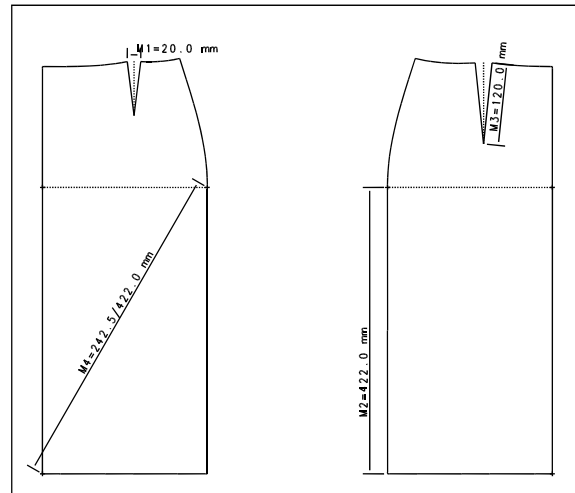
Show and hide finished measurements

As long as the *dimension* menu is not open, set measurements can be shown or hidden with <F7>. Quit the *dimension* menu with , grade and press <F7> a few times.

Pattern development after set measurement

After having set measurements, the pattern can be developed further without restrictions. Hide the measurements with <F7>. They are updated after each *test run* or *grading*.

Set some measurements in a construction according to Picture 7-9. Then, lengthen the skirt by moving the hem parallel with *-copy* and extend the centre front, centre back and the side seams with *separate* or *corners*. After *test run*, the respective measurements are updated, as long as the measurements had been attached to the line with *click l* and <Shift> and not to the points. In the latter case set the measurements again with *measurement: retake* and *click l* with <Shift>.

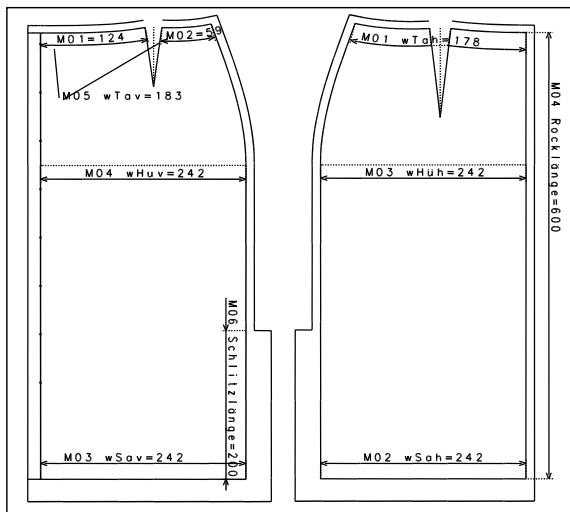


Picture 7-9

The set measurements are bound to points (*click p*) or lines (*click l*, *click plg*, *click rlg*, *intersection*). If points or lines of a measurement are deleted during pattern development, Grafis gives an undefined measurement after the next test run. You then have the option to set the measurement again or delete it.

Exercise

Open the 2nd exercise from section 5.6. Skirt front and back are contained in separate parts, Picture 7-10.



Picture 7-10

Set the following measurements in the skirt front:

- M01 length of front section of the waist line. Measure the length with the measurement type *partial length of a line*
- M02 length of the lateral section of the waist line
- M03 'wSav' hem width front skirt, again with the measurement type *partial length of a line*
- M04 'wHuv' hip width
- M05 'wTav' chain measurement from M01 and M02
- M06 length of vent as a vertical measurement

In the skirt back set the measurements M01 ,wTah' waist width, M02 ,wHüh' hip width, M03 ,wSah' hem width as well as the skirt length along the centre back.

Display finished measurement table

The finished measurements are recorded and can be repeated for other sizes. Grade the construction measured according to Picture 7-10 in the sizes 40, 42, 44 and 46, quit the *finished measurement* menu and open the *Finished Measurement Table* from the *Finished Measurements* pull-down menu. The *Grafis Finished Measurement Spec* window is opened as shown in Picture 7-11.

Each part has its own finished measurement table. You can switch to the finished measurement table of another part with the **file card tabs**. The style from Picture 7-10 has finished measurements in parts 3 and 4. The part name appears as a tooltip on the file card tabs.

The measurements are arranged in lines and the graded sizes in columns. The first column contains part and measurement number. T3M4 stands for fourth measurement in part 3. The arrangement of rows/columns can be swapped with



swap rows and columns

The second column contains the measurement unit. The third and fourth columns show the measurement designation (code and text). The following columns contain the measurement values in the available sizes. The position number in the size table is stated in the first row and the size designation in the second row.

Change the display of the finished measurement table via the pull-down menu *View → Display options*. Change the measurement units as well.

There are three **display options**:



normal view



difference to first size



relative difference/ difference to the previous size

The order of sizes in the finished measurement table originally corresponds with the order in the size table. To list the sizes of the size run use button:



sort sizes

			01	02	03	04
			N40_0	N42_0	N44_0	N46_0
T4M1	mm	wTah	185	195	205	220
T4M2	mm	wSah	233	243	253	266
T4M3	mm	wHüh	252	262	272	286
T4M4	mm	Skirt length	600	600	600	600

Picture 7-11

For a single measurement selected in the table you can adjust the following:



The measurement is centred on the screen. Thus, it is easier to find in the pattern.



Alter the measurement code or the individual measurement designation.

Copy the displayed table to the clipboard via **Edit → Copy**. Now, start a different Windows application such as Word for Windows or Excel and insert the table from the clipboard. If you have already created templates or forms in these applications, seam length calculations or other calculations can be solved quickly.

With **Edit → Copy measurement into the calculated finished measurement table** or <Ctrl>-B a selected measurement is transferred into the calculated table.

In the style from the exercise shown in Picture 7-10 transfer the measurements M03 to M06 from the front skirt and M01 to M04 from the back skirt into the calculated finished measurement table with <Ctrl>+B.

Deleting finished measurements can only be done via the function *dimension*.

Calculated finished measurement table

Finished measurements from different parts of a style are combined in one table in the calculated finished measurement table, see Picture 7-12. Finished measurements from different parts can be calculated together to establish a circumference measurement across different parts for example. The following additional functions are available for creation and editing of calculated measurements:

				01	02	03	04
				N40_0	N42_0	N44_0	N46_0
1	T4M1	mm	wTah	185	195	205	220
2	2*(T4M1 + T3M2)	mm	Waist	760	800	840	900
3	T4M2	mm	wSah	233	243	253	266
4	T4M3	mm	wHüh	252	262	272	286
5	T4M4	mm	Skirt length	600	600	600	600

Picture 7-12

	create a new calculated measurement at the end of the table
	delete selected measurement
	enter calculation formulae for the measurement
double-click	... onto the measurement in the construction transfers it into the active calculation formulae
	centers the construction to the measurement selected in the formulae, here T1M4:

The formulae for a calculated finished measurement can be created with the arithmetic signs for addition, subtraction, multiplication and division + - * /. Expressions in brackets are also permitted.

With *Edit → Move measurement up* or *Move measurement down* you can alter the order of the measurements in the calculated finished measurement table.

<Ctrl>+ ↑	alter order of measurements
<Ctrl>+ ↓	

New measurements are initially a 'number' without measurement unit. Please note that internally, everything is calculated in mm, mm² and °. Any conversion to the required measurement unit ensues after value output in the table.

Alter the finished measurements transferred from parts 3 and 4 according to Picture 7-12 and create a finished measurement table with the following measurements of your style: skirt length, waist width as circumference, hip width as circumference, hem width as circumference and vent length.

7.3 Set and edit text

The text menu

This menu can be called from the basic menu, directly by clicking on *texts*. It allows for entry, editing, positioning and adjustment of texts. The functions offered are sufficient for pattern annotation or entry of making-up instructions. They cannot be compared to a word-processing package.

Text menu

via keyboard ▪ via file

activate text ▪ copy text

delete active text ▪ delete all text

align left ▪ align centred ▪ align right

+/- grading ▪ +/- autom. direction


+/- frame ▪ +/- autom. size

user-defined text formats




set text formats



Step-by-step guide for entry of new text

- ⇒ *basic menu* → *texts*
- ⇒ Click on *via keyboard*
- ⇒ Enter text and/or specific information
- ⇒ Quit text entry with clicking on *OK* or *Cancel*
- ⇒ Position the text
- ⇒ Manipulate the active text according to the 'Step-by-step guide for alteration of text'
- ⇒ Quit with 

Step-by-step guide for alteration of text

- ⇒ *basic menu* → *texts*
- ⇒ Click the text
- ⇒ Alteration of text content:
 - double-click on the text
 - alter the text
 - quit with *OK* or *Cancel*
- ⇒ Alteration of text position:
 - drag as soon as the cursor  appears
 - possibly: bind the **text position** onto the construction with the upper left corner of the text frame
- ⇒ Alter text alignment:
 - drag the upper text frame as soon as the cursor  appears.
 - possibly: bind the **direction** onto the construction with the upper right corner of the text frame
- ⇒ Alter text size
 - drag the text frame as soon as the cursor  appears.
- ⇒ Alter text format:
 - click *aligned left*, *align centred* or *aligned right* in the menu
- ⇒ Set the switch *+/-grading*
- ⇒ Set the switch *+/-frame*

Enter or activate text

The active text is surrounded by a solid frame with active points. Existing text is activated by clicking. This works within the *text* menu, only. Double-click on a text opens the window for text entry. All functions in the middle of the function strip relate to the active text, only. A new text is set with:

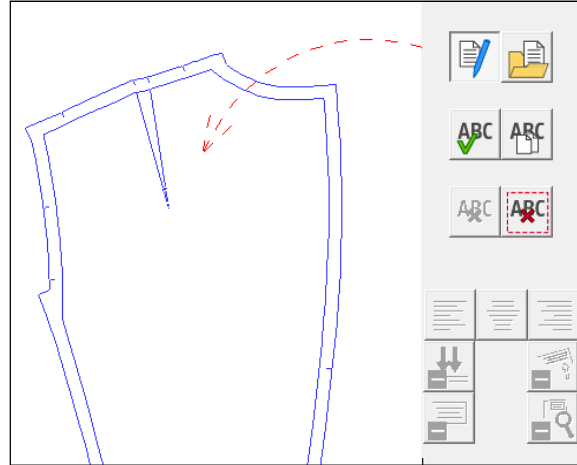
via file

After having clicked *via file* the position for the text is to be set, first (Picture 7-13). Then, a window for selection of prepared text masks opens. Prepared texts should be saved on the current drive in the directory \GRAFIS\TEXTE as _____.TXT files. ASCII text files are permitted, only.

The application of this function is especially interesting for pattern annotation with standard text.

via keyboard

After having pre-positioned the text (Picture 7-13) the window for entry of new text opens.



Picture 7-13

Additionally, the following text blocks with specific information can be inserted by clicking the buttons:

	Display in text editor:
date	{F 1...}
time	{F 2}
Grafis version	{F 3.....}
size name	{F 4...}
collection	{F 5...}
style	{F 6...}
part number	{F 7}
part name	{F 8.....}
measurement system	{F 9.....}


In Chapters 11 and 12 you will learn about x, g and z values. These numerical values as well as the previously discussed finished measurements can be inserted into text:

	Display and significance in text editor:
X value (active part)	{X00.2} Second x value of the active part.
Global x value	{XG01} First global x value
Z value	{Z05} Fifth z value of the active part
Measurement (active part)	{M04} Fourth measurement of the active part
Calculated measurement	{B1.3} Third calculated measurement in the finished measurement table

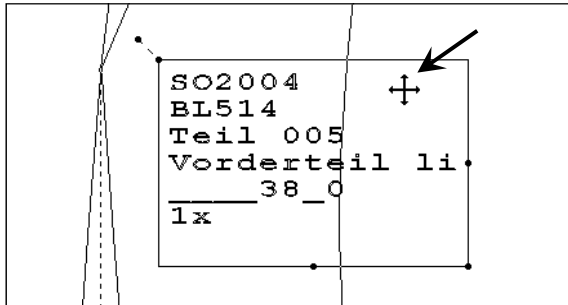
After *OK* the text is accepted and can be positioned, aligned and altered in size.

Position and align text


To **position the text** drag the text as soon as the cur-

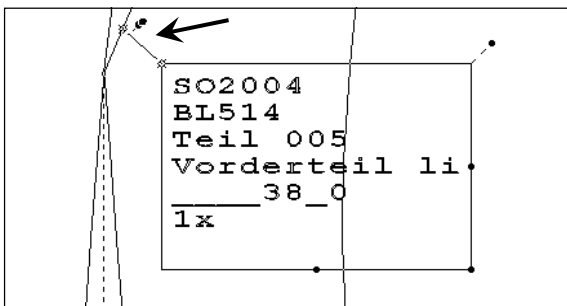
sor  appears (Picture 7-17). The text is positioned and remains in this position in all sizes.

Only after **binding the text** onto a line of the construction will its position change during grading. For




Picture 7-14

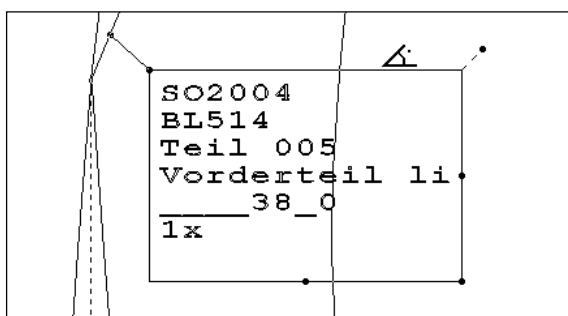
binding the text the active point at the upper left corner of the text frame can be used. As soon as the cursor  in the shape of a pin appears the text can be bound onto a line (Picture 7-15).




Picture 7-15

To **align the text freehand** the text is to be dragged at the upper right frame. As soon as the cursor takes


on the shape  the text can be rotated freehand with pressed left mouse button (Picture 7-16).

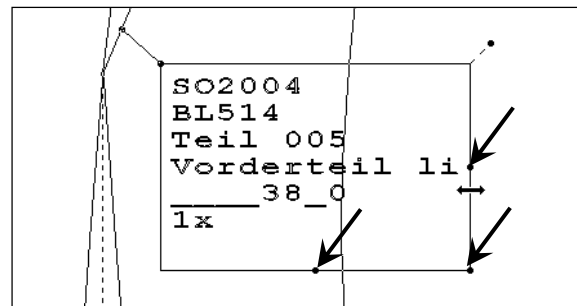


Picture 7-16

With bound direction point the text is also aligned along an existing line. The direction tag is located at the upper right corner of the text frame. It appears only after the text has been bound according to Picture 7-16. As soon as the cursor takes on the shape of the pin  near the upper right corner the text direction can be bound (no picture). In the different sizes the text is rotated about the angle the connection between the binding points is rotated.

Text size and format

Adjust the text size with the active points according to Picture 7-17. Near these active points the cursor takes on the shape of a double arrow .



Picture 7-17

Text of more than one line can be aligned *left*, *right* or *centred*. This format relates to the alignment of lines, only. The format for the active text is to be selected from the menu.

+grading or -grading

With this switch you decide whether or not the active text is graded.

-grading text appears in base size, only

+grading text appears in all graded sizes

Text with +grading is displayed slightly lighter than text with -grading.

+frame or -frame

With this switch you decide whether the active text is displayed with or without frame.

Copy and delete text

After having selected *copy text* from the menu the text to be copied is to be clicked. The copy is to be positioned according to Picture 7-13. **NB: Text can also be copied from an inactive piece into an active piece.** The menu functions *delete active text* and *delete all text* are used to delete text.

Prepared text format and automatic direction and size adjustment

Clicking on of the ten prepared text formats (004 to 121 with delivery) assigns the active text with the respective settings. The text formats can be edited via *set text format*.

With the switch *+autom. direction* you decide whether the direction of the text is changed according to the direction point during grading. When binding the direction point, the switch is automatically activated.

With *+autom. size* the direction point is also responsible for enlarging/reducing the text during grading. This ensures that the text is not positioned outside the perimeter in small sizes.

Prepare and switch texts in different languages

A text module can be stored in different languages. The text module must be saved as a *.txt file in German in the directory GRAFIS\TEXTE\049\ and in English in the directory GRAFIS\TEXTE\044\. The file name must be identical in both directories.

A prepared text module is called via the menu function *from file*. Switching languages ensues via the pull-down menu *Finished measurements | Language for measurements*. If the desired language is not available, it can be entered in the file \GRAFIS\Masscode.dat. The designated number is the international access code, e.g. 049 for German and 044 for English. **When switching the language, the text content is automatically recreated according to the contents of the text module file. Possible individual alterations to already set texts are reset. Alterations to the text module can be incorporated into styles in this way.**

7.4 Set symbols

The symbols menu

With the functions from this menu symbols can be set onto points or lines in any direction. If the symbol is not to lie on the construction line it can be moved to the seam allowance with *on allowance*, later. The available symbols are listed in the lower part of the menu. The active symbol is highlighted.

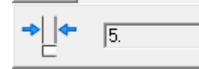


Symbols menu

place on



symbol length



move on allowance...

at right angle

in symbol direction

+/-copy



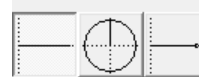
change symbol



slit notch (N1)

drillhole

grain line



notch

pitch

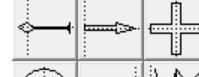
v notch (N2)



buttonhole

arrow *=>

cross



circle

arrow =>*

.CF



CB

drillhole plotted

scissors



repeat point weft

repeat point warp

text label



reset



Grain line 10 tool

Convert into notch tool



Start the tool automatically



Setting a new symbol

Step-by-step guide

⇒ *basic menu* → *symbols*

⇒ Activate the symbol required

⇒ Enter length of the new symbol

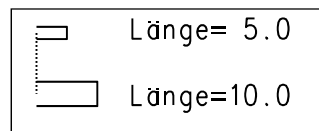
⇒ Activate *place on*

⇒ Construct position for the new symbol

Note

The function 'on allowance' is always active. For each new symbol the function 'place on' has to be clicked!

Set a new symbol select the symbol from the lower part of the menu. If the symbol is required in a length different from the default length (Picture 7-18) the symbol length must be altered. With *place on* the symbol can be attached to a point or a line. Then, the direction construction sub-menu is opened for orientation of the symbol. Symbols are treated as line sequences during further work. A placed symbol can be changed into another symbol with *change symbol*. There are no functions available for the alteration of size or direction of symbol, later. In this case the current symbol is to be deleted and a new symbol is to be set.



Picture 7-18

Moving a symbol**Step-by-step guide**

Prerequisite is a line onto which the symbol is to be moved.

- ⇒ *basic menu* → *symbols*
- ⇒ Adjust *+copy* or *-copy*
- ⇒ Activate *on allowance*
- ⇒ Activate *at right angle* or in *symbol direction*
- ⇒ Click the symbol

Frequently, a symbol, e.g. a notch, is to lie on the seam allowance rather than the construction line. The function *on allowance* is always active and the symbol to be moved can be clicked, directly.

Grafis then asks for the seam allowance onto which the symbol is to be moved. With the switch *+/-copy* you decide whether a copy of the symbol is created or whether the symbol is simply moved.

+copy creates a copy of the symbol
-copy symbol is moved.

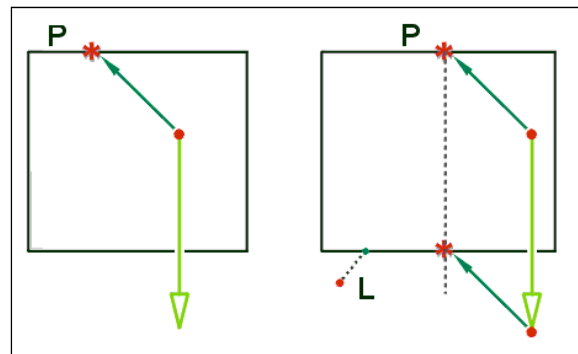
If relocate symbol at *right angle* is active, the symbol is moved to the seam allowance line at a right angle. If relocate in *symbol direction* is active, the symbol is moved to the seam allowance line in the run of the symbol direction.

Grain line 10 tool

From version 11 onwards, the very flexible interactive *Grain line 10* is available. The length of the grain line can be set. Alternatively, the grain line can be lengthened to a cutting line to be selected, see Picture 7-19. The length of the grain line results from the intersection with the cutting line. The direction of the grain line as well as the lateral relocation can be altered interactively.

Step-by-step guide:

- ⇒ Call *Grain line 10* from the *symbols* menu
- ⇒ Construct the base point
- ⇒ Adjust the direction of the grain line with the sub menu direction construction
- ⇒ Quit direction construction with the right mouse button
- ⇒ If necessary, click a cutting line. Clicking the cutting line can be initiated in the interactive environment at a later stage.



Picture 7-19

- ⇒ Interactive adjustment of the grain line (length of grain line, direction, lateral relocation). If a cutting line is required but has not been selected already, select *click cutting line* in the context menu.
- ⇒ Quit interactive adjustment with *End* in the menu on the right

The tool Convert into notch

With the *Convert into notch* tool, existing short lines of up to 10 mm length can be converted into notches. Follow the right principle when clicking the line, the line is converted into a 5 mm long slit notch.

7.5 Manufacturing symbols



As opposed to the symbols described in section 7.4, the manufacturing symbols can consist of multiple line elements and their shape may vary. *Notch 10* plays a special role, it does not generate an independent object, but change the shape of the line.

Menu manufacturing symbols

Seam 10 ▪ Seam 20 ▪ Seam 30

Seam 40 ▪ Seam 50 ▪ Bartack 10

Button 10 ▪ Button 20 ▪
Button 20

Button 40

Notch 10 ▪ Notch 10 (v-typ)

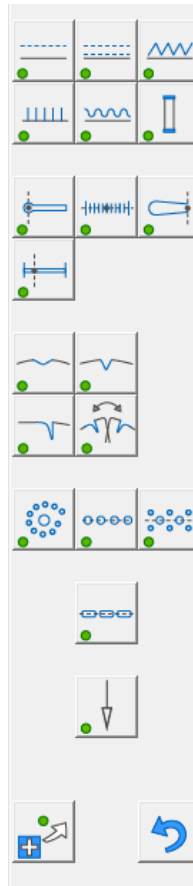
Notch 20 ▪ Notch 30

Perforation 10 ▪ Perforation 20 ▪
Perforation 30

Marking line 10

Grain line 10

start the tool automatically ▪ reset



The manufacturing symbols are not detected as symbol objects during export and print/plot. Within the pattern pieces, manufacturing symbols must not be positioned outside the piece perimeter or intersect the perimeter.

Interactive Seam Tools

From Version 10, five additional interactive seam symbols are available. As opposed to the symbols from section 7.4, the seam symbols have no further significance in the layplan or during data export.

In the pattern pieces, the interactive seam symbols should not be positioned outside the piece perimeter or intersect the perimeter!

Otherwise, these seam symbols are integrated into the perimeter and /or an error message appears during preparation for transfer to the layplan.

Overview over the interactive seam symbols

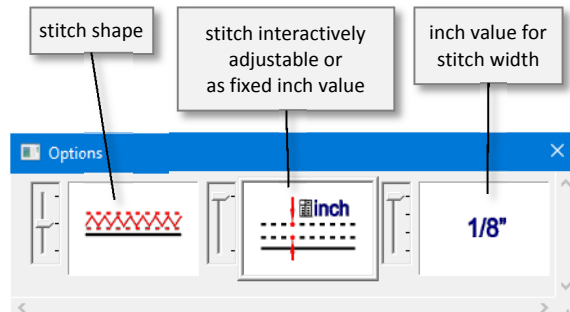
Seam 10 lockstitch	
Seam 20 double lockstitch	
Seam 30 zigzag stitch	
Seam 40 decorative stitches	
Seam 50 gather	

Step-by-step guide for setting interactive seam symbols

- ⇒ basic menu → manufacturing symbols
- ⇒ Select seam symbol
- ⇒ Click on one or up to 45 lines
- ⇒ Click on Exit
- ⇒ Activate one of the new seam symbols with double-click
- ⇒ Adjust the options
- ⇒ Interactive adjustment of stitch distance and possibly stitch width
- ⇒ End interactive adjustment with End

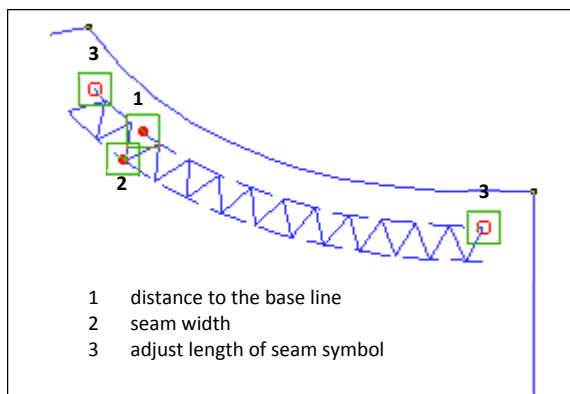
Significance of the options and drag cursor

The first option determines the shape of the seam symbol. The middle option in Picture 7-20 determines whether the seam width is to be adjusted interactively or set as a fixed inch value.



Picture 7-20

For the interactive adjustment of the seam symbols, there is exactly one drag area in which the stitch width, the distance to the base line and the length of the seam symbol can be adjusted interactively, see Picture 7-21.



Picture 7-21

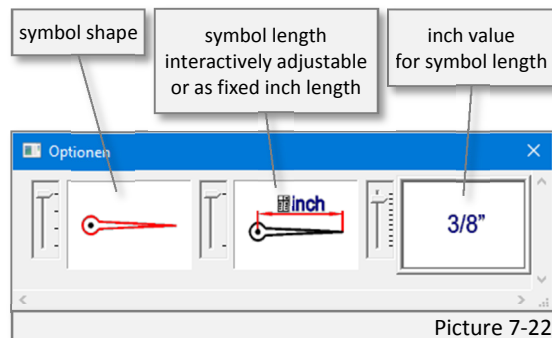
Interactive tools for buttonholes and bartack

Step-by-step guide for setting interactive buttonholes and bartack

- ⇒ *basic menu* → *manufacturing symbols*
- ⇒ Select symbol
- ⇒ Construct position of up to 45 new symbols with the sub-menu point construction
- ⇒ End with
- ⇒ Click reference line along which the symbols are to be aligned or click on *Exit*
- ⇒ Activate symbols with double-click
- ⇒ Adjust the options
- ⇒ Interactive adjustment of symbol length and interactive alignment of the symbols
- ⇒ Quit interactive adjustment with *End*

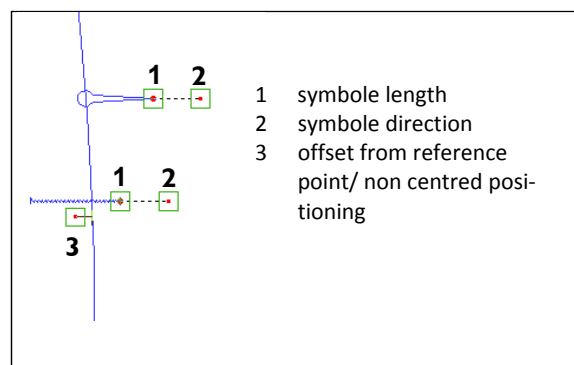
Significance of the reference line, options and the drag cursor

After having positioned the symbols, a reference line can be clicked. Thus, all symbols are aligned parallel to the reference line. The difference angle is then set interactively.



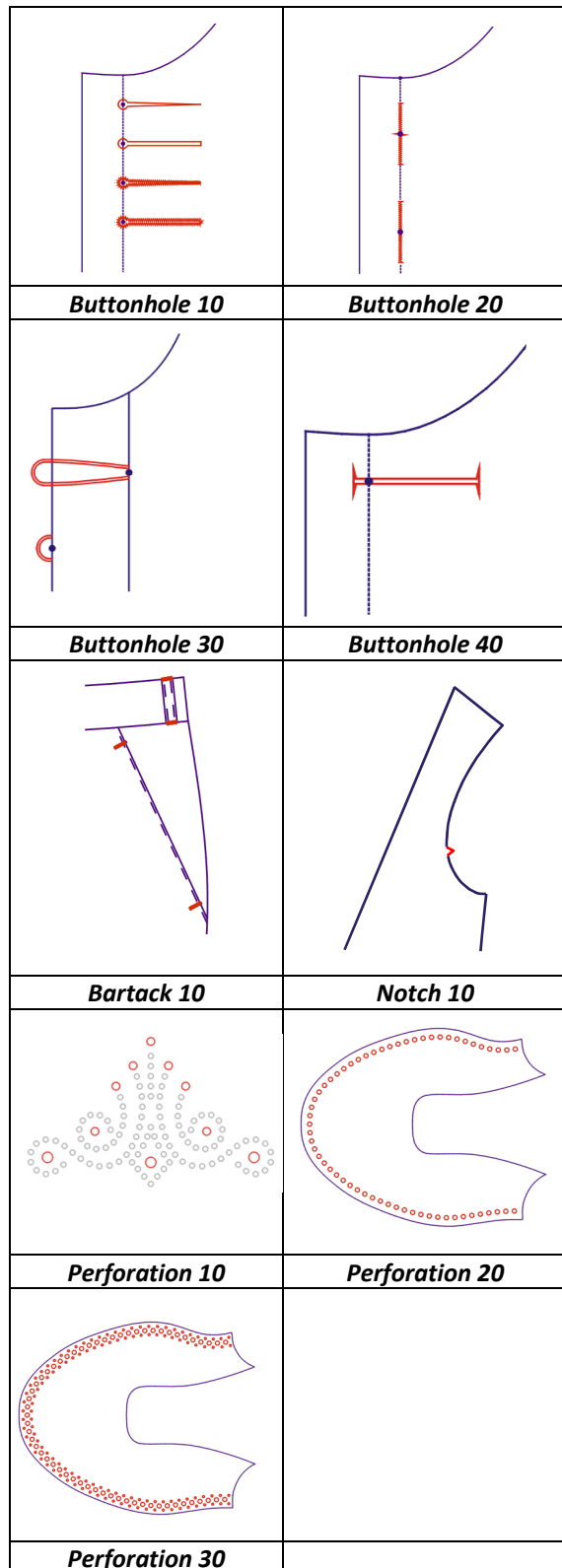
Picture 7-22

With the first or first two options the shape and position of the symbol is selected. The middle option in Picture 7-22 determines whether the length of the symbol is to be adjusted interactively or set as a fixed inch value.



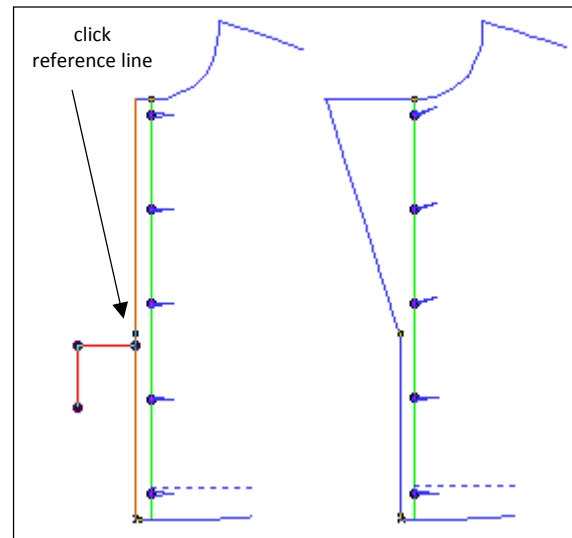
Picture 7-23

There is one drag area for interactive adjustment of symbols in which the symbol direction and depending on the option and symbol type also the symbol length and offset can be interactively adjusted, see Picture 7-23.




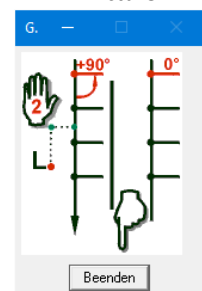
Exercise on interactive symbols

Construct the tool *Front edge 30* onto a Grafis Bodice according to Picture 7-24 left and set five buttonholes with *Buttonhole 10*. Click the front edge as reference line. Then, adjust the front edge according to Picture 7-24 right.



Picture 7-24

The buttonholes are aligned along the reference line. Reset calling the tool *Buttonhole 10* in the record and construct the buttonholes again. End without clicking a reference line by clicking on the button *Exit* after having clicked the points and  (Picture 7-25). The buttonholes are now aligned parallel to one another.



Picture 7-25

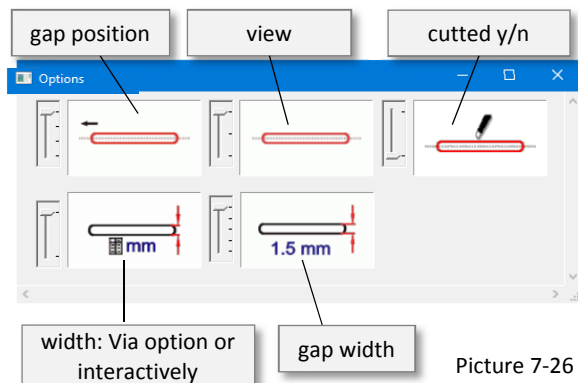
Tool *Marking line 10* for creation of templates

Part of production preparation is the creation of templates for sewing, for positioning of pattern pieces or embroidery. The templates must be generated for all sizes. The templates are constructed with the *Marking line 10* tool.

Step-by-step guide

- ⇒ *Basic menu* → *manufacturing symbols*
- ⇒ select *Marking line 10*
- ⇒ Click the lines for the marking line.
- ⇒ Adjust the options
- ⇒ End interactive adjustment with *End*

After having clicked the required lines, various options and adjustments can be selected, Picture 7-26.



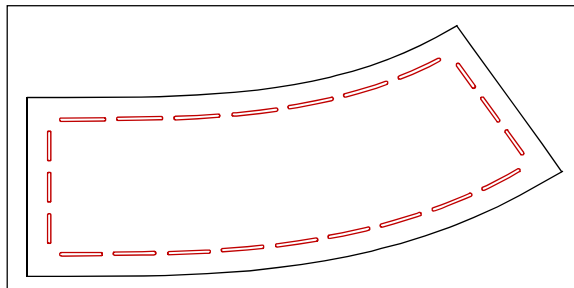
Picture 7-26

The number of gaps, the bridge width and the starting and end point can be altered in the drag area *Adjustments*.

Exercise

Construct a template for a shaped waistband for *Skirt 20* with the tool *Marking line 10*.

Into the new part 'template' insert the waist line, the centre front and the side seam of the front skirt and close the darts. Create a parallel of 60 mm to the linked waist line. Construct a seam allowance all the way around at a distance of 10 mm. Activate the tool *Marking line 10* and click the respective lines. Adjust the marking line to achieve a result corresponding to Picture 7-27.



Picture 7-27

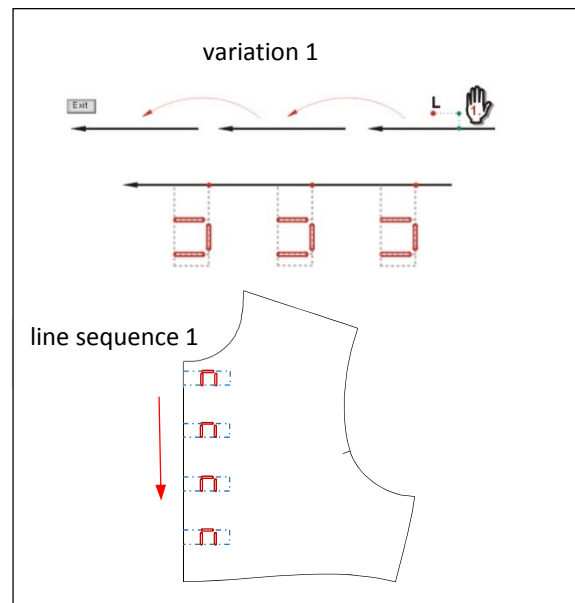
Construct a template for the skirt back waistband in the same way.

Tool Fastening 10 (velco)

Step-by-step guide

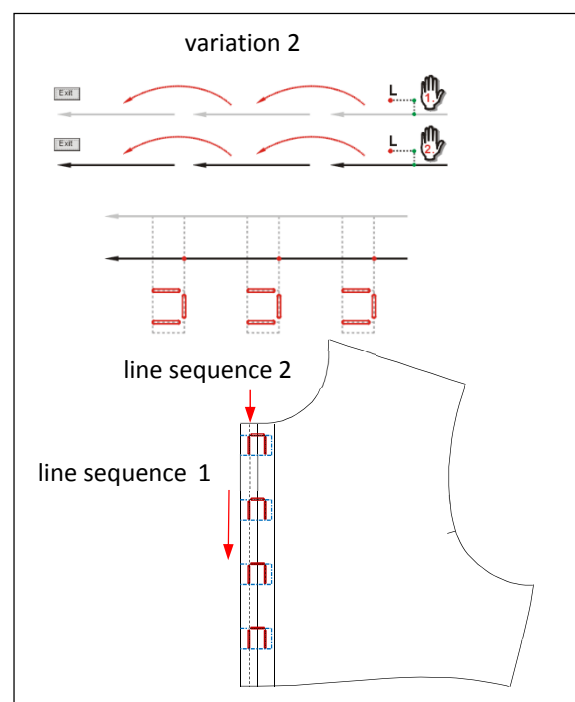
- ⇒ *Basisc menu* → *call* → *Grafis-Support programs*
- ⇒ *Select Fastening 10 (velcro)*
- ⇒ Click the lines for the fastening
- ⇒ Adjust the options
- ⇒ End interactive adjustment with *End*

Variation 1: only one line sequence is clicked, the fastening adjustments relate to the clicked line sequence, see Picture 7-28.



Picture 7-28

Variation 2: two line sequences are clicked. The fastening adjustments relate to the second line sequence, see Picture 7-29.



Picture 7-29

7.6 Attributes

The *attributes* menu

This menu *attributes* which can be called from the basic menu allows for alteration of line type or changing of a point into a particular mark.



Attributes menu

Line types...

continuous line ▪ dotted line small distance ▪ dotted line great distance

dashed ▪ dot-dash rough ▪ dot-dash fine

grain line ▪ split line ▪ annotation line

seam line ▪ cut internal line ▪ symmetry line

+/- chain

cross ▪ big point ▪ small point

asterisk ▪ arrow

reset



Alteration of line type

Step-by-step guide

- ⇒ *basic menu* → *attributes*
- ⇒ Activate the line type required
- ⇒ Click the line

Each line can be turned into one of the following line types:

Line types with structure...

continuous, dotted line with small distance, dotted line with greater distance, dashed, dot-dash rough, dot-dash fine or

Line types with significance...

annotation line, grain line, split line, cut internal line or seam line.

After activating the line type, the line to be altered in the construction is to be clicked.

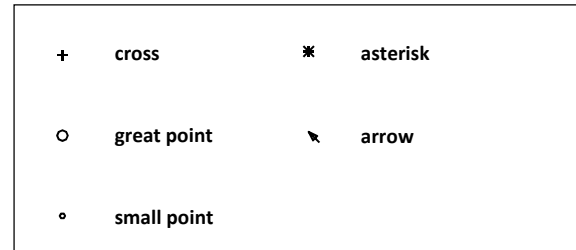
If the option *chain* is active continuous lines, e.g. the contour, are assigned the selected attribute.

The line types with structure have significance during plot/print, e.g. for plotter/cutters. The line types with significance are required in the marker making and for data export.

Setting a point mark

Step-by-step guide

- ⇒ *basic menu* → *attributes*
- ⇒ Activate the mark type required
- ⇒ Click the point



Picture 7-30

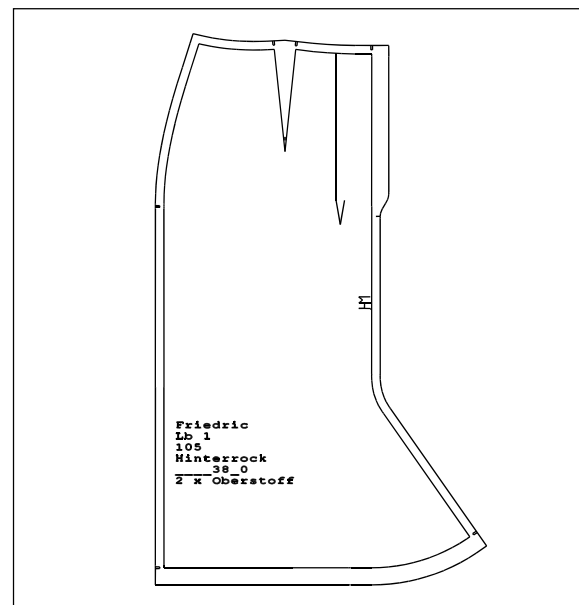
Each point can be changed into one of the point marks shown in Picture 7-30. For further modification, it is still treated as a point.

To change a point into a mark activate the selected mark type and click the point. The mark *cross* corresponds with the original point.

7.7 Exercises

1st Exercise

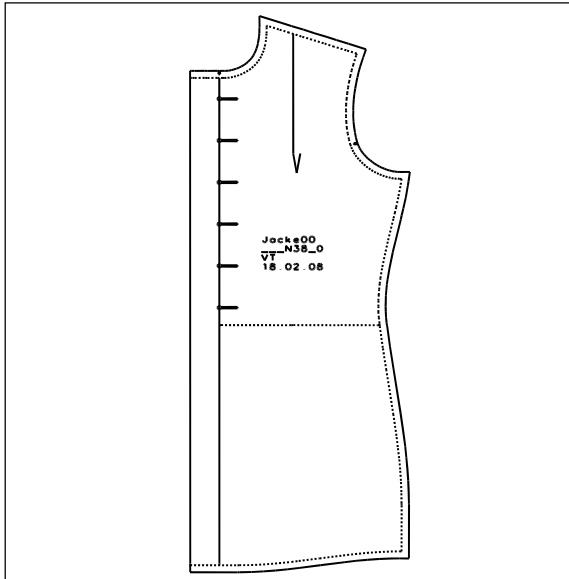
In the style 'Straight skirt' from Section 2.4 construct a grown-on godet at the centre back with a godet height of 200mm and an angle for the godet of 35° to the centre back. Link the godet line with the centre back with the *Link 20* tool. Then, construct the hem and the seam allowance. Set the text and the symbols.



Construct a godet as in Exercise 1 but in the front skirt.

2nd Exercise

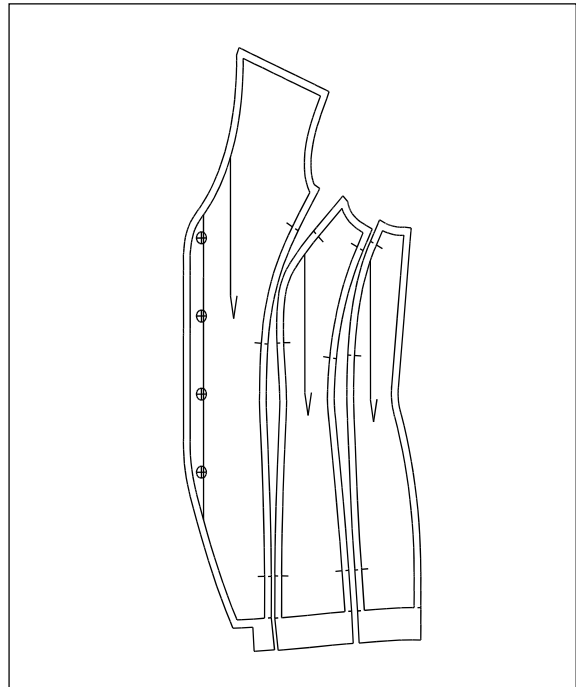
Call the construction *Bodice 50* and adjust the options so that the waist dart is drawn to the hem.



Annotate the front and back, setting the following text blocks automatically: name of collection, style name, part number, size, how often the piece is required per style and the material type.

3rd Exercise

Open the style from Chapter 5, Exercise 8 and set notches onto the panel seams. Construct the position of the notches with *intersection*. To align the



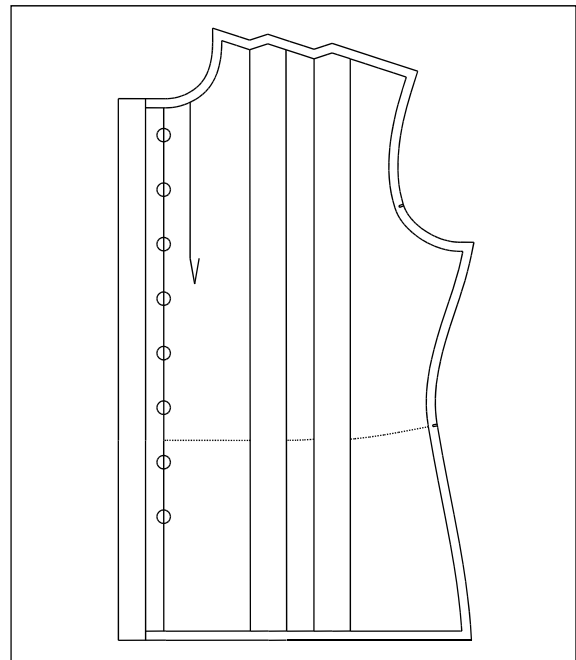
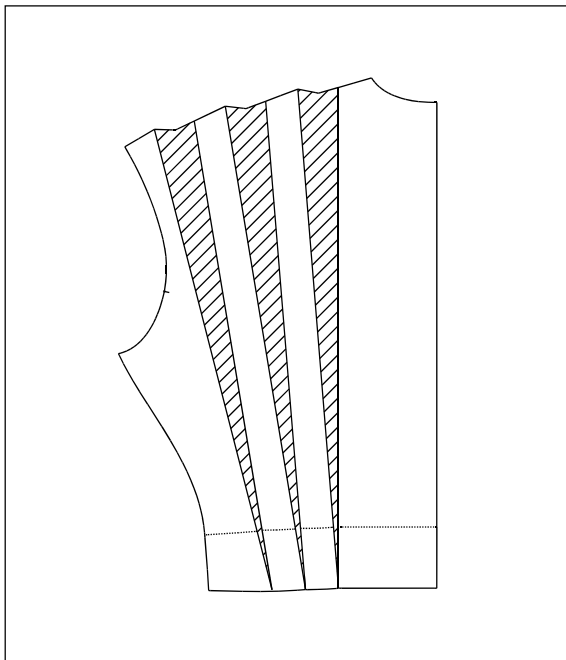
notches, click on the respective marking lines. Set circle symbols of 15mm length onto the points of the front edge. Set the grain line symbol into each piece. Grade the construction in various sizes and check the position and direction of the notches.

Chapter 8 Darts and pleats

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8.1 Relocate dart

The *dart* menu



Dart menu

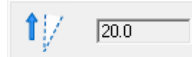
relocate dart



shorten dart



shortening amount



reset



Dart hood 10 tool



Pinch 10 tool ▪ Pinch 20 tool



This menu offers functions for relocation and shortening of darts, creation of dart hoods and pinching with a new dart.

Prerequisites for relocation of darts

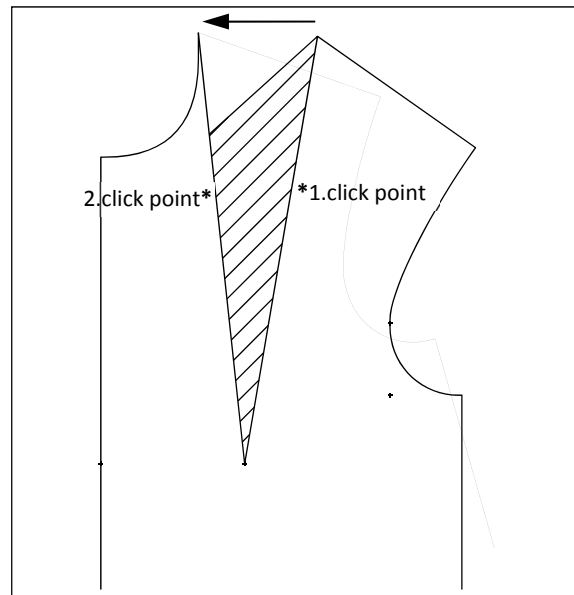
1. For the relocation of darts Grafis requires a closed perimeter - also across corners. Starting and final point of the lines are allowed a maximum of 0.5mm gap. The individual lines of the perimeter do not have to be linked.
2. The dart must not be closed, i.e. with a dart hood. If such a dart is to be relocated the hood is to be removed with *separate* and *cut* or *corners*, first.
3. The dart lines must be of the same length and share an apex.

Step-by-step guide

- ⇒ Check whether the conditions for dart relocation are met
- ⇒ *basic menu* → *dart*
- ⇒ Click *relocate dart*
- ⇒ Determine relocation direction by clicking both dart lines (succession!)
- ⇒ Adjust % of the dart to be relocated
- ⇒ Switch *+dart line* or *-dart line*
- ⇒ Click *automatic*
- ⇒ Determine insert position with the sub-menu point construction
- ⇒ Relocate additional objects; before clicking the objects the switch *+/-copy* is to be adjusted and the object type *lines* or *points* is to be activated.
- ⇒ Possibly, reset single objects with *reset single* or reset all objects with *reset all*
- ⇒ Continue with 5. or terminate with

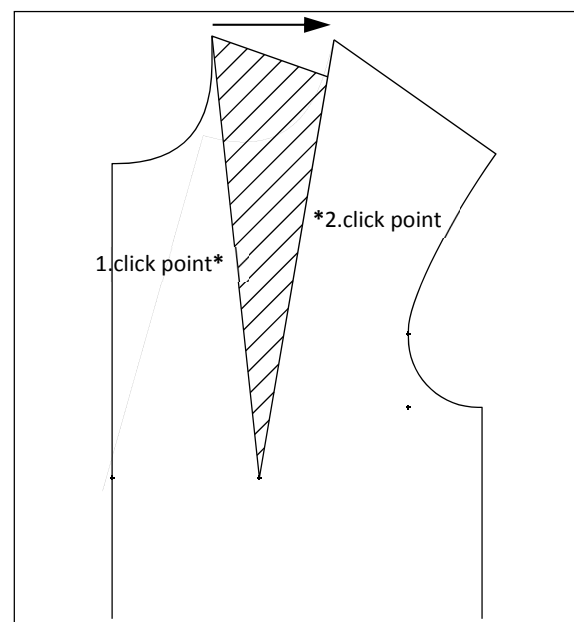
Pivot direction for *relocating darts*

When clicking *relocate darts* in the *dart* menu you will be asked which dart line is to be relocated towards the other. The succession of clicking the lines determines the pivot direction (Picture 8-1 and Picture 8-2).



Picture 8-1

After having determined the pivot direction, the dart is hatched. The direction of the hatching indicates the pivot direction. The *relocate dart* menu opens, see next page.



Picture 8-2

The dashed lines in Picture 8-1 and Picture 8-2 show the shape of the bodice in case the full dart (100%) is relocated.

The *relocate dart* menu

Relocate dart menu

amount of dart to be relocated

remainder of the dart

relocate automatic ▀ +/-dart line

reset all

relocate additional...
lines ▀ points ▀ +/-copy

reset



Amount of dart

In the first part of the menu you determine how many % of the dart is to be relocated in the next step. The line *rest=0%* shows the remainder of the dart which can still be relocated.

relocate automatic

Activating the function *relocate automatic* starts the relocation. The *dart line* switch determines whether or not the dart lines are drawn at the new position:

- +dart line draws the dart lines at the new position
- dart line does not draw the dart lines at the new position.

relocate additional

After having relocated parts of the dart important construction points and lines are no longer positioned correctly in relation to the part. These points or lines must be relocated directly after relocating the dart. The type of object (*points* or *lines*) is to be selected and the *copy* switch is to be set:

- +copy object is copied
- copy object is relocated only.

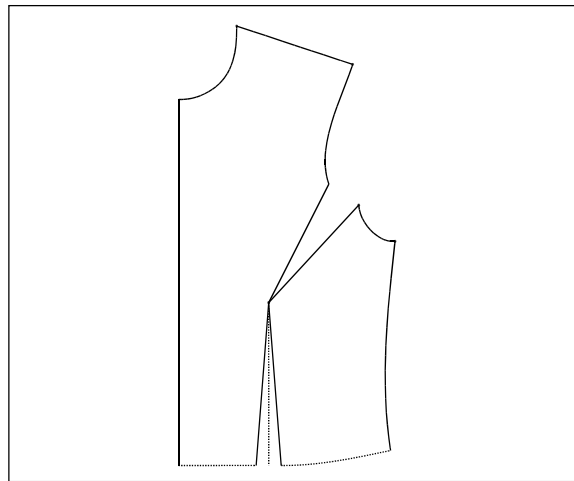
reset

Clicking *reset* determines:

- reset single additional relocated objects can be reset individually by clicking
- reset all the last relocation step is reset completely.

Relocate 100% of the dart

Relocating 100% of the dart is explained using an example. Call the basic block *Bodice 10* and relocate 100% of the dart into the front pitch (Picture 8-3):



Picture 8-3

call
dart

relocate dart

The right dart line is to be pivoted to the left. Click the right dart line first and then the left. Enter 100% in the first line. The actual relocation has not been carried out and the display shows: (*rest=100%*).


+dart line

relocate automatic

click p in free mode

construct the front pitch as insert position

As two lines are assigned to the front pitch Grafis asks for the base line required. You can click one of the lines offered and the dart is relocated automatically.

Check whether further objects are to be relocated to be positioned correctly in your construction. In this example this is not necessary and the dart relocation can be terminated with .

reset all the dart is replaced in its original position

Repeat relocation of the dart to a position on the side seam 30mm from the armhole (not shown).

Please note that the construction points of the armhole have to be relocated as well with:

points

-copy click the points required

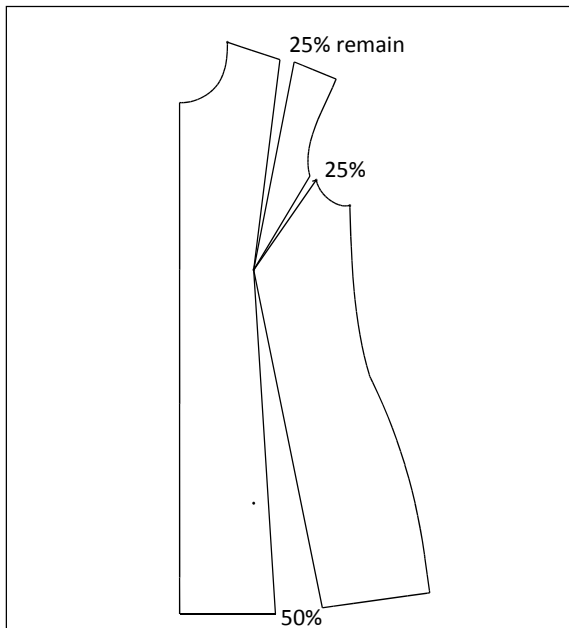


reset reset construction record to 001

Repeat relocating the dart with the left dart line being pivoted towards the right. Click the left dart line first and then the right. As opposed to Picture 8-3 the centre front is now angled, the position of the armhole remains unchanged.

Relocate parts of a dart

Relocating a portion of a dart is explained with an example. Call the basic block *Bodice 50*. Now, 25% of the bust dart is to be relocated to the front pitch and 50% into the hem (Picture 8-4).



Picture 8-4

call
dart

relocate dart

The right dart line is to be pivoted towards the left. Click the right dart line first and then the left.

25% enter in the first line (*rest=75%*).

+dart line

relocate automatic

click P front pitch

Please note that the construction points of the armhole have to be relocated as well:

-copy


points relocate construction points of the armhole

50% enter in the first line (*rest=25%*)

+dart line

relocate automatic

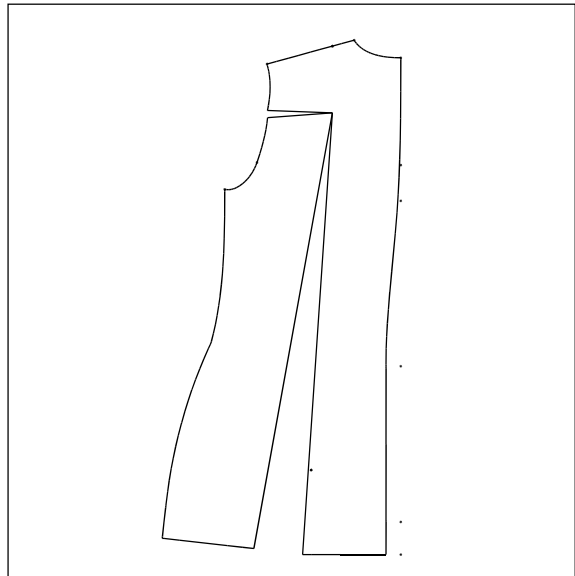
click L hem

Check whether any other objects must be relocated so that they are in the correct position in your construction. Terminate with .

Exercises

1st exercise

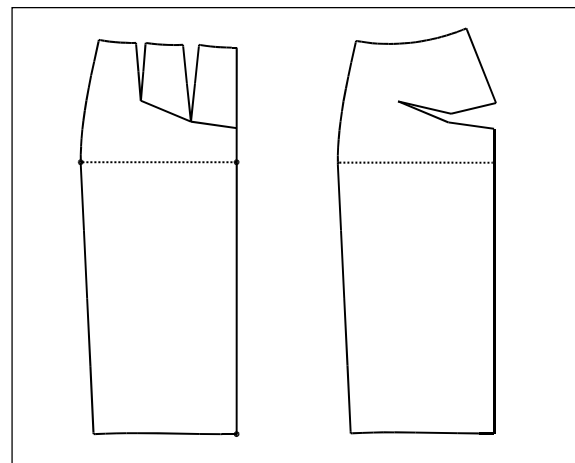
Relocate 50% of the dart in the back of basic block *Bodice 10* into the back pitch and the remaining 50% of the dart into the hem (Picture 8-5).



Picture 8-5

2nd exercise

Construct a grown-on yoke for *Skirt 20*. Use the functions *line from point to point* and the *Line 10* tool for the construction of the yoke. Relocate the dart into the yoke line (Picture 8-6).



Picture 8-6

8.2 Shorten dart

Step-by-step guide

- ⇒ *Basic menu* → *dart*
- ⇒ Adjust the *shortening amount*, by which the dart is to be shortened
- ⇒ Activate *shorten dart*
- ⇒ Click both dart lines

Calling the function *shorten dart*

This function is contained in the *dart* menu. With this function an existing dart can be shortened by a specified *shortening amount*.

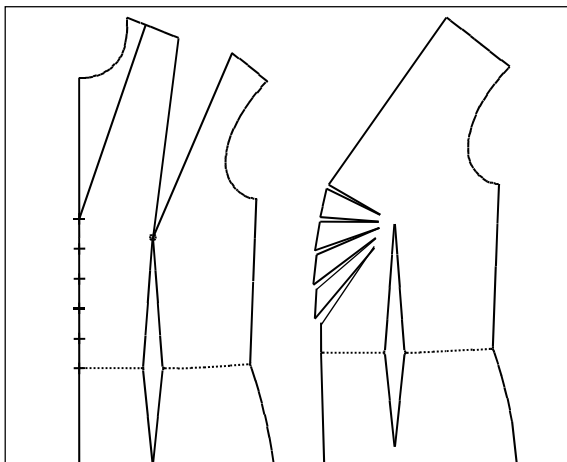
Entering a negative value *lengthens the dart*.

After having entered the amount and activated *shorten dart*, Grafis asks for the two dart lines. The shortened dart appears on screen. The distance between the original and the new apex is exactly the amount entered.

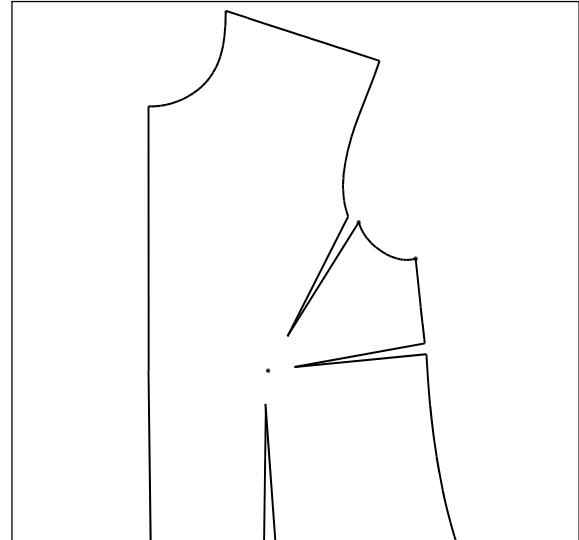
Exercises

1st exercise

Construct five pleats into the centre front of *Bodice 50*. The bust dart is relocated by 20% respectively into the rastered centre front. Shorten the first two resulting darts by 20mm, the third and fourth dart by 30mm and the fifth dart by 40mm (Picture 8-7).



Picture 8-7



Picture 8-8

2nd exercise


Relocate the dart in the basic block *Bodice 10* into the armhole, the side seam and the hem. Shorten the side seam dart by 20mm, the dart in the armhole by 30mm and lengthen the dart in the hem by 20mm (*shortening amount* = -20.) (Picture 8-8).

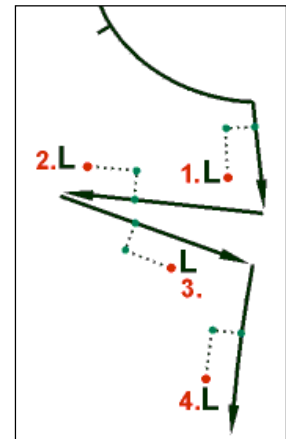
8.3 Hoods on darts and pleats



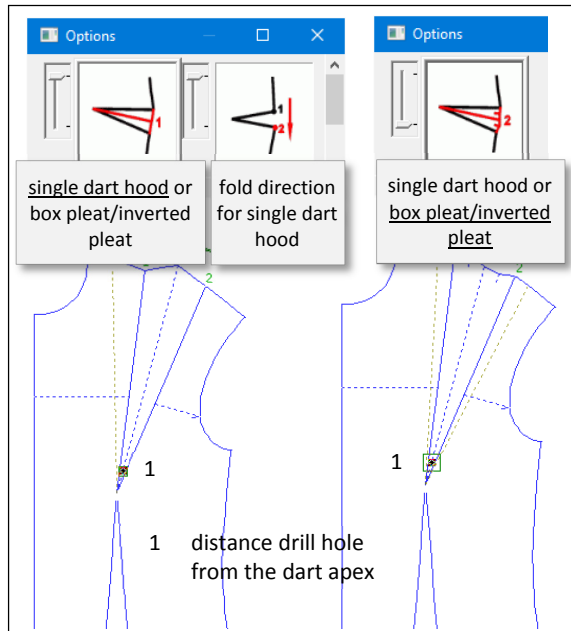
The tool for the construction of hoods on darts and pleats *Dart hood 10* is contained in the *dart* menu.

Step-by-step guide

- ⇒ *basic menu* → *darts* and call the *Dart hood 10* tool
- ⇒ Click on four lines **contour – dart – dart – contour** in a continuous direction (right principle! (Picture 8-9))
- ⇒ Close the *darts* menu with 
- ⇒ Double-click on the new dart hood
- ⇒ Adjust the options (Picture 8-10)
- ⇒ Interactive adjustment of the drill hole



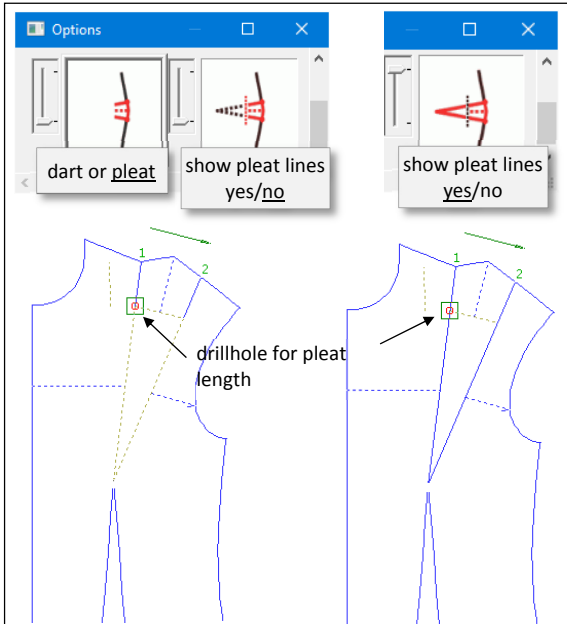
Picture 8-9



Picture 8-10

With the *Dart hood 10* tool, a dart hood with drill hole is constructed.

The first option (Picture 8-10) determines whether a single pleat or a box/inverted pleat is constructed. The second option is only active for single pleats. It defines the fold direction.

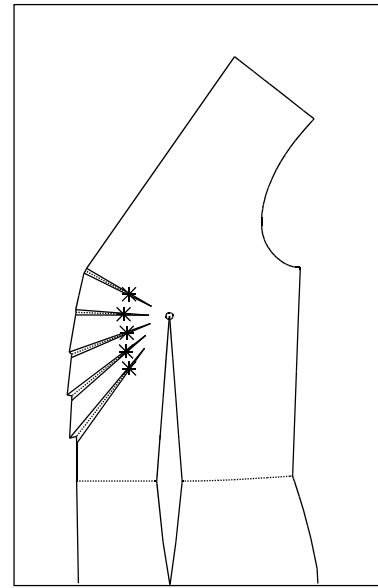


Picture 8-11

The third option determines whether a dart or a pleat is constructed. If the pleat is active, the pleat length can be adjusted interactively. The fourth option determines whether the lines of the pleat are visible in the part, Picture 8-11.

Exercise

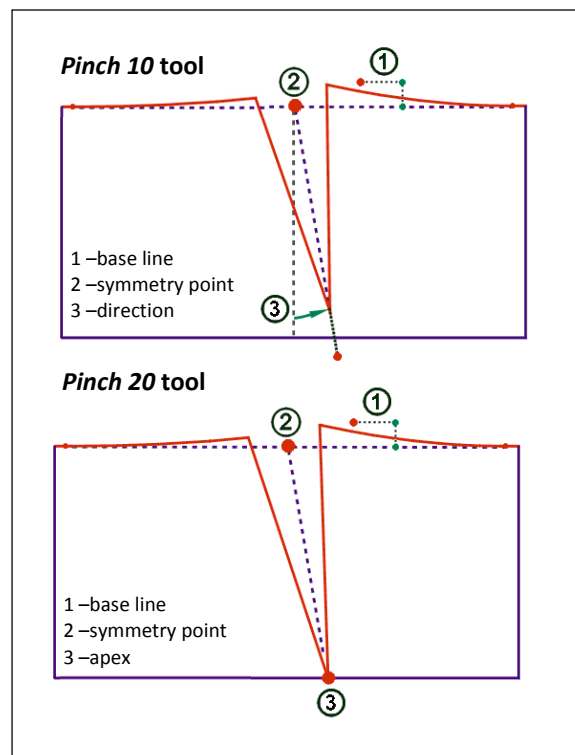
Construct the hoods for the darts in the first exercise of Section 8.2 with the tool *Dart hood 10* (Picture 8-12). Set the third option to pleat and position the drill-holes interactively.



Picture 8-12

8.4 Pinch with new dart

The two tools *Pinch 10* and *Pinch 20* for pinching through new construction of darts can also be found in the *darts* menu. With both tools, the pinch amount and




Picture 8-13

the correcting curve can be adjusted interactively. The tools differ only in the way the apex point is defined. With the tool *Pinch 10* the direction of the dart is constructed and the dart length is adjusted inter-

actively. With the tool *Pinch 20* the apex is determined directly with the sub-menu point construction.

Clicking (1)(3)(3) instead of (1)(2)(3) when calling the tool *Pinch 20*, creates the symmetry point as a perpendicular from the apex onto the base line.

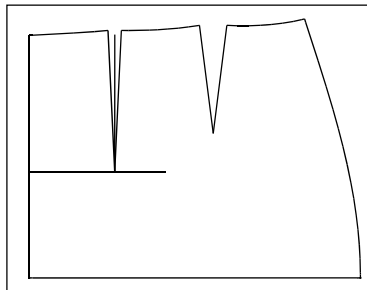
Step-by-step guide

- ⇒ *basic menu* → *darts* and call the tools *Pinch 10* or *Pinch 20*
- ⇒ Click the base line into which the dart is to be inserted
- ⇒ Construct the symmetry point
- ⇒ Depending on the tool selected: construct the direction of the dart or the apex
- ⇒ Close the *darts* menu with 
- ⇒ Double-click on the new dart
- ⇒ Interactive adjustment of the dart content

Exercises

1st exercise

In the style 'Straight skirt' from Section 2.4 construct an auxiliary line beginning 100mm below the waist on the centre front running horizontally.

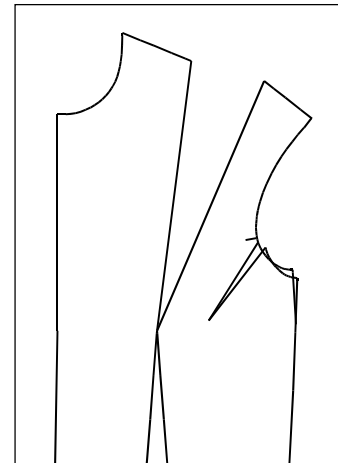


Picture 8-14

Drop a perpendicular from the centre (50%) of the front waist onto the auxiliary line. Construct a dart with a dart width of 10mm. The symmetry point and the apex are the beginning and end point of the perpendicular respectively (Picture 8-14).

2nd exercise

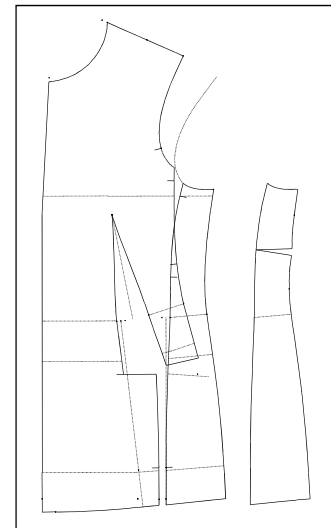
Construct a dart into the armhole of *Bodice 50* with a pinch amount of 10mm (see Picture 8-15).



Picture 8-15

3rd exercise

Call *Bodice 50* and load the prepared *shape004*. In the drag area *Side seam* set the relocation to 0. Open another part, call *Front part 30* and link it with *Bodice 50*. Open a further part and insert all lines for the side front panel. Separate the side seam and the panel seam at the waist curve. Now, the pattern is to be pinched at the side seam. A balanced transition can be ensured by creating the symmetry point from the perpendicular of the apex onto the side seam. Call the tool *Pinch 20* using the side seam as the base line. Now, click the side seam twice at a relative distance of 50%. Thus, the symmetry point is created as a perpendicular onto the side seam.



Picture 8-16

8.5 Spread for pleats, pivot open and close

The *spread* menu

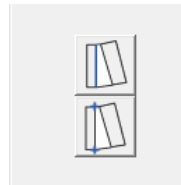
The *spread* function for preparation of pleat construction is the contents of this section.



Spread menu

click spread line

spread line defined by two points



re-define spread line

spacing 1 at the starting point of the spread line

spacing 2 at the final point of the spread line

+/-change direction

spread...

all ▪ single lines ▪ single points

reset...

all ▪ single lines ▪ single points

deposit ▪ +/-spread lines



Step-by-step guide for spreading

- ⇒ Construct the spread line or starting and final point of the spread line with the functions of the *points and lines* menu
- ⇒ *basic menu* → *spread*
- ⇒ Determine spread line via:
 - click spread line*
 - if a spread line is available or
 - spread line defined by two points*
 - if the spread line is to be defined by its starting and final point.
- ⇒ Construct the spread line, then the actual *spread* menu opens
- ⇒ Possibly, construct the spread line again after having clicked *re-define spread line*
- ⇒ Enter the *spacing amount* at the starting and final point of the spread line and adjust *+/-change direction*

- ⇒ Activate *spread: single points, single lines* or *all* and click the respective objects
- ⇒ Possibly, reset by activating *reset: single points, single lines* or *all* and clicking the respective objects
- ⇒ Adjust *+/-spread lines*
- ⇒ Terminate by clicking *deposit*

Spread line

After having constructed the spread line either with *click spread line* or *spread line defined by two points*, the actual *spread* menu opens. The spread line is displayed in black (yellow - if a line of the construction is situated underneath) and the target line in red. **All required Grafis objects will be spread according to spread line → target line.** Correction of the spread line is possible by clicking *re-define spread line*.

Distances between spread line and target line

The position of the target line is to be adjusted. The following options are available:

- alter the spacing between the starting points of spread and target lines *spacing 1*
- alter the spacing between the final points of spread and target lines *spacing 2*
- alter the spread direction by clicking the switch *change direction*

Spreading objects

As soon as the target line is in the required position spreading of the individual objects ensues. The option *spread: all* spreads the complete part from the spread line onwards. Then, individual lines or individual points can be spread, additionally by activating *spread: single points* or *single lines* and clicking the objects. If too many objects were spread with *spread: all*, individual points or lines can be reset with *reset: single points* or *reset: single lines*. With *reset: all* all spread objects are reset.

Deposit

After having spread all required objects the switch *spread line* is to be adjusted:

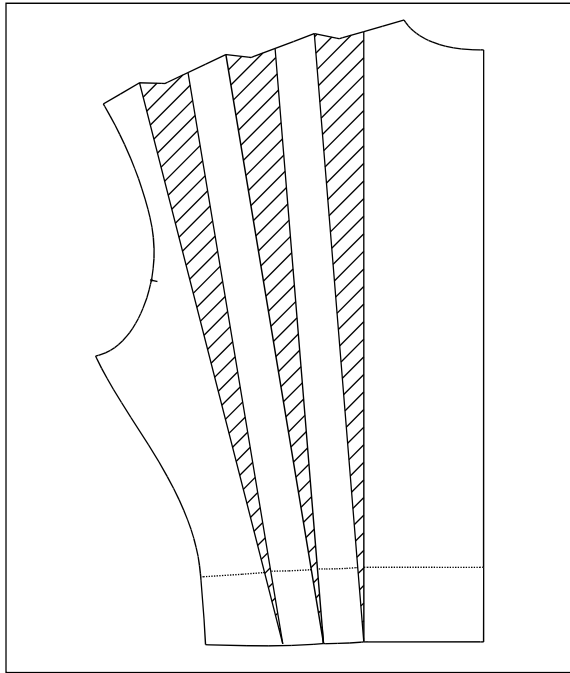
- +spread line* the spread line is drawn,
- spread line* the spread line is not drawn.

To terminate spreading click *deposit*.

Exercises on spread

1st exercise

Construct three pleats in the back of *Bodice 20* according to Picture 8-17.



Picture 8-17

First, raster the shoulder and then, construct three lines from these points to the waist, parallel to the centre back. Then, activate *spread* and click *spread line* and click the first spread line.

When clicking the spread line the right principle is to be followed. The starting point of the spread line is spread by the value spacing 1, the final point by spacing 2!

Enter the spread amount, here 0.0 and 40.0 and select the correct spread direction from centre back to the side seam by clicking on *change direction*. Click on *spread: all* to spread. Set the switch to *+spread lines* and deposit with *deposit*.

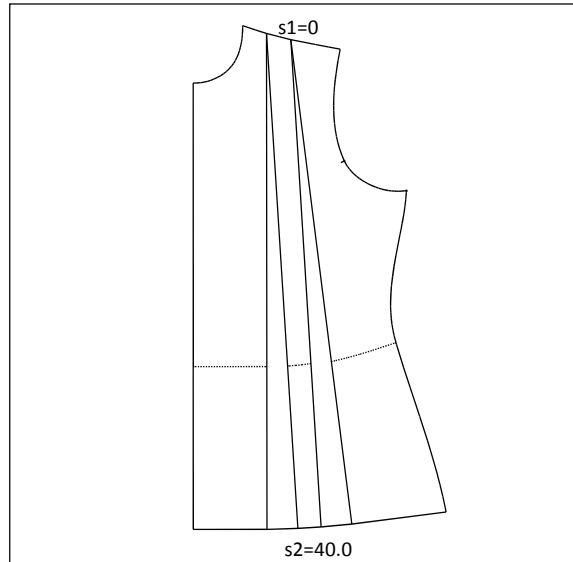
Before depositing, test also the following:

<i>reset: single lines</i>	click lines, with
<i>spread: single lines</i>	back
<i>reset: single points</i>	click points, with
<i>spread: single points</i>	back
<i>spread: all</i>	
<i>reset: all</i>	
<i>spread: single lines</i>	click lines
<i>spread: single points</i>	click points and restore the shape shown.

Click the next spread line. Grafis transfers the spread direction and spacing so you can continue with *spread: all* and *deposit*. Construct dart hoods for the pleats and measure the pleats.

2nd exercise

Design two pleats in the front of *Bodice 20*. First, link the shoulder and generate a point sequence of 5 points on the shoulder. Drop perpendiculars from the front two points onto the hem. Spread the perpendiculars with a spread amount of 40mm at the hem. The pleats are not opened at the shoulder. Link the hem lines (Picture 8-18).



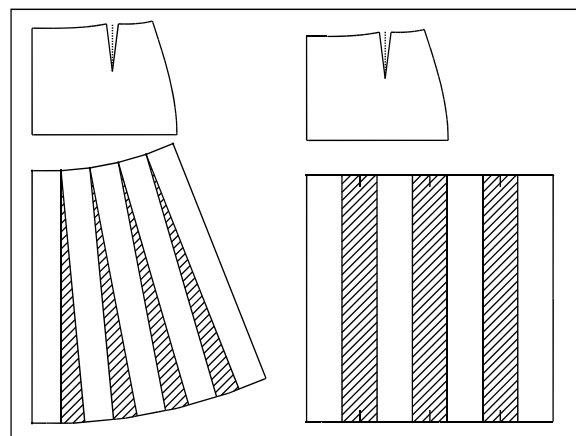
Picture 8-18

When clicking the spread line the right principle is to be followed. The starting point of the spread line is spread by the value spacing 1, the final point by spacing 2!

8.6 Exercises

1st exercise

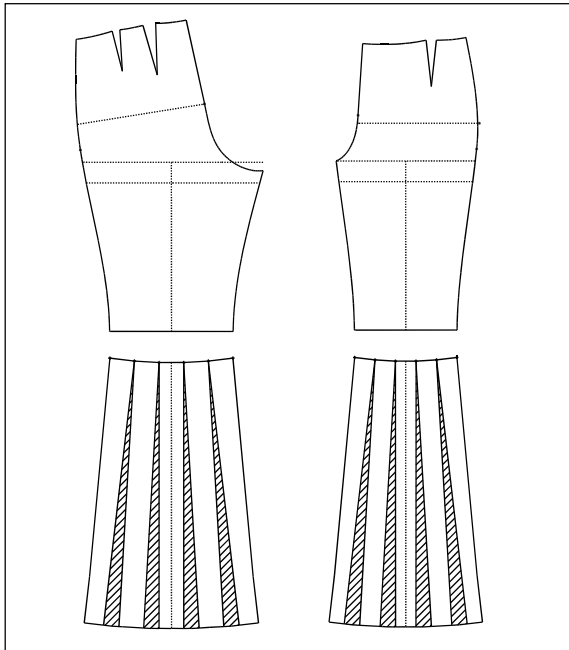
Design four pleats from the hip line in the front skirt of the style 'Straight skirt' from Section 2.4. The spread amount at the hip is 0 and the pleats are spread by 40mm at the hem.



Design four pleats from the hip line in the front skirt of the style 'Straight skirt' from Section 2.4. The pleats are spread by 60mm at the hip and hem respectively. Create inverted pleats at hip and hem.

2nd exercise

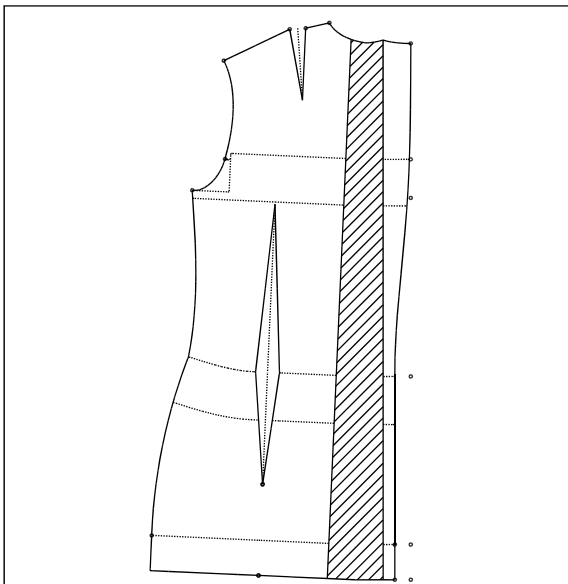
Construct four pleats from the knee in *Trouser 10*. The spread amount at the knee is zero and 30mm at



the hem. To the left of the crease line the pleats are to be spread towards the side seam, to the right of the crease line spread towards the inside leg. Link the hem lines.

3rd exercise

Construct an asymmetrical pleat in the back of construction *Bodice 10*, beginning at 50% of the neckline

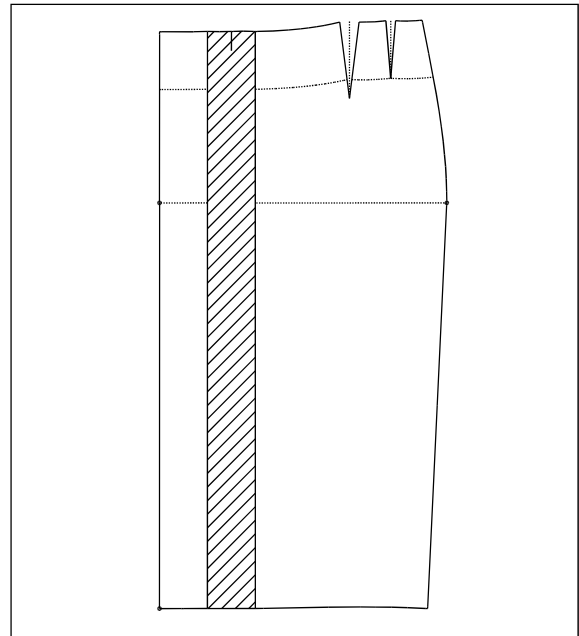


and running vertically down. Do not construct the spread line with *perpendicular line* as otherwise the spread line would change when interactively altering the hem curve.

Spread with a pleat content of 40mm at the neck and 70mm at the hem. Construct a single dart hood at the neck and link the hem curve.

4th exercise

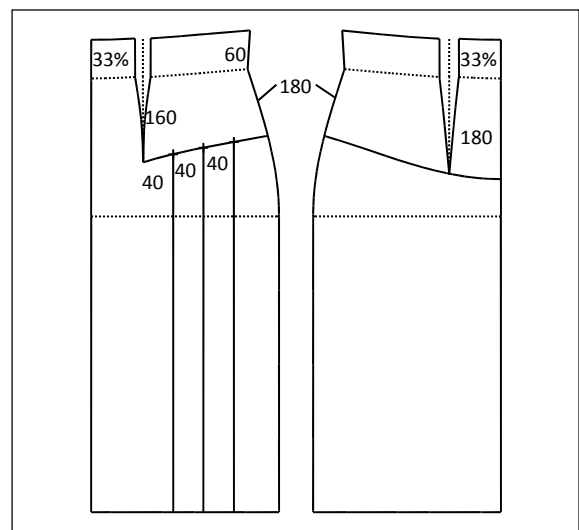
In the front of *Skirt 20* construct a pleat at a distance of 50mm from the centre front. The pleat content is

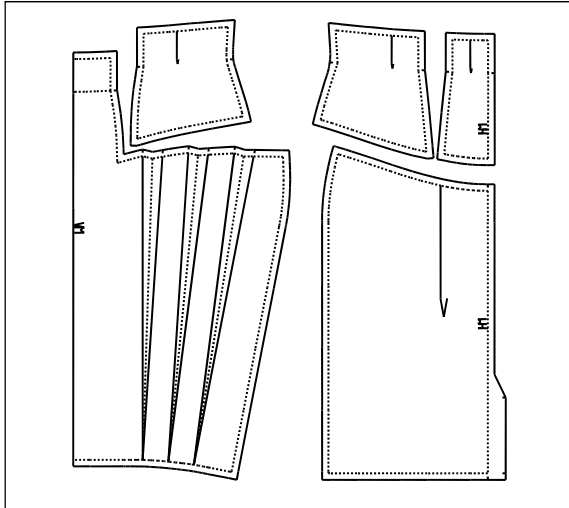


to be 50mm. First, construct a parallel of 50mm to the centre front and then spread the front skirt at the parallel.

5th exercise

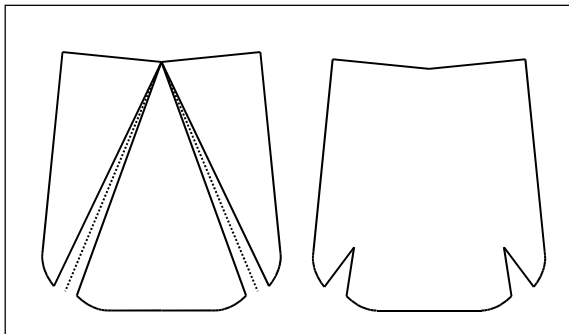
Call *Skirt 20* and construct a skirt with grown-on waistband and pleats in the skirt front.



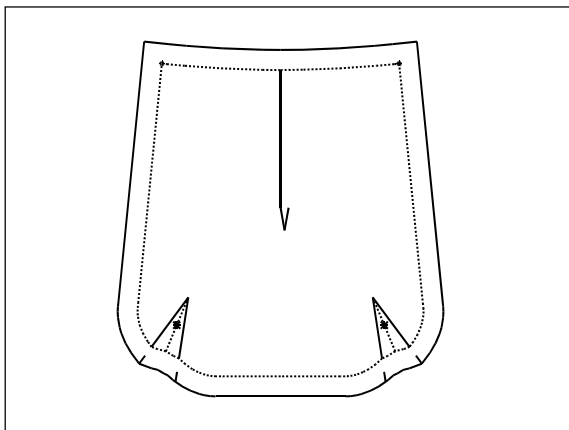


6th exercise

Construct a pocket with darts. First, construct a rectangle of 120mm width and 150mm height. Create co-ordinated round lower corners with the tool *Corner 50*.



Construct two spread lines and spread with a value of 15mm. Shorten the darts by 120mm.



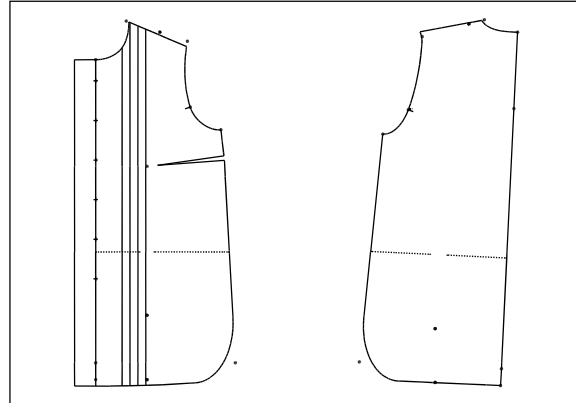
Construct the dart hood with the tool *Dart hood 10*. Link the upper edge with *Link 20* and then, shape the edge interactively. Construct the seam allowance and the symbols.

7th exercise 'Blouse with pin-tucks'

Open the style 'Blouse with pin-tucks' from Section 5.6 and continue designing. Construct a point on the back armhole, 100mm from the end of the shoulder.

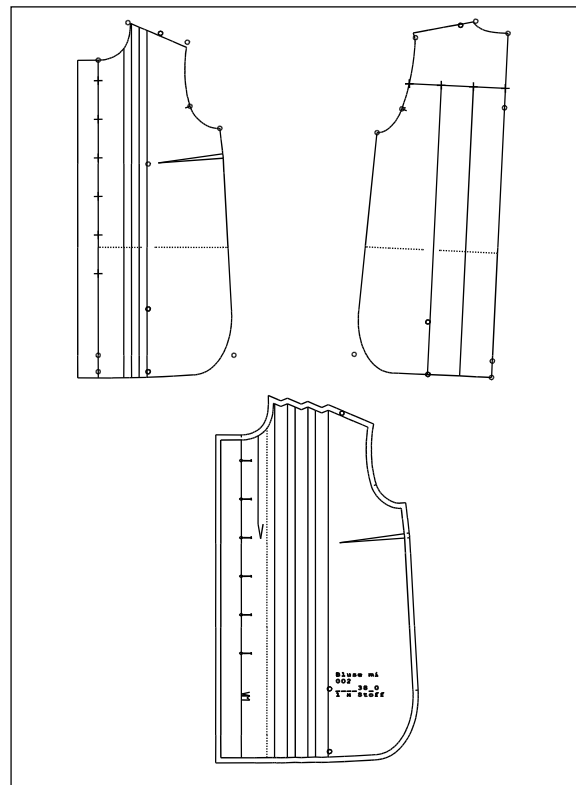
From this point, drop a perpendicular onto the centre back.

Construct a point sequence of four points on the per-



pendicular and construct two spread lines from these points. The spread lines are to be aligned parallel to the centre back. Extend the spread lines to the hem with *separate*.

Construct a single dart hood for the bust dart in the side seam.



Open another part 002 in the part organisation and insert all lines and points of the front from part 001 into part 002. Hide part 001 and continue designing with part 002.

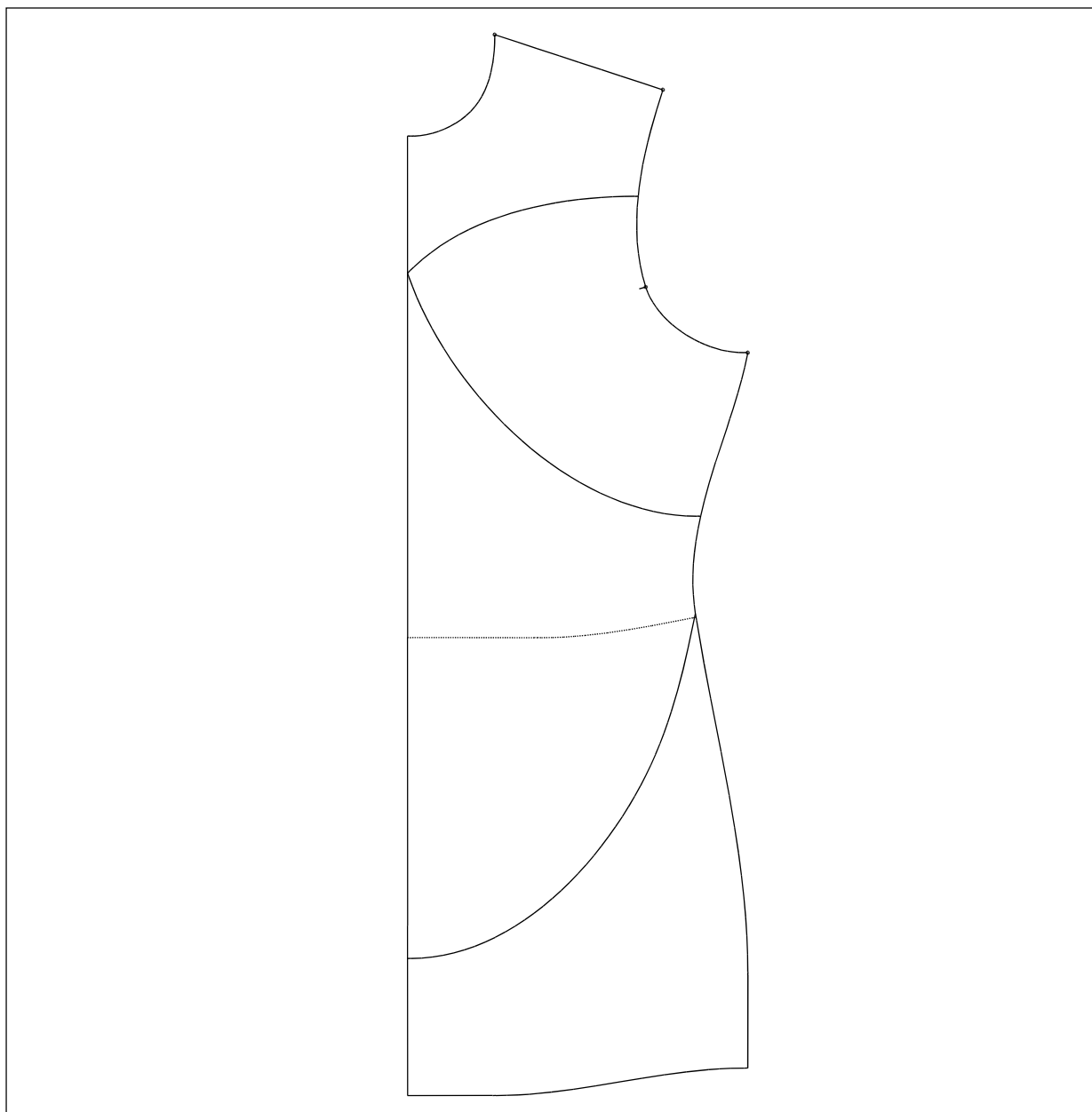
In part 002 spread the pleats in the front with a pleat content of 25mm at the shoulder and the hem respectively. Construct single dart hoods at the shoulder and close the hem with *link single*. Construct a seam allowance of 10mm with *chain* and set the symbols and the text.

Chapter 9 Curves and Part assistant

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9.2	Manipulate curve	127
9.3	The Part assistant	128
9.4	Exercises	134



9.1 Construction of curves

The *curves* menu

A new curve is created with the record function *curves* from the basic menu.



Curves menu

create new curve

replace curve

start the tool automatically

manipulate curve



In the *curves* menu, three functions are available:

- **new curve**
...is the new curve function from version 10.
- **replace curve**
...as *new curve*, but an existing line/ curve to be selected is replaced by a new curve. The curve to be replaced must be clicked in the direction of the green arrow.
- **manipulate curves**
... opens a menu with functions for relocating starting and final point of curves and for refining curve runs.

Base points and auxiliary points

A curve is shaped with so-called base points and auxiliary points.

Base points are points, which are bound to objects (points or lines) of the construction. Each curve has a minimum of two base points: starting point and final point. Base points constructed with *click l*, *click plg* or *click rlg* can be moved along their base lines. For all other variations, an additional **displacement line** can be determined by clicking. The following applies to base points:

- Base points are constructed, i.e. bound onto the construction.
- Base points can be moved along an existing displacement line.
- In a base point, a direction can be assigned to the curve.
- Base points are indicated by small crosses.

Auxiliary points are points, which are not bound to the construction. The position of auxiliary points is calculated relative to the zero curve. The zero curve is displayed as a dashed line and generated exclusively on the basis of the assignments of the base points. Auxiliary points are determined by their relative position to the zero curve between two adjacent base points. The following applies to auxiliary points:

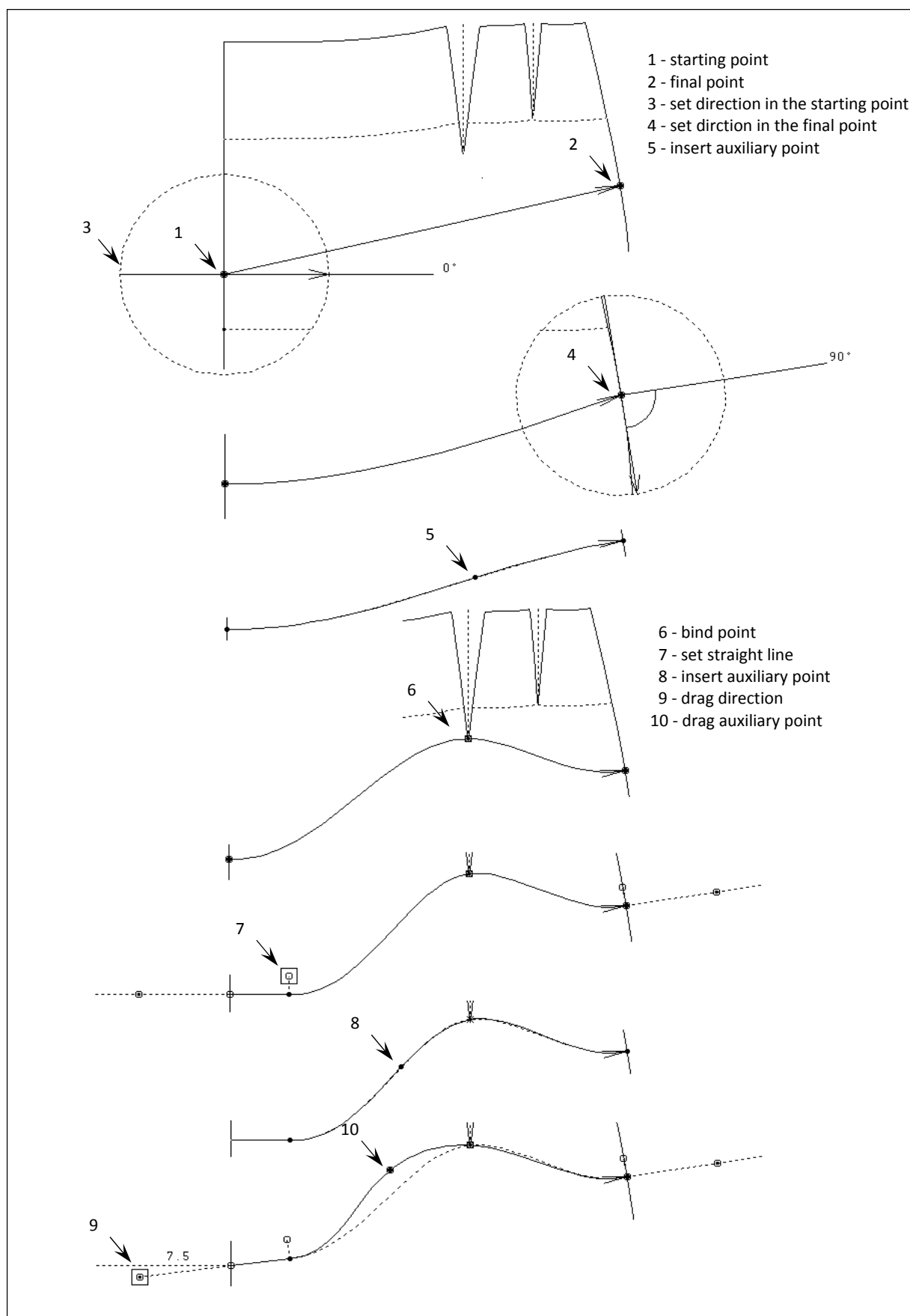
- They serve to fine-tune the shape of the curve between base points.
- Auxiliary points can be dragged freely.
- Auxiliary points are displayed as small round points.

The fewer the auxiliary points, the smoother the curve. After construction of base points and assignment of directions, usually no or few auxiliary points are necessary.

Step-by-step guide

- ⇒ *Basic menu* → *curves* → *new curve*
- ⇒ Construction of starting and final point of the new curve
- ⇒ Set the base points along the curve. This way, the curve is moved with the base points during grading:
 - *Insert points*
 - *Bind points*: The point becomes a base point.
- ⇒ The basic points are given by default with the *direction start/ final*. If necessary, this can be changed with the *Set direction*. Insert further auxiliary points for fine-tuning of the curve with *Insert points*
- ⇒ Insert further auxiliary points for fine-tuning of the curve with *Insert points*
- ⇒ If necessary, base points, auxiliary points and directions can be deleted.
- ⇒ Support during curve construction via the functions of the right menu strip:
 - *raster*
 - Set option *Move base point in %* and *Allow separation of base point from click point*,
 - various display options see Chapter 13 and
 - redo and undo the steps within the curve construction.
- ⇒ *End* or *Abort* to quit the curve construction

Important: Points must have a minimum distance of 5mm between each other!



Picture 9-1

Construct new curve

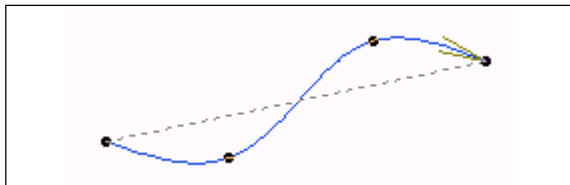
Construction of a curve starts with *basic menu* → *curves* → *new curve* and determination of starting point and final point of the curve. As the same construction step must be repeated in other sizes, the starting and final point of the curve must be bound to the construction.

In the case of *replace curve*, in addition to determining the starting point and final point, the curve to be replaced must be clicked.

The individual steps are explained using the example of a yoke curve in a skirt basic block (Picture 9-1). Call *Skirt 20*. Determine the starting point and final point of the new yoke curve with *click 1* respectively see Picture 9-1 (Picture 9-1 No.1 and 2).

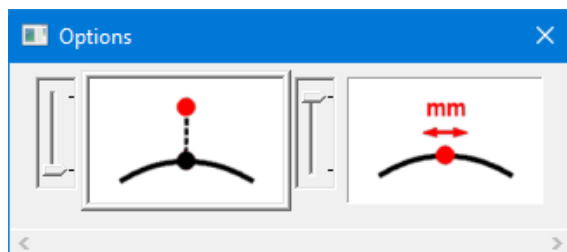
Having constructed starting point and final point of the curve, the interactive interface with the *Curve construction* menu (Picture 9-2) opens and the curve can be shaped. The *Curve construction* menu can be positioned anywhere on the screen.

During direction construction, the direction of the curve itself must be considered. It is indicated by an arrow at the end of the curve (Picture 9-3).



Picture 9-3

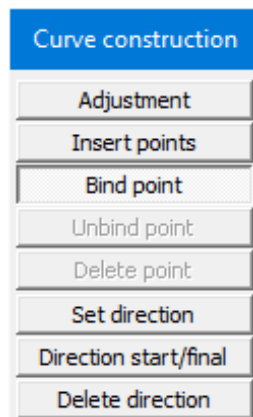
You can use the options to unbind the starting and final point from the line and to specify the shift variant mm or % (Picture 9-4).



Picture 9-4

Construct a direction in the base point

In a base point, the curve can be assigned a direction with *Set direction* or *Direction start/final*.



Picture 9-2

The yoke curve is to start horizontally and end at a right angle with the side seam in all sizes, according to Picture 9-1. These pre-requisites are respected if you activate *Set direction* and then, click the base point. Start with the starting point of the curve on the centre front and set a fixed direction of 0°, see Picture 9-1 No.3. Then, construct the direction in the final point at the side seam and set the direction at a right angle to the base line, see Picture 9-1 No.4.

The direction must be determined along the direction of the curve, i.e. from the starting point to the final point. Direction assignments should be relative to lines of the construction, such as the centre front and the side seam as shown in Picture 9-1.

The assigned direction is reset with *Delete direction*.

Insert and drag auxiliary points

If the curve is to be bound onto the construction along its length, further base points are required. Base points are generated by inserting an auxiliary point and then, turning it into a base point.

Insert an auxiliary point by activating *Insert points* and click on the curve, see Picture 9-1 No.5. The point is set. Now, activate *Adjustment* and drag the point with pressed down left mouse button.

Construct base point

An auxiliary point becomes a base point by binding it onto the construction with *Bind point*.

The yoke curve is to run through the end point of the dart in all sizes, according to Picture 9-1. To achieve this, bind the auxiliary point onto the dart, see Picture 9-1 No.6. It becomes a base point. Activate *Bind point*, click on the auxiliary point and construct its new position with the point construction sub-menu, here with <Shift> in the free mode. Now, the curve runs through this point in all sizes.

The position of a base point can be re-assigned by repeating the *Bind point* operation. This also applies to the starting point and final point of the curve. With *Unbind point* the binding of an auxiliary point onto the construction is reset. The base point reverts to an auxiliary point.

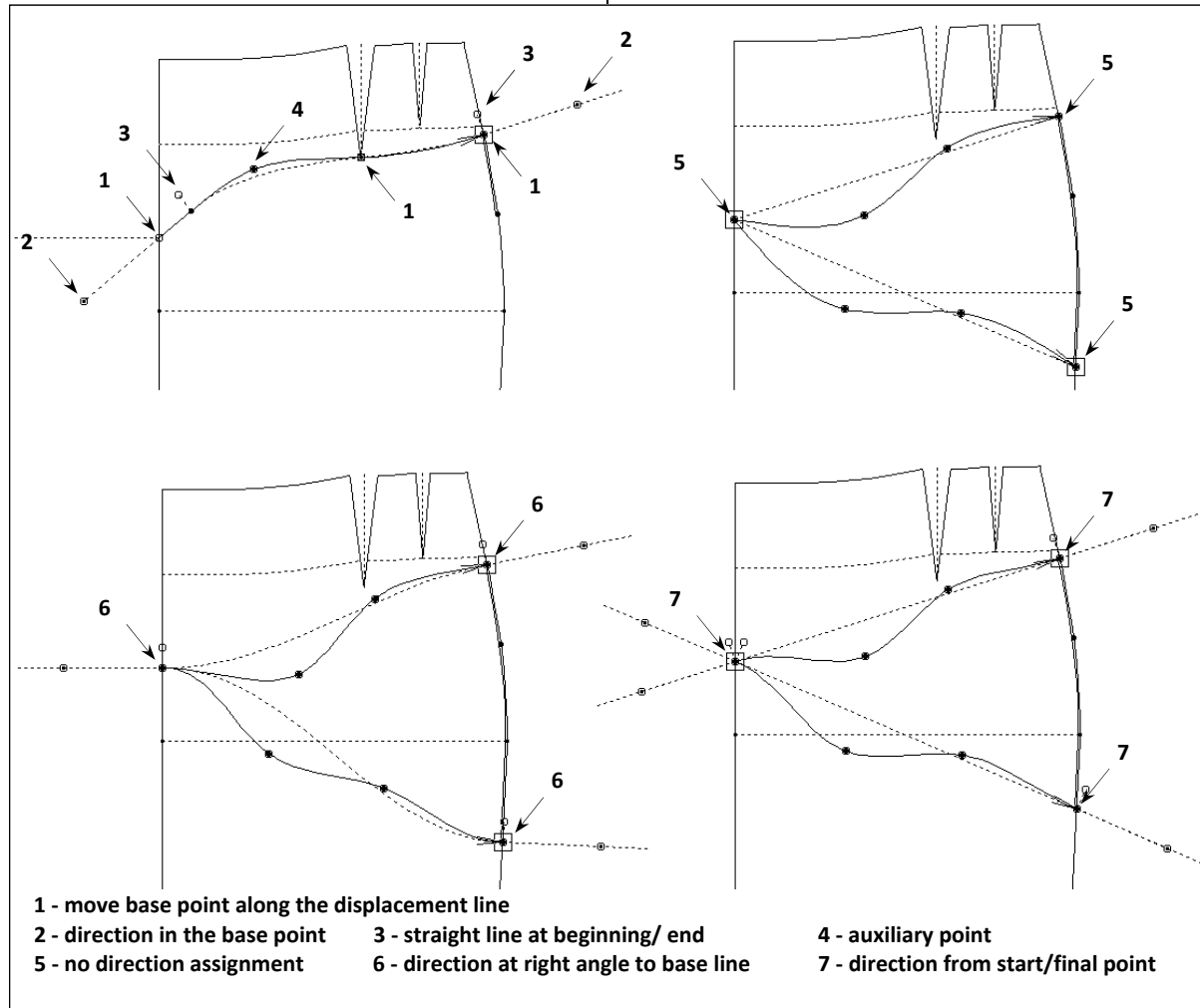
Delete points

With the exception of starting point and final point, all base and auxiliary points of a curve can be deleted with *Delete point*. To delete a point, activate *Delete point* and click on the point to be deleted.

Fine-tuning in the drag area *Adjustment*

In the curve construction menu, which can be positioned anywhere on the screen, dragging of handles is only possible with *Adjustment*. In all other menu functions, targeted action is expected.

shape. Activate *Insert point* and set a further auxiliary point, see Picture 9-1 No.8. Activate *Adjustment* again and move the auxiliary point, see Picture 9-1 No.10. Having moved the auxiliary point, the zero curve becomes visible. The zero curve is generated



Picture 9-5

Under *Adjustment* the following handles are available:

- Move base points along a base line or a displacement line, No.1 in Picture 9-5.
- Drag auxiliary points, No.4 in Picture 9-5.
- Adjust the straight line at the beginning and/or end of the curve, No.3 in Picture 9-5.
- Fine-tuning of directions in base points, No.2 in Picture 9-5, as long as a direction has been assigned to the base point.

Activate *Adjustment* and set a straight line of 20mm length at the beginning of the curve, see Picture 9-1 No.7.

The curve is shaped by inserting additional auxiliary points between the constructed base points. As a rule, one or two auxiliary points between adjacent points are sufficient to obtain the required curve

exclusively on the basis of the settings of the base points and displayed as a dashed line. Auxiliary points are determined by their relative position to the zero curve between two adjacent points.

Change the direction in the starting point of the curve at the centre front, also, see Picture 9-1 No.9.

Difference between *Set direction* and *Direction start/final*

In a base point

- the direction can be free, i.e. no direction assignment, see No.5 in Picture 9-5 or
- a constructed direction can be assigned, see No.6 in Picture 9-5 or
- the direction of starting point to final point can be assigned, see No.7 in Picture 9-5

These three variations are displayed for a curve with two auxiliary points in Picture 9-5. The differences

become obvious when the final point of the curve is moved significantly as in this example. Note particularly the directions of the curves in the starting point and final point. In case 6 in Picture 9-5, the direction in the final point was assigned at a right angle to the side seam.

End curve construction

With *end* in the menu on the right, the curve is deposited in your construction. *Abort* in the menu on the right rejects the current changes to the curve. The curve becomes a straight line from starting point to final point.

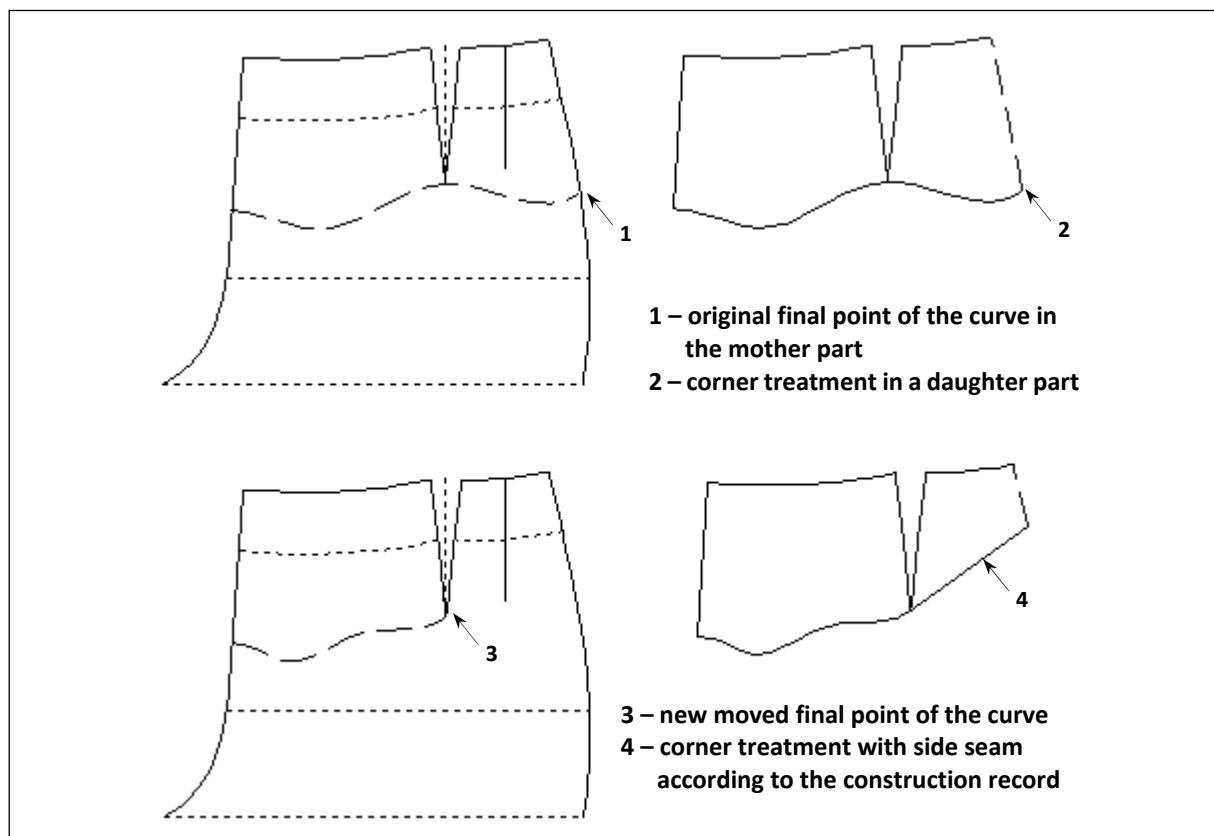
Subsequent curve correction

The curve can be re-opened for processing via double-click or the <F12> key at any point in the part in which the curve had been created originally. The construction record runs through to the respective record step and opens the curve for processing.

All functions for shaping the curve previously described are available. However, the curve may only be altered in so far as the logic of the following construction steps in the active part and in the daughter parts remains untouched. These limits are at the discretion of the user.

In the example in Picture 9-6, a curve had originally been constructed between centre front and side seam. A corner treatment has been carried out in the daughter part (2). Subsequently, the curve has been attached to the dart. In the daughter part, the curve treatment between curve and side seam is recorded and therefore, processed (4).

The example in Picture 9-6 demonstrates that daughter parts should also be test run after important changes to curves to ensure a correct construction run. Should errors occur, re-activate the curve and re-construct its original state. Resetting the record is not possible in this case as changes to the original record step of curve construction would occur.



Picture 9-6

9.2 Manipulate curve



The *manipulate curve* menu

The *manipulate curve* menu is opened from the *curve* menu. It offers two different functions:

- the *manipulate curve* function to relocate starting and final point of curves and
- the *refine curve* function for a more refined curve run.

With both functions the character of the curve remains unchanged.

The switch *+/-copy* decides whether or not the original curve remains existent. *Deposit* stores the manipulated curve.

Clicking on *reset* aborts the current curve manipulation or resets the last construction step.

Refine curve

Having activated *refine curve*, the start and end of a curve section must be defined by clicking. This section is then refined through reducing the number of curve points and subsequent interpolation. The shape of the curve remains unchanged.

Manipulate curve menu

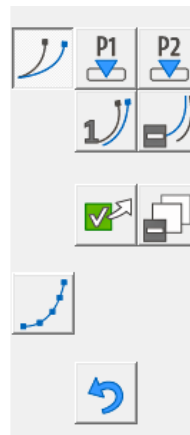
manipulate curve ▀ *re-set P1* ▀ *re-set P2*

transition types ▀ *+/-formed*

deposit curve ▀ *+/-copy*

refine curve

reset



Exercise

Call *Skirt 20* and adjust it according to Picture 9-7. Open a new part called 'lining' and insert all lines and points of the development part. The lining is to be 20mm shorter and 10mm wider at the hip than the outer fabric. Construct the corresponding parallels to the hem and to the side seam, see Picture 9-7 left.

Now, the parallel to the side seam must be connected with the new hem and the waist line. Separate the parallel to the side seam at the hip. Activate *manipulate curve* and relocate P1 of the upper side seam to the waist

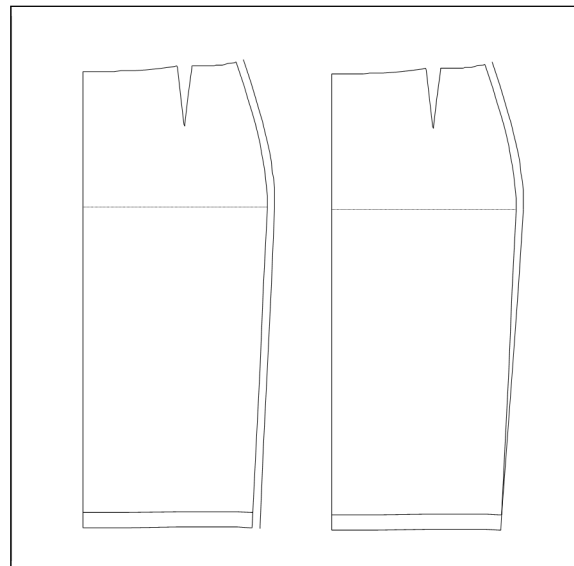
Manipulate curve

Step-by-step guide

- ⇒ *basic menu* --> *curves* --> *manipulate curve*
- ⇒ Activate *manipulate curve*
- ⇒ If required relocate the starting point of the curve with *re-set P1*
- ⇒ If required relocate the final point of the curve with *re-set P2*
- ⇒ Switch between the different transition types
- ⇒ Adjust *+/-formed*
- ⇒ Adjust *+/-copy*
- ⇒ End with clicking on *deposit curve*

After activating the *manipulate curve* menu, a curve has to be clicked. This curve will then display the designation P1 for the starting point and P2 for the end point of the curve. With *re-set P1* or *re-set P2* these points can now be relocated.

The manipulated curve appears in black. It can still be adjusted. Clicking on *transition types* alternates between six different transition types. The switch *formed* effects a change in the curve run for very specific curve shapes only.



Picture 9-7

line. It is important that a transition type which alters the curve run very little and in particular keeps the direction in the hip area, is selected before depositing the curve. Continue the exercise according to Picture 9-7 right.

9.3 The Part assistant



As detailed in Chapter 3, style development in Grafis ensues in three stages:

- call and adjust the basic construction
- development of one or more pattern development parts with all required styling elements
- derivation of production pattern pieces such as front, back, waistband, trimming, facings, lining etc.

Derivation of production pattern pieces usually involves the following repetitive operations:

- insert lines and points into the production part
- close the net contour
- add seam allowances
- close corners
- move existing symbols onto the seam allowance
- add symbols to the seam allowance
- set point symbols such as drillholes
- set grain line and special lines
- assign part parameter

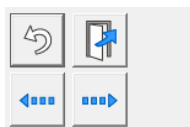
The existing Grafis functions from the different Grafis menus have been compiled in individual dialogues for exactly these operations in the part assistant. The operations carried out with the part assistant are recorded with these Grafis functions.

Using the part assistant reduces the time required for deriving production pieces significantly.

Having run through up to 10 dialogues, the part assistant switches to the next empty part and the user can continue immediately with generating the next production piece.

Start and navigate the part assistant

Start the part assistant via the *basic menu* → *part assistant*. If the active part is empty, the first dialogue *Insert objects* opens. If the active part already contains objects (lines and points), the second dialogue *Search contour* opens automatically.



reset ■ exit

backward <D> ■ forward <F>

The following buttons for navigation can be found in all dialogues of the part assistant:



... navigates backward and forward between the dialogues. Once all operations in the active dialogue are completed, ... (shortcut <F>) switches to the next dialogue. If you realise in the last dialogue *part parameter* that something needs changing in a previous dialogue for example, you can



navigate back to the respective dialogue with The recorded operations are preserved and carried out again during forward navigation. This applies only up to and including dialogue 4 *Seam allowances*. Backward navigation to dialogue 3 *Search contour* resets all previously recorded operations.



With ... reset all recorded operations in the *active* dialogue. Operations recorded in other dialogues remain.

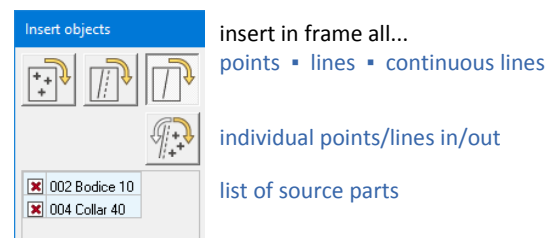
You can normally switch between the functions in the dialogue with <TAB>.



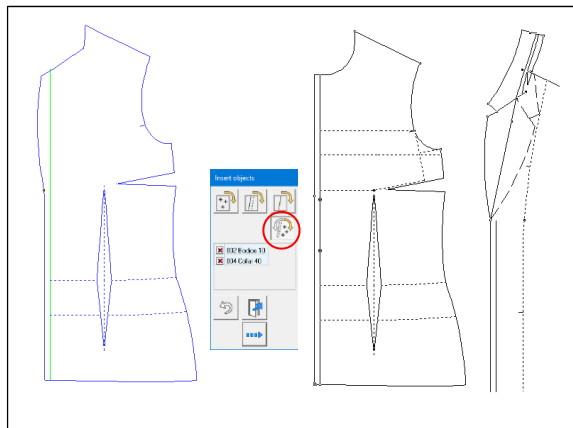
... saves the part in its current state and ends the part assistant.

■ Dialogue 1 – Insert objects

In dialogue 1 *Insert objects* all lines and points required for completion of the production pattern are transferred into the active part.



Generate a new style and open three new parts in the part organisation. Call *Bodice 10* and *Front edge 30* into the first part and call *Collar 40* into the second part. Separate the mirror seam at the collar point. The first and second part remain visible. The third part becomes the active part into which the objects for the production pattern 'front' are to be inserted. Activate the *part assistant* from the *basic menu*.



Picture 9-8

Using <TAB> activate the third button in the first row and drag a rectangle across the front. With the function *all continuous lines in frame*, the continuous lines are now transferred. Part 001 appears in the list of source parts. Click on *reset* or in the list of source parts. Select the suitable function with <TAB> and insert all required lines and points according to Picture 9-8.

With *individual points/lines in/out* you can accept or remove individual points in the source part or the active part via clicking.

This dialogue of the part assistant may be used simply for inserting objects for example for a pattern development part. In this case, quit the part assistant after having inserted the required objects with .

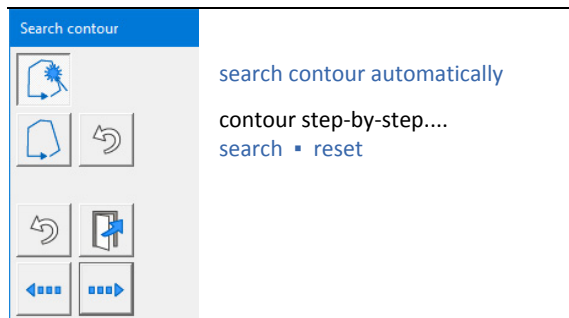
All objects inserted in this dialogue cannot be released subsequently with 'Reset click'.



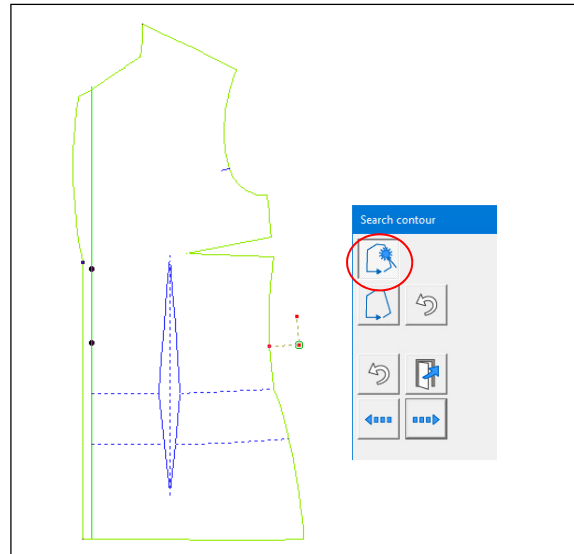
(shortcut <F>) switches to the next dialogue.

■ Dialogue 2 - Search contour

With dialogue 2 *Search contour* the lines of the net contour and their order and direction are determined.



First, attempt to find the contour with *search contour automatically*. Activate the function and click on a line. If the desired contour is not found au-



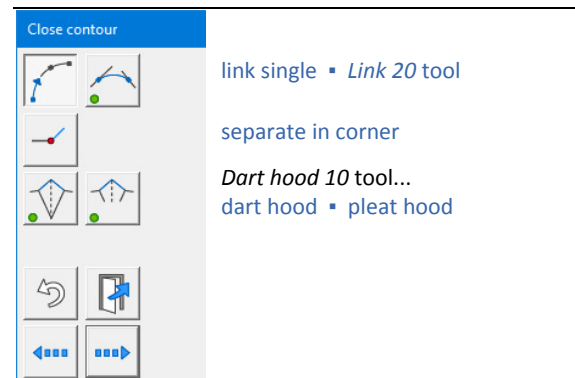
Picture 9-9

tomatically, switch with <TAB> to *search contour step-by-step* and click the lines of the contour one after the other, see Picture 9-9.

Only if button is active is the net contour defined and you can move on to the next dialogue.

■ Dialogue 3 - Close contour

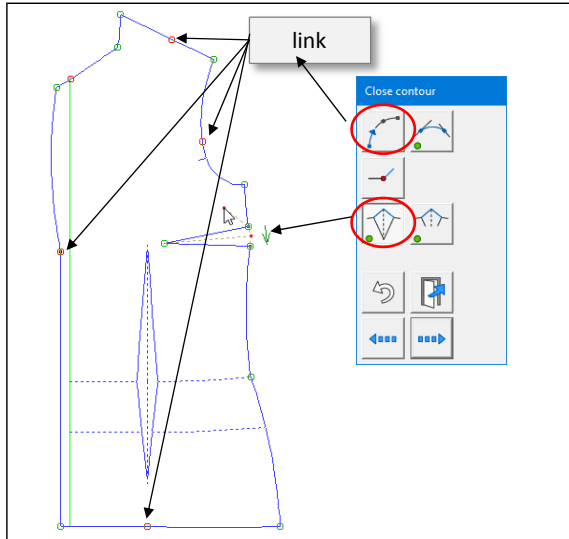
With dialogue 3 *Close contour* gaps or overlaps in the contour are removed and dart and pleat hoods are constructed. In this dialogue you find the function



link single and the tool *Link 20* from the *link* menu, the function *separate in corner* from the *separate* menu and the interactive tools for hood construction.

All line transitions are marked by a green or red point. The functions from this dialogue can be applied to these line transitions.

Red points indicate very flat line transitions which should be linked. The user can treat flat transitions either with *link single* or with the *Link 20* tool. As the assistant is aware of the order and direction of the lines, a simple click on the line transition is sufficient.



Picture 9-10

In this dialogue *separate in corner* may be useful to enable future corner treatment or in preparation for export of the parts. After having activated the function *separate in corner* the positions of the net contour, where it can be separated, are marked with .

Hoods for darts and pleats are also constructed in this dialogue. Instead of four clicks in the menu, here only one click is required which also determines the fold direction. Please note the echo depending on the cursor position.

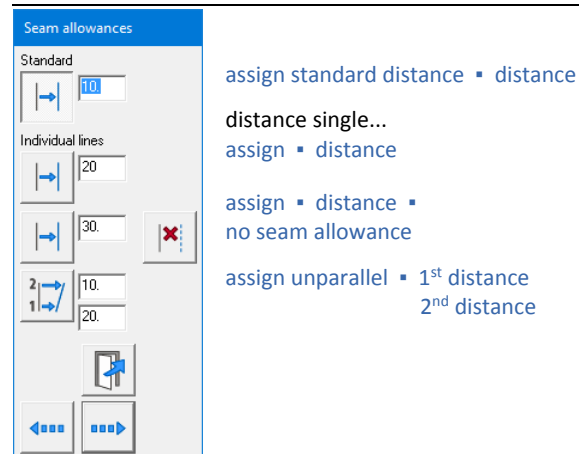
Close the contour of part 003 according to Picture 9-10 and then move on to the next dialogue.

■ Dialogue 4 – Seam allowances

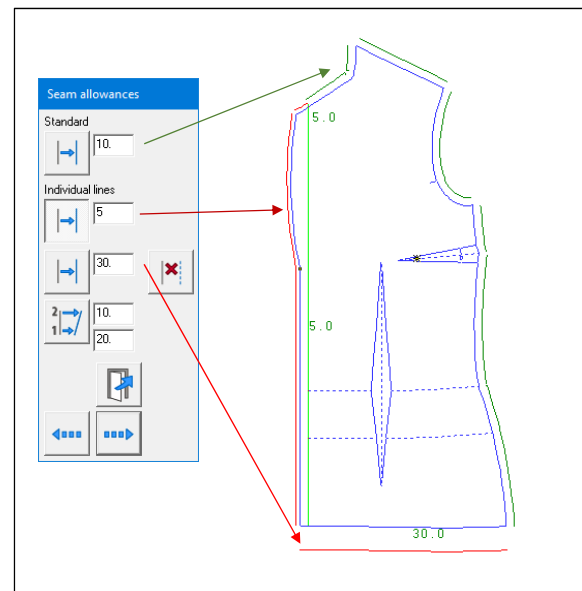
In dialogue 4 *Seam allowances* the seam allowances are added to the net contour.

As opposed to all other dialogues of the part assistant, this dialogue can be opened and edited subsequently via <F12>.

Initially, all lines of the net contour are assigned the standard distance. The standard distance can now be altered or an x or z value can be used. If individual lines are to deviate from the standard distance, enter the desired value under *single lines* and click the line.



For the construction in Picture 9-11, enter a standard distance of 10 mm and then assign a seam allowance of 5mm to the front edge and 30 mm to the hem via *single lines*. Then, move on to the next dialogue.



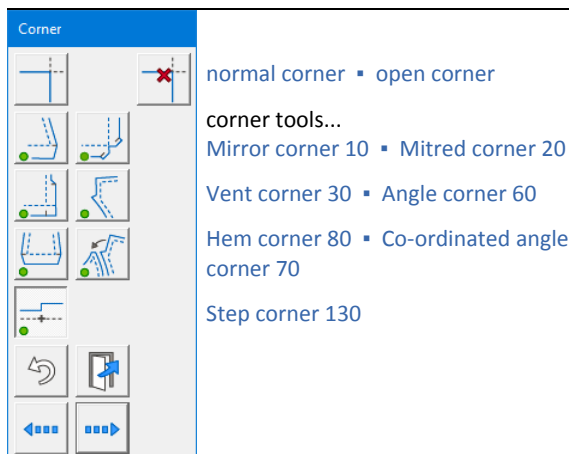
Picture 9-11

■ Dialogue 5 – Corners

In dialogue 5 *Corners* the remaining line transitions are closed via corner treatment. The line transitions are indicated by green points.

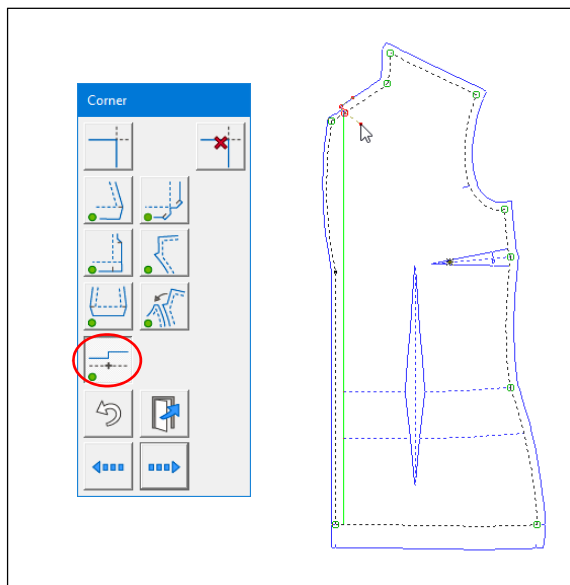
Select the required corner type with <TAB>. When the cursor is close to a line transition, a preview of the corner construction appears. Click on the line transition to re-assign or edit the corner construction.

For a co-ordinated angle corner, the part to be co-ordinated must be visible as the line to be co-ordinated must be clicked.



To alter a corner, no reset is required. The part assistant automatically updates the record.

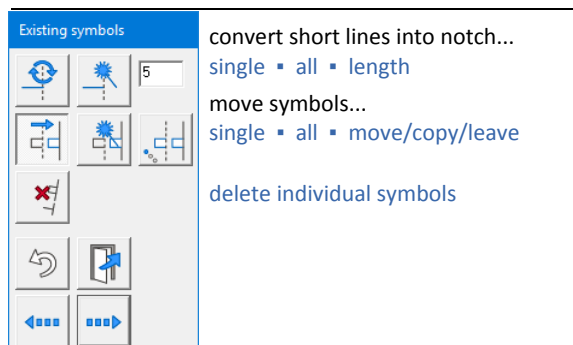
For the example in Picture 9-12 set a hem corner at the hem, two angle corners at the shoulder and a step corner at the transition collar / neckline.



Picture 9-12

■ Dialogue 6 – Existing symbols

This dialogue appears only if there are line symbols or short lines at the net contour. Otherwise this dialogue is skipped.

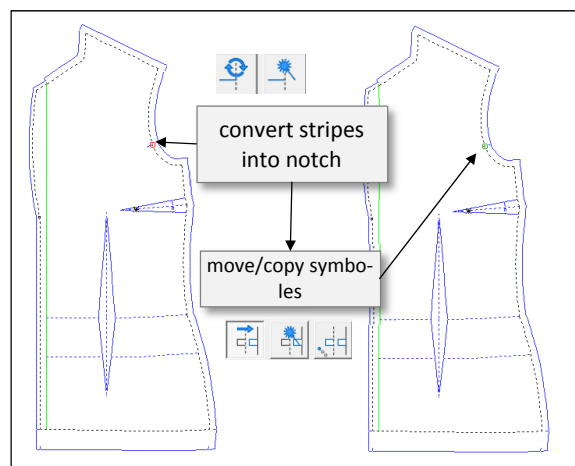


Convert lines into notch

The first row of functions is only visible if there are short, totally straight lines of maximum 15mm length at the net contour which can be converted to a notch. Such short lines are marked with a red point. First, determine a length and then, convert all short lines marked in red into notches with . If not all short lines are to be converted, activate and click the lines individually.

Move line symbols

With the functions of the second row you can move line symbols onto the seam allowance. All line symbol which can be moved are marked by a green point. By clicking on you decide whether the symbols are to appear 'inside and outside | only inside | only outside'. applies this setting to all



Picture 9-13

line symbols, lets you apply the setting to individual line symbols.

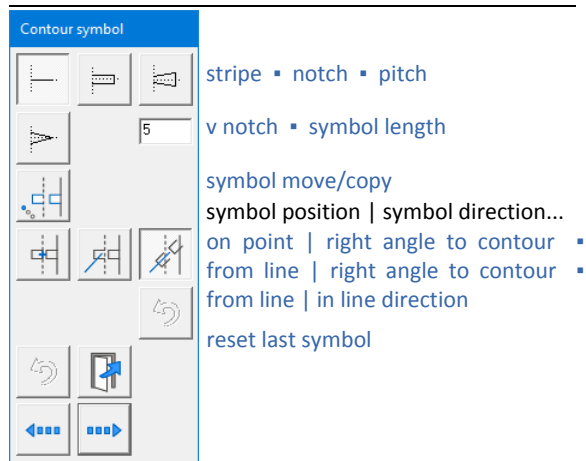
Not required line symbols can be deleted with .

Convert the short lines marked in red into line symbols and move them to the net contour and the outer contour, see Picture 9-13.


■ Dialogue 7 – Contour symbols


In dialogue 7 *Contour symbols*, new contour symbols are constructed to the outer contour. Select the required contour symbol and enter the desired length.


By clicking you select again whether the symbols are to appear 'inside and outside | only inside | only outside'.



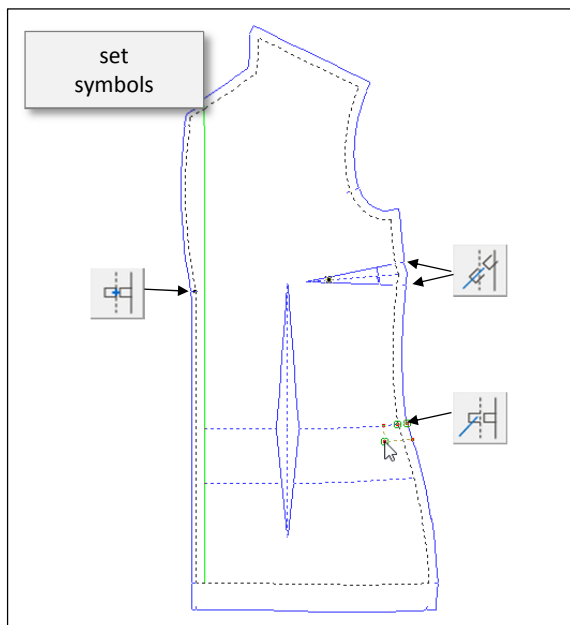
Symbol position and symbol direction

With  the symbol is set with the sub-menu point construction and then moved at a right angle to the net contour onto the outer contour.

With  a line is clicked and the symbol is set onto the intersection of this line with the net contour and then also moved at a right angle to the net contour onto the outer contour.

With  a line is clicked and the symbol is set onto the intersection of this line with the net contour. However, the symbol is moved to the outer contour in the direction of the line.

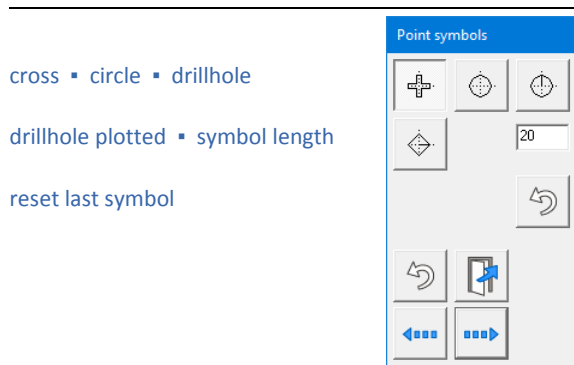
Set the notches displayed in Picture 9-14.



Picture 9-14

Dialogue 8 – Point symbols

In dialogue 8 *Point symbols* new point symbols are set inside the pattern.

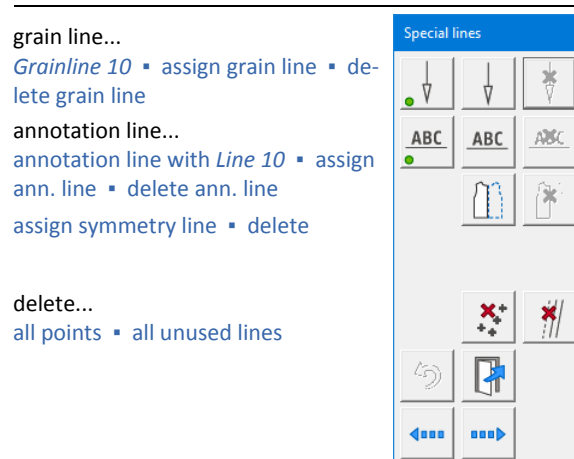




First, enter the desired symbol length, active the type of symbol and then set the symbol with the sub-menu point construction.



Set the *drillhole* symbol for the waist and bust darts, see Picture 9-8.



Dialogue 9 – Special lines

In dialogue 9 *Special lines*, the grainline and annotation line are constructed or assigned.



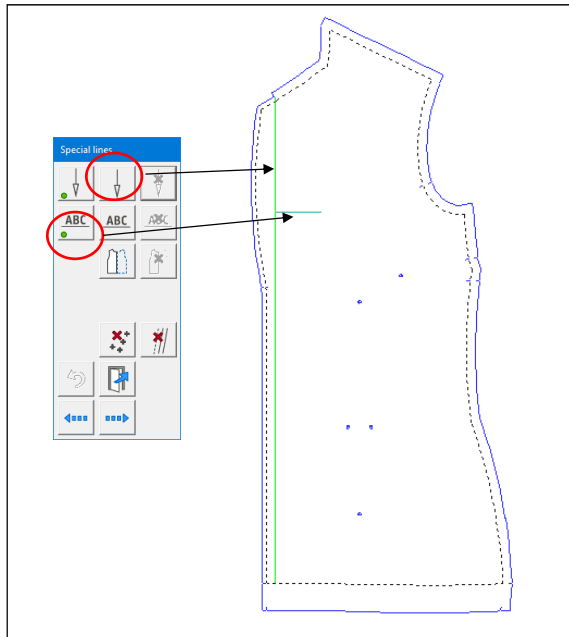
If a grain line or annotation line already exists, it can be deleted with  or  and then re-constructed at a new position or with a new direction.

 calls the tool *Grainline 10*. With  an existing line can be marked as a grainline.

With  an existing line can be marked as an annotation line. With , a new line is constructed with the tool *Line 10*. It is instantly assigned the attribute *annotation line*.

At the end of the actual construction process, it is useful to delete all points and all unused lines. Click once onto  and  respectively.

The part assistant saves the deleting of points and unused lines as a last record step in this part. This record step can be reset at a later date, if required, and the points / lines become visible again.





Pictuer 9-15

Set the grainline and the annotation line as displayed in Pictuer 9-15 and delete all points and all unused lines.

■ Dialogue 10 – Part parameter

In the last dialogue of the part assistant, assign the part name and the part parameter to the part, see section 17.2.

After clicking  the system automatically move on the next part or a new part is opened and the part assistant begins with dialogue 1 *Insert objects*. Alternatively, quit the part assistant with  and return to the basic menu.

Subsequent alterations

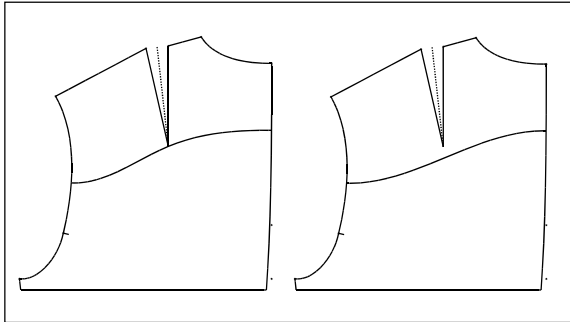
Before quitting the part or the part assistant, you can navigate and edit backwards and forwards at will from dialogue 4 *Seam allowances* to dialogue 10 *Part parameter*. Recorded steps in other dialogues remain intact. Moving to dialogue 3 *Close contour* or lower resets all subsequent steps.

After having quit the part or the part assistant, all interactive functions called within the part assistant can be activated and adjusted via double-click or F12. Via F12 or double-click onto the seam allowance, dialogue 4 *Seam allowances* can be opened for this part. The record is saved in blocks in the order of the dialogues. Resetting the record in the basic menu is therefore possible.

9.4 Exercises

1st Exercise

Construct a yoke in the back of *Bodice 10*. The yoke is to run through the apex of the shoulder dart (see Picture). The curve is to begin at a right angle to the centre back 60mm from the neck and end at the armhole 80mm from the shoulder.

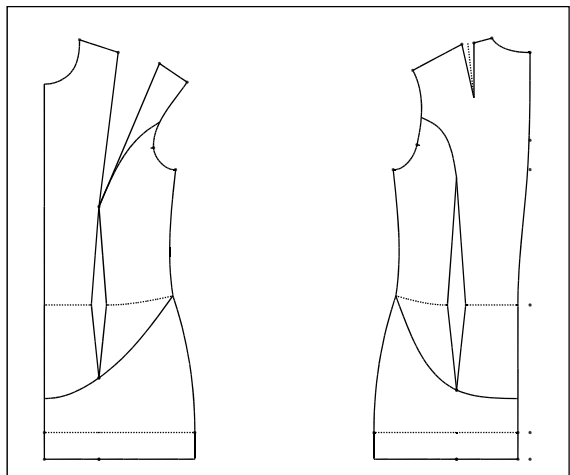


First, insert an auxiliary point in the curve and attach the auxiliary point to the dart apex. The curve is to run at a right angle to the centre back and horizontal at the armhole.

Reset the curve construction and construct a yoke curve in the same way, but not attached to the dart apex.

2nd Exercise

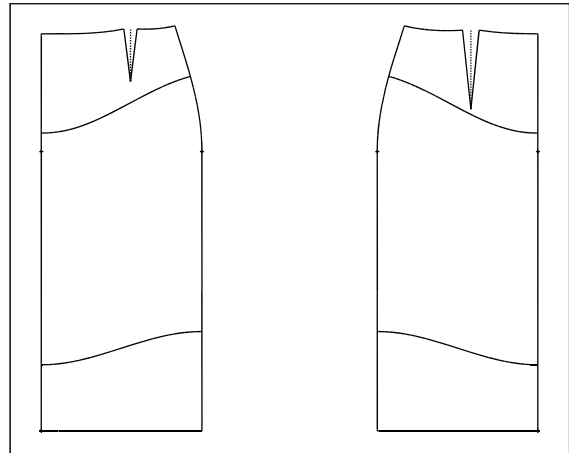
In the front and back of *Bodice 10* construct a princess seam and curves in the hip area. The princess line is to begin on the armhole 80mm from the shoulder and end at the bust point. In the back, the curve is also to start 80mm from the shoulder and run into the waist dart. The curves in the hip area start at the



intersection of waist line and side seam and end at a right angle 100mm from the hem on the centre front and centre back respectively. The curves are to be attached to the apex of the waist darts.

3rd Exercise

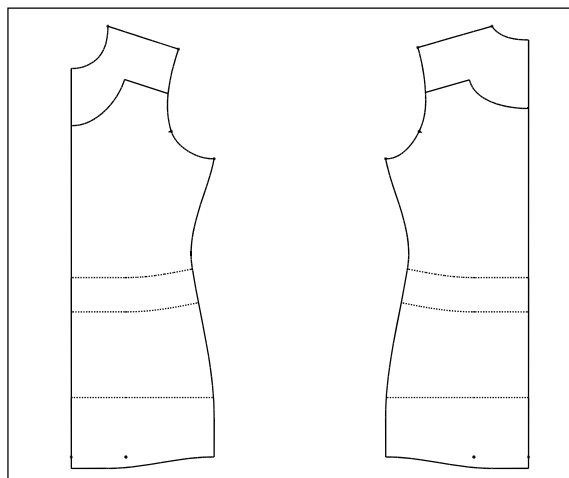
In the style 'Straight skirt' from Section 2.4 construct a yoke and a separate hem curve. The yoke is to start 150mm from the waist on the centre back and centre



front and to end on the side seam 80mm from the waist. The curves are to arrive at a right angle at starting and final point respectively. The hem curve is to start 100mm from the hem on the centre front and centre back and end 150mm from the hem on the side seam. These curves are also to end in a right angle.

4th Exercise

Construct the displayed yokes in *Bodice 20*. The yokes start at the armhole with a straight line of 80mm at 80mm from the shoulder. The lines are to run parallel to the shoulder. A curve is to be attached to the new line, starting at a right angle at the centre front, measured 100mm from the neck and ending at a right angle at the straight line. In the back, the curve ends in a right angle at the centre back, measured 120mm from the neck.

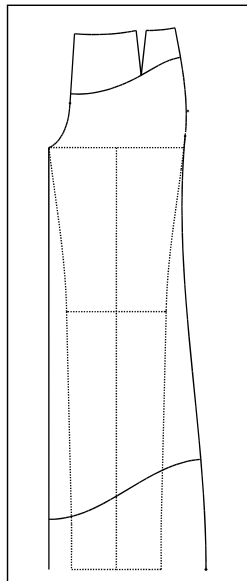


5th Exercise

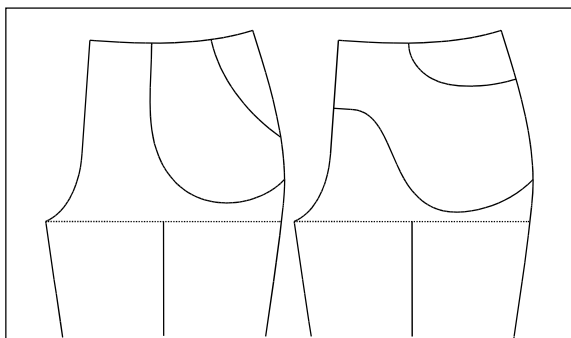
From *Trouser 10* with turn-up set to 0. construct the displayed shortened, flared trouser front with yoke and curved hem. The yoke is to start on the side seam, 60mm from the waist and end on the centre front, 120mm from the waist. The curve is to run through the dart apex.

The side seam is flared by 90mm. The inside leg seam is to be vertical. Construct a new side seam and inside leg seam.

Shorten the hem by 220mm at the side seam and 100mm at the inside leg. Draw a new hem curve with a right angle at the side seam and the inside leg seam.

6th Exercise

Construct the displayed pocket in *Trouser 10* with *new curve*. First, close the dart and link the waist line. The pocket mouth begins on the waist at a distance of 50mm from the side seam and ends on the side seam at 130mm from the waist. Set all directions and shape the pocket mouth. Construct the pocket bag on the waist with a distance of 120mm from the centre front and on the side seam with a distance of 180mm from the waist. Shape the pocket bag by setting directions and if necessary adding auxiliary points. End curve construction.



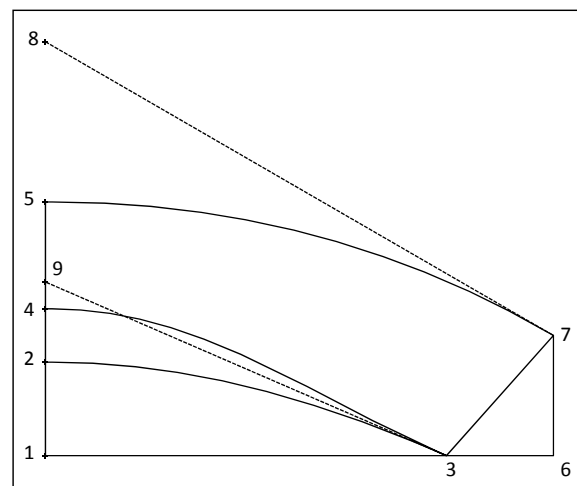
Change the pocket interactively into a jeans pocket by moving starting point and final point of the curve according to the image.

Then, modify the pocket bag. Unbind the starting point on the waist and bind it to the centre front. Set directions in the starting point and final point of the curve. The right angle at the centre front should remain for the first 20mm of the curve.

7th Exercise

Construct the collar band shown with the following points:

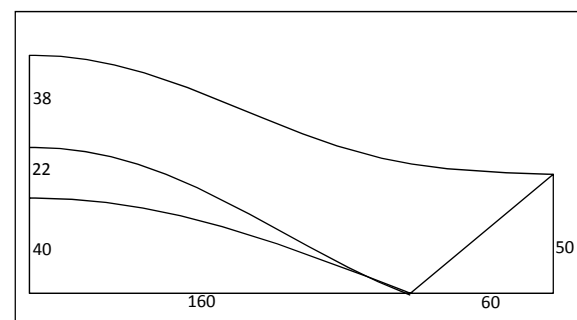
- point 1 - point 3: 150mm
- point 3 - point 6: 40mm
- point 6 - point 7: 45mm
- point 1 - point 2: 35mm
- point 2 - point 4: 20mm
- point 4 - point 5: 40mm
- point 1 - auxiliary point 9: 65mm
- point 1 - auxiliary point 8: 155mm.



The connection between point 7 and point 8 is to define the direction of the outer edge of the collar in point 7. In the same manner, the connecting line between point 3 and point 9 defines the direction of the collar fold and neck line in point 3.

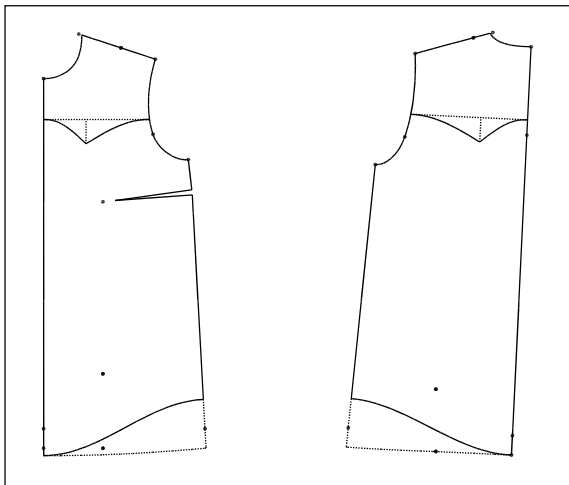
8th Exercise

Construct the collar shown with the given measurements.



9th Exercise

Open the style 'Shirt blouse' from Section 2.5 and construct a line at the front and back armhole, respectively at 100mm from the shoulder. The lines are to be right-angled to the centre front and centre back respectively. Cut the lines at centre front and centre back. Construct an auxiliary line for the yoke point with the *Parallel 10* tool. The auxiliary line is to be 40mm long, start at 40% measured from the centre front or centre back and be aligned at a right angle to the base line. Construct the displayed curves from the yoke point to the armhole and to the centre front or centre back. The curves are to run into the base line.



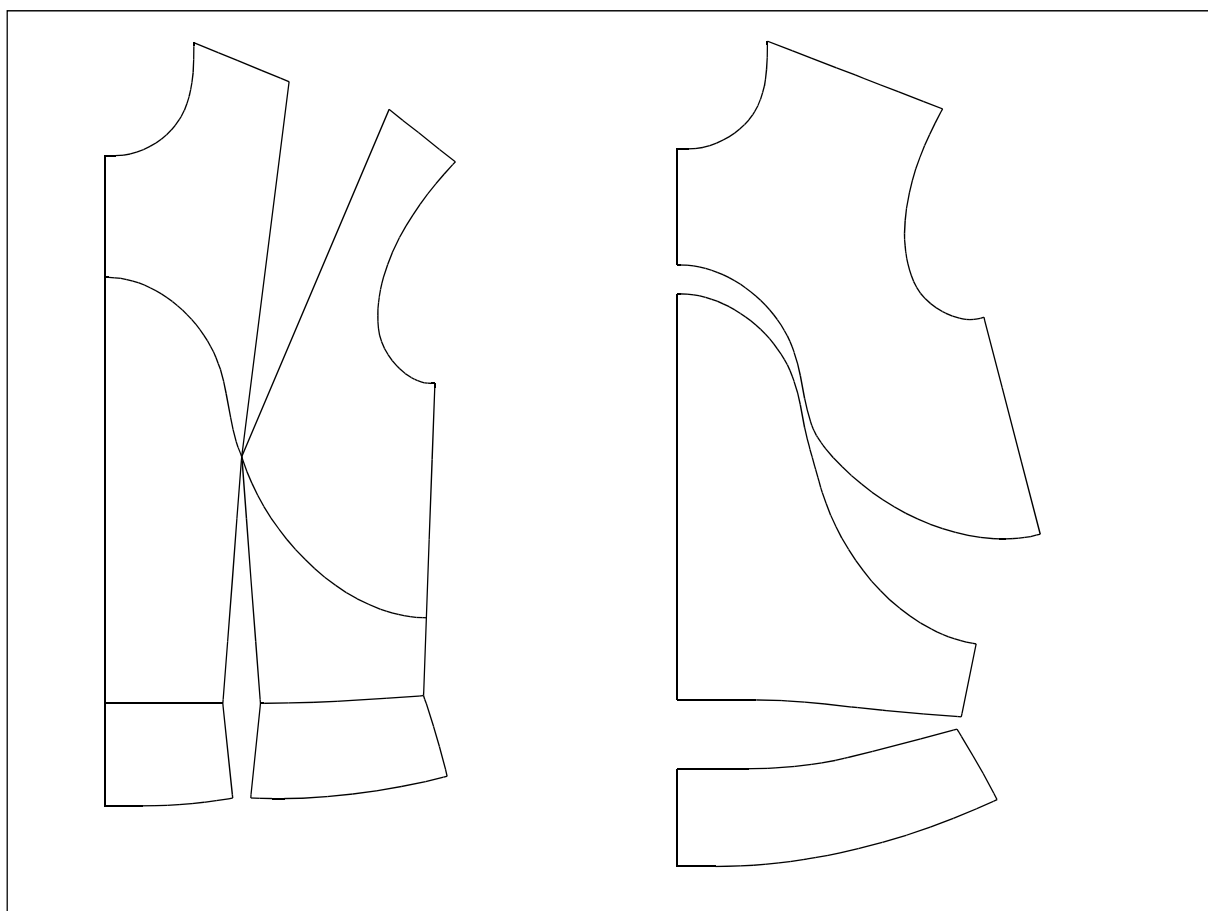
The two new hem curves are to start at a right angle at the end point of the centre front and centre back and end at a right angle at the side seam, 80mm from the hem.

Chapter 10 Transformation

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10.1 Transformation

The transformation menu



Transformation menu

move...

move...: by dx and dy

move value dx

move value dy

move...

from point to point ▪ set points

turn with...

turn point and angle ▪ set turn point

turn angle

turn with...

turn point from point to point ▪ set points

turn and move...

with four points ▪ set points

scale transformation

scale

scale value in x direction

scale value in y direction

mirror

mirror at...two points ▪ set points

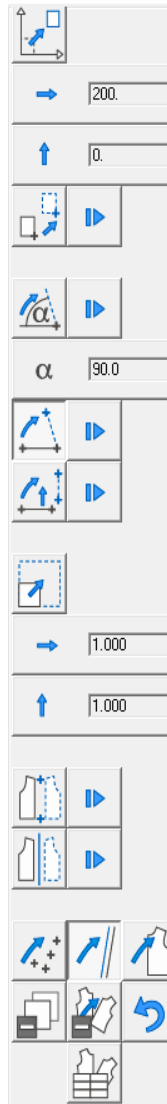
mirror at...line ▪ set line

objects to be transformed

points ▪ lines ▪ part

+/-copy ▪ revers transformation ▪ reset

transformation list



Step-by-step guide

⇒ Adjust the transformation parameters

⇒ Select the type of object (*points, lines...*)

⇒ Activate the transformation

⇒ Adjust +/-copy: the original objects remains/ does not remain existent

⇒ Set the transformation direction with +/-reverse transformation in reverse/ normal direction, e.g. change of sign for set angle. No significance with mirror!

⇒ Click the objects to be transformed within the construction.

Reset resets the last transformation step.

Move by dx and dy

This move function (translation) with pre-set values requires the entry of the move value in x direction dx and y direction dy. A detailed explanation on the co-ordinate system can be found in chapter 4.3. The move values can be positive or negative:

dx= -mm	to the left
dx=+mm	to the right
dy= -mm	downwards
dy=+mm	upwards

Move the shoulder and armhole of *Bodice 10* by dx=+200 and dy=-50 (Picture 10-1).

First, enter the values for dx and dy, select *lines* and set the switches to *+copy* and *-reverse transformation*. The move transformation *move* is active. You can now click the lines to be moved. Activate *points* and also move the corresponding points. Set the switch to *+reverse transformation*. You can now transform the objects back again. The transform settings remain in place also after quitting the *transformation* menu.

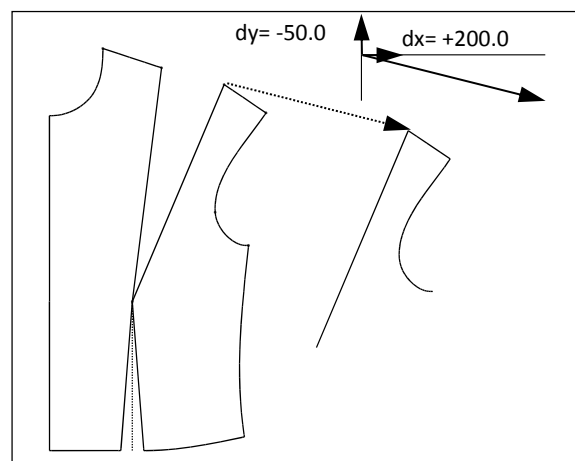
The functions of this menu allow for moving, rotating, scaling and mirroring of Grafis objects. The eight transformation types are:

- 2 move transformations
- 2 turn transformations
- 1 turn and move transformation
- 1 scale transformation
- 2 mirror transformations

Object types

You can transform:

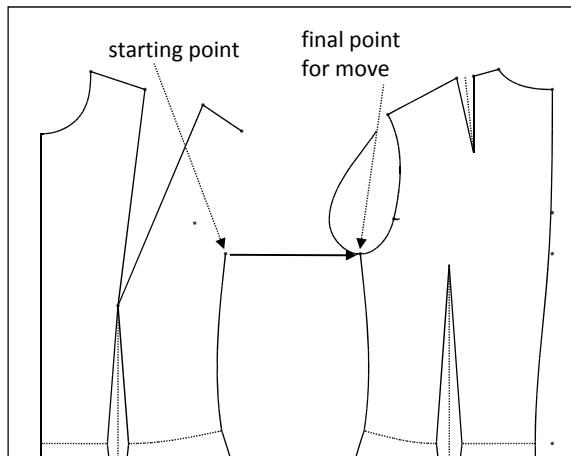
- single points
- single lines
- the complete part



Picture 10-1

Move from point to point

The objects are moved about the connecting line between two points of the construction (Picture 10-2).



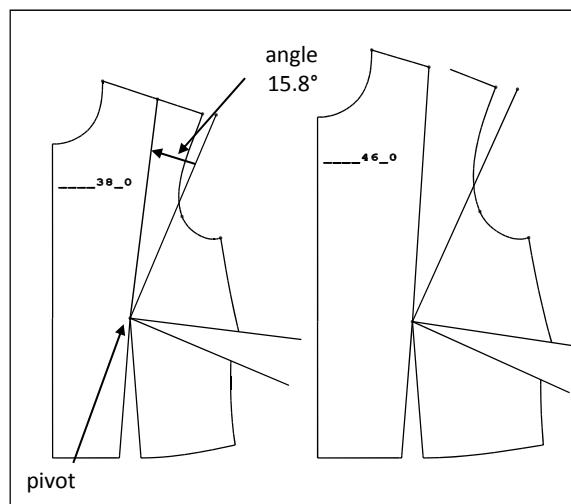
Picture 10-2

After having clicked *set points* the starting and final point of the move line have to be constructed. Then, *move from point to point* is active and the move of objects can begin. In *Bodice 10*, move the armhole curve of the front towards the back. Grade the construction.

Turn with turn point and angle

With the transformation function *turn with turning point and angle* the objects are rotated about a constructed pivot point by a given angle (Picture 10-3).

Note: The set angle remains constant throughout all sizes!



Picture 10-3

After having activated *set turn point* the pivot point is to be constructed and the angle in ° is to be entered. Then, the line *turn with turn point and angle* is active and turning of objects can begin.

Measure the bust dart of *Bodice 10* in your base size and relocate it into the side seam (Picture 10-3). First, construct an auxiliary line at the side seam for the position of the dart and separate the side seam at the auxiliary line.

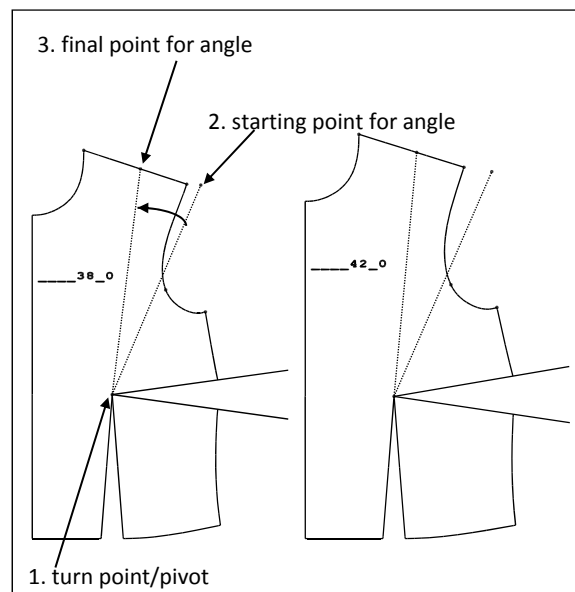
Enter the measured angle as *turn angle*, click on *set turn point* and select the bust point. Now, activate *lines* or *points* and transform the objects of the shoulder, the armhole, the upper side seam and with *+copy* the auxiliary line. Grade.

Use this type of transformation only if the angle is to be constant across all sizes or in connection with *x* values or *z* values.

Turn about a turn point from point to point

This transformation rotates the objects about a constructed pivot point. The angle is determined by the angle between turning point → starting point of the rotation angle and turning point → final point of the rotation angle.

Having selected *set points*, the points are to be clicked in the following order: **turning point → starting point of the rotation angle → final point of the rotation angle**. Then, *turn about a turn point from point to point* is active and the rotation of objects can begin.

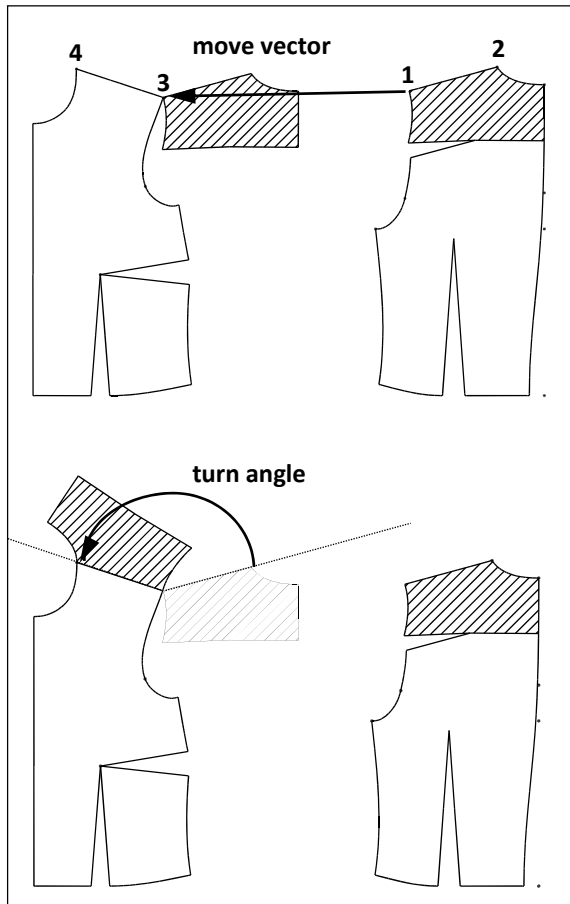


Picture 10-4

Relocate the bust dart into the side seam (see Picture 10-4). First, construct an auxiliary line for the position of the dart in the side seam and separate the side seam at the auxiliary line. Click on *set points* in the *transformation* menu and then, click the bust point and the right and left dart legs one after the other. Now activate *lines* or *points* and transform the objects of the shoulder, the armhole and the upper side seam; transform the auxiliary line with *+copy*. Grade.

Turn and move

The objects are moved and rotated in one operation. For this function four points are to be clicked. The move vector is defined by its starting and final point (Picture 10-5 top). The rotation angle is defined by the moved starting point and the final point of the angle (Picture 10-5 bottom).



Picture 10-5

After having activated *set points* the points are to be clicked in the order: **starting point of the move vector** → **starting point of the rotation angle** → **final point of the move vector** → **final point of the angle**. Then, *turn and move* is active and the transformation of objects can begin.

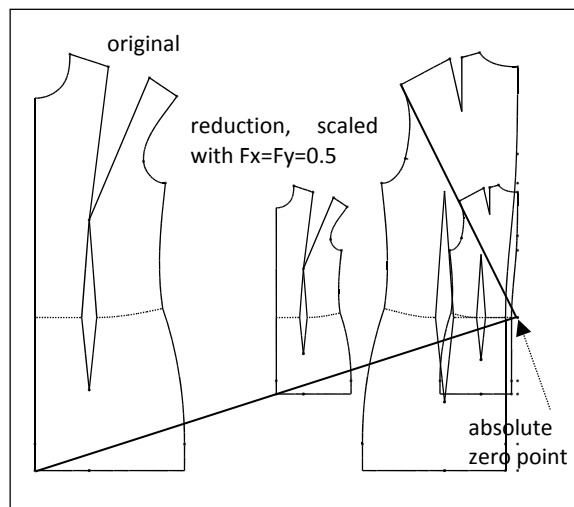
This function is especially useful for relocating yokes or relocating the shoulder seam. Turn and move a yoke in the back according to Picture 10-5. Relocate the front dart into the side seam and the back dart into the armhole. Drop a perpendicular onto the centre back and separate the centre back.

Transform the yoke by selecting *set points* for *turn and move* from the *transformation* menu and clicking the points in the suggested order. Activate the object type *lines* and click the construction lines of the back yoke. Transform the corresponding points with *+copy*.

Scale

The objects are reduced and increased relative to absolute zero (Picture 10-6).

The *scale value in x* (F_x) applies to the x component of the objects in the construction only, the *scale value in y* (F_y) to the y component.



Picture 10-6

Increase/reduction/stretching/shrinking of the pattern is required for stretch material for example, lining or under collar or for the correction of changes in length after washing. The following applies: $F_x=F_y=1.00$ - no change in scale; $F_x=1.10$, $F_y=1.00$ - stretching of the pattern by 10% in horizontal direction; $F_x=F_y=0.90$ - shrinking by 10% in all directions.

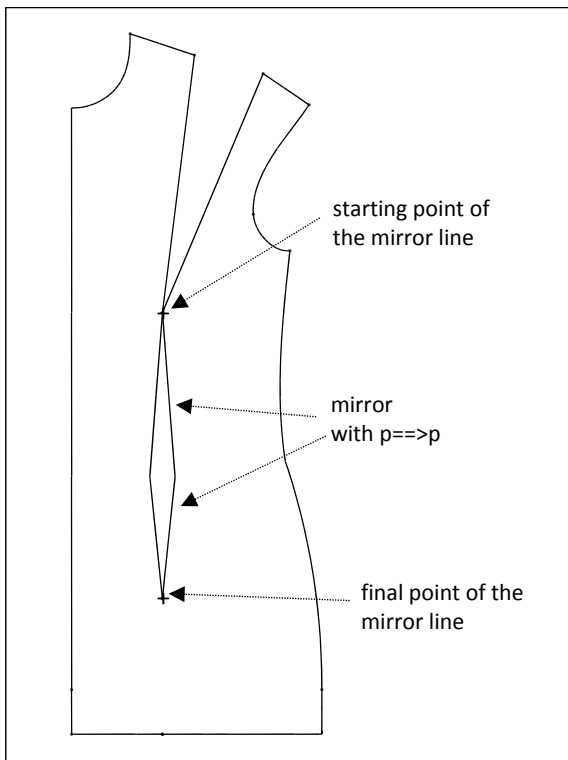
Different values in F_x and F_y distort the construction in width and height. The same values increase or reduces the construction to scale; $F_x=F_y=0.5$ halves the dimension of the construction and $F_x=F_y=2$ doubles it.

Scale the *Bodice 10* by half. The zero point of this construction is positioned at the centre back at waist height. Enter the values $F_x=F_y=0.5$ in the *transformation* menu and activate *scale*. Set the switch to *+copy*, click on *part* and click on a line of the construction. The construction is now reduced by 50% in x and y direction in all sizes.

Reset the record and repeat with the values $F_x=1.00$ and $F_y=1.10$. Now increase single lines in y direction.

Mirror at two points

The objects are mirrored at the connecting line of two points (Picture 10-7).



Picture 10-7

To activate this function *set points for mirror* is to be clicked and the points of the mirror line are to be defined with the sub-menu point construction. Then, the objects to be mirrored can be clicked.

Draw new waist dart lines in *Bodice 10*. In the free mode, construct the waist dart points exactly at waist height using <Shift>. Then, delete the waist dart lines and construct a new left waist dart with *curves*. Mirror the new left waist dart line to the right.

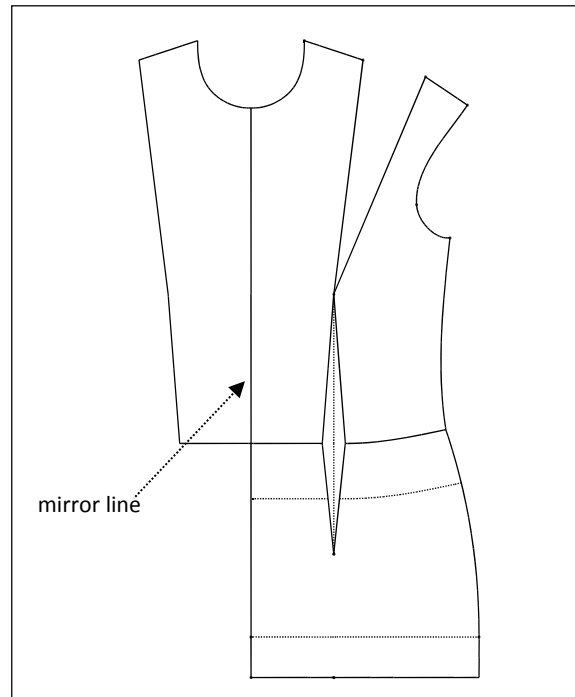
Mirror at a line

The objects are mirrored at an existing line of the construction (Picture 10-8).

To activate this function, first click *set line* and then determine the mirror line within the construction. Then, the objects to be mirrored can be clicked.

Mirror the displayed lines in *Bodice 10* at the centre front for a facing. Select *set line* in the *transformation* menu and click on the centre front. Set the switch to *+copy*, activate *lines* and click the lines to be mirrored.

If you mirror the whole part the centre front is doubled and cannot be seen. In this case delete one of the centre front lines.



Picture 10-8

Transformation list

All transformations carried out in the active part can be re-activated.

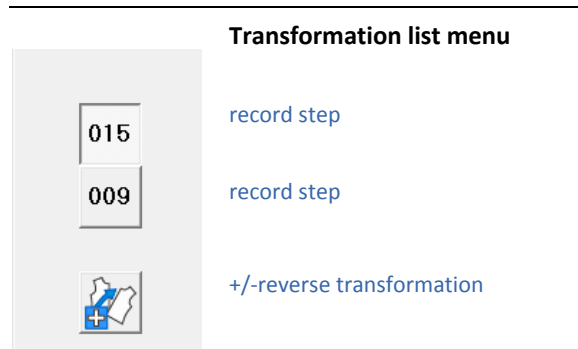
To activate the last transformation of a transformation type, click on the corresponding button:

- move by dx and dy
- move from point to point
- turn with turn point and angle
- turn with turn point from point to point
- turn and move
- scale
- mirror at two points
- mirror at a line

In case no transformation of this type has been carried out in this part, setting of a new transformation begins automatically.

Step-by-step guide for selection of a previous transformation:

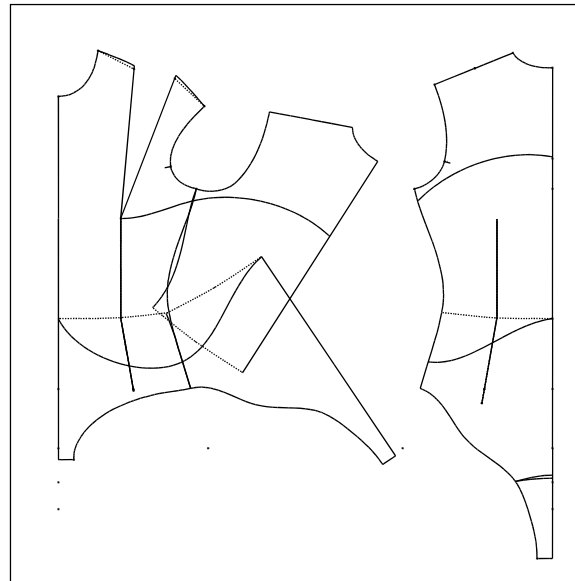
- ⇒ Activate the transformation type
- ⇒ Click on *transformation list*
- ⇒ Select one of the displayed record steps
- ⇒ Clicking on an object shows a preview of the selected transformation. If required, the transformation direction can be switched with *+/-reverse transformation*.



To select a previous transformation first, activate the respective transformation type then, click on *transformation list*. The *transformation list* menu appears showing up to ten previous transformations of the active transformation type. The menu displays the respective record step in which the transformation has been carried out. In this menu you can also see a preview of the transformation by activating the record step and then, clicking on individual objects of the construction. The objects will be transformed for a few seconds. Then, you can select a different record step and let individual objects be transformed for a few seconds. Once you have found and activated the required transformation switch back to the *transformation* menu with . Transforming with the previous transformation can begin.

Exercise on transformation list

In *Bodice 80* two panel seams are to be constructed, running from the front via the side seam to the centre back. Before the panel seams can be constructed with *new curve*, relocate the upper back to the side seam of the front with *turn and move*, see Picture 10-9. The reference points are the corner point at the armhole and a point at a partial distance of 40mm from the armhole respectively. From Chapter 11 onwards you can deposit this value as an x value and have the curve run exactly through this point. The lower back is to be transformed in the same way with the reference points corner point hem and a point at 50mm partial distance from the hem. Construct the two curves and separate at the side seam. In the *transformation* menu activate *turn and move*. The transformation instruction for the back is still active. Change the switch *+/-reverse transformation* and then, relocate the lines of the lower back as well as the panel seam.

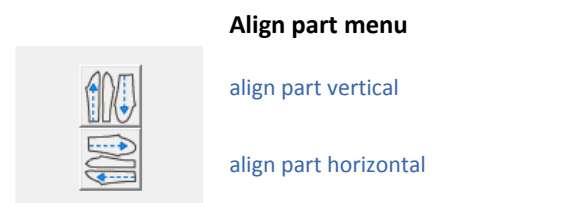


Picture 10-9

Via *transformation list* open a menu with the previous *turn and move* transformations. Activate the transformation of the upper back, set the switch *+/-reverse transformation* and click a few objects of the construction. If the required transformation is active, switch back to the *transformation* menu with and then, relocate the lines of the upper back and the new panel seam back to its original position.

10.2 Align part

As opposed to the previous transformations *align part* does not apply to individual objects of the construction but to the whole active part



The *align part* menu opens directly from the basic menu. Parts can be aligned vertically or horizontally. Having activated the corresponding function, a line of the part is to be clicked following the right principle.

10.3 Insert with transformation

With the *insert* function from the basic menu, points, lines or all objects of a part can be inserted into a part with a higher part number. This process has already been described in section 3.1 and practised a number of times.

During insertion of objects one of the two insert transformations can be carried out directly:

- move transformation *move from point to point* or
- move-rotate transformation *turn and move*.

Insert with transformation can be replaced by insert without transformation and subsequent transformation of individual objects. Insert with transformation is sensible if a part with a large number of points/ lines is to be inserted, see the embroidery motif in Pictures 10-10 and 10-12.

Objects from a maximum number of 10 parts can be inserted into the active part.

The two insert transformations in conjunction with detailed explanations of the *insert* menu form the content of this section.

Functions of the insert menu

Insert menu

select objects...

points ▪ lines ▪ part

reset single ▪ reset all

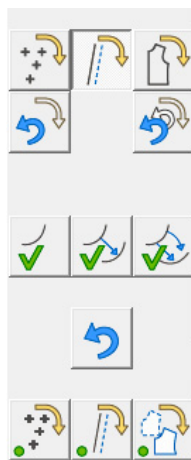
deposit objects...

without transformation ▪ move ▪ turn and move

reset

Tools...

Insert points ▪ Insert lines ▪ Insert part



Select objects:

All visible objects belonging to an inactive part with a lower part number can be inserted into the active part with these functions. One of the type of objects *points*, *lines* or *parts* is to be selected and the objects are to be clicked one after the other. The inserted objects appear in a different colour and, after having pressed <F5> removed from the original object.

With *reset single* or *reset all* individual inserted objects can be reset step-by-step or completely.

The selected coloured objects are accepted into the active part only after having called a function in the *deposit objects* section of the menu.

Deposit objects:

This block of functions determines **HOW** the objects or parts are deposited in the new part. In section 3.1 parts were inserted exclusively without transformation. However, Grafis allows for parts to be moved or rotated during insertion. This transformation is stored as a hereditary step and repeated automatically during grading.

1. *move from point to point*

Moving a point of the object to be inserted to a point of the active part. All objects to be inserted are moved accordingly.

2. *turn and move*

Move and rotation of the insert object according to the identical instruction of the transformation type with the same name in the *transformation* menu.

This function is especially useful for inserting yokes, sleeves or facings which already have the correct dimensions.

3. *without transformation*

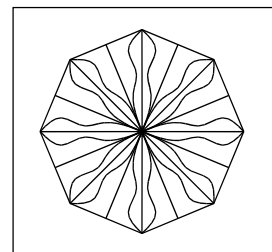
The selected objects are inserted without transformation, see section 3.1.

Reset undoes the last transformation step.

Quit insert with .

Exercises on insert with move transformation

In part 002, construct a small embroidery motif from scratch with a radius of approx. 35mm (according to Picture 10-10). Call the *Bodice 10* into part 001, delete the auxiliary lines, adjust the construction as required and construct positioning points for the embroidery motif (Picture 10-11 left). Construct a point in the centre of the embroidery motif.

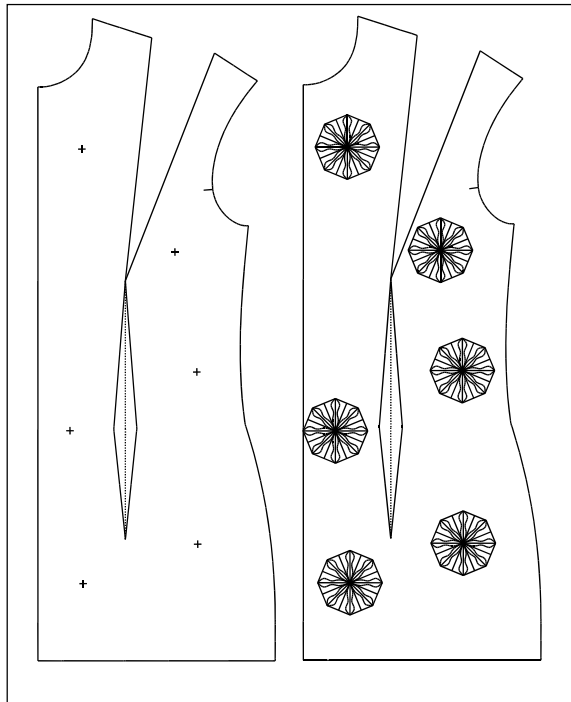


Picture 10-10

Insert all lines and points of the bodice construction from part 001 into part 003. Use *insert without transformation*.

Then, insert the embroidery motif into part 003, centred on the positioning points. Use the function insert with *move from point to point*. Activate *select object: parts* and click on the embroidery motif. It appears with red lines after having pressed <F5>.

Then, insert the embroidery motif into part 003, centred on the positioning points. Use the function insert with *move from point to point*. Activate *select object: parts* and click on the embroidery motif. It appears with red lines after having pressed <F5>.

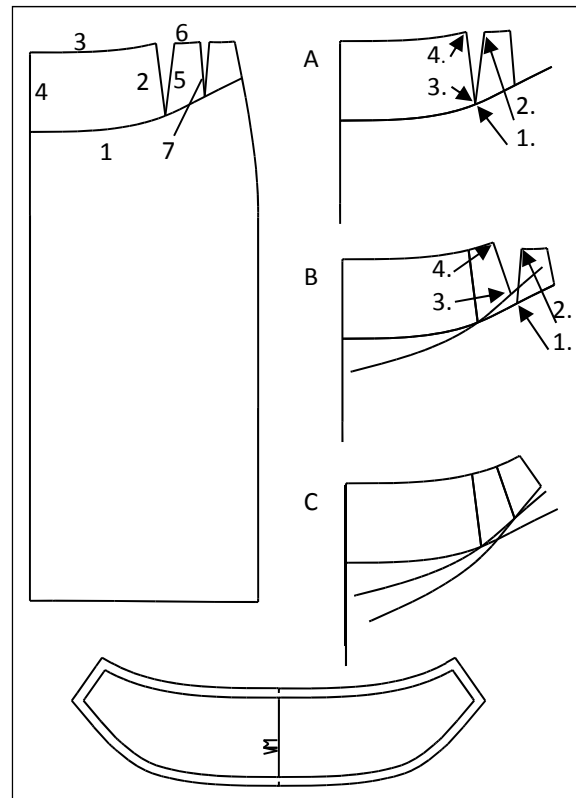


Picture 10-11

Then, click on *deposit objects: move*. Now, click on the first move point in the red group of objects. Click the centre of the motif. Define one of the positioning points in the active part as the final point for the move. The menu remains active. You can insert the embroidery motif a second time, a third time and so on.

Exercises on insert with turn and move

Construct a yoke in the front of Skirt 20 which runs through the dart apexes. Open the new part 002 'front yoke' and activate it. Insert lines 1 to 4 from part 001 without transformation. Then, insert lines 1,5,6,7 with *turn and move*. Activate *select object: lines* and click on the lines 1,5,6,7. They appear as red lines after having pressed <F5>. Then, click on *deposit objects: turn and move*. Click the end points of the lines with *click I* or *intersection* in the order shown in Picture 10-12 A. The menu remains active. You can now select the next lines by clicking and then, deposit them in the part, taking into account the clicking order shown in Picture 10-12 B. Then, develop a production pattern from the inserted lines (Picture 10-12 bottom).



Picture 10-12

Raglan sleeve construction

Construct a raglan sleeve from *Bodice 10*, using *insert with turn and move*. Note: Grafis version 12 contains an interactive raglan sleeve *Grafis-Sleeve 50*, which is not used at this stage during practising of the insert transformation.

Call *Bodice 10* into part 001. Loosen the armhole interactively by 10 to 20mm. Rotate the rest of the bust dart into the hem with *relocate dart*. Relocate the back shoulder dart into the armhole, see Picture 10-13 top.

Open a further part and call *Sleeve 40*. Adjust the following in the options for the sleeve:

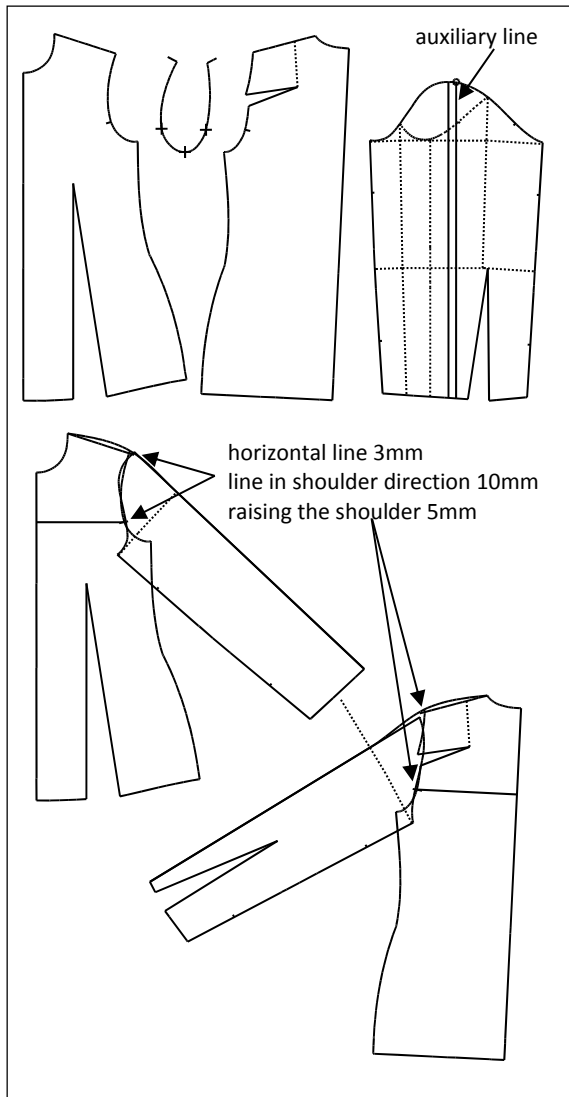
- 4 segments
- grade sleeve hem as sleeve top
- sleeve head height as deduction from medium armhole height.

Adjust a tolerance of 20mm in the *Curve adjustment* drag area and in the *Ease distribution* area adjust ease of approx. 10mm in the 2nd and 3rd segment. Construct a line from the shoulder point to the hem in the direction of the grain. Separate the sleeve head and the hem at this line.

Open a further part and insert the lines of the front. Construct an auxiliary line with 3mm length from the front/back pitch horizontally to the outside using the *Line 10* tool. Construct a second auxiliary line with 10mm length from the shoulder point to the outside in direction of the shoulder. Construct a third auxiliary line of 5mm length for raising the shoulder see Picture 10-13 bottom.

Insert the lines and points of the front sleeve into the front. When inserting, use the insert transformation *turn and move*, clicking in the following order:

- sleeve pitch of sleeve
- shoulder point of sleeve
- end of 1st auxiliary line
- end of 2nd auxiliary line.



Picture 10-13

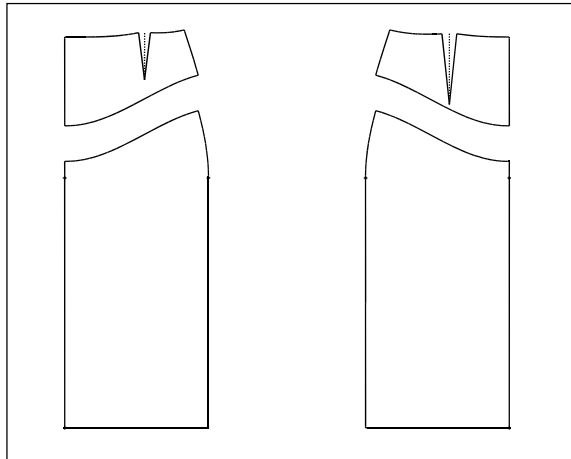
Construct a curve from the neckline to the sleeve hem and attach the curve to the end of the third auxiliary line and to the intersection upper arm line/panel seam. Adjust the directions. Construct a yoke line from the front pitch as a perpendicular onto the centre front.

Proceed in the same way for the back.

10.4 Complex exercises

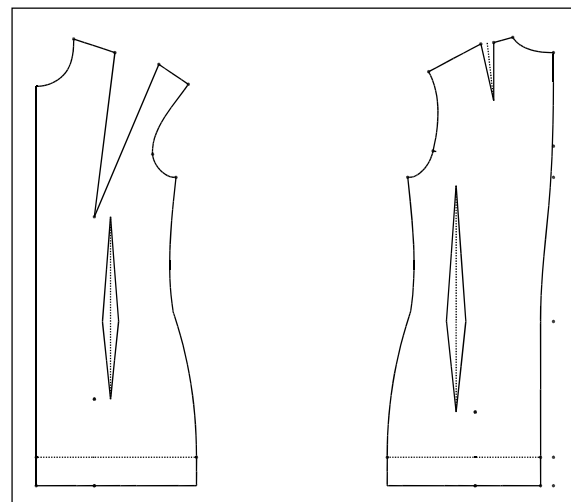
1st exercise

Construct a yoke in the style 'Straight skirt' from Section 2.4 starting at 150mm on the centre front or centre back and ending at 75mm on the hip curve, measured from the waist respectively. Then, move the yoke away from the skirt with *move* $dx=0$ and $dy=60$.



2nd exercise

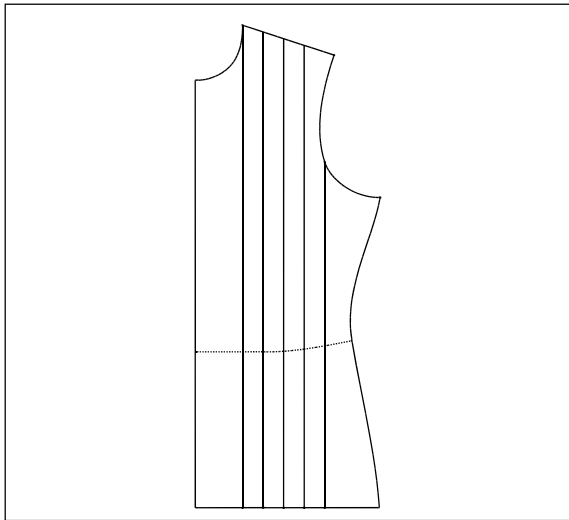
In the construction *Bodice 10* move the waist dart in the front by 25mm towards the side seam and in the back by 30mm towards the side seam. Use the transformation type *move* (dx, dy). Grade in a number of sizes.



Reset the move and now move the darts by the respective dart width at waist height. Use the transformation type *move from point to point*.

3rd exercise

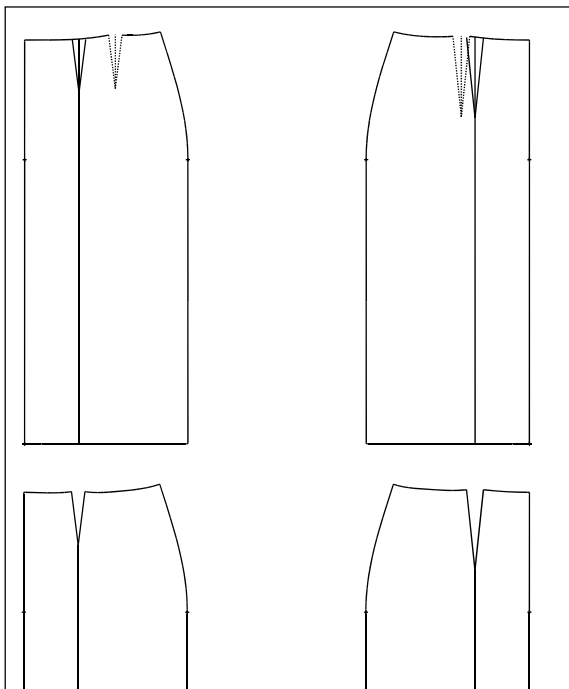
In the construction *Bodice 20* construct two lines parallel to the centre front from the neck/shoulder point



and from the front pitch to the hem. Perpendiculars are unsuitable, here in case the hem line is altered interactively at a later time. Separate the hem line at both lines and raster the hem line piece in between with 5 points. Move one of the two lines to the new raster points using the transformation type *move from point to point* with the setting *+copy*. Cut the spread lines at the shoulder.

4th exercise

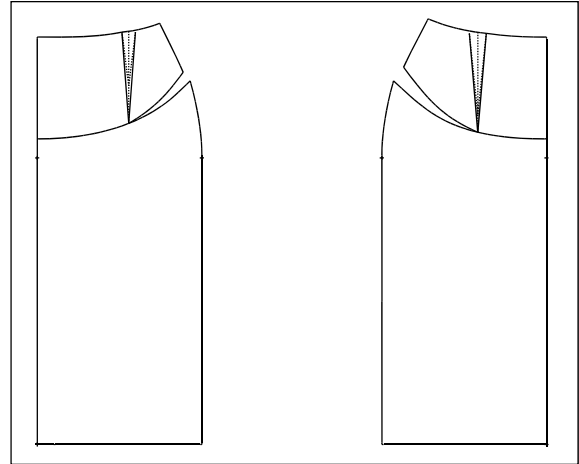
In the style 'Straight skirt' from Section 2.4 move the dart into the panel seam. Construct a panel seam at 33.3% from the centre front and centre back, measured along the hem. Cut the panel seams at the waist. Move the darts with *move from point to point* into the panel seams. Draw new waist curves. Note



that the waist curves are to end at the dart lines in a right angle.

5th exercise

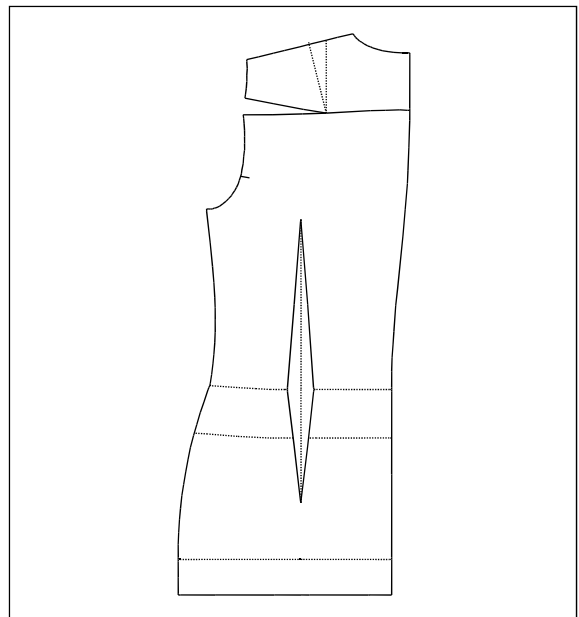
In the style 'Straight skirt' from Section 2.4 rotate the dart into the yoke. Construct a yoke starting at



150mm on the centre front and centre back, measured from the waist and ending at 80mm on the side seam, measured from the waist. Lengthen the dart to the yoke and close the dart with the transformation type *turn about a turn point from point to point*. Make a copy of the yoke curve in the process.

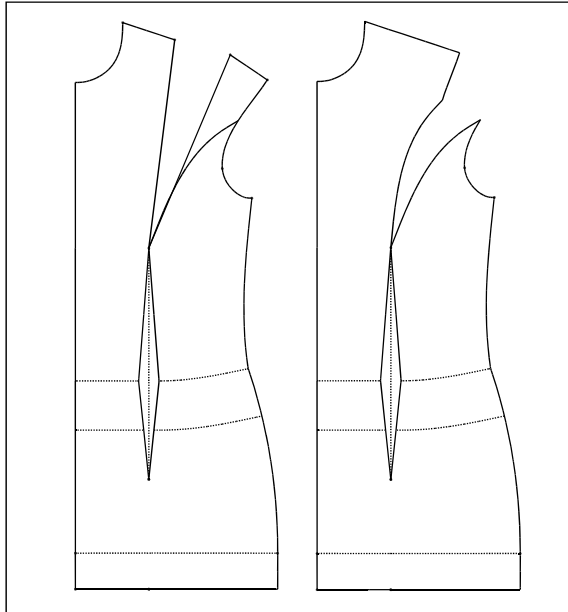
6th exercise

Construct a yoke in *Bodice 10* which runs through the shoulder dart apex and rotate the shoulder dart into the yoke line. Use the transformation type *turn about a turn point from point to point*.



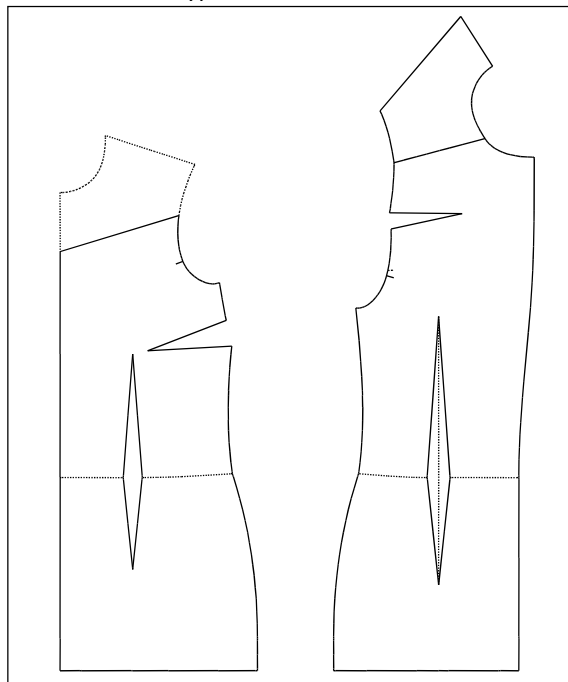
7th exercise

In the *Bodice 10* construct a princess line and rotate the bust dart into the panel seam. Use the transformation type *turn about a turn point from point to point*.



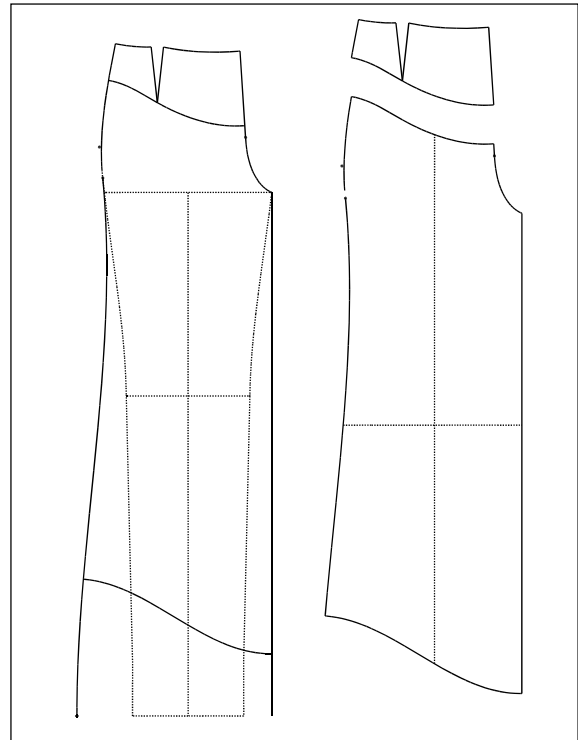
8th exercise

In the *Bodice 10* relocate the bust dart into the side seam and the shoulder dart into the armhole. Construct a yoke in the front from the centre front to the armhole. Relocate the yoke to the back with the transformation type *turn and move*.



9th exercise

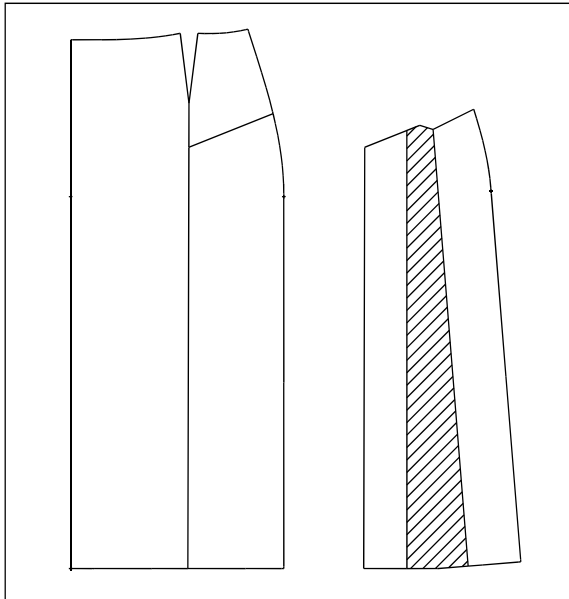
In the *Trouser 10* (with turn-up set to 0) construct a yoke beginning 60mm from the waist on the side seam and ending 120mm from the waist at the centre front. The yoke curve is to begin and end at right angles. Attach the yoke curve to the dart apex.



Flare the side seam by 90mm at the hem and construct a new side seam. The inside leg is to be vertical (*perpendicular line*). The new hem curve is to start 220mm from the hem at the side seam and end 100mm from the hem on the inside leg seam. The curve is to begin and end at right angles. Move the yoke upwards by 60mm. Insert the yoke into part 003 and the trouser front into part 004.

10th exercise

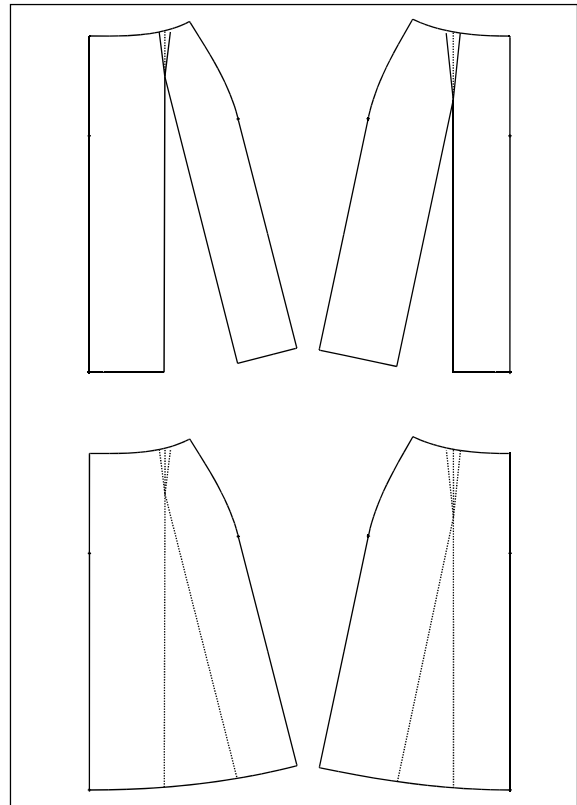
In the style 'Straight skirt' from Section 2.4 construct a side panel with one pleat. Construct a line from the dart apex parallel to the centre front. A perpendicular



lar is unsuitable in case the hem curve is altered interactively at a later time. Then, construct a yoke line starting 100mm from the waist on the side seam and ending 50mm from the dart apex on the auxiliary line. Move the pleat piece to the right by 200mm and spread it at the auxiliary line from the centre of the yoke. The spread amount at the yoke is 30mm and 70mm at the hem.

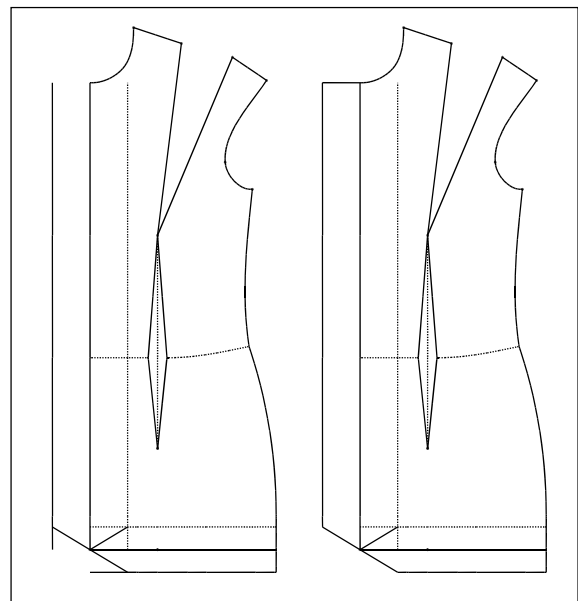
11th exercise

In the style 'Straight skirt' from Section 2.4 rotate the dart into the hem. Delete the hip line and construct a vertical line from the dart apex onto the hem. Close the dart with the transformation type *turn about a turn point from point to point*. You need a copy of the perpendiculars. Close the hem.



12th exercise

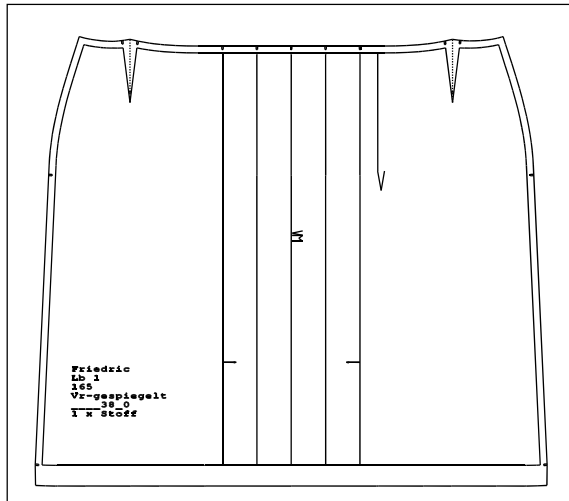
In the front of *Bodice 10* construct an overlap of 50mm at the centre front and a hem of 30mm with a mitred corner at the centre front/hem.



Mirror the allowances at the respective seam lines, construct a diagonal line and mirror the diagonal line at the seam lines. Close the corners.

13th exercise

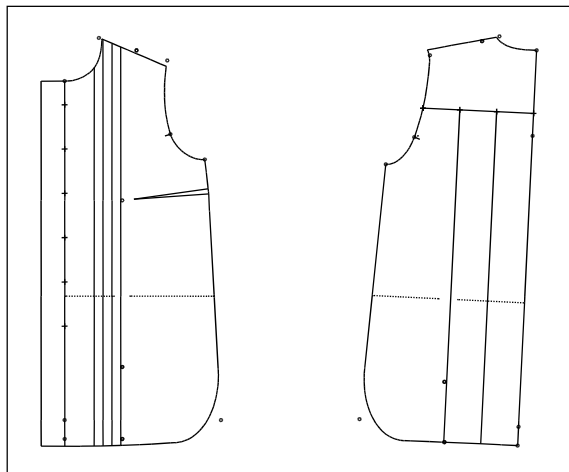
In the style 'Straight skirt' from Section 2.4 construct an inverted pleat with 50mm pleat content at the



centre front and a flared side seam. Mirror at the centre front. Set the text and the displayed symbols.

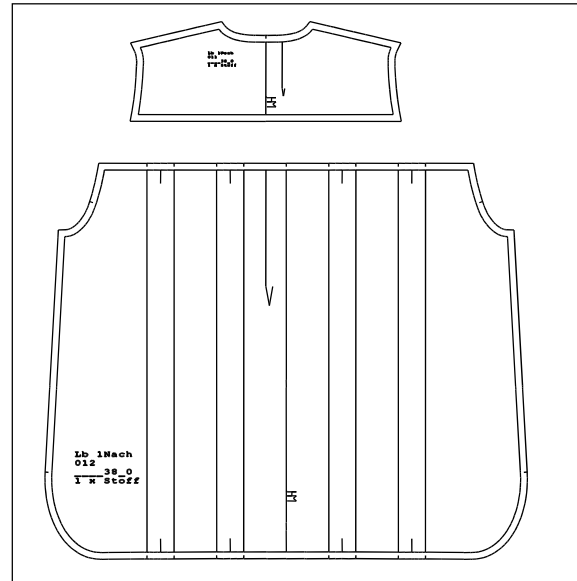
14th exercise

Open the style '**Blouse with pin-tucks**' from 5th exercise in section 8.6:



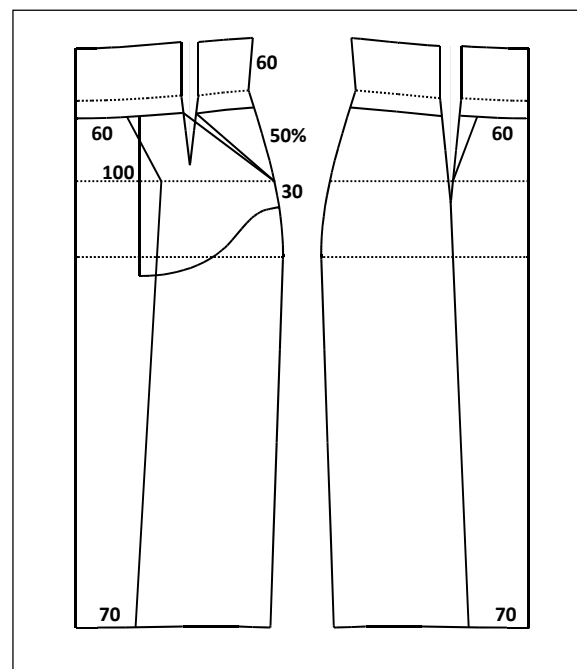
Open two new parts 003 'back yoke' and 004 'back'. Insert all lines and points you need to construct a yoke into part 003. Construct the seam allowances and the notches, adjust the part vertically (*align* → *part adjust vertical*) and mirror the part at the centre back. The centre back is now doubled and one of the lines must be deleted. Set the grain line symbol and a text.

Create part 004 'back' in the same way, adding 2 pleats spread with a pleat content of 25mm and construct the dart hoods

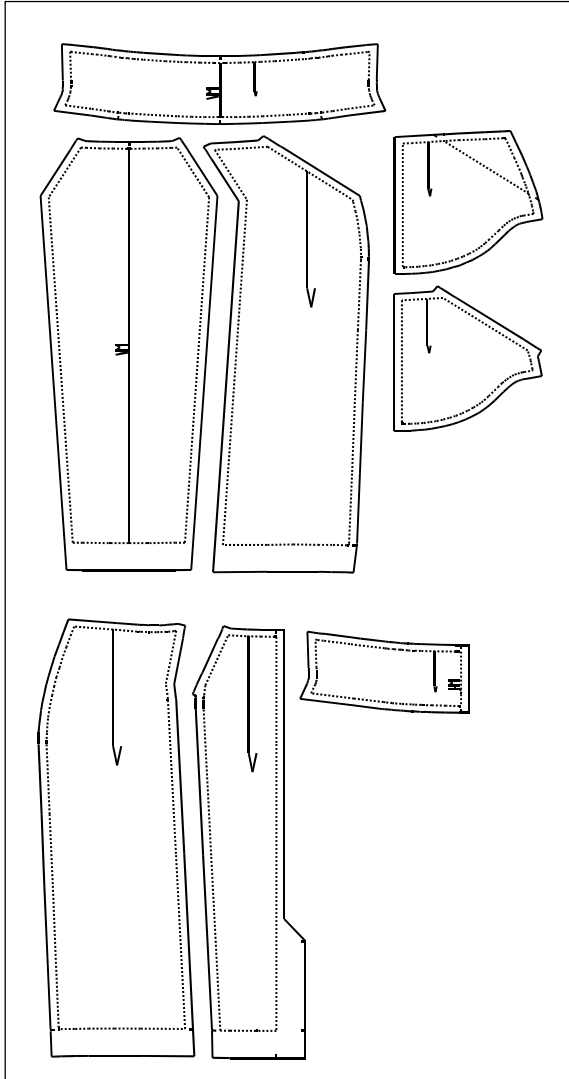


15th exercise

Call *Skirt 20* and construct a panel seam with vent in the front skirt. Relocate the dart in the back into the side seam. Use the tool *Parallel 10* and the functions

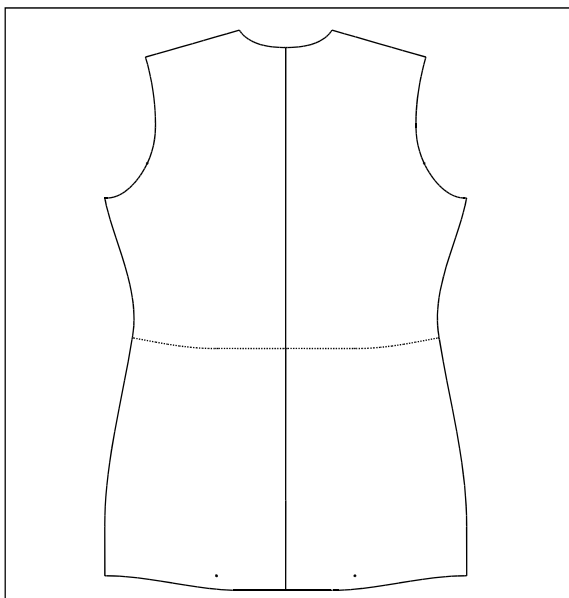


under *transformation*. Detach the production pattern pieces, construct the seam allowances, set symbols and mark the seam lines as dotted lines.



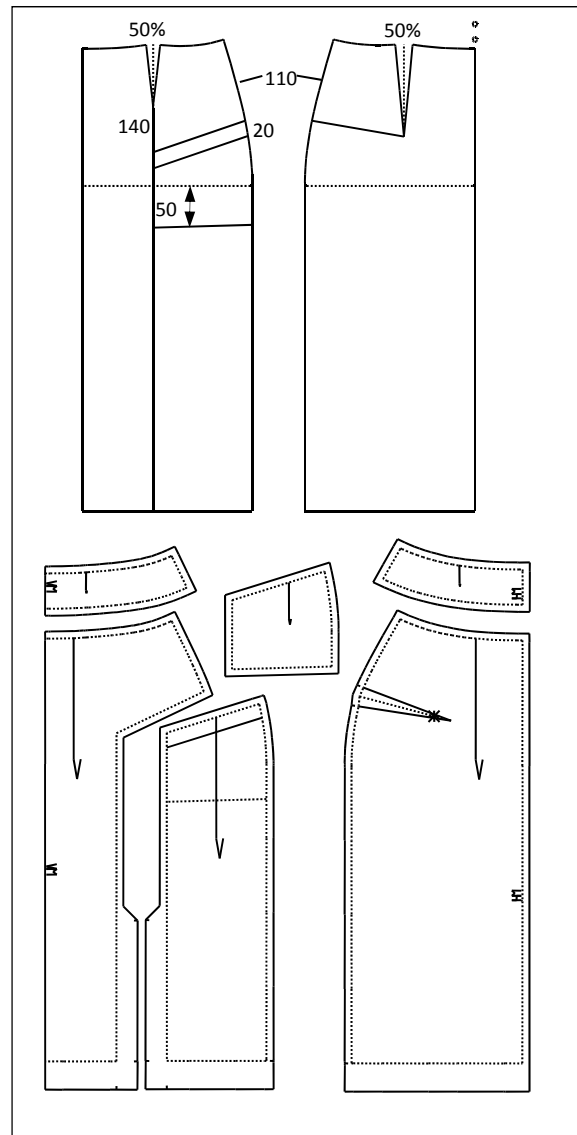
16th exercise

Mirror the back of *Bodice 20* at the centre back. Use the transformation type *mirror at line*.



17th exercise

Construct a skirt with panel seams and a pocket in the front skirt from *Skirt 20*. Activate the grown-on waistband in *Skirt 20* and adjust it interactively. To shape the skirt use the functions *parallel*, *line from point to point*, *new curve* and *transformation*. Construct a vent in the centre back. Detach the production pattern pieces, construct the seam allowances, set symbols and mark the seam lines as dotted lines.



Chapter 11 The construction parameter x value

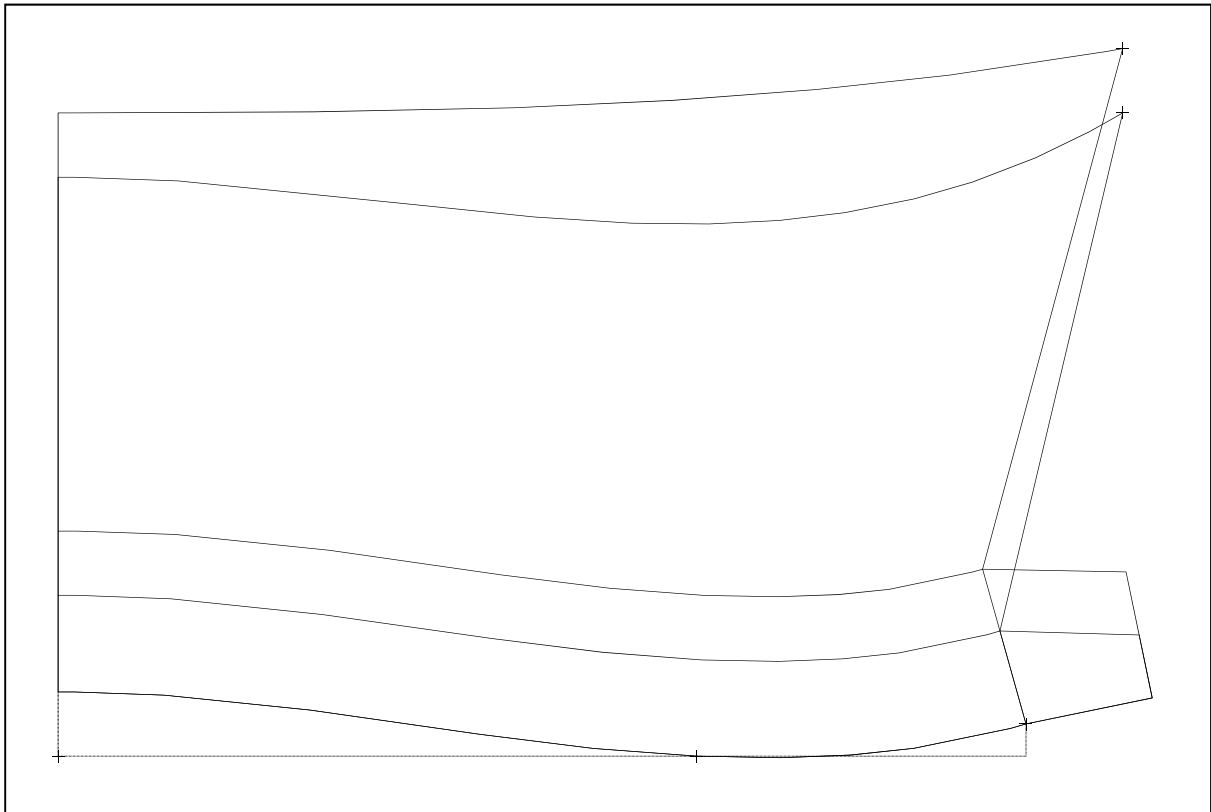
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The application of the construction parameter x value and the resulting manifold styling options is one of the outstanding features of Grafis. The skilful

use of x values allows for creation of style variations or trend adjustments through adjustment of the x values, only.



11.1 The X values

X values are size-related construction parameter. The numerical values are logged in x value tables and can represent lengths, distances, radius or angles, for example. X values can be altered after completion of a style at any time. Thus, later modification of the style is possible in a very effective manner. For example, in the collar construction (title picture of this chapter) the x values 'collar stand' and 'angle for collar step' were altered.

There are three different types of x values:

- x values of non-interactive basic blocks,
- x values of the construction record and
- x values of all parts.

The difference relates to the validity of the respective type of x value. The application of x values is identical for all types and is elaborated on the x values of the construction record.

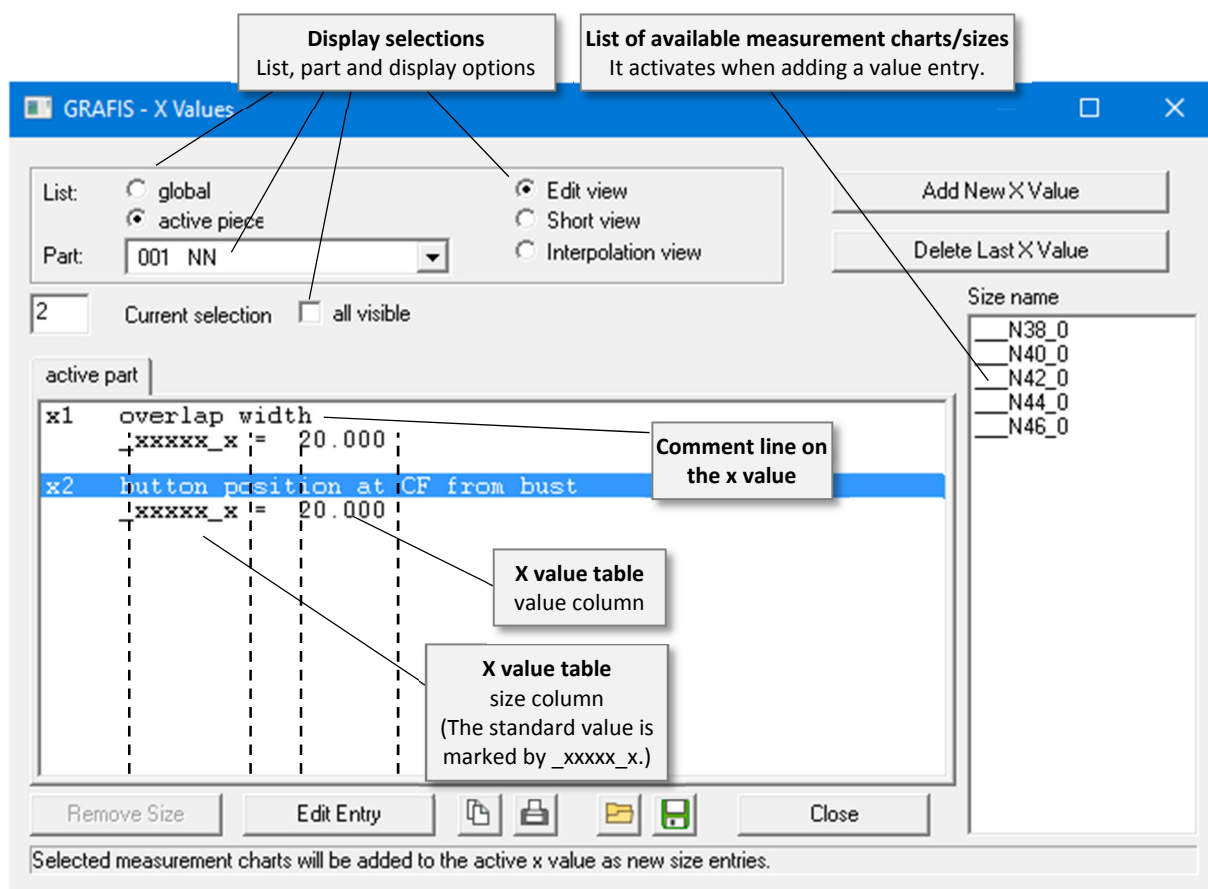
The x values of the interactive constructions can only be edited in the drag environment and are greyed out in the x value list.

Step-by-step guide

- ⇒ Open the x value table from the pull-down menu *Extras* via *x value table* or from the toolbox
- ⇒ Select the *List: (global or active piece)*
- ⇒ Select the index card (*values of the part or 1st basic block* for the basic block of the part)
- ⇒ Adjust one of the view options *Edit view, Short view or Interpolation view*
- ⇒ Add, edit or delete size-related x value assignments

The x values of the basic blocks

Each basic block contains a prepared x value table. The x values represent lengths, percent, or angles which are variable according to the respective construction instruction, e.g. ease or position and length of the darts. The implementation of the x value into the basic block and pre-assignment of an appropriate value ensued by the developer of the basic block. The user has the option to modify the basic block to his own requirements by altering the x values.



Picture 11-1

The x values of the construction record

The x values of the construction record are user defined and implemented during construction. Thus, the respective construction step can be altered later.

Before starting the construction consider for which construction steps the use of x values would be beneficial for flexible pattern modification!

In the following menus the use of x values offers great modification options:

- *parallel* menu: distance for parallels
- *raster* menu: distance values and number of points
- *lengthen* menu: values for *lengthen by* and *lengthen to*
- sub-menu point construction: values for relative length or partial length
- *dart* menu: ...% of dart to be relocated
- *spread* menu: distance of spread line
- *curves* menu: bind starting point, final point and base points of the *new curve* via the point construction sub-menu
- *transformation* menu: move amount, scale factor, rotation angle
- *points and lines* menu: distance values, relative values for point construction, length of a line

The x values of all parts (global x values)

Global x values apply to all parts of the style. They can be used for example for:

- seam allowance self / lining,
- ease,
- distances for markings,
- adaptation factors for stretch etc.


The x values of all parts are additionally indicated with a G (for 'global'); small and capital letters have the same significance. Example: XG5 or xg5.

XG5 stands for the fifth x value of the x value table of all parts whereas x5 stands for the fifth x value of the construction record of the active part. This rule applies to calculation with z values as well as direct entry into numerical fields.

You can switch between record x value tables of different parts in the 'Grafis X Values' window, directly. Merely select the required part number in the 'Part:' field.

Step-by-step guide for editing x values

⇒ Insert new x value into the x value table:

- *Extras* → *X Values...*
- Select the *List: (active part or global)*
- For *List: active part*: select the index card *Values of the part*
- Click on *Add New X Value*. A maximum of 80 x values can be opened per part.
- Double-click the comment line and enter the description for the new x value. Be careful to use clear definitions!
- Double-click on the standard value (to the right of `_xxxxx_x=`), enter the value and <ENTER>
- possibly: insert size-related x value entries
- possibly: delete the last x value with *Delete Last X Value*
- Quit with  or with *Close*

⇒ Continue the construction and enter an x value (e.g.: X2 oder XG1) instead of a numerical value

The Grafis - X values window

The *Grafis - X values* window offers the following option for display of the required x value table (Picture 11-1).

List and index cards:

For each part one of the following x value tables can be displayed:

- global (the x values of all parts) or
- the x values of the active part offered on a number of index cards. The index cards contain the x values of the non-interactive basic blocks and the x values of the construction record.

Select the required list under *List:* and then, click on the card tag. The x value list of the interactive constructions remains greyed out.

Part:

Select the part for which the list of x values is to be displayed.

Display options:

The x value table can be displayed in the options

- *Edit view*,
- *Short view* or
- *Interpolation view*.

The *Edit* view with all size entries is the most detailed option.

In the *Short view* only the x value numbers and description and the standard value `_xxxxx_x` are displayed.

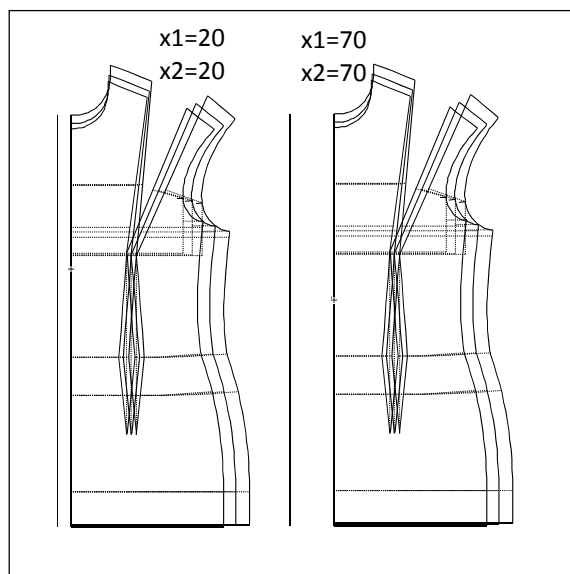
Interpolated values for specific sizes can be viewed in the **Interpolation view** after having clicked the size in the *Size name* field.

Generate new x value and apply it to the construction

Open the list of x values of the construction record via *Extras* → *X values...* and select *List: active part*. The file card *active part* is active. Switch to *Edit view*. Open a number of new x values by clicking on *Add new x value* and delete a few by clicking on *Delete last x value*.

Name the first x value x1 'overlap width' by double-clicking on the comment line and entering the text. Now assign the standard value for x1 with 20 by double-clicking to the right of `_xxxx_x=` and entering 20. Name the second x value x2 'button position from bust point height' and assign this standard value also with 20 (Picture 11-1).

Now call the construction *Bodice 10* and construct a parallel for the overlap (Picture 11-2). In the *parallel* menu, enter the *distance value* **x1** before clicking on the centre front. This determines that the current value of x1 will be used for construction of the next parallel. Now click the centre front and the overlap appears at a distance of 20mm.



Picture 11-2

Construct the first button position with a distance of x2 from the bust point on the centre front. Use the point construction *point with distance to a base point on a line* with the *distance value* **x2**. First, the bust point is to be clicked and then, the centre front in direction hem.

Grade the construction in the sizes N40, N36, N44. Stack at the bust point and measure. You will see a result according to Picture 11-2 left. In the x value list, alter the values of x1 and x2 to 70 respectively. After *test run* and *grading* you will see the result according to Picture 11-2 right. Enter other values.

Alterations to x values are only visible after test run and grading.

An x value must be defined before it can be used in a construction step. Should this not be the case, Grafis will refuse processing.

Whether an x value is interpreted in mm, in percent or in degrees depends on the function with which the x value is used. When entering the x value as a relative length, the x value is used as a percentage. When entering the x value as a rotation angle, the x value is an angle in degrees.

Redirecting an x value

From Version 9 recorded x values can be redirected to global x values. The character set in the comment line of the respective x value is supplemented with `=>{XG4}`, here for the redirection to the fourth global x value. If this character set is removed, the original values apply. The production patterns of the pocket modules contain x values for seam allowance. If you control the seam allowance for your styles via the global x value XG2 you can supplement the comment line of the seam allowance x value in the production pattern with the character set `=>{XG2}`.

Size-related x values

Adding, editing and deleting size-related x values can ensue in the *Edit view*, only.

To **add x value entries** the x value or one of the corresponding size-related x value entries are to be highlighted. The list of available measurement charts from which measurement charts can be selected by clicking opens to the right. Each selected measurement chart is accepted into the x value table.

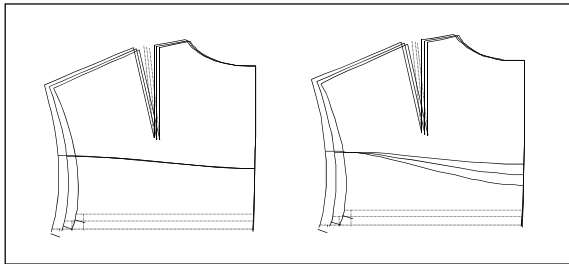
A size can be assigned a value, only if it is available as a measurement chart on the workstation!

Adding new x value entries is followed by **editing the values** by double-click on the numerical value or clicking on *Edit Entry*. With *Edit Entry* the next numerical value is offered, automatically.

To **delete or edit x value entries** the entry is to be highlighted and *Remove Size* is to be clicked.

Opening new x values or deleting existing x values is not possible with x values of the basic block.

Construct a yoke in the back of *Bodice 10*. The start of the yoke at the centre back is to be controlled via x3 and the end of the yoke at the armhole via x4. Enter the x values x3 (100mm) and x4 (70mm) and construct a curve starting vertically on the centre back at a *partial length with plg=x3* and ending horizontally at the armhole with *plg=x4*. The measurements are taken along the curves from the neck to the hem respectively. Grade the sizes N38 to N42 and stack at the neck. The result is shown in Picture 11-3 left.



Picture 11-3

The start of the yoke on the centre back is to be size-dependent and altered by 10mm from size to size. Select one of the lines of the respective x value x3 (Picture 11-4). The list of existing measurement charts/sizes opens. From this list you transfer the sizes N40 and N42 with a simple click.

Having double-clicked on the line of size N40, enter the value 120 and in the line for size N42 enter the value 130. Now close the *X value* window, grade and stack. You obtain a result according to Picture 11-3 right.

Rules for size related value assignment

X values can be altered in correspondence with the size. However, it is not necessary to assign each size with a value. The following cases apply:

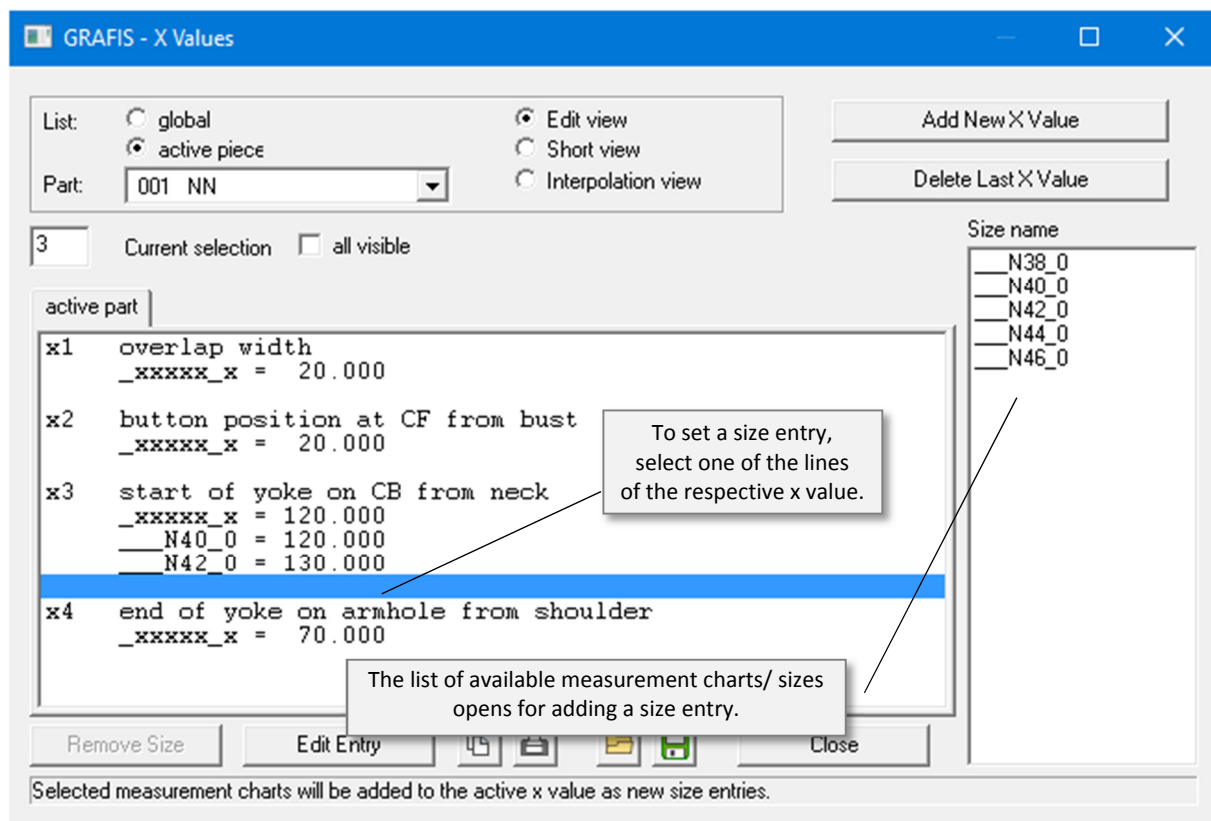
Case 1: The x value is identical for all sizes

In this case, only the standard value `_xxxxx_x` is to be assigned. Further entries are not necessary.

Case 2: The x value is to be identical for all sizes of the same figure type

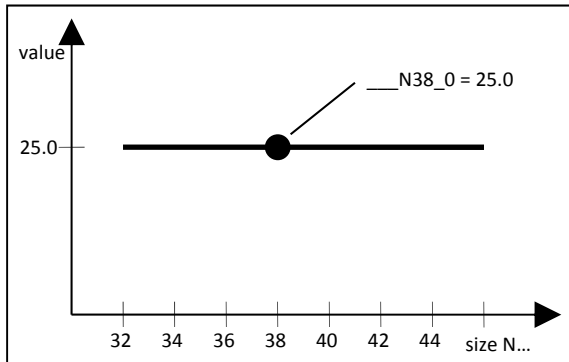
The standard measurement charts are organised in figure types, depending on the measurement system. For example, the Optimass measurement system distinguishes between narrow hips/ normal hips/ wide hips and additionally between short/ regular/ long.

If only one size of a figure type is assigned a value this value applies to all other sizes of this figure type, see Picture 11-5.



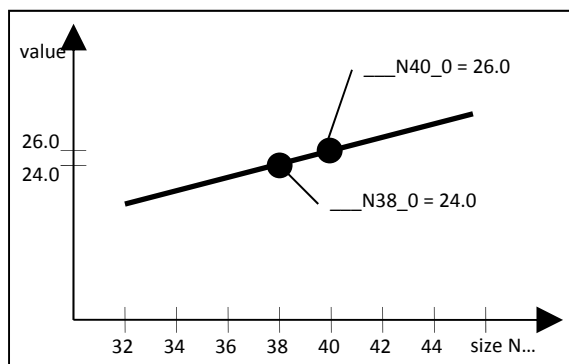
Picture 11-4

You can find more information on figure types in Chapter 2 in the section 'Work with measurement charts'.



Picture 11-5

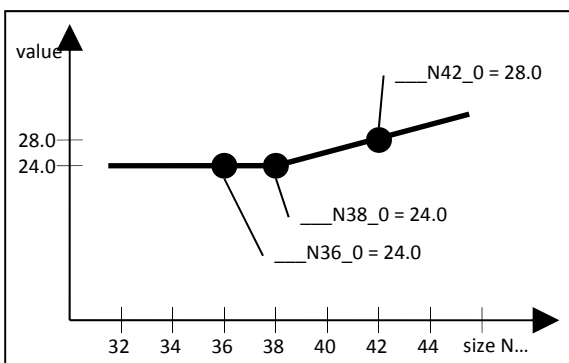
Case 3: An even alteration to the x values for the sizes within a figure type is to ensue



Picture 11-6

In this case it is sufficient to assign **two** sizes of the relative figure type with the required x values. The even alteration of the x value is continued throughout all sizes of the figure type, see Picture 11-6.

Case 4: The x value is to be altered unevenly within a figure type.



Picture 11-7

In this case it is necessary to assign values to a number of sizes. The following rule applies: an even alteration of the x value ensues between two adjacent

sizes. The even alteration continues for the sizes before the first and after the last entered size, but for the respective figure type, only, see Picture 11-7.

These rules apply to standard sizes of a figure type, only.

Individual measurement charts can be assigned x values, also. Furthermore, an individual measurement chart can be assigned the x value of a standard size via x value references, see section 11.3.

Enter the x values absolutely necessary for the required dependency into the x value table, only. This makes care easier and reduces mistakes.

After having altered x value entries test run should always ensue!

Exercise

Create a shirt with flared hem from *Bodice 10* with portions of the bust dart being relocated into side seam and hem depending on the size. In the smaller sizes up to size N40 the complete bust dart is to be relocated into the hem. From size N42, 25% of the bust dart are to be relocated into the side seam and 75% into the hem. From size N46, 50% are to remain as bust dart and the remaining 50% are to be relocated into the hem.

Call *Bodice 10* and delete auxiliary points and lines which are not required.

Generate two x values:

x1	portion bust dart in side seam	25.
x2	portion bust dart in hem	25.

Note: With this pre-assignment of the x values, all darts initially remain open so that correct dart hoods and allowances can be constructed.

Relocate the bust dart into the side seam with the function *relocate dart*, entering 'x1' as value for the *dart portion*. Relocate additional lines and points such as the front pitch for example. Relocate a further portion of 'x2' into the hem.

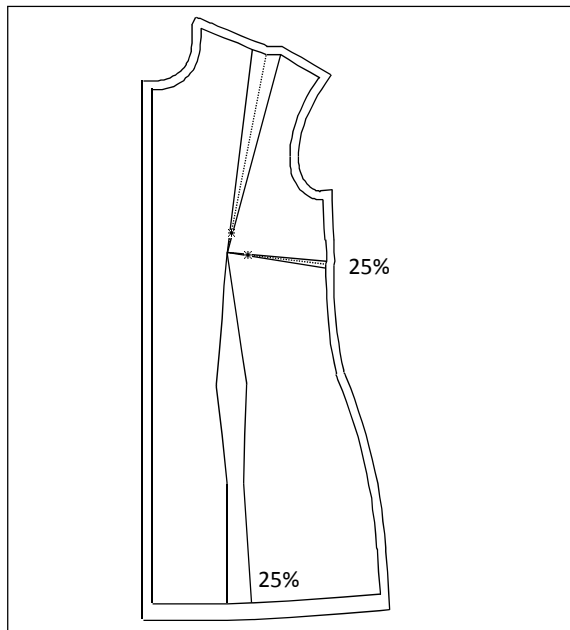
Construct a single dart hood for the bust dart and the dart in the side seam. Link the hem as a curve. Then, link the side seam and the shoulder as a continuous line sequence including the dart hood lines. Then, construct the parallels to ensure that the seam allowances are also created correctly when the dart is closed.

Generate two global x values for the allowances:

x1	general seam allowance	10.
x2	hem allowance	20.

Construct the seam allowances at side seam, arm-hole etc using 'xg1'.

The hem allowance is created with 'xg2'. You will obtain a result according to Picture 11-8.



Picture 11-8

Only now, adjust the x values according to the instructions:

x1 portion bust dart in side seam

```

_XXXXX_x = 25.000
___N38_0 = 0.000
___N40_0 = 0.000
___N42_0 = 25.000
___N44_0 = 25.000
___N46_0 = 0.000
___N48_0 = 0.000

```

x2 portion bust dart in hem

```

_XXXXX_x = 25.000
___N38_0 = 100.000
___N40_0 = 100.000
___N42_0 = 75.000
___N44_0 = 75.000
___N46_0 = 50.000
___N48_0 = 50.000

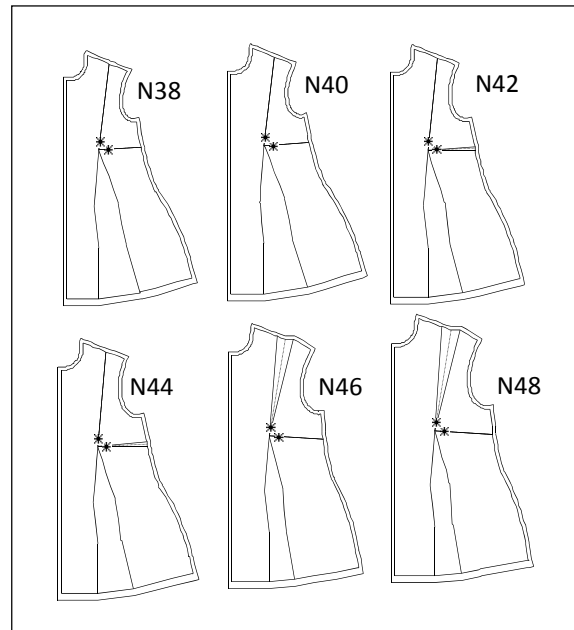
```

Sizes N38 and N48 were also assigned with a value to ensure that the dart distribution does not change further in the following smaller or larger sizes.

For example, if no value is assigned to size N48, the value for size N48 would be calculated from the values for N44 and N46 via extrapolation. In this case x1 would equal -25 and x2 would equal 25.

Ensure realistic values also for very small and very large sizes when using size-dependent x values!

With the listed x values you obtain a result according to Picture 11-9.

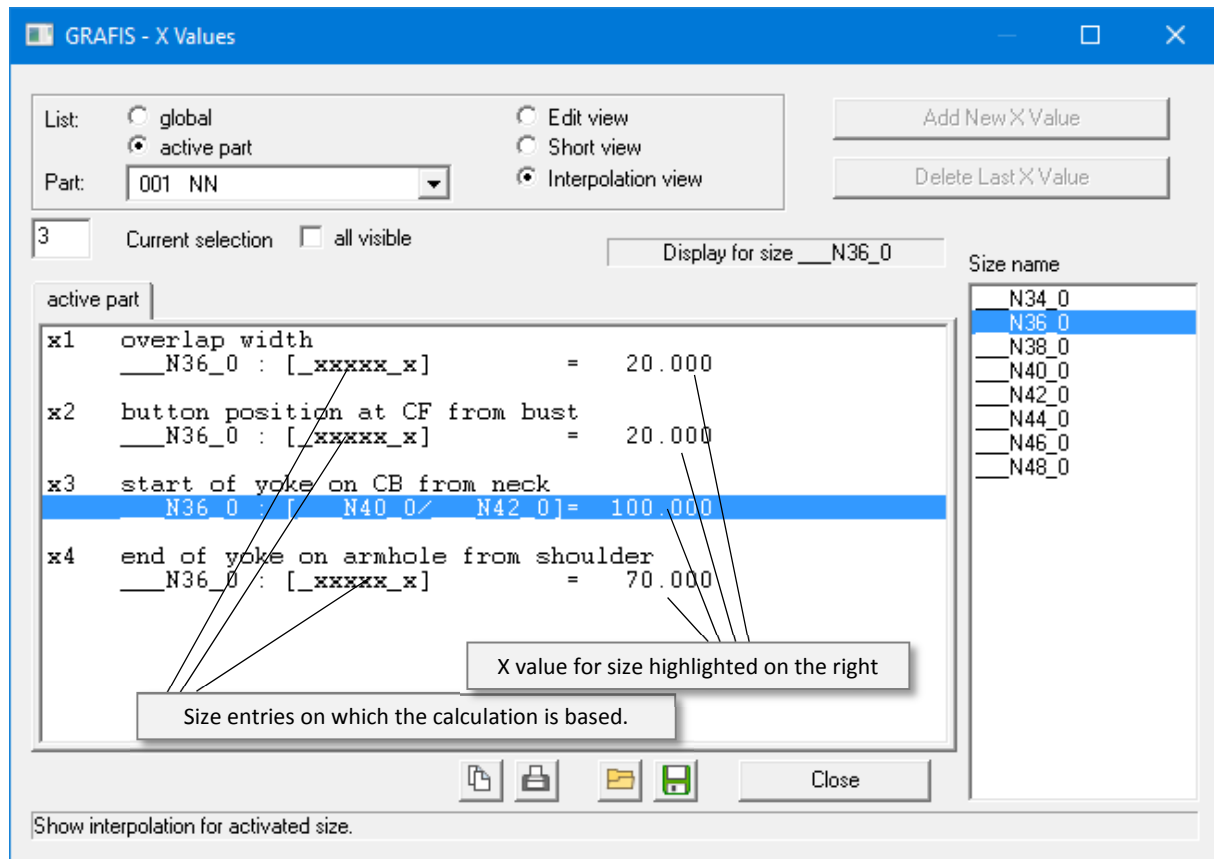


Picture 11-9

Checking the calculation of x values

Checking x value calculations is made easy with the *Interpolation view* option (Picture 11-10). Highlight the respective sizes in the *Size name* list. In the x value table only the x values of the respective size are displayed, see also Picture 11-10. Additionally, the sizes used for calculating the x value are stated. The calculation variations are displayed as shown for size N36:

1. The standard value applies to the respective size (XXXXX_x), e.g.:
x1 overlap width
___N36_0: [XXXXX_x]
2. A specific value is assigned to the respective size, e.g.:
x1 overlap width
___N36_0: [N36_0]
3. For the figure type of the respective size only one size entry is available (here: size ___N40_0); it applies to the respective size, also, e.g.:
x1 overlap width
___N36_0: [N40_0]
4. The x value of the respective size is calculated from two size entries (i.e.: size ___N42_0 and size ___N46_0), e.g.:
x1 overlap width
___N36_0: [N42_0/N46_0]



Picture 11-10

Exercise

Alter the x value table of the first construction of this chapter as follows:

- x1 overlap width
 _____x = 20.0
- x2 button position on CF from bust point
 _____x = 20.0
- x3 start of yoke on CB from neck
 _____x = 120.0
 ___N38_0 = 120.0
 ___N40_0 = 120.0
 ___N42_0 = 130.0
 ___N46_0 = 150.0
 ___N52_0 = 155.0
- x4 end of yoke on armhole from shoulder
 _____x = 70.0

Reflect which value x3 has in the sizes N34, N36, N38, N44, N46, N48 and N52. Then switch to the interpolation view and select the respective sizes one after the other in the *Size name* list. For size ___N36_0 all information appears according to Picture 11-10.

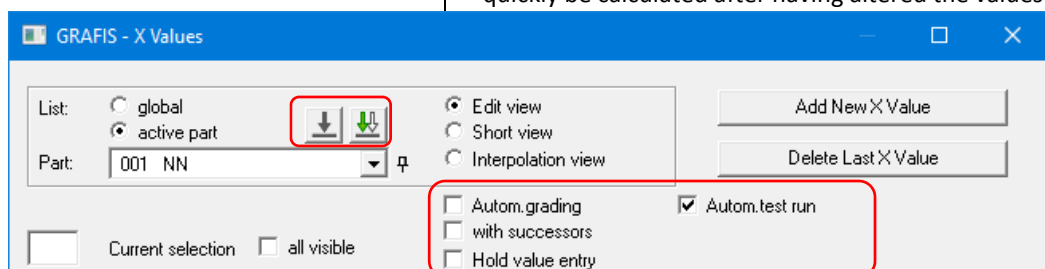
Analyse the displayed values with graphic representation like Picture 11-5 to Picture 11-7.

Analyse the values for other figure types. Supplement the x value table with your own entries and check the implications on the x values of other sizes. Start *test run*, *grading* and measure.

Additional functions

The pin is an echo and cannot be clicked. While the pin is visible, the x values of the selected part are shown, even if another part has been activated by clicking in the main window. If the pin is not visible, the x values of the active part are indicated automatically.

In Grafis Setup advanced users can activate the option *Additional functions in the x value window*, see Picture 11-11. These additional options help during visual adjustment of the user's x values. With the buttons *test run* and *grading*, the active part can quickly be calculated after having altered the values.



Picture 11-11

Automatic grading with / without successors and *Automatic test run* starts automatic calculation of the construction after alteration of values. *Hold value entry* activates the hold function for the altered x value.

11.2 Size-dependent adjustment of interactive constructions

Step-by-step guide

- ⇒ Assign size table with at least the sizes to be adjusted
 - ⇒ Activate construction with double-click or from the overview with <F12>
 - ⇒ Select the drag area in which drag points are to be adjusted size-dependently
 - ⇒ Open the *Break sizes* window by clicking on *break sizes* in the menu on the right
 - ⇒ Transfer break sizes
 - ⇒ Make size-dependent adjustments to individual drag points either
 - in each size or
 - in one size, maintaining the set increments.
- The aids *stack* and *ruler* can be used during dragging.

How does drag work?

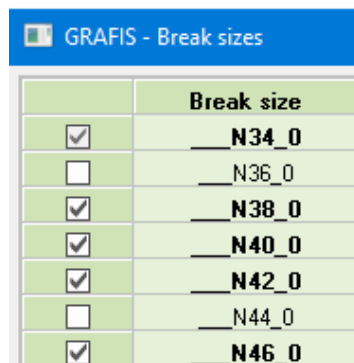
Each interactive construction is variably adjustable via a multitude of x values. As opposed to the x values of the construction record, the x values of the interactive construction are 'visible' through drag points. Moving a drag point alters one or two x values. You can see the value of the current x value and its number in the value window (Picture 11-13).

The construction is recalculated after each alteration of the value. The effect on the complete construction is immediately visible. As the logic of a construction, for example of a bodice, can be extensive, powerful computers should be used. Otherwise, the construction changes in jumps. If this is the case for you check whether a raster is active. If not, you should continue working on a computer with higher clock speed.

Size-dependent adjustment of an interactive construction means adjusting the x values of the construction depending on size.

Select break sizes

First, assign the size table with at least the sizes you probably need as break sizes. Then, activate the construction with double-click or with <F12> and select the drag area in which the drag points are to



Picture 11-12

be adjusted size-dependently. Click on *break sizes* in the menu on the right. The *Break sizes* window opens (Picture 11-12).

The list of break sizes in Picture 11-12 contains all sizes which can become break sizes of the active drag area. These are all activated sizes of the size table or their reference size. Further information on reference sizes can be found in section 11.3. The first position of the list is occupied by the base size.


The **base size** of the interactive construction is the size, which is adjusted interactively if no other break sizes are activated. The size in the first position in the size table is automatically also the base size of the interactive construction.


Open a new style and call the basic block *Skirt 20*. The skirt is to be graded in the sizes _N34 to _N46. Enter these sizes into the size table. The first position of the size table is still to be assigned with _N38. Grade the construction. The width of the skirt changes across the sizes but not its length. The skirt length is to be adjusted to a constant 600mm for the smaller sizes up to _N40 and 700mm from size _N42 upwards. Activate the construction *Skirt 20* and change to the drag area *Line relocation*. Click on the button *break sizes* in the menu on the right. A window opens as shown in Picture 11-12. Activate the sizes _N40, _N42 and _N46 and end selection of break sizes with <OK>.

Only sizes (or their reference size – see section 11.3) listed and activated in the size table can be adjusted interactively.

The value window

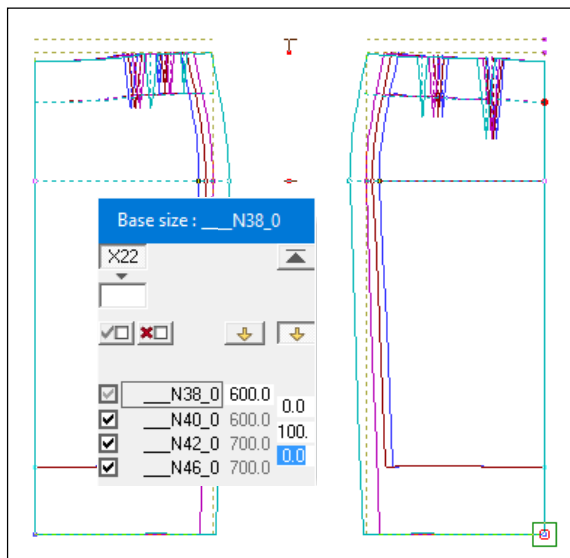
The break sizes activated in the drag area appear in the value window, see Picture 11-12 and Picture 11-13.

Click on the left of the two buttons . Each **size** can now be dragged **individually** or adjusted with values. Use this display option while no grade has been determined for this drag point.

Click on the right of the two buttons . In this display option you can

- edit the increments with numeric values or
- adjust one of the offered sizes interactively, maintaining the increments. The other sizes are altered respectively after release of the mouse button.

Set the skirt length in the drag area *Line relocation of Skirt 20* as shown in Picture 11-13. Then, quit the interactive environment and grade in the sizes N34 to N46. The x value for the skirt length is calculated ac-



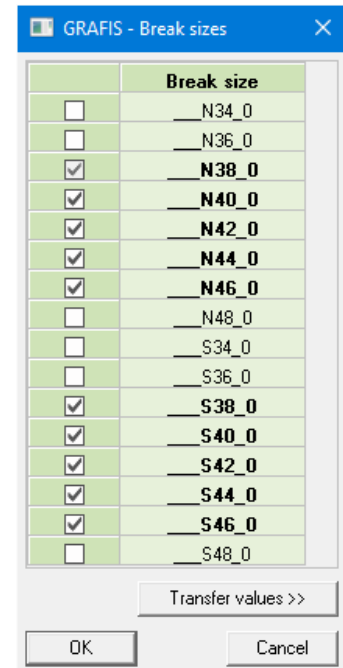
Picture 11-13

ording to the rules of section 11.1. Thus, the skirt is 600mm long in the smaller sizes up to N40 and 700mm long in the larger sizes from N42 upwards.

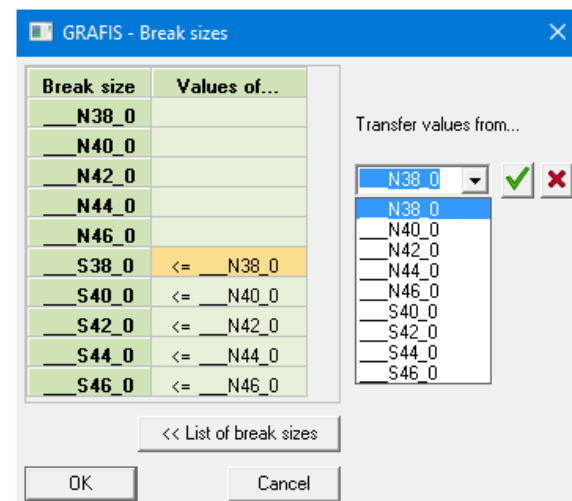
Transfer values from break size to break size

A construction prepared for normal N sizes is now also to be produced in short S sizes. If you have not been able to immerse yourself in the alternative break size from section 11.4, simply activate the respective short sizes as break sizes and assign the values of the normal sizes. This process is only required in drag areas with more than one break size.


The list of break size in Picture 11-14 belongs to a drag area in which initially the normal N sizes N38, N40, N42, N44 and N46 had been adjusted. Additionally, the short sizes are to be adjusted. These have already been entered in the size table and activated in the break size table. If the *Grafis - Break sizes* dialogue is now closed with **OK**, all short break sizes will be assigned the values of base size N38.



Picture 11-14



Picture 11-15

For a suitable pre-assignment of the short sizes, click on *Transfer values>>*. The *Grafis - Break sizes* dialogue changes according to Picture 11-15 right. Now click in the column *Values of...*, select the corresponding size from the normal figure type in the column *Transfer values from...* confirm with  and continue assigning values with the next short size. After having clicked **OK** all sizes of the first column *Break size* will be assigned with the values from the sizes of the column *Values of...*

This transfer of values is a one time operation. There is no permanent link such as is possible with the alternative break size from section 11.4.

11.3 The x value reference

In the size table you can find the column *x reference* (Picture 11-16), which influences the calculation of x values.

All sizes for which an entry exists in the 'x reference' column of the size table are calculated with the x values of the assigned x value reference size (short: x reference).

The measurement chart in this column...

	Size	X ref
<input checked="" type="checkbox"/> 01	N38_0	
<input checked="" type="checkbox"/> 02	A38	N38_0
<input checked="" type="checkbox"/> 03	A40	N40_0
<input checked="" type="checkbox"/> 04	A42	N42_0
<input checked="" type="checkbox"/> 05	A44	N44_0
<input checked="" type="checkbox"/> 06	KAREN	N42_0
<input checked="" type="checkbox"/> 07	NICOLE	N38_0
<input type="checkbox"/> 08		

... is graded with the x values of the measurement chart of this column.

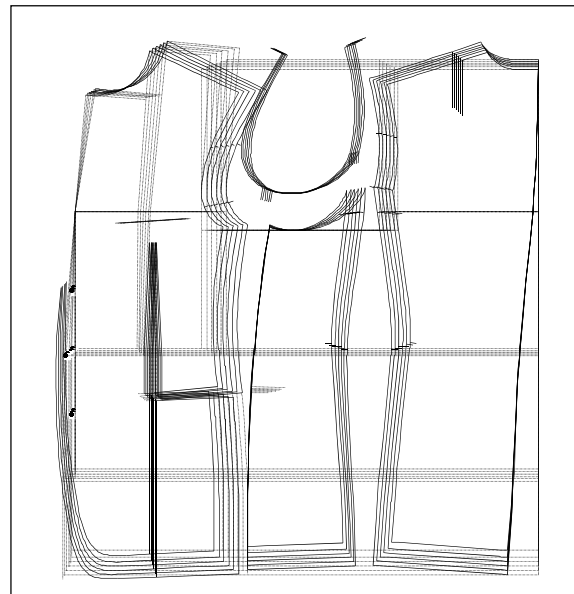
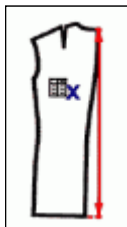
Picture 11-16

With the x value reference, measurement charts/sizes in the size list are assigned with x values of other measurement charts/sizes.

The x value reference is usually used to assign the x values of a standard measurement chart to an individual measurement chart.

When entering an individual measurement chart into the size table, the x value reference is assigned by default with the standard size on which the individual measurement chart is based. If no x value reference is entered the standard value applies to individual measurement charts. Entering, editing and deleting the x value reference ensues analogous to editing the measurement chart column.

Open a new style and call *Tailored jacket 20* from the folder *Grafis Bodices / Mens bodices* and load the standard mens sizes _HN48 to _HN58 into the size table. In the interactive environment of *Tailored jacket 20* adjust the option *Style length based on x value*. Go to the *Line relocation* drag area and open the list of break sizes. In addition to base size _HN48 activate the size _HN58 as break size and close the list. Activate the drag point for the style length and adjust it to 790mm in size _HN48 and to 830mm in size _HN58. Then, grade all sizes.



Picture 11-17

Now, the jacket is to be graded with company-specific body measurements. Set up an individual grade run from 'HAKA48' to 'HAKA58' based on the standard figure type _HN. Alter the grade run of the bust and lower hip circumferences. Enter the individual sizes 'HAKA48' to 'HAKA58' into the size table and grade. Through application of the x value reference to the standard sizes _HN, the size dependent style length of the _HN sizes is applied to the individual 'HAKA' sizes, see Picture 11-17. Now, remove the x value reference in the size table and grade again. The style length is now applied based on the settings of the base size.

11.4 The alternative reference size

This section is for advanced users. Beginners are advised to read through all application examples and then, come back at a later date for a more detailed look if required.

The alternative reference size has been developed for Grafis Version 11. It has system-wide effect and should therefore, only be applied by experienced Grafis users. The function has been developed to allow users to apply changes to x values quickly from one figure type to another figure type. The alternative reference size is particularly interesting for

- **companies**, which manufacture styles for different figure types and
- **made-to-measure** studios where styles are developed in a standard size range and then, adjusted to individual customers' wishes.

Please note the application examples on the following pages.

Assigning an alternative reference size

Open a style and make size-dependent adjustments for figure type 'N'. Switch on the alternative reference size in the Grafis Setup. An additional column, *alt. reference* appears in the size table into which standard measurement charts can be entered. The size in the *alt. reference* column acts as alternative reference size to the size in the second column.

Rules and effects of the alternative reference size

The alternative reference size takes effect if no settings have been saved for the size to be graded in the following areas

- individual x values (Chapter 11),
- individual drag areas of interactive constructions,
- individual grade points in grade rule grading and
- curve adjustments.

The alternative reference size is a 'deviation' size if for this size or its x value reference no settings are entered in the above four cases.

When calculating a value in one of the above four cases, a matching size entry is searched according to a pre-set priority. This priority is slightly different during grade rule grading as no grade rules can be saved for an individual measurement chart. The numbers in Picture 11-18 and Picture 11-19 state the priority for search of a matching size entry.

Priority for search of a matching size entry for x values, in drag areas and for curves:

	Size	X ref	Alt ref
✓ 01	N40_0 ①		
✓ 02	N42_0		
□ 03			
✓ 04	A40	N40_0 ①	
✓ 05	A42	N42_0	
□ 06			
✓ 07	B40	S40_0 ①	N40_0 ②
✓ 08	B42	S42_0	N42_0
□ 09			
✓ 10	S40_0 ①		N40_0 ②
✓ 11	S42_0		N42_0
□ 12			
✓ 13	LS40_0 ①	S40_0	N40_0 ②
✓ 14	LS42_0	S42_0	N42_0
□ 15			
✓ 16	KAREN	N40_0 ①	
✓ 17	NICOLE	N42_0	
□ 18			
✓ 19	KAREN2 ①		N40_0 ②
✓ 20	NICOLE2		N42_0

Picture 11-18

Priority for search of a matching size entry for grade rules of single grade points:

	Size	X ref	Alt ref
✓ 01	N40_0		
✓ 02	N42_0 ①		
□ 03			
✓ 04	A40	N40_0 ①	
✓ 05	A42	N42_0	
□ 06			
✓ 07	B40	S40_0 ①	N40_0 ②
✓ 08	B42	S42_0	N42_0
□ 09			
✓ 10	S40_0 ①		N40_0 ②
✓ 11	S42_0		N42_0
□ 12			
✓ 13	LS40_0 ①	S40_0	N40_0 ②
✓ 14	LS42_0	S42_0	N42_0
□ 15			
✓ 16	KAREN	N40_0 ①	
✓ 17	NICOLE	N42_0	

Picture 11-19

Summary

- The application of the alternative reference size is only useful if a style is to be manufactured in different figure types or if a prepared style is to be adjusted specifically for a particular person.
- The alternative reference size is a 'deviation' size if for the size or its x value reference no settings have been saved.
- The alternative reference size effects the x values of a construction, adjustments to interactive constructions, curve adjustments and grading with grade rules.
- As a rule, a style should be completely adjusted and checked for one figure type. Only then, should the style be adjusted for further figure types or for particular persons via the use of the alternative reference size.
- Take notes for each style detailing exactly which part/construction of the style has been globally adjusted and in which parts/constructions specific adjustments have been made for the different figure types or a particular person. Only with good documentation can the style development be recreated at a later date.
- During grade rule grading the grade of one figure type can be transferred once onto another figure type.

1st Application example

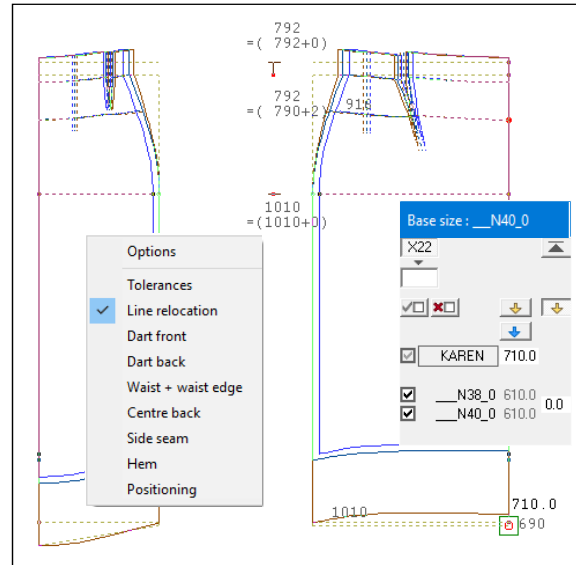
Corporate outfit with individual adjustments

For the corporate outfit of a company, a puffball skirt has been developed in sizes _N34 to _N44, tested and approved by the customer. Colleague Karen requires a special fit: the skirt is to be 10cm longer than the standard size range. Karen's body measurements have been taken and saved as an individual measurement chart. The nearest standard size is _N40.

	Size	X ref	Alt ref
<input checked="" type="checkbox"/>	01	N40_0	
<input checked="" type="checkbox"/>	02	N34_0	
<input checked="" type="checkbox"/>	03	N36_0	
<input checked="" type="checkbox"/>	04	N38_0	
<input checked="" type="checkbox"/>	05	N42_0	
<input checked="" type="checkbox"/>	06	N44_0	
<input type="checkbox"/>	07		
<input checked="" type="checkbox"/>	08	KAREN	N40_0

Picture 11-20

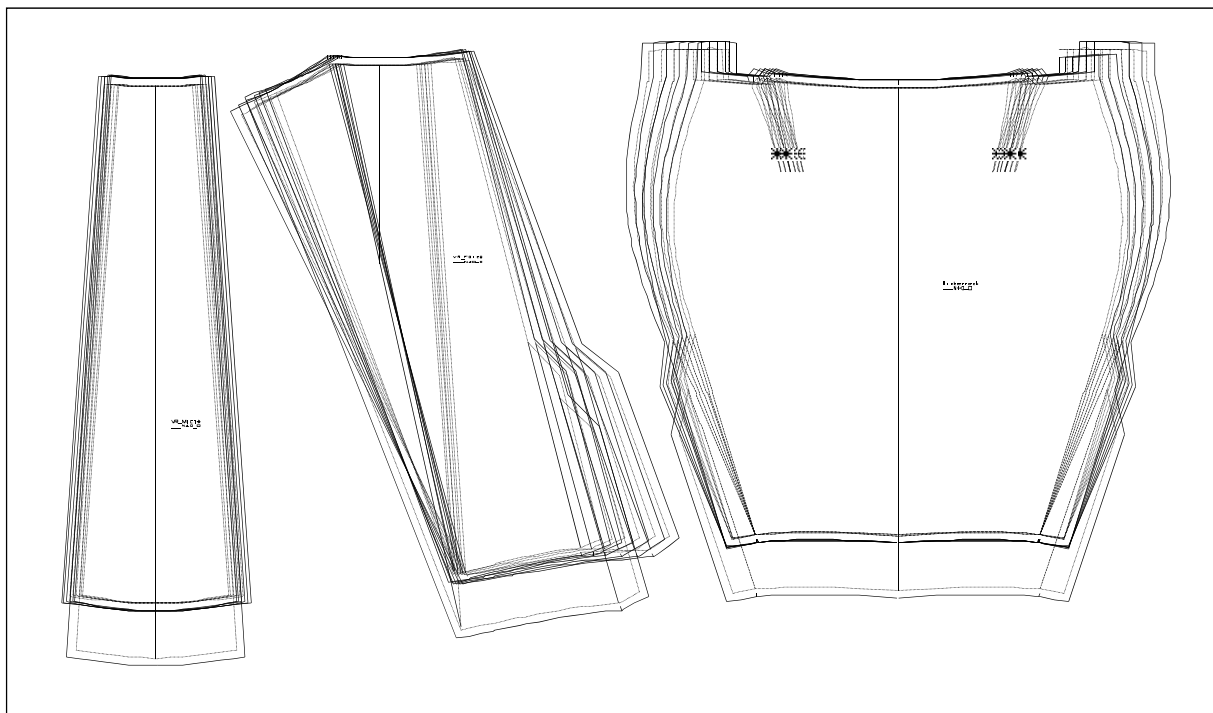
Adjust your size table according to Picture 11-20. Currently, the size KAREN is graded based on body measurements. The skirt length for this size is identical with the skirt length in size _N40. Activate the interactive skirt basic block, change to the drag area *Line relocation* and load the size KAREN as an additional break size, see Picture 11-21. Ensure that size



Picture 11-21

KAREN has been pre-assigned the values of _N40. Now, lengthen the skirt in size KAREN to the desired length and grade with a result according to Picture 11-22.

Please note that the size KAREN has otherwise been graded according to the settings for _N40 and the set body measurements



Picture 11-22

2nd Application example

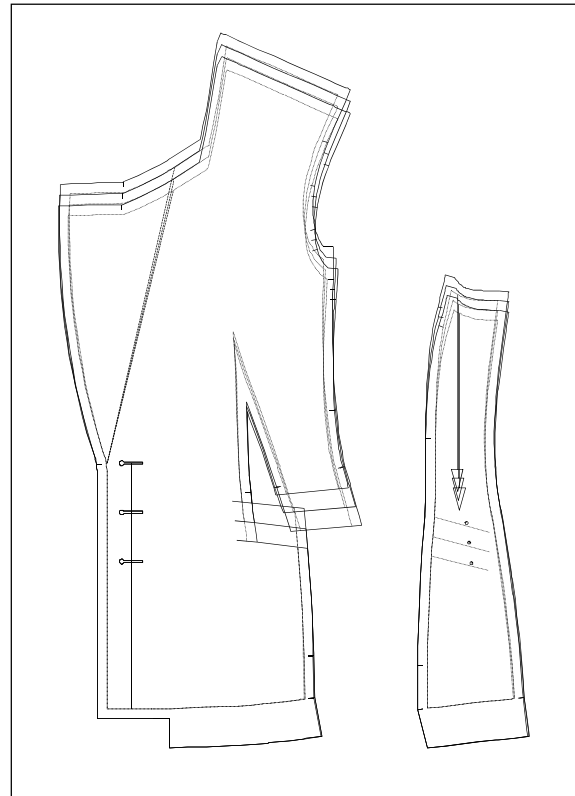
Creation of a jacket style for different figure types

A jacket has been developed from the interactive constructions *Bodice 50*, *Front part 30*, *Front edge 30* and *Back part 40*, see Picture 11-25. The jacket has already been adjusted for sizes *_N38* to *_N42*. In addition to the normal sizes, short and long sizes are to

	Size	X ref	Alt ref
<input checked="" type="checkbox"/> 01	<i>_N38_0</i>		
<input checked="" type="checkbox"/> 02	<i>_N36_0</i>		
<input checked="" type="checkbox"/> 03	<i>_N40_0</i>		
<input type="checkbox"/> 04			
<input checked="" type="checkbox"/> 05	<i>_S38_0</i>		<i>_N38_0</i>
<input checked="" type="checkbox"/> 06	<i>_S36_0</i>		<i>_N36_0</i>
<input checked="" type="checkbox"/> 07	<i>_S40_0</i>		<i>_N40_0</i>
<input type="checkbox"/> 08			
<input checked="" type="checkbox"/> 09	<i>_L38_0</i>		<i>_N38_0</i>
<input checked="" type="checkbox"/> 10	<i>_L36_0</i>		<i>_N36_0</i>
<input checked="" type="checkbox"/> 11	<i>_L40_0</i>		<i>_N40_0</i>
<input type="checkbox"/> 12			

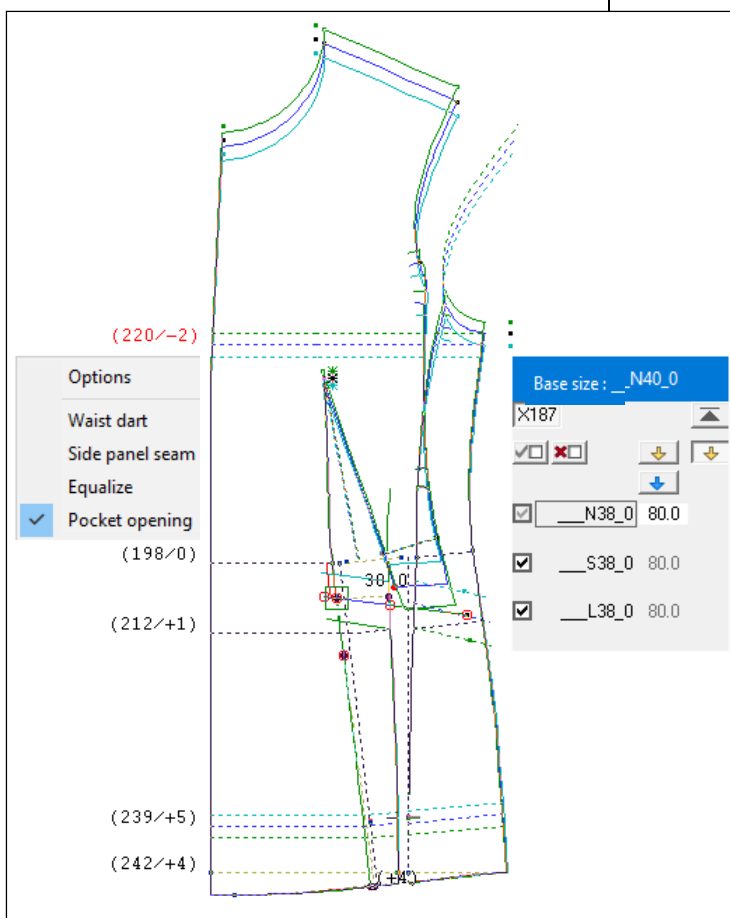
Picture 11-23

be produced. The basic adjustments such as seam allowances must be the same in all figure types. Only the position of the pocket is to be adjusted.



Picture 11-25

Prepare your size table according to Picture 11-23 and grade. Activate the *Front part 30* tool and change to the drag area *Pocket opening*. Insert two break sizes in this drag area: *_S38* for the short sizes and *_L38* for the long sizes. Adjust the pocket opening in sizes *_S38* and *_L38* according to your ideas, see Picture 11-24. Then, grade sizes *_N38*, *_S38* and *_L38* with a result similar to Picture 11-25.

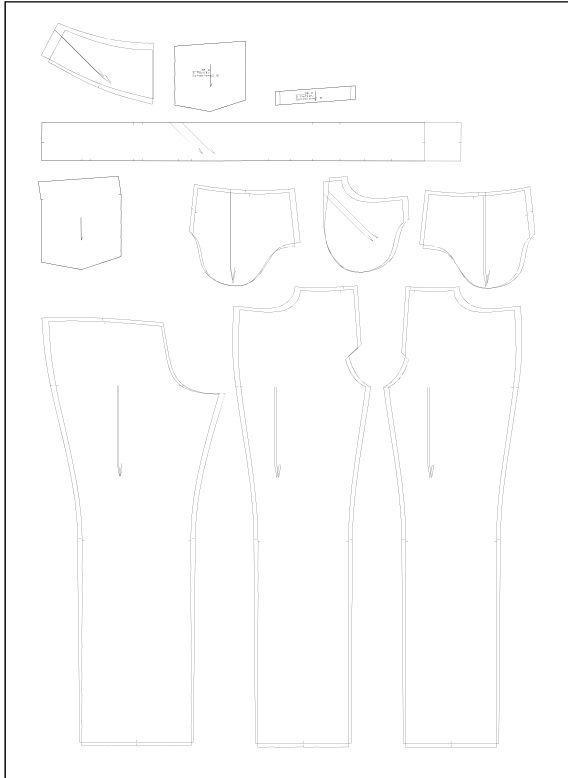


Picture 11-24

3rd Application example

Creation of an imported trouser pattern in short sizes

A trouser pattern has been imported in sizes _36 to _44. The imported pattern looks similar to Picture 11-26 in sizes 38 and 42.



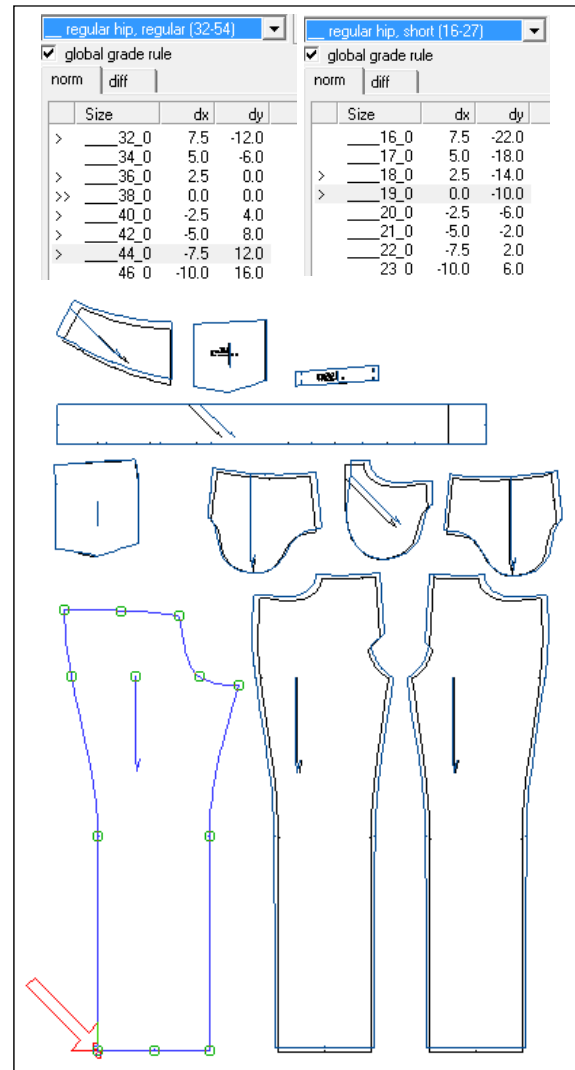
Picture 11-26

The trousers are now to be manufactured in short sizes also. The pattern must not be altered in the hip area. Only the grade rules at the hem are to be adjusted for the short sizes.

	Size	X ref	Alt ref
<input checked="" type="checkbox"/>	01	38_0	
<input checked="" type="checkbox"/>	02	36_0	
<input checked="" type="checkbox"/>	03	40_0	
<input checked="" type="checkbox"/>	04	42_0	
<input checked="" type="checkbox"/>	05	44_0	
<input type="checkbox"/>	06		
<input checked="" type="checkbox"/>	07	18_0	36_0
<input checked="" type="checkbox"/>	08	19_0	38_0
<input checked="" type="checkbox"/>	09	20_0	40_0
<input checked="" type="checkbox"/>	10	21_0	42_0
<input checked="" type="checkbox"/>	11	22_0	44_0

Picture 11-27

Set up the size table according to Picture 11-27. Activate the grade rule pattern of the trouser back and adjust the three grade points at the hem for the short size figure type manually by entering values according to Picture 11-28



Picture 11-28

The hem is now 10cm shorter in the short sizes, see Picture 11-29.



Picture 11-29

The alternative reference sizes _36 to _44 must be referenced permanently to ensure the required grading.

4th Application example

Transfer of an imported grade to another figure type

A trouser pattern has been imported in sizes _36 to _44. The imported pattern looks similar to Picture 11-26 in sizes 38 and 42. The grade is to be applied to sizes _N36 to _N44, _S36 to _S44 and _L36 to _L44 to be adjusted for other figure types at a later date.

	Size	X ref	Alt ref
<input checked="" type="checkbox"/>	01	___38_0	
<input checked="" type="checkbox"/>	02	___36_0	
<input checked="" type="checkbox"/>	03	___40_0	
<input checked="" type="checkbox"/>	04	___42_0	
<input checked="" type="checkbox"/>	05	___44_0	
<input type="checkbox"/>	06		
<input checked="" type="checkbox"/>	07	___N36_0	___36_0
<input checked="" type="checkbox"/>	08	___N38_0	___38_0
<input checked="" type="checkbox"/>	09	___N40_0	___40_0
<input checked="" type="checkbox"/>	10	___N42_0	___42_0
<input checked="" type="checkbox"/>	11	___N44_0	___44_0
<input type="checkbox"/>	12		
<input checked="" type="checkbox"/>	13	___S36_0	___36_0
<input checked="" type="checkbox"/>	14	___S38_0	___38_0
<input checked="" type="checkbox"/>	15	___S40_0	___40_0
<input checked="" type="checkbox"/>	16	___S42_0	___42_0
<input checked="" type="checkbox"/>	17	___S44_0	___44_0
<input type="checkbox"/>	18		
<input checked="" type="checkbox"/>	19	___L36_0	___36_0
<input checked="" type="checkbox"/>	20	___L38_0	___38_0
<input checked="" type="checkbox"/>	21	___L40_0	___40_0
<input checked="" type="checkbox"/>	22	___L42_0	___42_0
<input checked="" type="checkbox"/>	23	___L44_0	___44_0
<input type="checkbox"/>	24		

Picture 11-30

Set up your size table according to Picture 11-30 and grade all sizes. Activate all parts of the imported pattern one after the other and select


- Rule pattern → Extract Grade Rule Pattern
- extract

N Women regular (28-7)			
<input checked="" type="checkbox"/> global grade rule			
norm	diff		
Size	dx	dy	
___N28_0	12.5	-20.0	
___N30_0	10.0	-16.0	
___N32_0	7.5	-12.0	
> ___N34_0	5.0	-8.0	
> ___N36_0	2.5	-4.0	
> ___N38_0	0.0	0.0	
> ___N40_0	-2.5	4.0	
> ___N42_0	-5.0	8.0	
> ___N44_0	-7.5	12.0	
___N46_0	-10.0	16.0	
___N48_0	-12.5	20.0	
___N50_0	-15.0	24.0	

S Women short, regular			
<input checked="" type="checkbox"/> global grade rule			
norm	diff		
Size	dx	dy	
___N28_0	12.5	-20.0	
___N30_0	10.0	-16.0	
___N32_0	7.5	-12.0	
> ___N34_0	5.0	-8.0	
> ___N36_0	2.5	-4.0	
> ___N38_0	0.0	0.0	
> ___N40_0	-2.5	4.0	
> ___N42_0	-5.0	8.0	
> ___N44_0	-7.5	12.0	
___N46_0	-10.0	16.0	
___N48_0	-12.5	20.0	
___N50_0	-15.0	24.0	

L Women long, regular			
<input checked="" type="checkbox"/> global grade rule			
norm	diff		
Size	dx	dy	
___N28_0	12.5	-20.0	
___N30_0	10.0	-16.0	
___N32_0	7.5	-12.0	
> ___N34_0	5.0	-8.0	
> ___N36_0	2.5	-4.0	
> ___N38_0	0.0	0.0	
> ___N40_0	-2.5	4.0	
> ___N42_0	-5.0	8.0	
> ___N44_0	-7.5	12.0	
___N46_0	-10.0	16.0	
___N48_0	-12.5	20.0	
___N50_0	-15.0	24.0	

Picture 11-31

- quit grade rule pattern with 
- save changes in record?: Yes
- activate next part

In this way, the grade rules of the sizes of figure type _36 to _44 are transferred to the figure types _N, _S and _L. New break sizes have been inserted in all grade rule tables for the sizes activated in the size table, see Picture 11-31.

You can now remove the alternative reference size and adjust the grade rule patterns in the figure types _N, _S and _L separately. In the figure types _N, _S and _L the alternative reference size is no longer effective as the grade rule tables of all points now have values in all parts for these figure types.

Alter the size table according to Picture 11-32 and grade.

	Size	X ref	Alt ref
<input checked="" type="checkbox"/>	01	___N40_0	
<input checked="" type="checkbox"/>	02	___N42_0	
<input checked="" type="checkbox"/>	03	___N44_0	
<input checked="" type="checkbox"/>	04	___N36_0	
<input checked="" type="checkbox"/>	05	___N38_0	
<input type="checkbox"/>	06		
<input checked="" type="checkbox"/>	07	___S36_0	
<input checked="" type="checkbox"/>	08	___S38_0	
<input checked="" type="checkbox"/>	09	___S40_0	
<input checked="" type="checkbox"/>	10	___S42_0	
<input checked="" type="checkbox"/>	11	___S44_0	
<input type="checkbox"/>	12		
<input checked="" type="checkbox"/>	13	___L36_0	
<input checked="" type="checkbox"/>	14	___L38_0	
<input checked="" type="checkbox"/>	15	___L40_0	
<input checked="" type="checkbox"/>	16	___L42_0	
<input checked="" type="checkbox"/>	17	___L44_0	

Picture 11-32

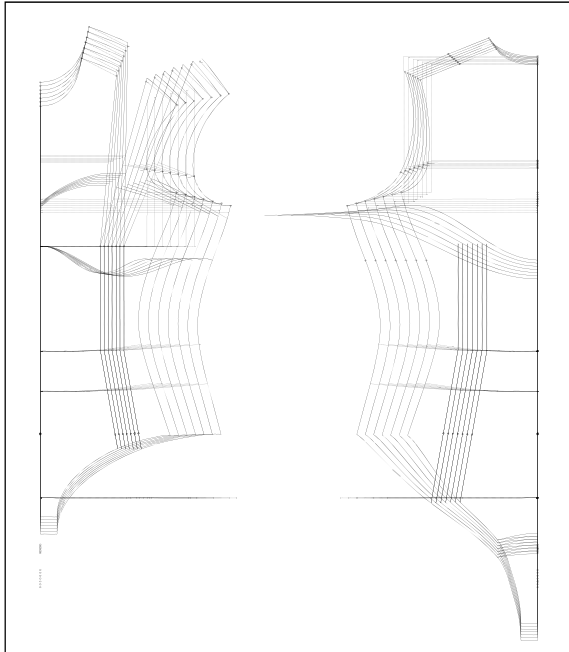
In case some parts are identical in the figure types _N, _S and _L, you can continue to work with the alternative reference size in the style. These parts are graded in the _N sizes only and then, start *Extract*

Grade Rule Pattern. Thus, in these parts only grade rules for the _N sizes are saved. The alternative reference size for the _S and _L sizes must point permanently to the _N sizes. The grading of parts with grade rules in _N, _S and _L ensues according to the set grade rules, independent of an alternative reference.

5th Application example

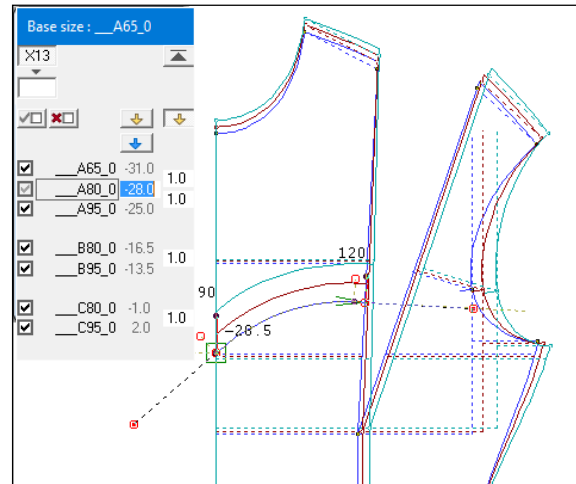
Creation of a swimsuit in different cup sizes

A swimsuit has been developed from the basic block *Bodice 80*, see Picture 11-33.



Picture 11-33

The swimsuit has already been adjusted for cup size A and the underbust sizes A65 to A95. In addition to the A cup sizes, the swimsuit is to be adjusted for B and C cup sizes.

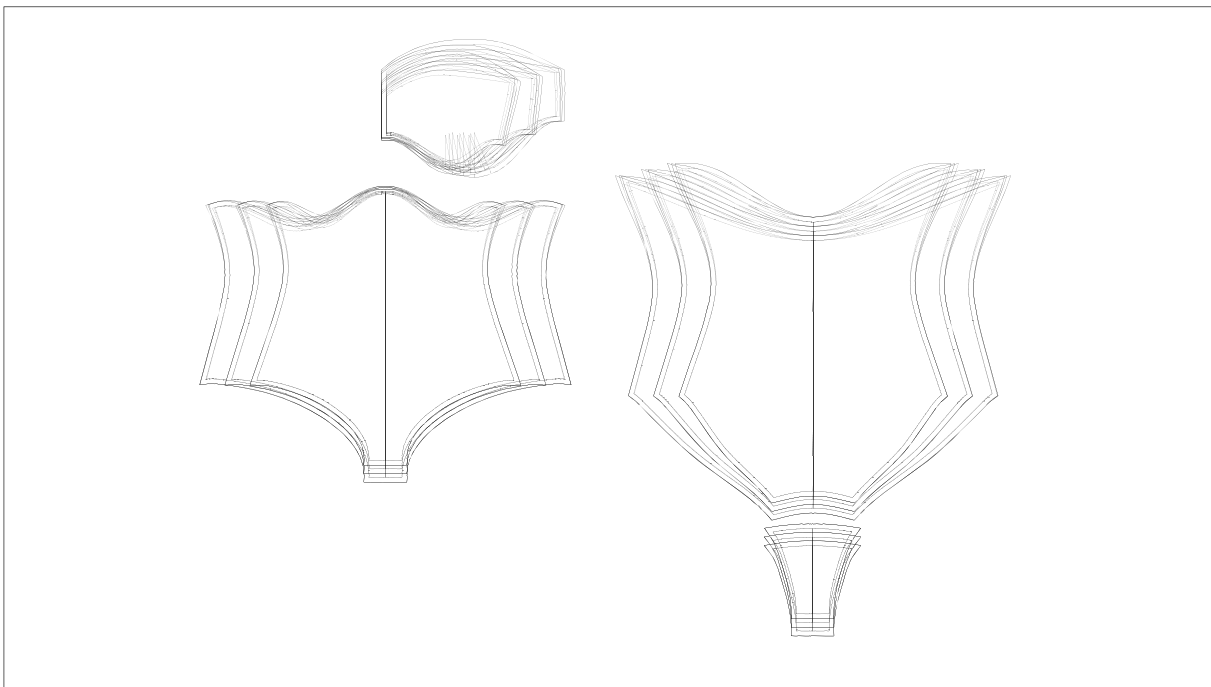


Picture 11-34

Create your size table according to Picture 11-35 and grade. Activate the curve for the cup shaping, load additional break sizes for the B and C cup sizes and interactively adjust the cup shape, Picture 11-34. Then, grade all A, B and C cup sizes with a result similar to. Picture 11-36.

	Size	X ref	Alt ref
01	A80_0		
02	A65_0		
03	A70_0		
04	A75_0		
05	A85_0		
06	A90_0		
07	A95_0		
08			
09	B65_0		A65_0
10	B70_0		A70_0
11	B75_0		A75_0
12	B80_0		A80_0
13	B85_0		A85_0
14	B90_0		A90_0
15	B95_0		A95_0
16			
17	C65_0		A65_0
18	C70_0		A70_0
19	C75_0		A75_0
20	C80_0		A80_0
21	C85_0		A85_0
22	C90_0		A90_0
23	C95_0		A95_0
24			

Picture 11-35



Picture 11-36

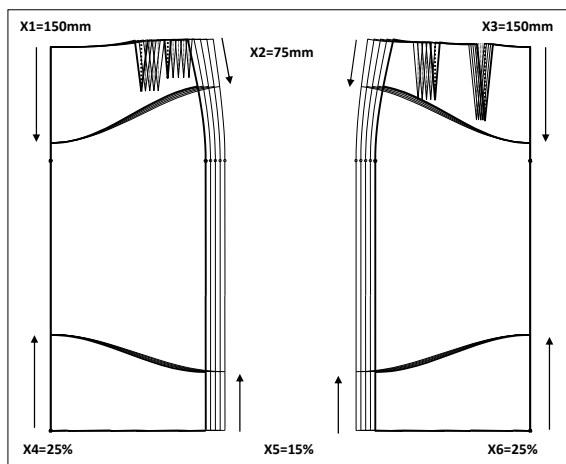
Exercises on X values

1st Exercise

Call the basic block *Skirt 20*, design a yoke and a separate panel in the lower part of the skirt which can be modified via x values with *new curves*.

X value assignment:

- x1 Yoke centre front [mm]
_xxxxx_x = 150.000
- x2 Yoke side seam [mm]
_xxxxx_x = 75.000
- x3 Yoke centre back [mm]
_xxxxx_x = 150.000
- x4 Lower skirt part centre front [%]
_xxxxx_x = 25.000
- x5 Lower skirt part side seam [%]
_xxxxx_x = 15.000
- x6 Lower skirt part centre back [%]
_xxxxx_x = 25.000

2nd Exercise

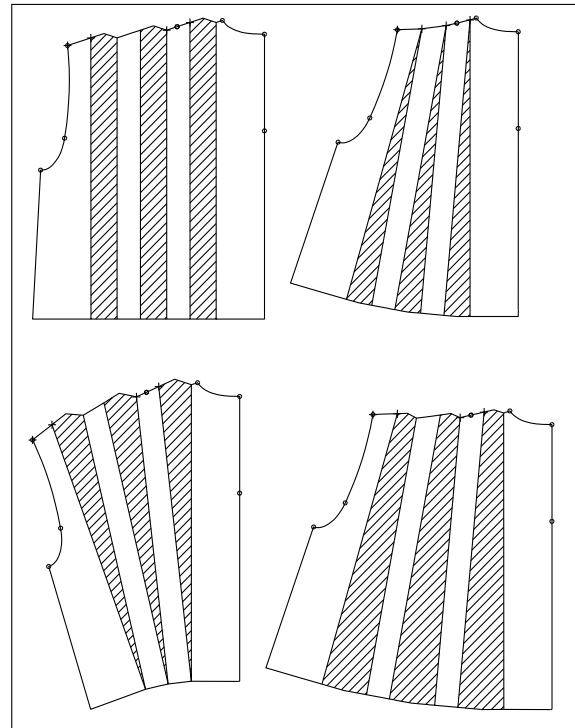
Create a shirt blouse with three variable pleats in the back from *Bodice 10*. Adjust the following options:

- centre back fold
- straight side seams

Close the shoulder dart and the waist dart. Then, delete all auxiliary lines and shorten the piece to the waist. Link the shoulder. Construct a point on the shoulder at a distance of $x_1=10\text{mm}$ from the neck. The first spread line is to begin at this point. Starting at this new point construct a point sequence of 4 equally distributed points along the shoulder. Construct three spread lines to the hem. Spread the three pleats, controlling the pleat content at the shoulder via $x_2=40\text{mm}$ and the pleat content at the hem via $x_3=40\text{mm}$. Close the pleats at the shoulder with a single dart hood and link the hem. Link the shoulder and dart hood lines with *link single*.

X value assignment:

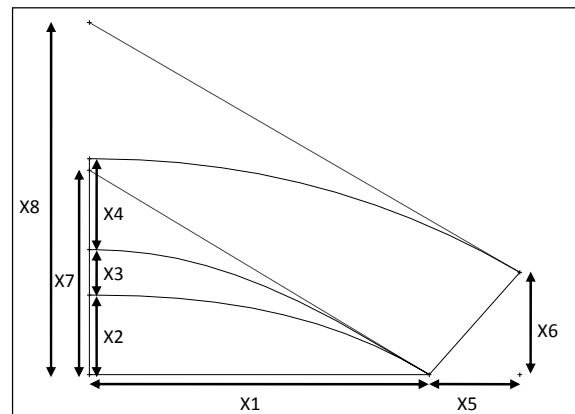
- x1 first pleat from neck [mm]
_xxxxx_x = 10.000
- x2 pleat content shoulder [mm]
_xxxxx_x = 40.000
- x3 pleat content hem [mm]
_xxxxx_x = 40.000



Alter the pleat content as displayed by altering the values for x_2 and x_3 . After *test run* the construction is changed accordingly.

3rd Exercise

Construct a simple collar with distances variable via x values where indicated.

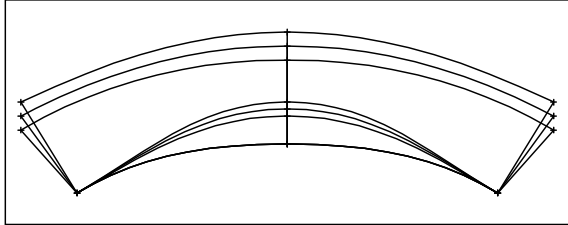


The pre-assignment for the x values is to be as follows:

- X1=150.0 X2=35.0 X3=20.0 X4=40.0
- X5=40.0 X6=45.0 X7=80.0 X8=155.0

With this pre-assignment the displayed collar is created.

Mirror the collar and delete superfluous points and lines. Alter the x values x3 and x4 to 5mm increments per size and x6 to 10mm increments per size. Grade the collar in the sizes N38, N40 and N42. With the x value x1 the length of the neck seam can be adjusted. All other x values mainly alter the shape of the collar.



4th Exercise

Construct a shirt collar with indicated measurements variable via x values.

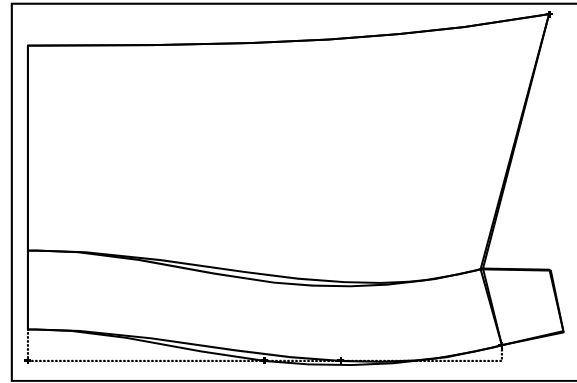
The pre-assignment for x values is to be as follows:

X1=10.0	X2=5.0	X3=10.0	X4=25.0
X5=65.0	X6=20.0	X7=20.0	X8=15.0
X9=10.0	X10=10.0	X11=66.0	X12=150.0

Assign all x values as the standard value indicated.

Activate the sizes N38 and N40 in the size table. Alter the x value x11 so that it is 66. for size N38 and 50. for size N40. Grade the shirt collar construction.

Alter x11 so that it is 66. for all sizes.



Alter X4 and X10:

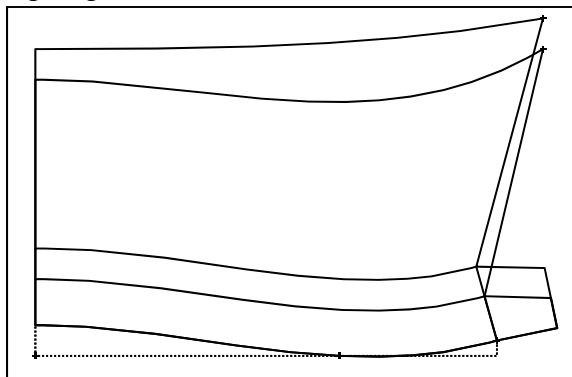
X4: ___ N38_0=25.

___ N40_0=15.

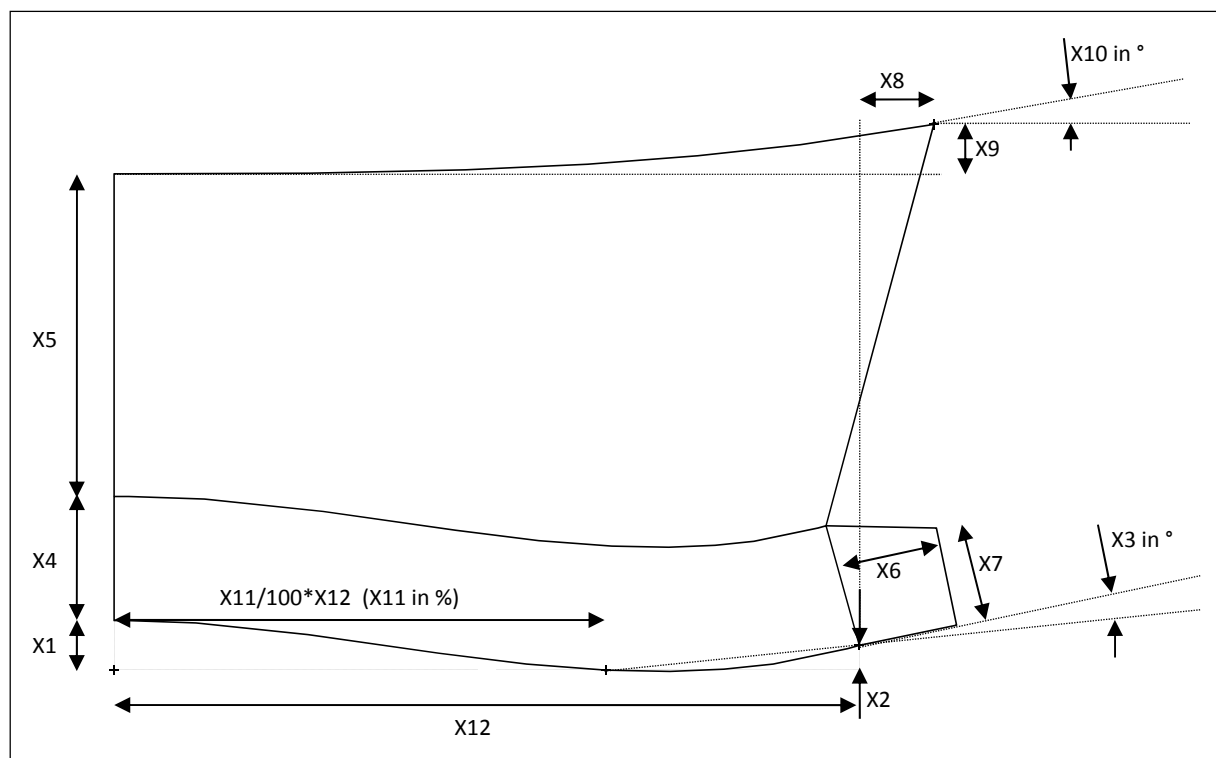
X10: ___ N38_0=10.

___ N40_0=20.

Again, grade the sizes N38 and N40.



The collar has not been aligned with the length of the neckline. For a simple alignment, z values are required, see Chapter 12.



5th Exercise

Create fashionable trousers with a zip in the left side seam from *Trouser 10*.

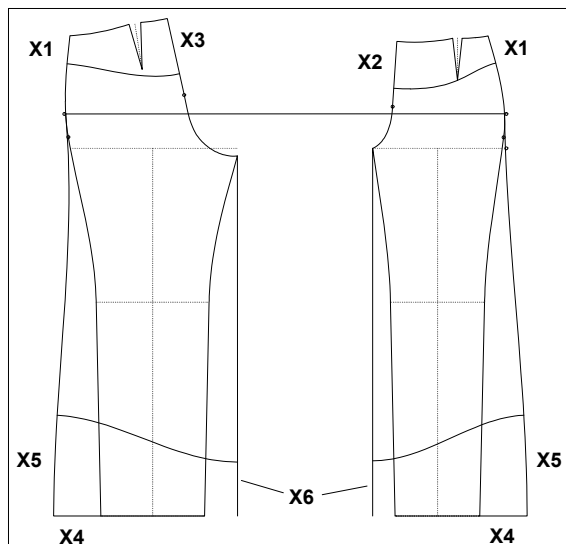
Create and label the following parts in the part list:

- 001 basic trouser shape
- 002 developm. trouser
- 003 PP yoke ft
- 004 PP yoke bk left
- 005 PP ft left
- 006 PP bk left
- 007 PP yoke bk right
- 008 PP ft right
- 009 PP bk right

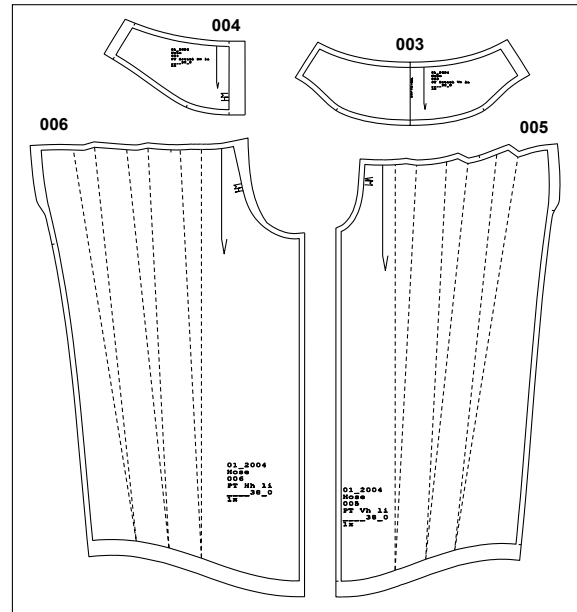
Call the basic block *Trouser 10* into part 001, set the hem turn-up to 0. and close the second dart in the trouser back. Insert part 001 into part 002.

Create the style development in part 002, applying the following x values:

- x1 yoke ft ss from waist [mm]
_xxxxx_x = 60.
- x2 yoke ft CF from waist [mm]
_xxxxx_x = 100.
- x3 yoke bk CB from waist [mm]
_xxxxx_x = 120.
- x4 flare ss [mm]
_xxxxx_x = 100.
- x5 cut height ss from hip line [%]
_xxxxx_x = 75.
- x6 cut height inside leg [%]
_xxxxx_x = 85.

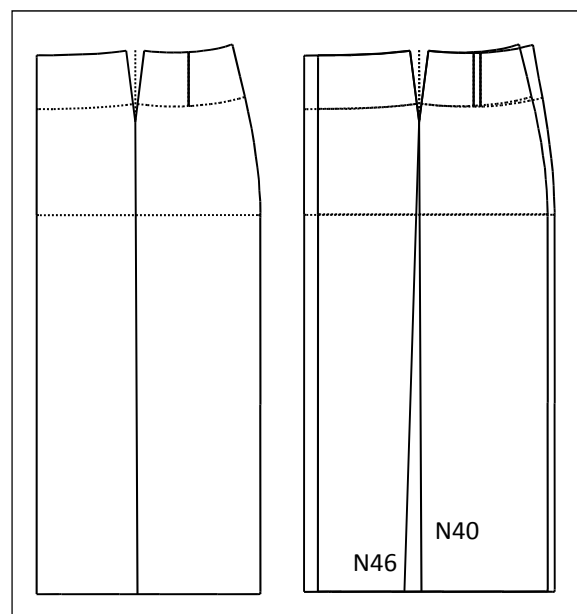


Derive the production patterns (PP) 003 to 009 from part 002 and develop them to production standard. The pleat content in parts 005, 006, 008 and 009 is to be controlled via an x value of the part. Parts 003 to 006 are displayed.

6th Exercise

Call the *Skirt 20*, interactively adjust straight side seams, close the second dart in the skirt front and move the first dart to 50%. Generate an x value for the position of a panel seam in the hem, measured from the centre front and construct the panel seam starting at the end point of the dart. To achieve an optically more flattering run of the panel seam in larger sizes, the position of the panel seam at the hem is altered size-dependently:

- x1 position panel seam hem from CF in %
_xxxxx_x = 45.000
_N38_0 = 45.000
_N40_0 = 45.000
_N44_0 = 40.000
_N46_0 = 40.000



Chapter 12 The construction parameter G and Z values

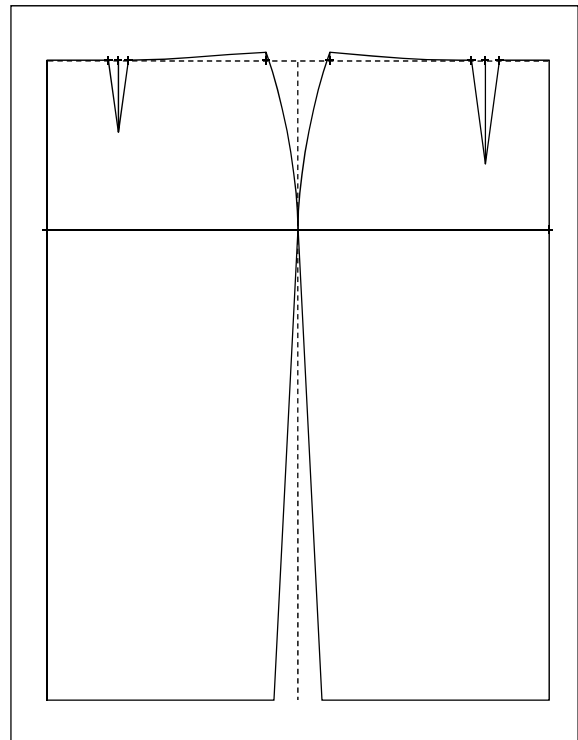
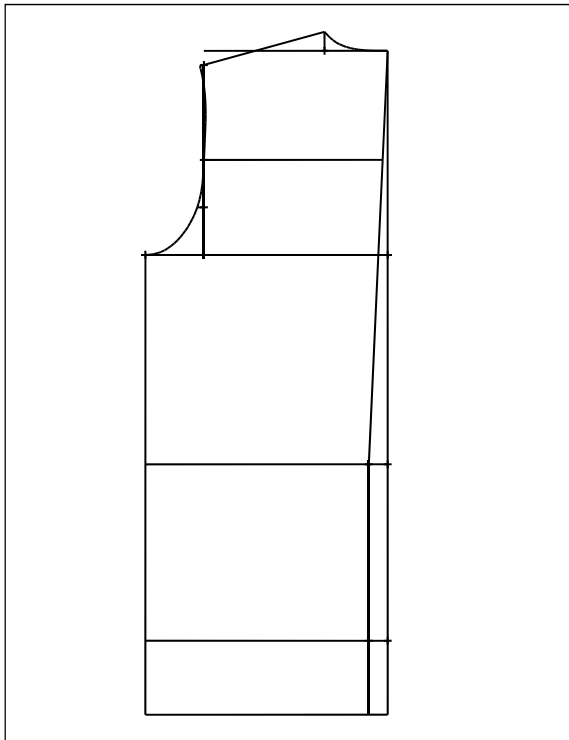
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The g and z values complete the palette of construction parameters so that basic blocks can be drafted from scratch. The g values deliver the relationship to the measurement chart of the measurement system.

The z values allow for calculation of construction parameters with numerical values or values measured in the construction.



12.1 The G values

	standard	Individual	Difference
	N42_0	Kerstin	
01 I Kö - Height	1690		
02 u Br - Bust	960	940	-20
03 u Ta - Waist	800	760	-40
04 u Ut - High Hip 8 cm below Waist	960		
05 u Ge - Hip	1050	1060	10
06 I Ac - Scye Depth	206		
07 I Ta - Nape to Waist Centre Back	410		
08 I Ge - Waist to Hip	200		
09 I Br - Bust Depth	295		
10 I Vo - Neck to Waist over Bust	452		

Picture 12-1

G values are the size values of the current measurement system which are logged in the well-known measurement charts. g1 defines the first value of the current measurement chart, g2 the second value and so on. In the measurement system *Optimass (Basis_A)* for example g2 is the bust and g1 the height, see Picture 12-1. The measurement charts can be edited, viewed and/or printed via *Extras* → *Measurement Charts*.

Always consider the selected measurement system when working with g values!

G values are applied in the same way as x values. In conjunction with the z values - which will follow - they allow for drafting basic blocks on screen.

Exercises

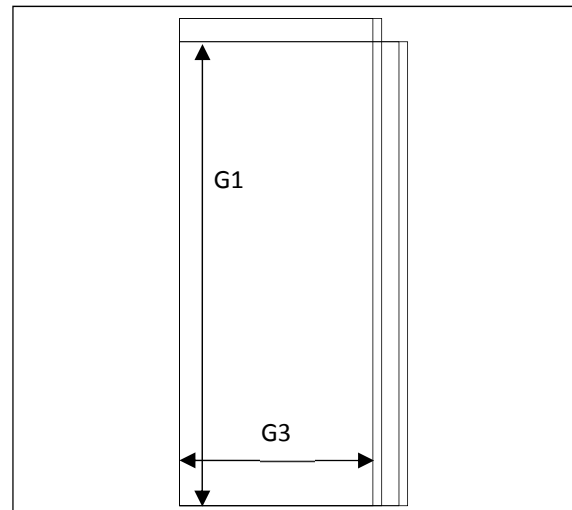
1st exercise

Construct a rectangle with the waist as the width and the body height as the height. Grade in sizes N38, NS38, N42 and NS42, see Picture 12-2.

For this construction, use the interactive tool *Rectangle 10*. The lower left corner is set to the zero point (x=0 and y=0).

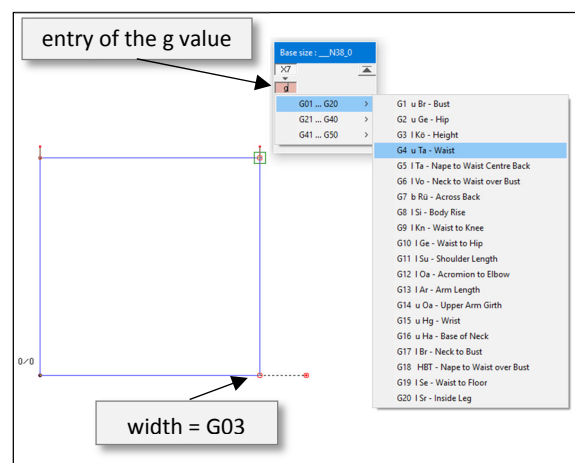
From Version 12 onwards, x, g and z values can be applied to selected drag points of the interactive constructions and tools!

Activate the interactive tool *Rectangle 10* and select the drag point for the width, see Picture 12-2. Then, enter 'g' into the value window and select G03 for the waist girth.



Picture 12-2

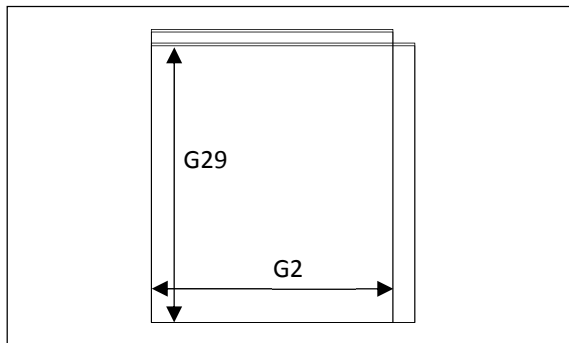
Next, select the drag point top right for the height and assign G03 for body height to this drag point in the same way.



Picture 12-3

2nd Exercise

Construct a rectangle with the bust as width and waist to floor as height. Grade the sizes N38, NB38, N42 and NB42, see Picture 12-4.



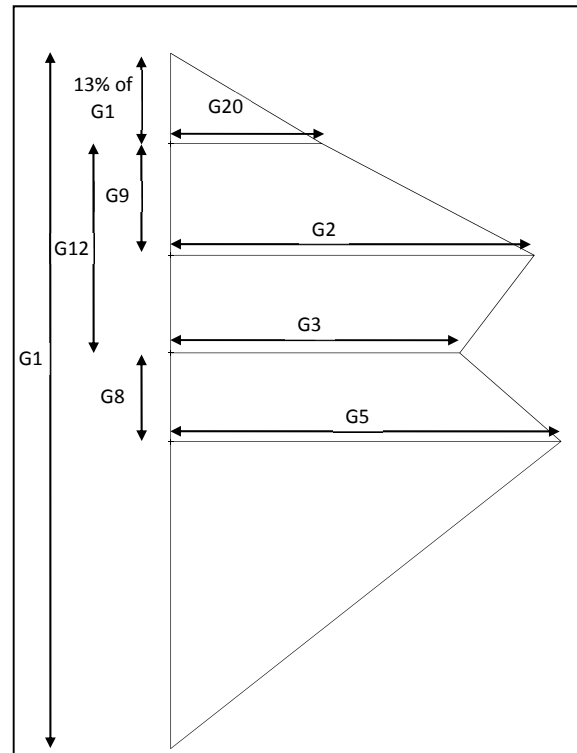
Picture 12-4

In the *Optimass (Basis_A)* measurement system, connect the two drag points for width and height of *Rectangle 10* with width =G02 and height=G29. The lower left corner is to be placed with *point from* $x=y=0$. The lower left corner is to be placed with *point from* $x=y=0$.

3rd Exercise

Construct the figure displayed in Picture 12-5 or a similar shape in the measurement system *Optimass (Basis_A)*. The circumference measurements are not halved or quartered. The calculation of g values is possible with the application of z values, see next section.

In the *points and lines* menu construct a vertical line with the interactive Tool *Line 10* with a length=G1, starting at the zero point. Then, carry out the length division.



Picture 12-5

The first point is to be constructed at a *relative length=13*. from the top. For all further points use the function *point at a distance to a base point on a line* with the distances G9, G12 and G8 respectively. Construction of the horizontal lines ensues with *Line 10*, with the lengths G20, G2, G3 and G5. Close the shape with *line from point to point*. Grade the figure.

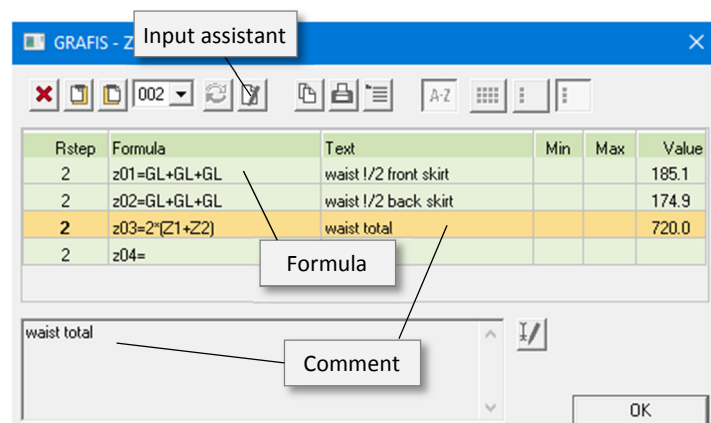
12.2 The Z values**What are z values?**

Z values are calculated construction parameters. For the calculation of z values

- all defined construction parameters (x, xg and g values),
- previously defined z values,
- measurements from the construction, so-called process data (e.g. GL, AB, TL),
- numerical and mathematical functions can be used.

From Version 12 onward, a case differentiation can be entered for z values with up to three conditions. Use the input assistant.

Defined z values are applied in the same way as x values.



Picture 12-6

Entering and altering z values

Entering and altering z values is started with the function key <F11> or via *Extras* → *Z Values*. With few exceptions this is possible in all menus after *test run* or a record function.

Pressing the <F11> key opens the z value entry window (Picture 12-6). The z value with its calculation formula is entered into the *formula* column and a corresponding comment is entered into

the *text* column. Longer comments can be entered into the large edit window below the z values.

The calculated result for the style size appears in the *value* column. Having selected the z value, an existing z value can be re-assigned. After correction of the selected z value, the construction record runs to the saved record step and re-determines the z value. Switching to long format also displays the values for the other sizes in the grade table. The display can be switched from *normal display* to *difference to 1st size* or *relative difference*. The order of sizes can be arranged according to the order in the grade table or according to standard sizes (Picture 12-7).

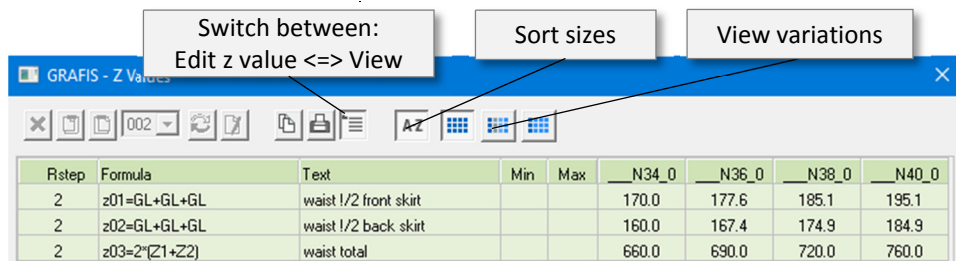
In addition, the z value list can be printed or copied to the clipboard. The z value list displays the record step during which the z value was entered. A z value can only be deleted if it is no longer required for a correct record run. When resetting the Grafis record the z values which are part of the record step are also reset.

Use z values also for displaying warnings!

For example, if a distance may never be smaller than 100mm, generate a z value $z.=Ab$, enter the value 100 in the *Min* field and measure the distance after having pressed <ENTER>. In case the value is actually smaller, a warning appears 'Warning: value fallen below minimum $z.=Ab$ '. Ensure a suitable comment for the z value!

Syntax (spelling) of the z value entry

- Each instruction is to begin with $z1=$ or $z20=$. It is recommended to enter the z values in the given ascending order.
- Small and capital letters have the same significance. Spaces are ignored.
- The calculation of expressions in brackets is possible.



Picture 12-7

- Angles are to be entered in degrees (e.g.: $\sin(45)$ for the sine of 45 degrees).
- Mathematical expressions with correct syntax are accepted only.
- Defined x and g values, mathematical functions and process data can be used to calculate z values (see examples). Processing previously defined z values is also possible.

The calculation of z values is recorded. Resetting the record resets the z values also!

Permitted operators

+	for addition
-	for subtraction
*	for multiplication
/	for division
#	for exponent

Permitted operands

g6	g values g6=sixth value of the current measurement chart
x3	x values x3=third value of the x value table (<i>active part</i>) of the current part
xg5	x values of all parts (see Chapter 11) xg5=fifth value of the x value table of all parts of the style
z4	z value z4
number	numbers, e.g. 12; -12.0; 23.6, with the point as decimal point
pi	the constant pi (=3.1415927)

Functions permitted as operands


cos	for cosine
sin	for sine
tan	for tangent
atn	for arc-tangent
sqr	for square root
btr	for absolute value

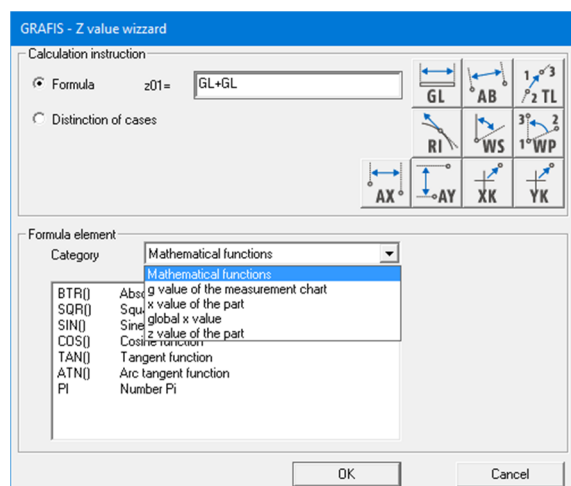
Process data permitted as operands

gL	full length of a clicked line	
Ab	distance between two points	
TL	partial length of a line	
Ri	direction of a line in the 'click point'	
WS	angle at intersection point of two lines	
WP	angle out of three points	
Ax	horizontal distance	
Ay	vertical distance	
xK	x co-ordinate value of a point	
yK	y co-ordinate value of a point	

For the process data gL, Ri and WS existing lines of the construction are to be clicked. Other process data determined with the point construction sub-menu.

Input assistant

The input assistant facilitates the entry of calculation instructions for the z value. To open the input assistant, click on the button  in the upper menu (Picture 12-7).



Picture 12-8

The process data can be selected via the buttons. In the *Formula element* area, all other permitted operands such as mathematical functions, g values of the measurement chart, x values of the part, global x values or z values of the part can be selected. The selection is automatically transferred to the z value formula (Picture 12-8).

Examples for correct z values

$z1 = 12.3 - 124.3 + 100 - 33 - .123$
 $z2 = 123.4 - \pi + gL + \sin(Ri - Ri)$
 $z3 = (gL + gL) * 1.05 + g1 / 100$
 $z4 = z1 + x12 - g2 / 3.5 + Ab$
 $z5 = \sqrt{(xK - xK)^2 + (yK - yK)^2}$
 theorem of Pythagoras
 $z6 = \text{atn}(z1 / z3)$

Exercise on entering z values

Call the *Bodice 10* and define two x values. Enter the following z values. Scroll in the list of z values and check the calculated values on the right side of the list, see also Picture 12-7. The values apply to the base size.

<F11> or *Extras* → *Z Values...*

$z1 = 1 + 2 + 3 + 4 + 5$ <ENTER>

$z2 = 100 - 20$

$z3 = 5 * 5$

$z4 = 100 / 4$

$z5 = \pi$ the number Pi

$z6 = G1$ body height in system *Optimass*

$z7 = G1 / 2$ half of the bust

$z8 = G16 / 2$ half of the neck

$z9 = G4 / (2 * \pi)$ radius of a circle with circumference = waist

$z10 = GL + GL + GL$ <ENTER>

Now, you are requested three times to click a line. In *Bodice 10*, you can click on the three armhole lines of front and back one after the other. In this case z10 equals the full length of the armhole curves.

$z11 = (Ab + Ab) / 2$ <ENTER>

Measure the distance between the final points of the side seams of front and back by clicking the points of the side seam at the armhole and at the hem of the front and back respectively. z11 is the average value of this distance.

$z12 = x2 + 100$

$z13 = z2 / 2$

$z14 = (Ab + Ab + Ab + Ab) * 2$

Measure four distances between 2 points, respectively, e.g. the waist in front and back without darts.

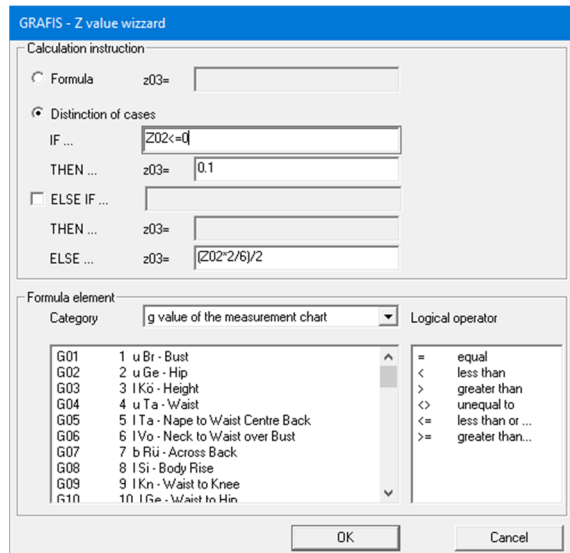
$z15 = z3 + z4$

$z16 = \sqrt{16}$

Define your own z values and combine different functions, process data and construction parameters.

Case differentiation (if – elseif – else)

Case differentiations are used if constructions are to behave differently under different conditions. Case differentiations are entered in the input assistant. For entry of the *Conditions*, the possible comparison operators are offered for selection. (Picture 12-9).



Picture 12-9

An example for multiple branching is displayed in the following exercise. The z value z02 has been assigned the difference between hip girth and waist girth. Z value z03 now calculates the waist deficit at the side seam. If z02 is greater than 0, i.e. the hip girth is greater than the waist girth, $z03 = (z02 * 2/6)/2$. Otherwise, $z03 = 0.1$.

Exercise

For the skirt construction from the 1st Exercise, the waist deficit is to behave differently if the hip girth with ease is smaller than the waist girth with ease. First, the z value z02 is assigned the difference between hip girth with ease and waist girth with ease. To enter z03, use the input assistant and activate the case differentiation.

The waist deficit in the skirt back z03 is to behave as follows:

if $z02 > 0$: $z03 = (z02 * 2/6)/2$
 else: $z03 = 0.1$

The waist deficit in the skirt front z04 is to behave as follows:

if $z02 > 0$: $z04 = (z02 * 1/6)/2$
 else: $z04 = 0.1$

The side seam deficit z05 is to behave as follows:

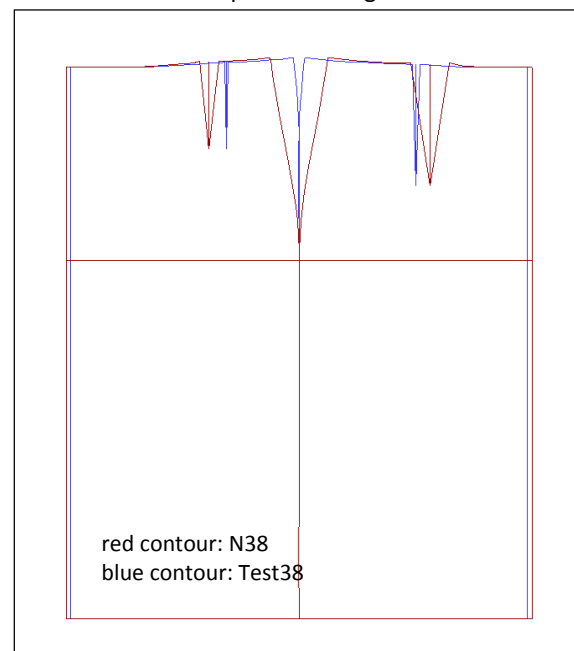
if $z02 > 0$: $z05 = (z02 * 3/6)/2$
 else: $z05 = 0.1$

To check the construction, generate an individual measurement chart Test38. Alter the hip girth to 950mm and the waist girth to 900mm.

	standard	Individual	Difference
	N38_0	Test38	
01 IKö - Height	1680		
02 uBr - Bust	880		
03 uTa - Waist	720	900	180
04 uUt - High Hip 8 cm below Waist	880		
05 uGe - Hip	970	950	-20
06 lAc - Scye Depth	196		
07 lTa - Nape to Waist Centre Back	410		

Picture 12-10

Enter the measurement chart in to the size table, enter size N38 for comparison and grade.

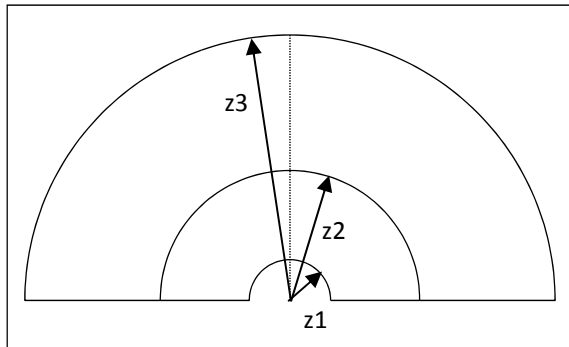


Picture 12- 11

Exercises on the application of g values in z value calculations

1st Exercise

Construct a ½ circular skirt with the waist being identical to the waist in the measurement chart and a length of 615mm from waist. Draw the hip circle at waist to hip (G5) + 30.



Use the following z values:

$$z1 = G3 / (2 * \pi)$$

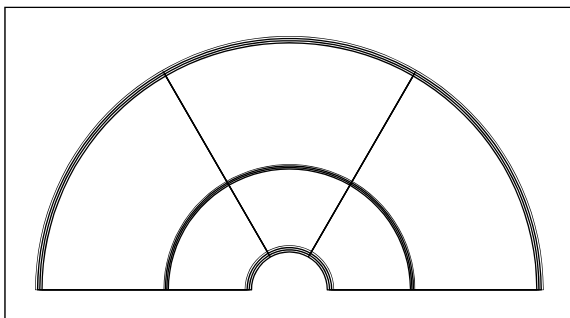
$$z2 = z1 + G5 + 30.$$

$$z3 = z1 + 615.$$

Grade the circular skirt in 5 sizes.

2nd Exercise

Construct a ½ circular skirt with g, x and z values. The x value x1 is to be processed as an addition to the hip circle and x2 is to define the skirt length. Draw the hip circle again at a distance of waist to hip +x1. From this skirt construct 1/4, 1/3 and other panel skirts.



The steps are analogous to the 1st Exercise with x1=30 and x2=615 and the z values

$$Z1 = G3 / (2 * \pi)$$

$$Z2 = Z1 + G8 + X1$$

$$Z3 = Z1 + X2$$

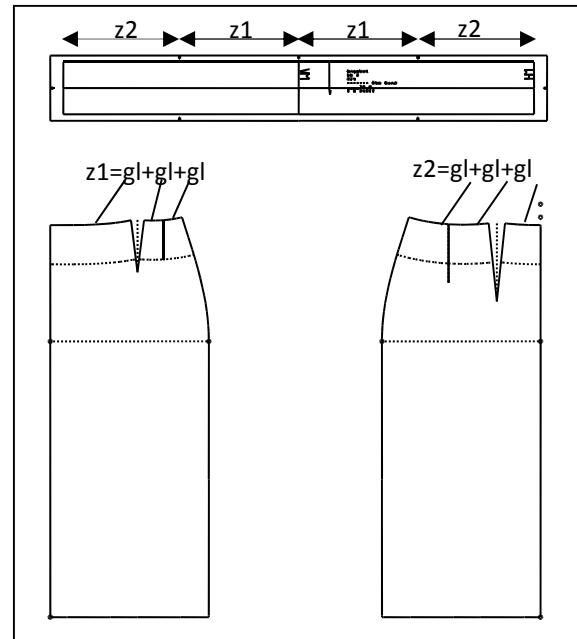
Assign the x values with different values according to the different figure types

Exercises on the application of measurements of the construction (process data) in z value calculations

1st Exercise

Design a waistband with the length of the waist lines in *Skirt 20*.

Call the construction and reset the hem reduction interactively and close the second dart. Open a new part and insert the three waist lines of front and back skirt respectively into the new part.



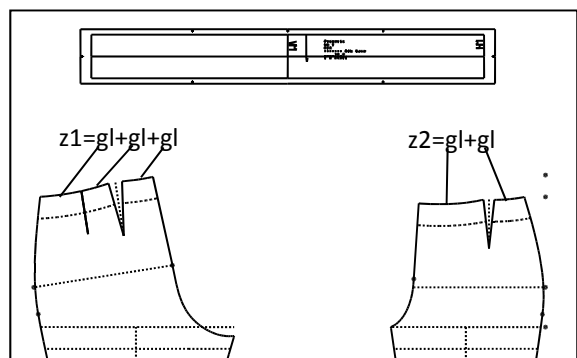
Generate two z values:

$$z1 = gl + gl + gl \text{ waist lines front skirt}$$

$$z2 = gl + gl + gl \text{ waist lines back skirt}$$

Generate an x value for the waistband height preset to 40mm. Construct the waistband with z1, z2 and x1. Set notches on the side seam positions. Mark the centre back and centre front. Grade the skirt and then the waistband. Check the measurements.

2nd Exercise



Create a waistband for the construction *Trouser 10*.

12.3 Complex Exercises

1st Exercise

Construct a straight skirt with g, x and z values.

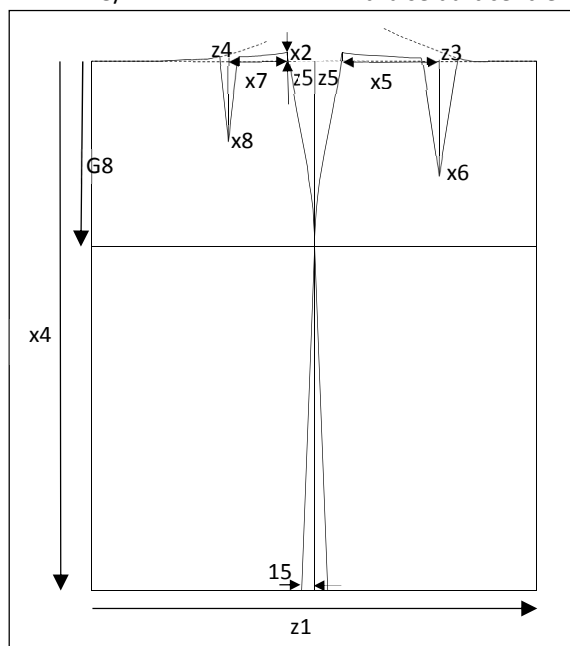
X value table pre-assignment:

x1	ease to ½ hip width in mm	(20)
x2	raise at ss in mm	(10)
x3	ease ½ waist width in mm	(10)
x4	skirt length	(600)
x5	position of skirt back dart from ss in %	(50)
x6	dart length skirt back	(130)
x7	position of skirt front dart from ss in %	(30)
x8	dart length skirt front	(90)
x9	hem decrease in mm	(15)

Z value table:

Rstep	Formula	Test	Min	Max	Max
1	$z01 = G5/2 + x2$	½ hip + addition			495.0
1	$z02 = Z1 - (G3/2 + x3)$	deficit			125.0
1	$z03 = (Z2^2/6)/2$	½ dart width bk			20.8
1	$z04 = (Z2/6)/2$	½ dart width ft			10.4
1	$z05 = (Z2^3/6)/2$	½ deficit side seam			31.2
1	$z06 = x3/4$	bk raise dart centre			2.5
1	$z07 = x3/2$	ft raise dart centre			5.0
93	$z08 =$				

$Z1 = G2/2 + x2$	1/2 hip + ease
$Z2 = Z1 - (G3/2 + x3)$	deficit
$Z3 = (Z2^2/6)/2$	1/2 dart width bk
$Z4 = (Z2 - x4^2 - x7)/2$	1/2 dart width ft
$Z5 = (Z2^3/6)/2$	1/2 deficit side seam
$Z6 = x3/4$	bk raise dart centre
$Z7 = x3/2$	ft raise dart centre



Grade in sizes N38 to N44.

Then, alter the position of the two darts by interactively moving the dart centre.

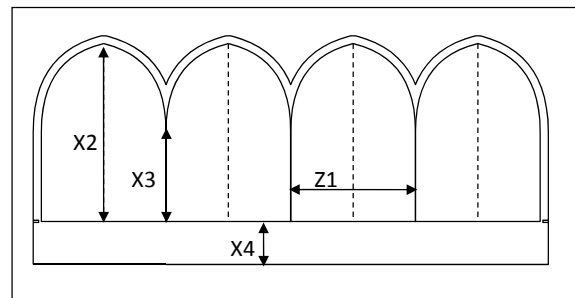
2nd Exercise

Construct a children's hat with the values

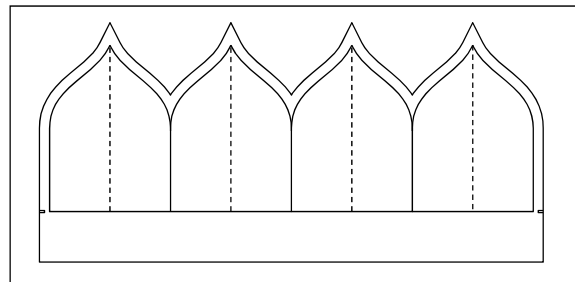
- X1 ease to head circumference (10.)
- X2 hat height in mm (165.)
- X3 head height in mm (80.)
- X4 seam allowance in mm (40.)

$$Z1 = (G28 + X1)/4$$

Note: G28 is the head circumference in Optimass (Basis_A).



Other hats can be obtained with different curve forms for example.



3rd Exercise

Construct a stand-up collar with x, g and z values.

Call a bodice block and insert the necklines of front and back into the next part of the part organisation

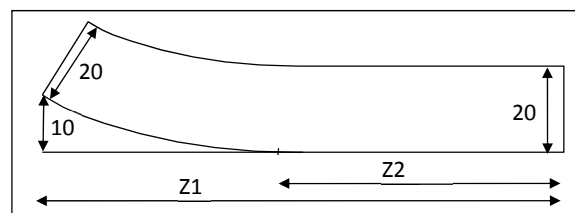
with the tool *insert lines*.

Create the following x values :

- X1 shortening back in mm (2.)
- X2 shortening front in mm (2.)

Create the following z values for this part:

- $Z01 = (g1 + g1) - (x1 + x2)$ length of front and back neck
- $Z02 = g1 + x1$ length back neck



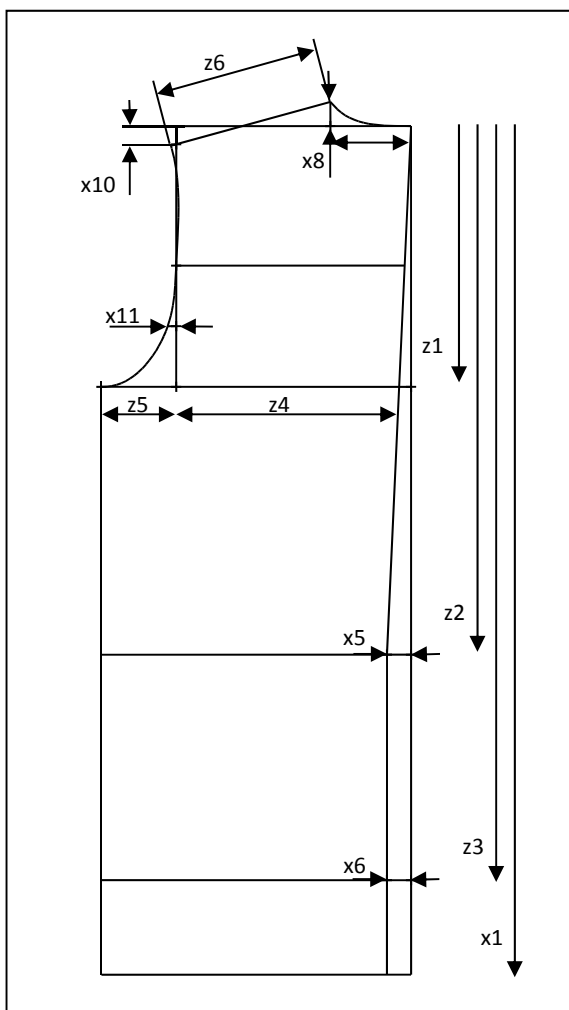
After the completion of the construction trace the production patterns.

4th Exercise

Construct a back with g, x and z values in the measurement system Mueller&Sohn Women.

X value table pre-assignments:

- x1 style length in mm (700.)
- x2 addition nape to scye in mm (20.)
- x3 addition nape to waist in mm (20.)
- x4 addition nape to hip in mm (0.)
- x5 reduction waist in mm (20.)
- x6 reduction hip in mm (20.)
- x7 addition ½ across back in mm (20.)
- x8 raise neck at shoulder in mm (20.)
- x9 ease for shoulder width in mm (15.)
- x10 shoulder angle in mm (15.)
- x11 armhole curve point in mm (7.)



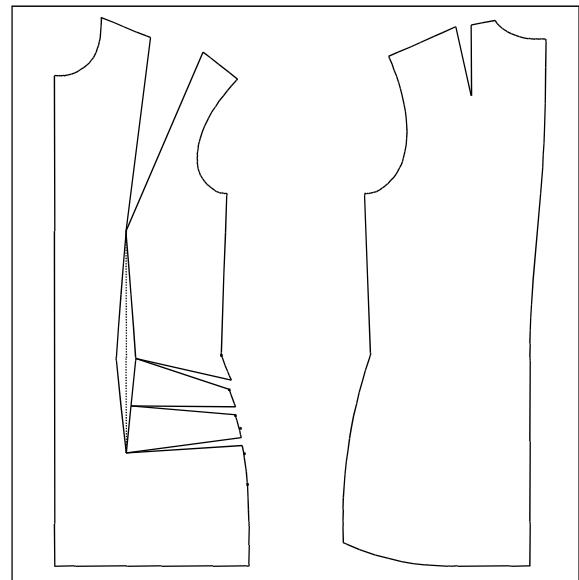
Z values with the value in size 38:

$z01 = g7 + x2$	215.0
nape to scye + addition	
$z02 = g8 + x3$	436.0
nape to waist + addition	
$z03 = g9 + x4$	622.0
nape to hip + addition	
$z04 = g13 + x7$	185.0
across back + addition	
$z05 = g14 * 2/3$	62.0
2/3 armhole diameter	
$z06 = g16 + x9$	137.0
shoulder width + ease	

5th Exercise

With the *Pinch 20* tool pinch the side seam of the front of *Bodice 50* at 40mm, 30mm and 35mm. The apex of the new dart is to be positioned at start, centre and end of the waist dart respectively. Depending on the set pinch amount, the side seam of the front is shortened. Therefore, measure the remaining side seam between waist and hem in the front with

$$z01 = g1 + g1 + g1 + g1$$



Lengthen the side seam of the back from the waist to the length z01. The hem of the back must be connected with the shortened side seam. Use the function *manipulate curve* and attach the end point of the hem to the side seam. Select a suitable *transition type*, here type 4 and deposit the manipulated curve. Refine the curve run a little with the *refine* function from the same menu.

6th Exercise

Bodice 50 is to be styled with panel seams. First, construct a curve from the centre front to the waist dart in the front. Interactively move the starting point of the first curve along the centre front and the final point along the line of the waist dart. A second curve is to run from the waist dart to the side seam. Both curves are to merge smoothly when sewing the waist dart.

Measure the partial length of the waist dart to the waist:

$$Z01 = TL$$

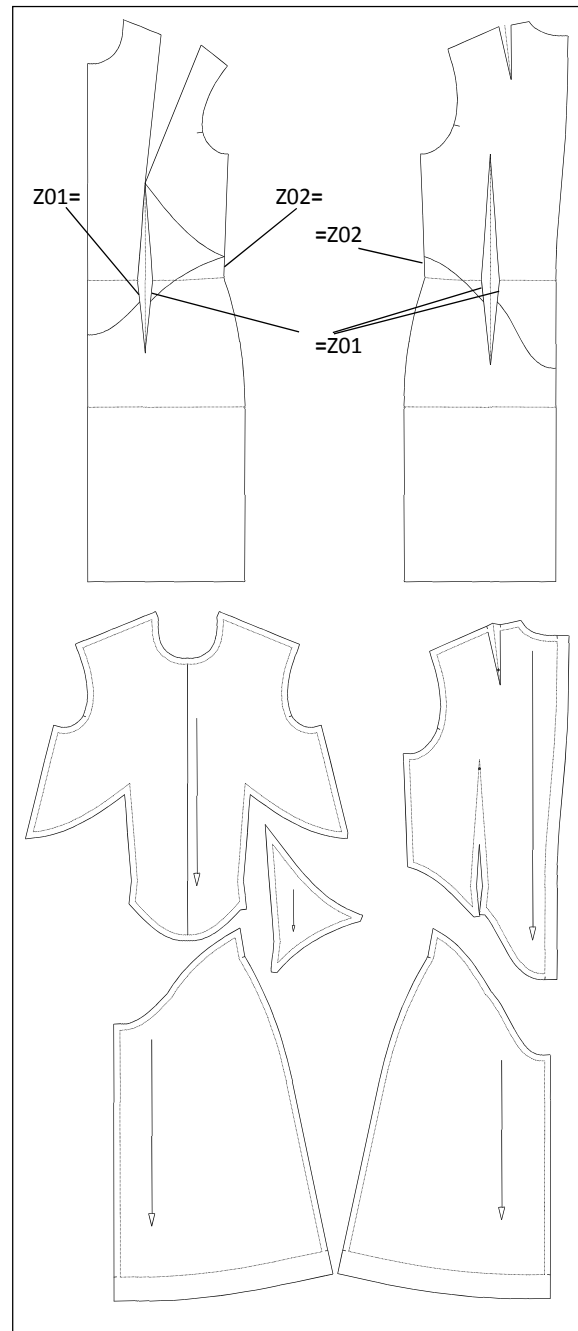
When constructing the second curve, start the curve at a *partial length* $z01$ from the waist and merge smoothly into the side seam. In the back, a third curve is to run from the side seam to the waist dart. The second and third curve are to merge smoothly as well when sewing the side seam.

Measure the length of the side seam to the waist

$$Z02 = TL$$

The third curve now starts at a partial length $Z02$ on the back side seam and ends at a partial length $Z01$ on the waist dart in the back.

Trace the production patterns using the Part assistant, see Chapter 9. Interactively, alter the final point of the first curve and start *test run all parts*.

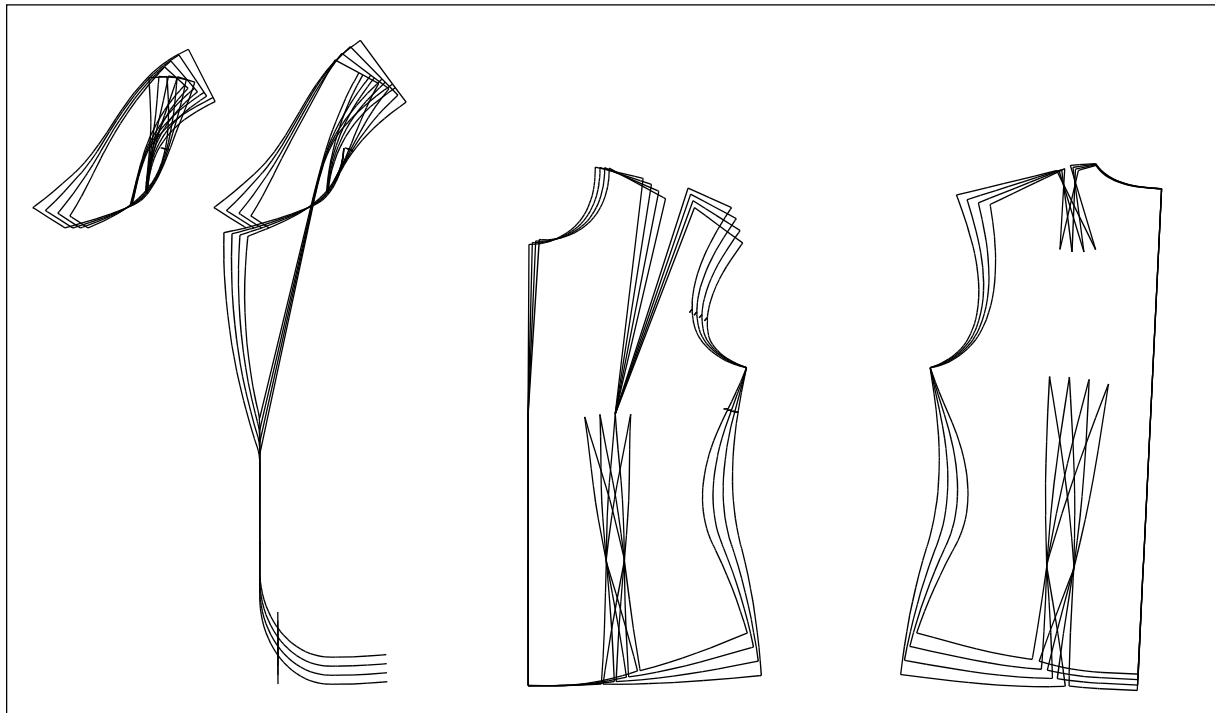


Chapter 13 Interactive Constructions

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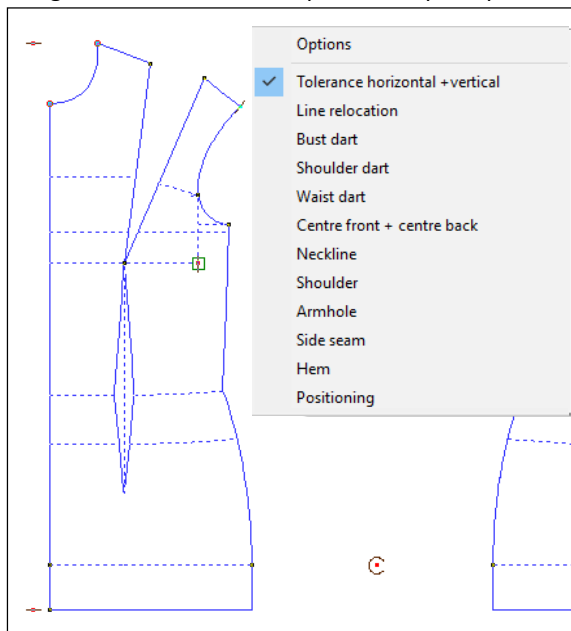
Content

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13.1 Interactive Bodice 50

Basic options and adjustment systems are explained using *Bodice 50* as an example. These principles are



Picture 13-1

repeated in a similar way in the other constructions. Drag points on curves for direction and shaping points are not explored at this point as they are identical to adjustments in the *Link 20* tool, see Chapter 5.1

Picture 13-1 shows *Bodice 50* with all its drag areas. An overview of all options for *Bodice 50* is displayed in Picture 13-2 with an indication of the respective drag area (DA) for each option.

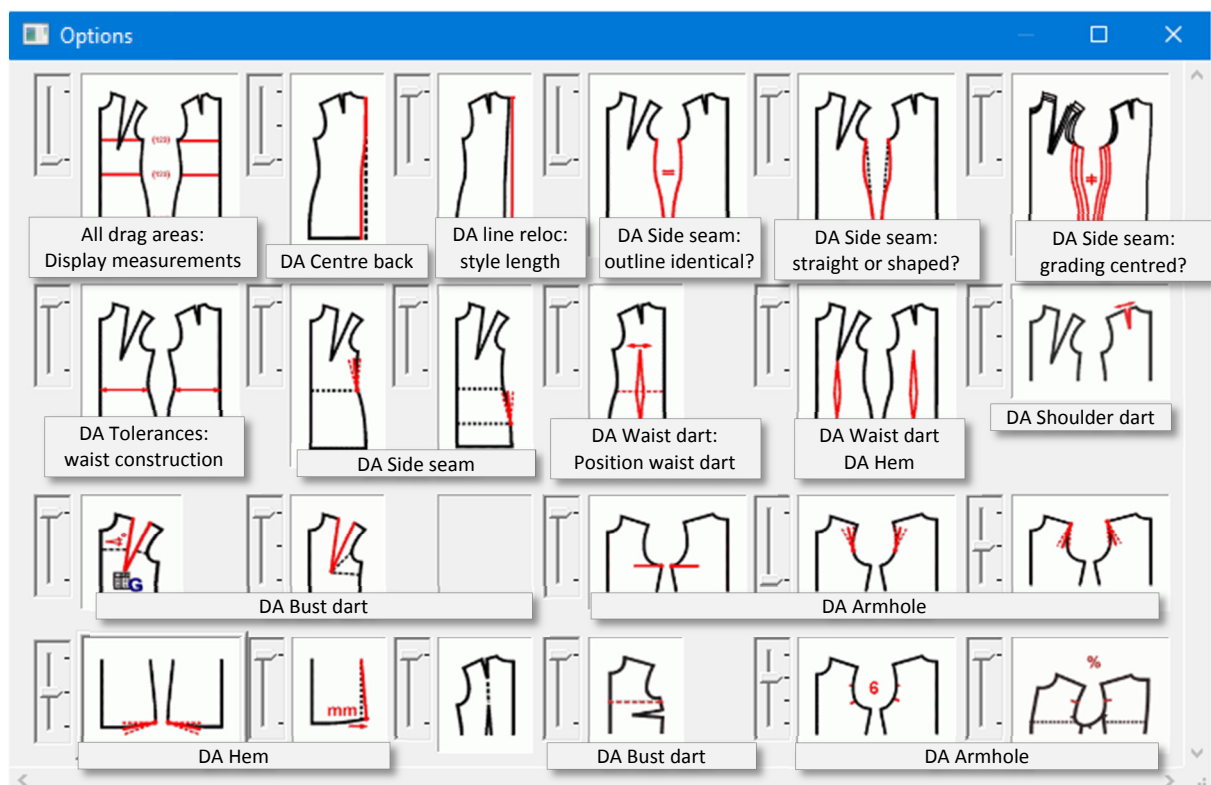
Auxiliary adjustments

In the **Positioning drag area**, the front and the combined armhole can be moved. These adjustments have no relevance for the construction.

Option Auxiliary measurements



This option displays important auxiliary measurements. We recommend having this option active.



Picture 13-2

Drag area Tolerance horizontal and vertical

Width in torso area

- 1 Addition to bust girth, which is originally added to the armhole diameter. Important, see explanation on **Bust girth**.
- 2 Part of the tolerance added to bust girth for front width. If this amount is increased, the portion in the armhole diameter decreases.
- 3 Part of the bust girth tolerance for back width. If this amount is increased, the portion in the armhole diameter decreases.
- 4 Tolerance to waist girth; see topic **Waist construction** on the next page.
- 5 Tolerance to hip girth

Balance between front and back

- 6 Shorten/lengthen the front in relation to the back
- 7 Shorten/ lengthen the front
- 8 Shorten/ lengthen the back; see topic **Style length** on the next page

Adjust basic neckline

- 9 Basic neck front
- 10 Basic neck front – shoulder
- 11 Basic neck back – shoulder

NB: In this area the fit specific characteristics of the neckline are adjusted. All style specific adjustments are made in the Neck-line drag area.

Adjust shoulder width

- 12 Addition to shoulder width front and back
- 13 Addition to shoulder width back only

Adjustments to the shoulder slope are made with the *Shoulder* drag area.

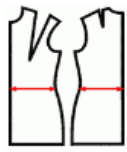
Picture 13-3

Bust girth

In the different measurement systems, one or more of the four body measurements **bust girth**, **front width**, **back width** and **arm width** are available. As a rule, the bust girth is used for construction of the bust line.

Only in the Optimass measurement system in which all four body measurements are available, the bust girth remains unconsidered.

NB: In *Bodice 10*, the arm width remains unconsidered. It is calculated from the bust girth. Further information can be found in the help for the basic block.

Waist construction

If this option is active, the drag point 4 in Picture 13-3 works as tolerance to the waist girth.



If this alternative option is active, the waist line is constructed in relation to the bust line. The side seam can be interactively adjusted at waist height, see Picture 13-4. In this case, the side seam does not change if the dart content is altered.

Option Style length from...

The style length is adjusted in the *Line relocation* drag area.

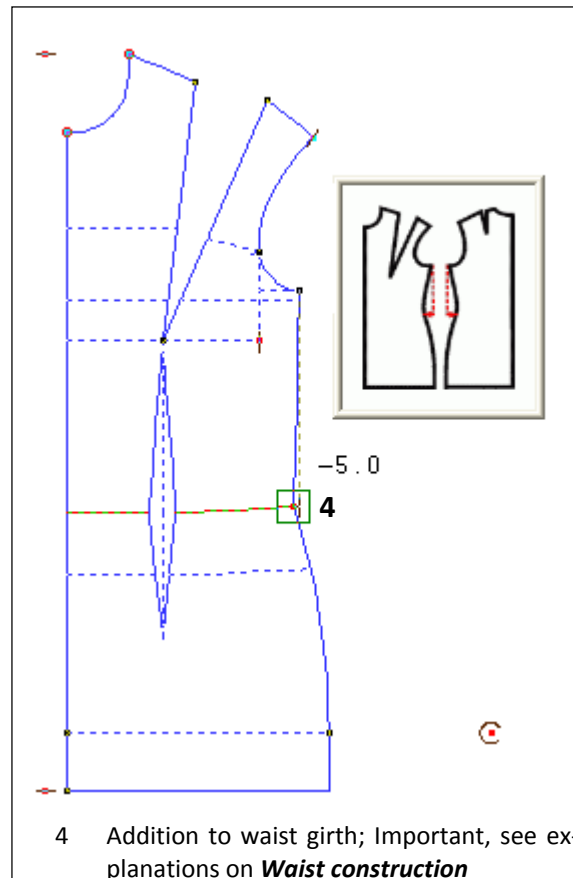


If this option is active, the style length is constructed from the basic neck.

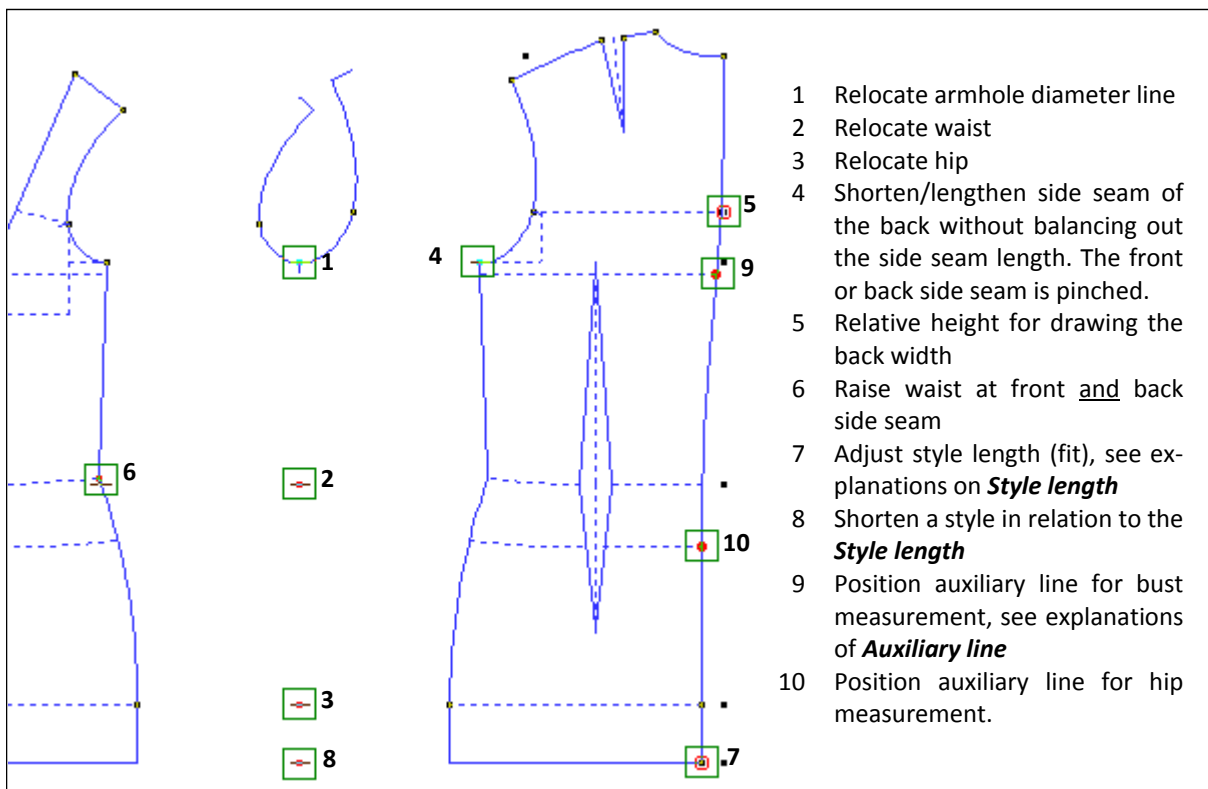
NB: With drag point 8 in Picture 13-3, the hem line moves in relation to the given style length.



If this alternative option is active, the style length is constructed from the waist. During alteration with drag point 8 in Picture 13-3, the hem line is not moved.



Picture 13-4

Drag area Line relocation

Picture 13-5

Style length

Via switching options, the style length can be constructed from the neck or from the waist. It is adjusted at the centre back with drag point 7 in Picture 13-5. The following applies to drag points 7 and 8:

For pieces longer than hip depth, drag point 7 is used and drag point 8 remains at zero. For pieces shorter than hip depth, a company specific style length is set and the piece is shortened with drag point 8.

The style length with drag point 7 is required for example for the construction of hem widening in millimetres and for spreading/overlapping the waist dart

in the hem. Due to logic of construction, it must always be positioned below the hip.

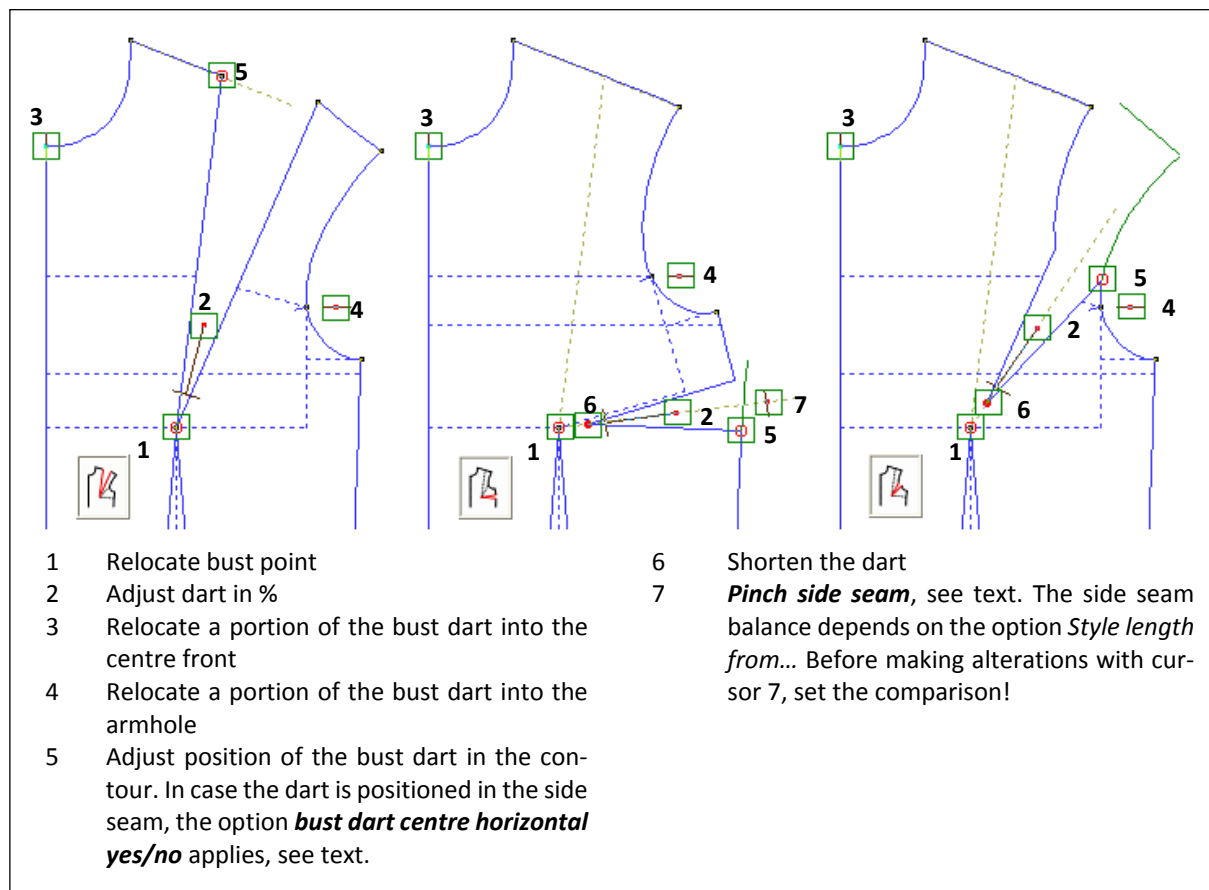
Auxiliary line for bust measurement



Depending on the setting of this option, the line is either horizontal or transformed in relation to the bust point. The difference is particularly obvious with the bust dart located in the side seam.

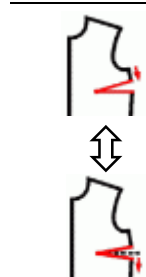
Drag area Bust dart

First, the position of the bust dart must be adjusted via options. The bust dart can be located in the shoulder, the side seam and the armhole, see Picture 13-6.



Picture 13-6

Option Bust dart centre horizontal



If the bust dart is located in the side seam, the option *bust dart centre horizontal yes/no* applies. Depending on the setting of this option, the position is adjusted as a distance to the armhole or in relation to the horizontal.

Pinch side seam

If the bust dart is located in the side seam, it can be increased/decreased with drag point 7 in Picture 13-6. As a result, the front side seam is indirectly pinched. The front and back side seam length are corrected depending on the *Style length from...* option as follows:

- Style length from neck ... by spreading/pinching the front

- Style length from waist ... by spreading/ pinching the back; NB: The style length from the neck is altered!

Bust dart construction based on body measurement Upper front width

Only the measurement system *Optimass* offers the option of constructing the bust dart with the bust angle or with the upper front width:

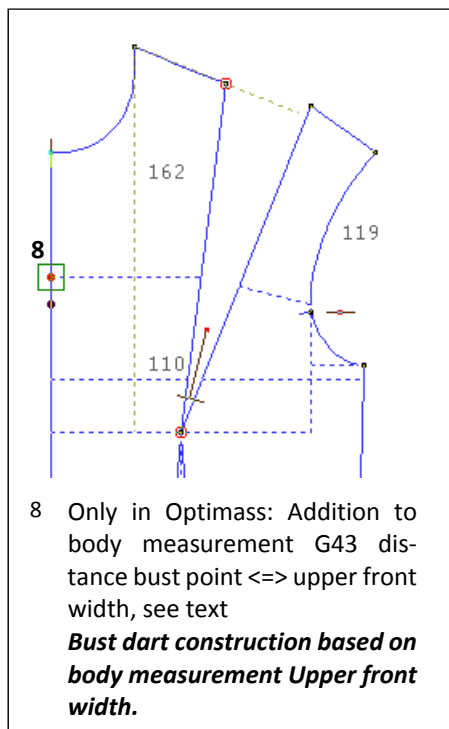


If this option is active, the bust dart is constructed on the basis of the bust angle from the measurement chart.



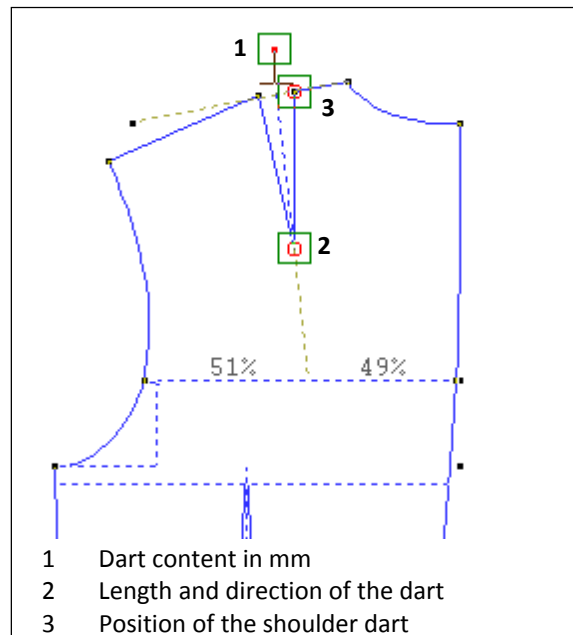
If this alternative option is active, the bust dart is constructed from the body measurement G42, upper front width. This is only possible within the *Optimass* system as only *Optimass* contains this measurement in the measurement chart.

In this case, the additional drag point 8 in in Picture 13-7, appears which can be used for moving the construction line for the upper front width. The bust dart is now constructed with the dashed line starting at drag point 8 becoming the upper front width. This line indicates the narrowest area above the bust and is connected to the armhole pitch.



Picture 13-7

Drag area Shoulder dart



Picture 13-8

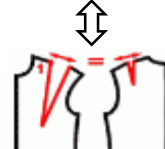
NB: When altering the position of the shoulder dart, the armhole in the back is also altered.

If the shoulder dart is to be moved in a tested pattern, set the comparison and then, reinstate the original armhole shape via shoulder angle correction in the *Shoulder drag area*.

Option Position shoulder dart



If this option is active, the shoulder dart is positioned at a relative length on the shoulder.

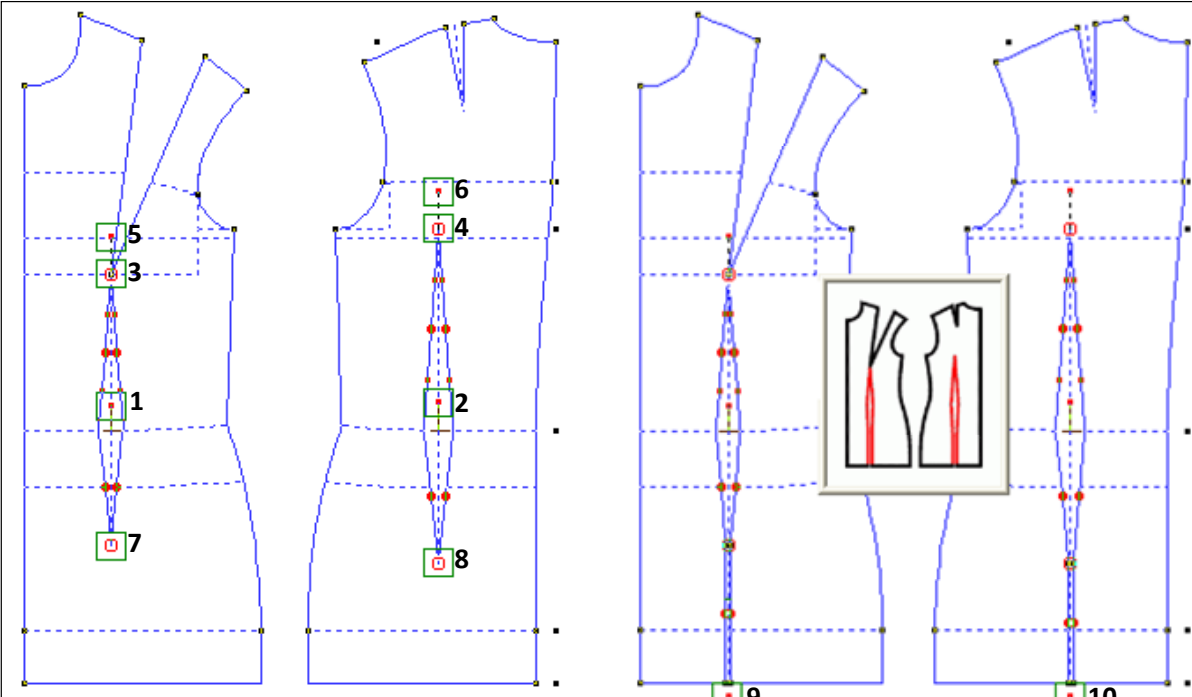


If this alternative option is active, the zero position of the shoulder dart is determined by the position of the bust dart. This option is only appropriate if the bust dart is also located in the shoulder.

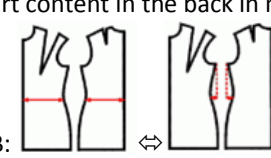
Option Back panel



With this option, waist and shoulder dart can be connected via an auxiliary line. When using the *Back part* tools, this option is not significant.

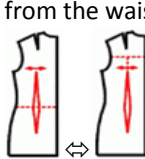
Drag area *Waist dart*


- 1 Dart content in the front in mm
- 2 Dart content in the back in mm



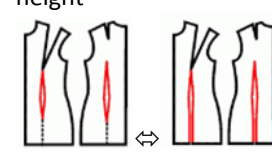
NB: When altering the dart content, the side seam is only altered if the waist is constructed from the waist girth; see explanation on ***Waist construction***, in drag area *Tolerance horizontal and vertical* on previous pages.

- 3 Position for the top point of the front waist dart in relation to the bust point
- 4 Distance of the top point of the waist dart from the waist and horizontal position



Depending on the option, the horizontal position is determined relative to the waist or to the back width

- 5 Rotate/tilt the complete front dart
- 6 Rotate/tilt complete back dart
- 7 Rotate/tilt lower front dart
- 8 Rotate/tilt lower back dart
- 9 Spread/overlap front hem at style length height
- 10 Spread/overlap back hem at style length height



The cursors 9 and 10 are only active if the waist dart option *Open to hem* has been selected.

Picture 13-9

Position of the waist line

The position of the waist line is influenced in two drag areas:

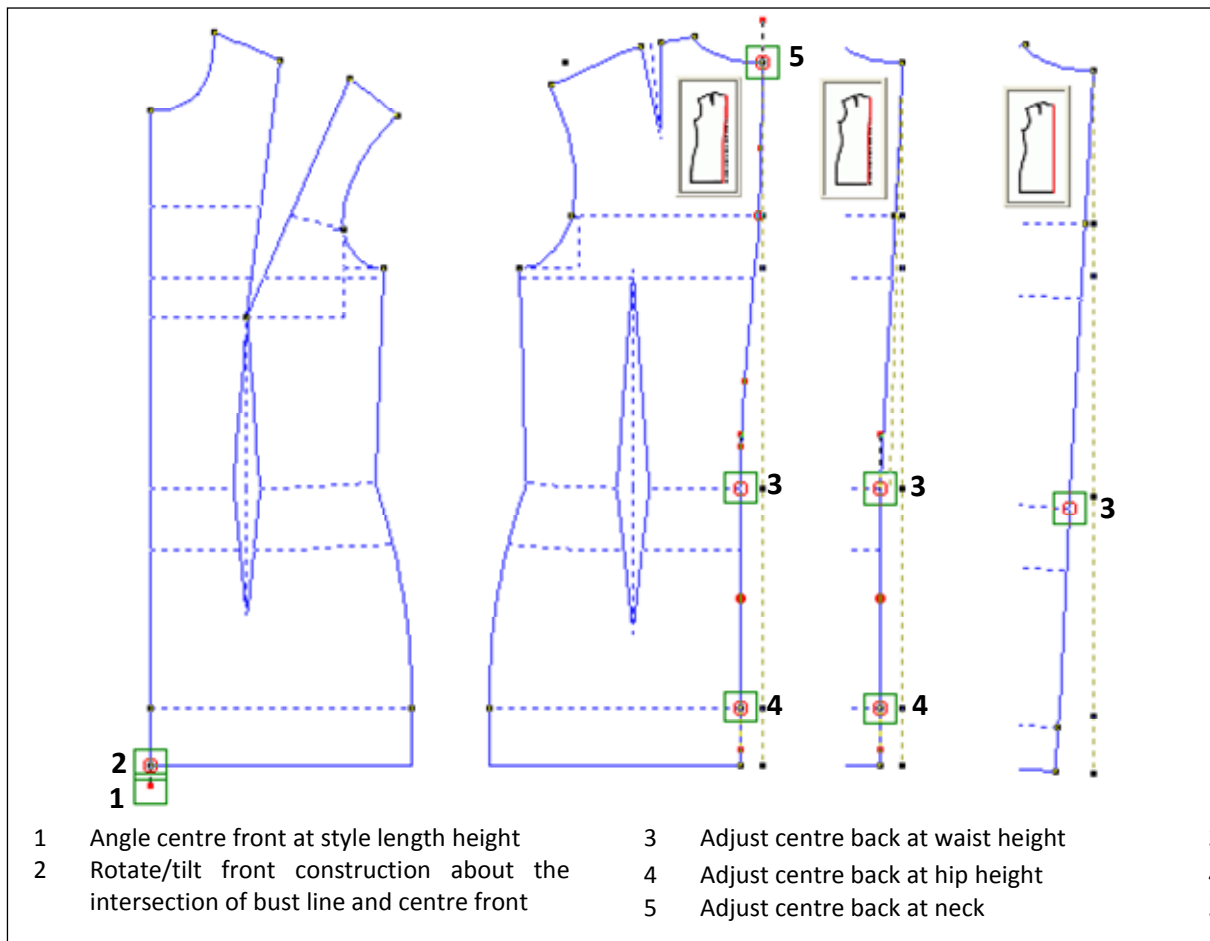
Drag area *Line relocation*

- Total waist height

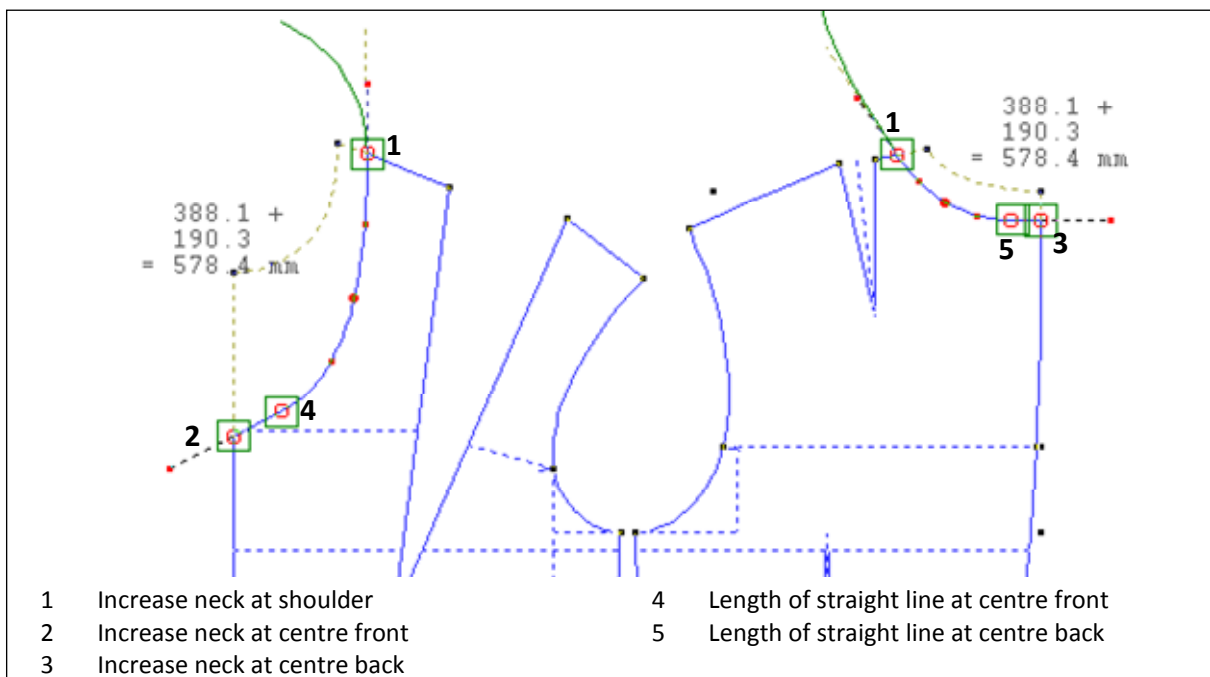
- Raise waist at side seam

Drag area *Side seam*

- Raise waist at centre front

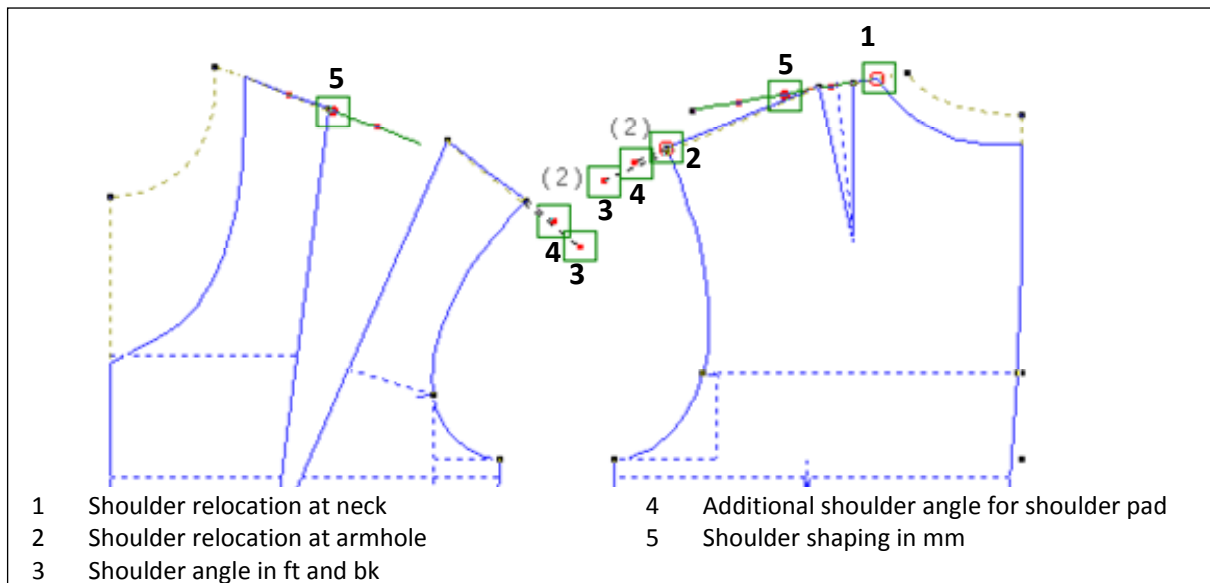
Drag area Centre front and Centre back

Picture 13-10

Drag area Neckline

Picture 13-11

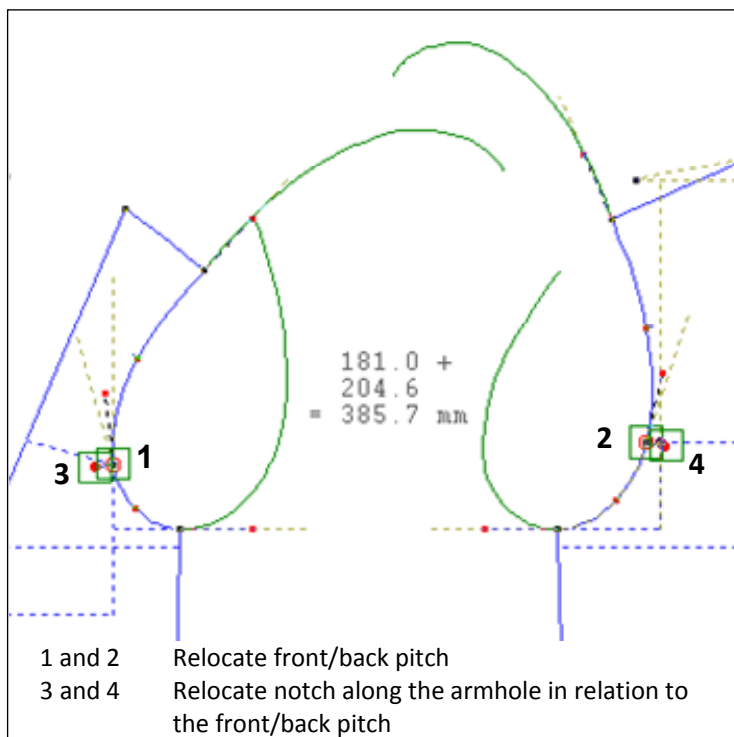
NB: The fit of the neck has already been adjusted in the drag area Tolerance horizontal and vertical. In the Neckline drag area, the neckline is shaped.

Drag area Shoulder


Picture 13-12

NB: The fit specific shoulder angle is adjusted with drag point 3 in Picture 13-12. In addition and style-specific, you can add a further tolerance for shoulder pads with drag point 4. The respective additional length in mm is shown in brackets.

Should the style be produced with a relocated shoulder at a later date, the shoulder should be relocated temporarily before calling the sleeve. For a correct distribution of notches, the natural shoulder must be clicked, which is only visible with relocated shoulder.


Drag area Armhole

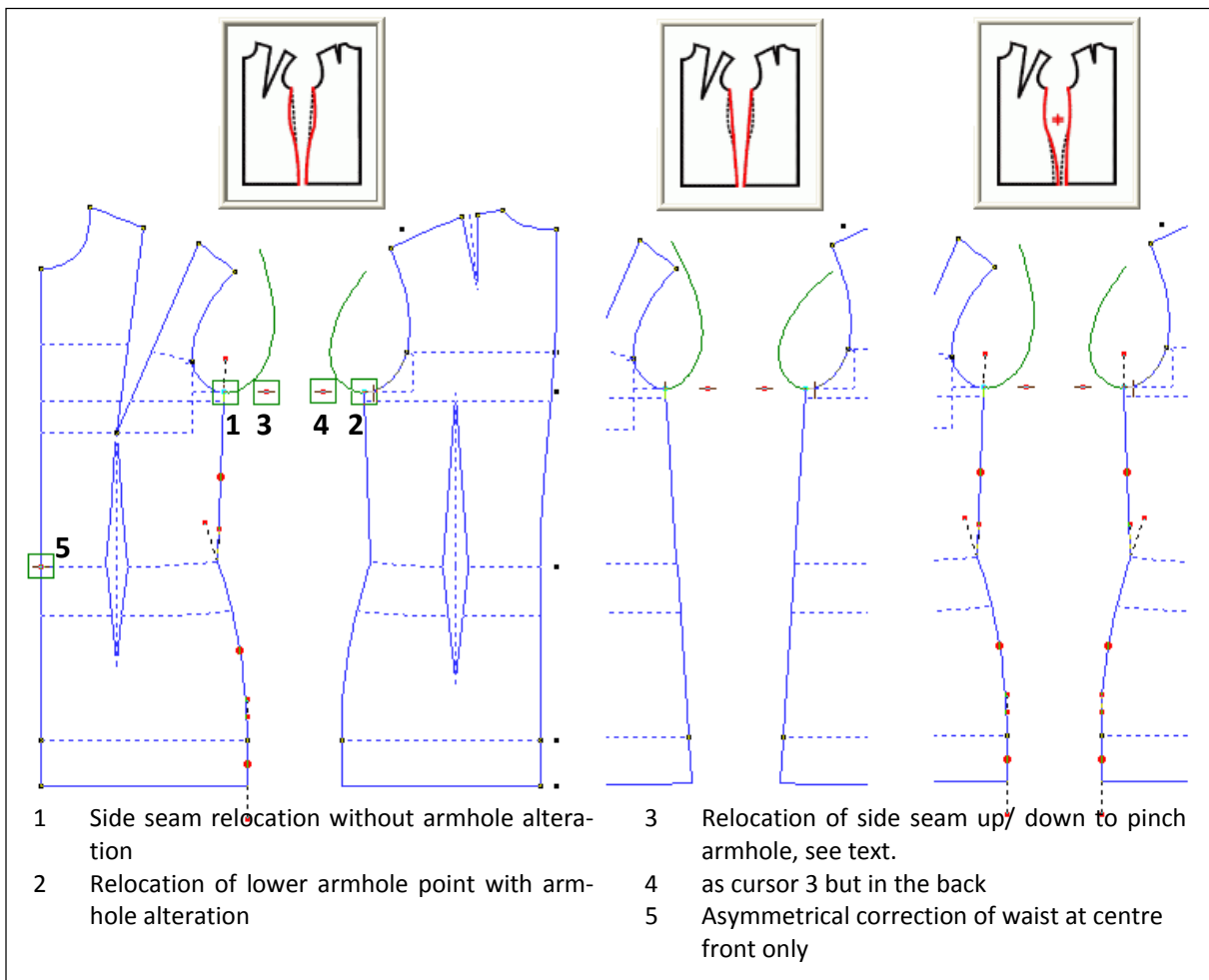
Picture 13-13

The option  adjusts the number of segments in the armhole.

4 segments means two segments respectively in front and back, separated by the sleeve pitches
 6/8/10 segments means 2/3/4 segments respectively above the sleeve pitch

The number of segments in the armhole must be identical to the number of segments in the sleeve. It can be altered subsequently.

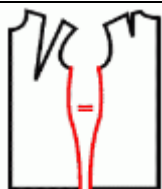
The option  appears from 6 segments upwards. It offers the choice of adjusting the length of the uppermost segment as a relative length in % or as a partial length.

Drag area Side seam

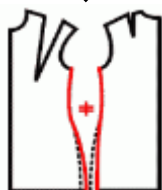
Picture 13-14

Relocate side seam up/down

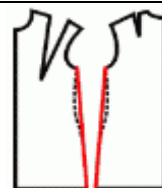
With drag point 3 in Picture 13-14, the side seam can be moved up/ down. This drag point is used for shortening the armhole. The bust dart is indirectly relocated into the hem area.

Options Contour identical side seam

Front and back side seams are contour identical. The shape of the side seam is adjusted in the front.



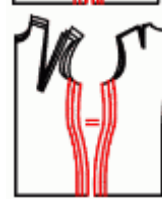
Both side seams can be adjusted independent of each other, see Picture 13-14 right. Differences in length are adjusted at the front side seam.

Option Side seam straight/shaped

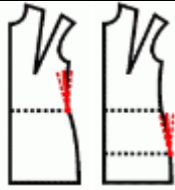
With this option, the side seams are straight, see Picture 13-14 centre.

Option Side seam grading centred

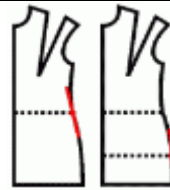
If this option is active, the side seam is graded proportionally to the bust width and back width.



If this option is active, the side seam is graded by $\frac{1}{4}$ of the bust increment independent of the increments of the individual sections.

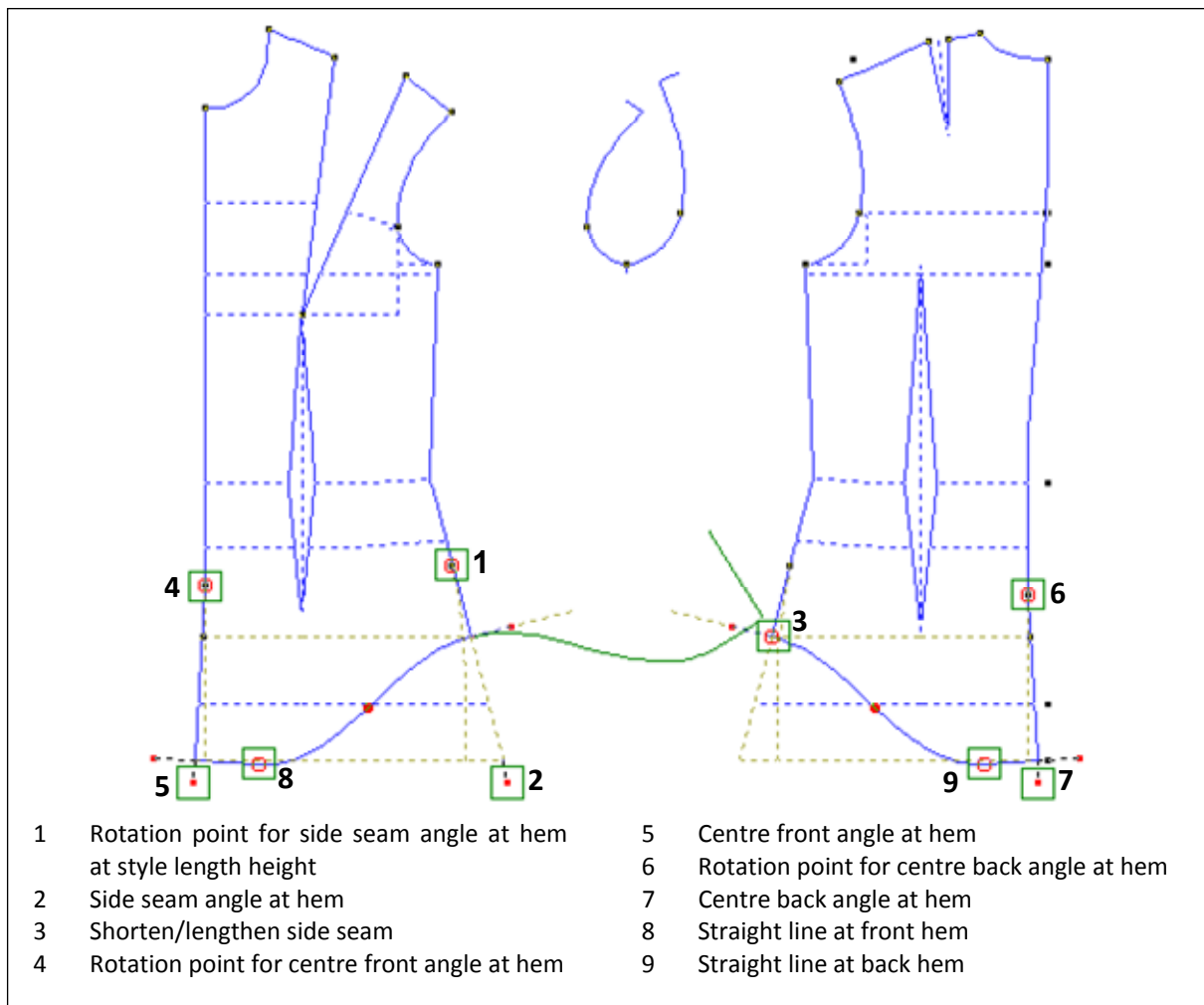
Option Side seam direction

If this option is active for waist or hip, the direction of the curves can be adjusted independently from each other.



If a continuous curve shape is desired, this option should be selected.

With the long direction handle, the curve direction of the lower section is adjusted. Starting with this direction, the direction of the upper section can be influenced with the short direction handle. For a continuous curve shape, set the short direction handle to 0°.

Drag area Hem

Picture 13-15

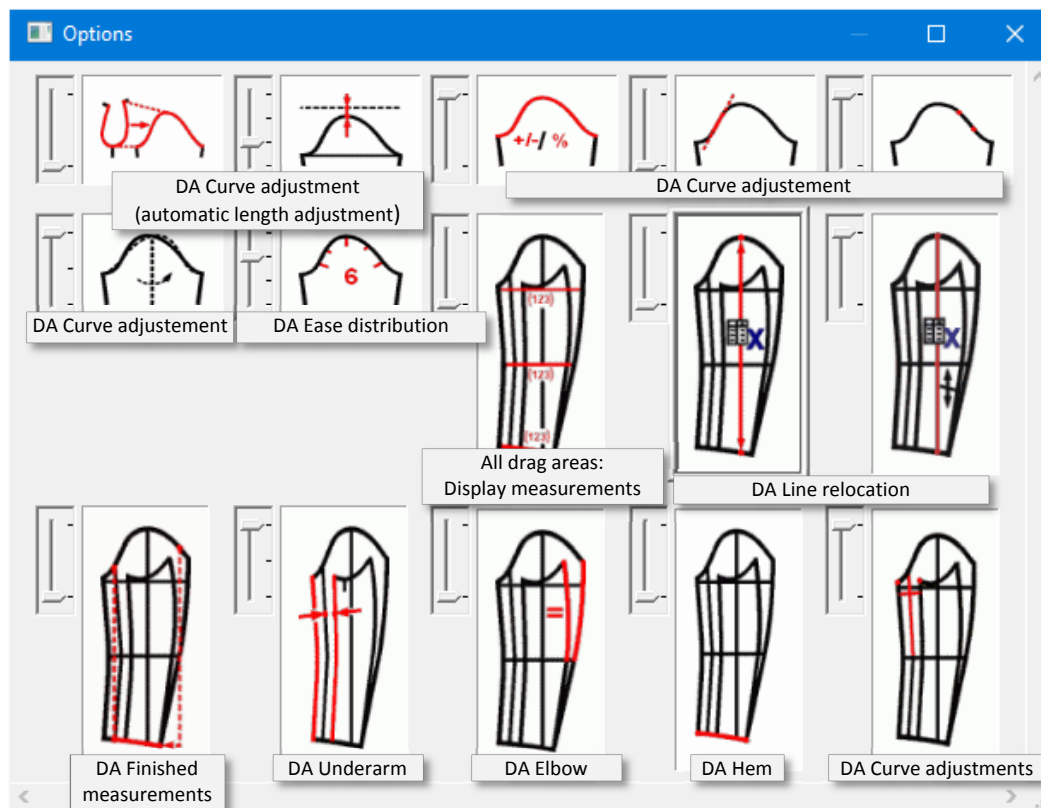
Option Hem increase in mm/°

The increase on drag point 2 ensues in millimetres or in degrees.

Option Hem direction at side seam

The hem direction is calculated as a right angle to the side seam or free or linked.

13.2 Interactive Sleeve 30



Picture 13-16

Using *Sleeve 30* as an example, the principal options and adjustment systems of all Grafis sleeves are explained.

Calling the sleeve

All interactive Grafis sleeves are automatically adjusted to the armhole of the bodice. This automatic adjustment is possible because various information on the bodice is transferred by clicking when calling the sleeve:

- natural shoulder back
- armhole back
- back pitch
- lower armhole point
- front pitch
- armhole front and
- natural shoulder front.

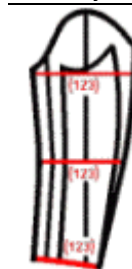
The armhole in the front and the back must be a continuous line sequence, respectively. If the shoulder of the bodice has been relocated towards the front or the back, the natural shoulder must be clicked, i.e. the shoulder in its original position. The sleeve must not be altered by shoulder relocation. The same applies to the lower armhole point in case of a side seam relocation.

In Grafis bodices, the natural shoulder is indicated as a dashed line as soon as the shoulder has been relocated. We recommend relocating the shoulder before calling the sleeve and then, reinstating the original shoulder position after the sleeve has been called. From Version 10 onwards the function *Reset 'Clicks'* can be used for correction of a completely adjusted sleeve, see Chapter 14. In Grafis bodices, the front armhole is separated so that the number of objects is correct even in the case of *bust dart in armhole*. Therefore, when calling the sleeve the connected armhole should be clicked, normally located between front and back.

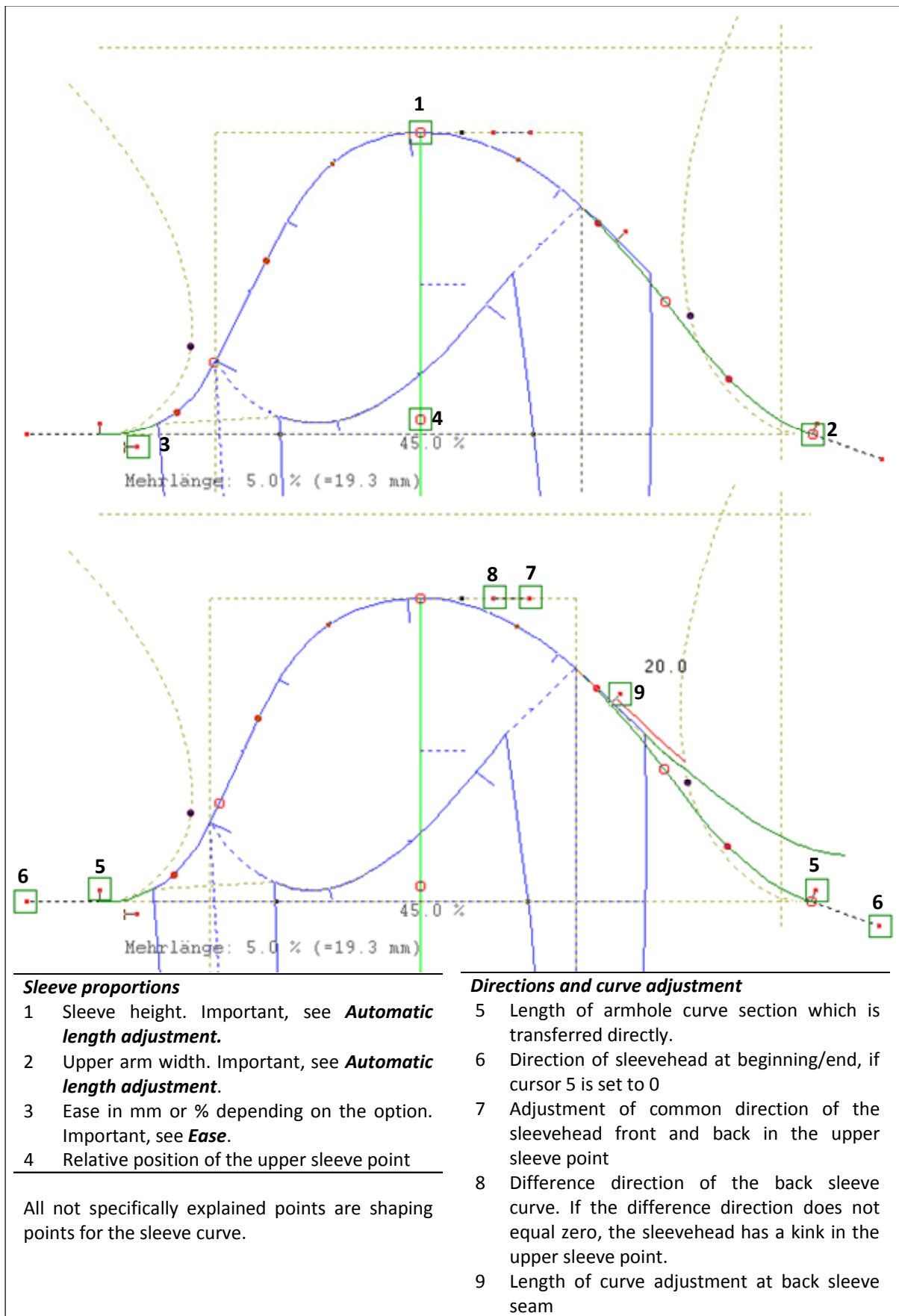
Picture 13-16 shows an overview of all options for *Sleeve 30*, indicating the corresponding drag areas.

Auxiliary adjustments

Auxiliary measurements option



This option displays important auxiliary measurements. We recommend having this option activated.

Drag area Curve adjustment

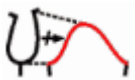
Picture 13-17

Automatic length adjustment

When constructing a sleevehead, three construction measurements are dependant on one another:

- sleevehead height
- upper arm width and
- sleevehead length.

The sleevehead length equals the length of the arm-hole lines plus ease. Generally, two of these construction measurements are given and the third measurement results from these settings.

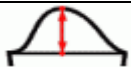


If this option is active, automatic length adjustment is applied. The sleevehead height or the upperarm width are adjusted so that the given sleevehead length is achieved. Automatic length adjustment can ensue in four variations; see option **Length adjustment as...**

If this alternative option is active, the automatic length adjustment is switched off. Sleevehead height and upperarm width are given and the sleevehead length is a result from the construction. Select this option only if the sleevehead from a digitised template is to be transferred. Switch automatic length adjustment back on after the transfer.

Option Length adjustment as ...

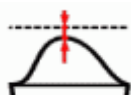
If automatic length adjustment is active, sleevehead height and upperarm width are automatically adjusted to achieve the given sleevehead length. The ease can be adjusted size dependantly. The length adjustment can ensue in four variations:



Sleevehead height is set as a finished measurement with break sizes. Upperarm width is a result from the construction.

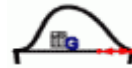


The upperarm width is set as a finished measurement with break sizes. Sleevehead height is a result from the construction



The sleevehead height is adjusted starting from the centre armhole height. Upperarm width is a result from the construction.

The sleevehead height is graded proportionally to the average armhole height, even without break sizes.



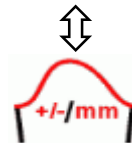
The upperarm width is adjusted starting with the upperarm girth measurement. Sleevehead height is a result from the construction.

The upperarm width is graded proportionally to the upperarm girth even without break sizes.

Ease

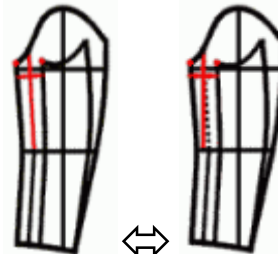


The adjustable ease, adjusted with drag point 3 in Picture 13-17 is calculated as a percentage value of the armhole length.



The ease is calculated as a length in millimetres.

Option Mirror lower armhole point at angled or straight sleeve fold line ...



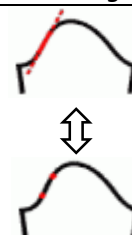
This option determines whether the lower armhole point is mirrored at the straight break line or the angled break line. The lower armhole point can be moved up/down in the *Line relocation* drag area. This option has an impact on the adjustment of the elbow.

Option Mirrored curve ...

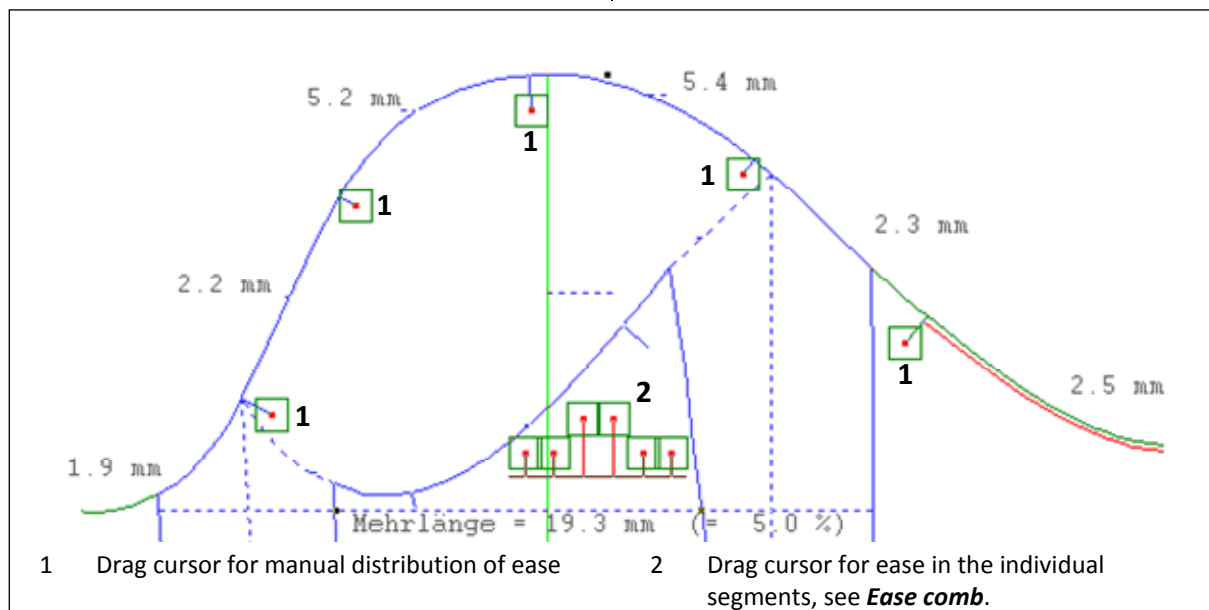


With this option, the mirrored sleevehead curve can be made visible additionally and temporarily in the *Curve adjustment* drag area.

Option Straight line front... or straight line back ...



With this option, a straight line is switched on/off between the second and the third shaping point. This option is available for the front and back sleeve.

Drag area *Ease distribution*

Picture 13-18

Option *Segment number ...*

With this option, the number of segments along the sleevehead is determined; see detailed explanation on the *Armhole* drag area in *Bodice 50*.

The number of segments in the armhole must be identical with the number of segments in the sleeve. It can be altered subsequently.

Ease comb

The ease can be distributed either manually via dragging the notches at the drag points 1 in Picture 13-18

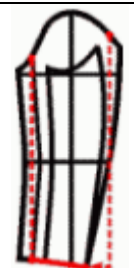
or via adjustment of the ease comb with drag points 2. Each drag point of the ease comb corresponds with the ease in one segment. As a rule, the ease comb is used as it allows simultaneous visual control.

Measurement lines for ease

The small horizontal dashed lines in the centre of each segment are also transferred into the construction. The length of these auxiliary lines equals the ease in the corresponding segment. The same applies to the dashed auxiliary lines at the grain line, which equals the total ease. These lines can be transferred into finished measurement tables via the *finished measurement* function or into text via z values.

Drag area *Finished measurement*

The *Finished measurement* drag area can only be selected if the wrist width has been set as a finished measurement.

Option *Grade sleeve hem as upperarm*

If this option is active, the wrist width is calculated from the body measurement upperarm width minus the sleeve fold adjustment at lower/front and minus the elbow dart content. The elbow dart is adjusted in the *Elbow* drag area with drag point 15 (Picture 13-19).



If this alternative option is active, the wrist width is set as a finished measurement with break sizes. Only in this case can the *Finished measurement* drag area be activated.

Drag areas *Line relocation, Sleeve fold, Underarm, Elbow*

The image displays four technical diagrams of a sleeve pattern, each illustrating a different drag area for interactive construction. The diagrams are labeled: DA Line relocation, DA Sleeve fold, DA Underarm, and DA Elbow. Each diagram shows a sleeve pattern with various points marked by numbers 1 through 21, indicating where users can interact with the pattern to adjust its fit and shape. The diagrams use blue lines for the main pattern and green lines for the drag areas. Points are marked with small squares and numbers, and some points have arrows indicating the direction of movement.

DA Line relocation

- 1 Rotate the sleeve in the armhole via relocation of notches
- 2 Move lower armhole point upwards/downwards
- 3 Relocate elbow line
- 4 Adjust sleeve length, depending on the selected option either as finished measurement with break sizes or as an addition to the arm length, see **Sleeve length**
- 5 Manual correction of the sleeve length

DA Sleeve fold

- 6 Adjust sleeve fold at elbow
- 7 Tolerance to elbow width
- 8 Adjust sleeve fold at wrist

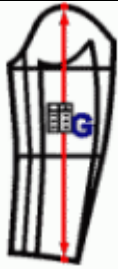
DA Underarm

- 9 Underarm seam relocation along the sleeve-head. The zero position is dependant on the **Option Seam relocation front...**
- 10 Underarm seam relocation at elbow
- 11 Underarm seam relocation at wrist
- 12 Adjust seam length difference
- 13 Move notches along the underarm seam
- 14 Length of curve smoothing section at the underarm

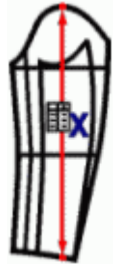
DA Elbow

- 15 Adjust elbow dart. This drag cursor is only active if the wrist width is calculated from the body measurement upperarm width, see explanation on drag area **Finished measurement**.
- 16 Elbow seam relocation along the sleeve-head
- 17 Elbow seam relocation at elbow
- 18 Elbow seam relocation at wrist
- 19 Adjust seam length difference
- 20 Move notches along the elbow seam
- 21 Length of curve smoothing section at the elbow seam

Picture 13-19

Option Set sleeve length ...

If this option is active, the sleeve length is a result of the arm length body measurement. It can be adjusted with drag point 4 (Picture 13-9) in the *Line relocation* drag area. The elbow line does not change during this adjustment.



If this alternative option is active, the sleeve length is adjusted interactively with drag point 4 and break sizes. In this case, the position of the elbow line is also altered.



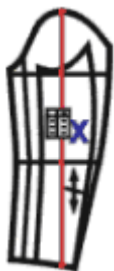
After shaping the hem curve, the actual sleeve length is automatically corrected. The hem is transformed to the set sleeve length and the underarm seams are lengthened or shortened correspondingly. However, in the *Hem* drag area, this correction is de-activated. It is carried out after changing the drag area or after quitting the interactive menu.

Option Seam relocation front ...

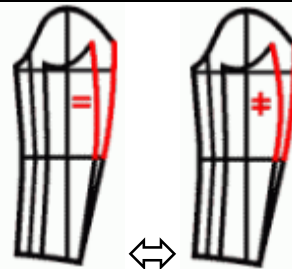
Depending on the setting of this option, the zero position for drag point 8 (Picture 13-19) is calculated either from the lower point or from the side seam of the bodice or from the underarm seam.

Option Automatic adjustment of hem position...

The length of the grain line (green line) corresponds with the actual sleeve length. After having shaped the hem curve, the actual length may differ from the sleeve length set with drag point 4.



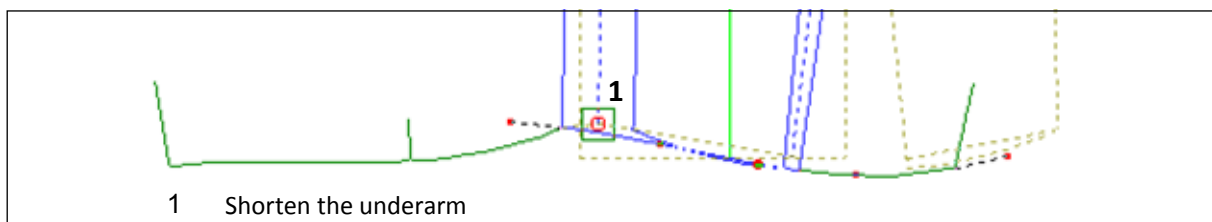
After shaping the hem curve, there is no automatic adjustment of the actual sleeve length. The sleeve length must be adjusted with drag point 5 if required.

Option Elbow seam contour identical ...

Depending on the setting of this option, an additional drag point for shaping of the elbow seam appears.

Drag area Hem

After quitting this drag area, the hem curve is automatically transformed to the set sleeve length if applicable; see explanation on the two options for sleeve length at the top of this page.



Picture 13-20

Option Hem as curve sequence ...

If this option is active, the hem is shaped as a curve sequence.



If this alternative option is active, the hem of the underarm is a straight line and only the upper arm hem can be shaped.

13.3 Additional functions for adjusting interactive constructions

The adjustment of interactive constructions has already been explored in sections 2.4 'Adjust interactive construction' and 11.2 'Size-dependent adjustment of interactive constructions'. This section deals with additional functions in the menu for interactive constructions.

Menu for interactive constructions

load shape ▪ save shape

set break sizes

raster

+/-magnet ▪ +/-ruler

+/-comments ▪ +/-options ▪
+/-values

+/-measurements ▪ set measurements

+/-compare ▪ set comparison

+/-stack ▪ set stack

alteration steps

original state ▪ undo alteration step ▪
redo alteration step


end ▪ abort


help for construction




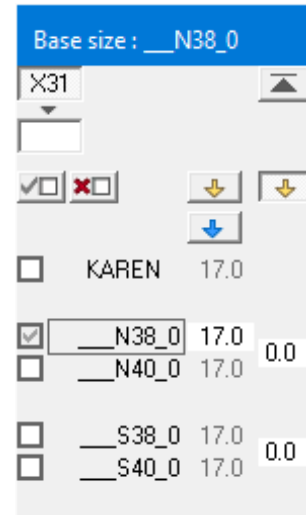
The value window

The value window (Picture 13-21) contains the x value settings for the active drag point. All activated break sizes in the active drag area are displayed and can be adjusted.

With the **left button**  **individual sizes** can be dragged. Changes made to one size are not applied to other sizes. The grade rules are altered.



With the **right button**  **sizes of a figure type** can be adjusted simultaneously. Alterations are automatically applied to all sizes of the respective figure type. The grade rules remain unchanged.

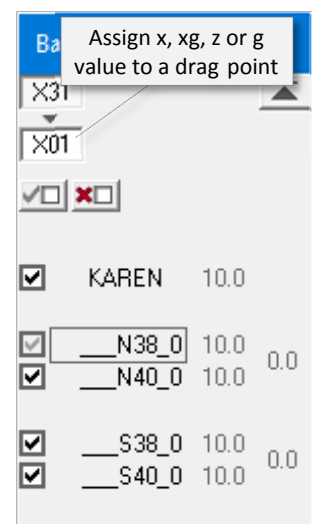
With the **button**  **all break sizes** can be altered simultaneously. Adjustments are automatically applied to all break sizes. The grade rules remain unchanged.



Picture 13-21

From Version 12 onward, selected drag points can be assigned x, xg, z or g values. In this case, an additional input option appears, see Picture 13-21. If an x, xg, z or g value is entered, this drag point is connected with this value and can no longer be altered interactively. Removing the entry also removes the connection.

If a value is entered into the input window for **x, xg, g or z values**, the buttons  and  are hidden, Picture 13-22. After having deleted the parameters from the input window, the buttons reappear.



Picture 13-22

The other elements of the value window have the following significance:

	With this drag point, a single x value is adjusted.
	With this drag point exactly two x values are adjusted, e.g. the x and y co-ordinate of a free moving point. The settings for only one x value are visible at a time.
	Minimise/maximise the window
	Show all sizes.
	Hide all sizes except the active size.
<input checked="" type="checkbox"/>	Base size of the construction
<input type="checkbox"/>	This size is hidden. Clicking on the tick box in front of the size shows the size again.
<input checked="" type="checkbox"/>	The size is shown. Clicking the tick hides the size.

Use of set stack

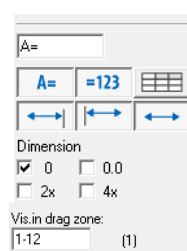
The *stack* function can be used for interactive adjustment of a graded nest. After clicking on *set stack* the stack point and then, optionally a direction point are determined. If no direction point is required, simply use the right mouse button after having set the stack point.

Clicking on *+/-stack* activates or deactivates the nest. All drag points can be adjusted on a stacked nest. Grafis takes into account the shift caused by stacking.

Dimensioning an interactive construction

A number of dimensions are already shown on an interactive construction. In practice however, other special company-specific dimensions are required. Therefore, Grafis offers the option of setting your own measurements which are altered immediately during interactive modification of the construction.

With the dimensioning function you can set your own measurements which are altered immediately during dragging.



Picture 13-23

Dimensioning ensues analogous to measuring, described in section 7.1. Additional options exist for each measurement, see Picture 13-23.

Display options:	
	text for measurement
	show/hide text
	show/hide value
	show/hide left auxiliary line
	show/hide right auxiliary line
	show/hide measurement line
	clicking turns measurement into ID measurement . ID measurements are saved with the shape.
Vis. in drag zone: (1)	In which drag areas are the measurements to be shown?

The **ID measurement** button ensures that a measurement is automatically entered into the comments of the construction and saved as a measurement table when saving the shape. This table appears in the preview window when loading a shape. The *ID measurement* button remains inactive if the measurement has been attached to points which are not part of the interactive construction. For example, if you are interactively adjusting a pocket you can set measurements for the underlying bodice construction. These measurements for the bodice cannot be entered as an ID measurement as they do not describe the pocket shape and may be changed when loading a different shape.

Measurements can also be set for a comparison part. For example, if you want to make a modification during which a measurement is not to be altered, proceed as follows: first, set a comparison and switch to *+compare*. Position the comparison part suitably with <F3> and <F5>. Set measurements for the comparison part and the original part. Carry out the modifications. Measurements for the comparison part are reset when quitting the drag menu.

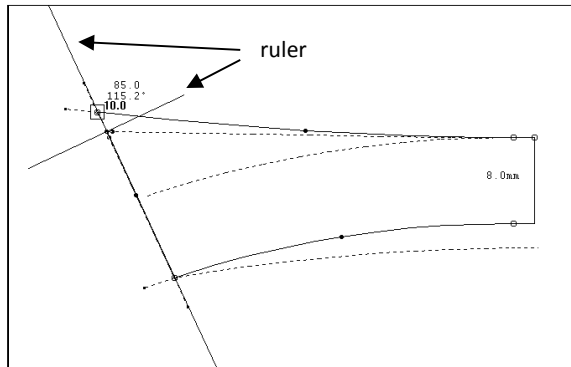
Measurements can be printed via *Edit* → *Copy* to the clipboard.

Use of ruler

Toggle to *+ruler* displays the ruler. It consists of two lines at a right angle, one line is very long and the other considerably shorter.

Clicking with pressed down mouse button...

- at the short line moves the ruler
- at the long line rotates the ruler.



Picture 13-24

When moving and rotating the ruler it is automatically attracted by neighbouring lines and points. You can set the ruler onto a point and adjust it along a line.

Free moving drag points  **can only be moved in the direction of the ruler with active ruler.**

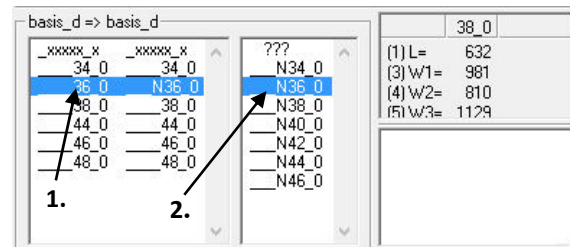
In Picture 13-24 the ruler was set onto the collar point and adjusted. The drag point collar point can now only be moved along the ruler. Thus, the collar point has been lengthened by 10mm without altering the collar angle.

Load and save shapes

The adjustments of an interactive construction are saved in the corresponding x value list. This list is invisible for the user, it is updated automatically by Grafis. Clicking on *save shape* saves this x value list together with a preview, the comments and the previously explained ID measurements.

The name of the shape is created from the date, the time as well as the computer and user names. They are saved as single XWF files under \Grafis\Forms\[name of construction].

Clicking on *load shape* opens the list of available shapes of the construction. All shapes stored as XWF files under \Grafis\Forms\[name of construction] are offered. Clicking onto a shape with the right mouse button opens the context menu with the functions **rename** and **delete**. Use the rename function in particular to organise your list of shapes.



Picture 13-25

Shapes can be loaded for other break sizes and also into styles of other measurement systems. The **break sizes of the shape** may have to be **reassigned**. If you want to load a shape, which has originally been adjusted for sizes _38 etc. the break sizes can be reassigned, see cutting in Picture 13-25. The construction is graded in size N42 as originally in size _42.

ID measurements set with *dimensioning* as well as **comments** are saved with the shape. The field for entry of notes opens by switching to *+comments* in the menu on the right hand side.

For new developments, first load the basic construction and then, one of your prepared shapes. This combination of interactive construction and new shape can be entered into the call list, see section 13.5.

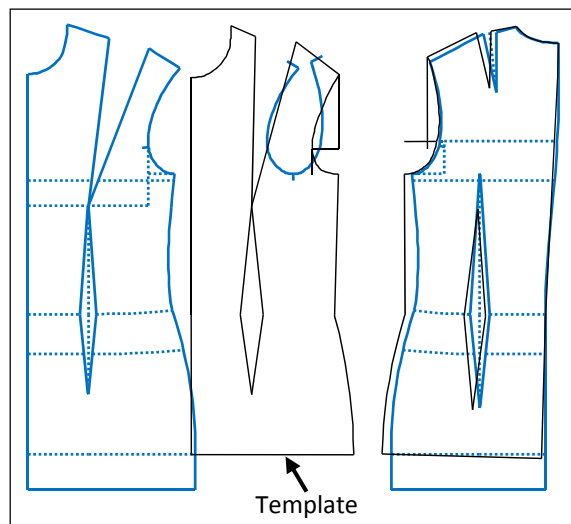
13.4 Reconstruct a digitized template pattern with an interactive construction

Step-by-step guide

- ⇒ Call the digitised template pattern and the interactive construction into different parts
- ⇒ Position the parts to one another with <F3>, e.g. at the zero point of the interactive construction
- ⇒ Activate the interactive construction
- ⇒ Adjust the most important options
- ⇒ For front/ back constructions: activate the drag area *Positioning* and move the front and back towards one another. Use the magnet function.
- ⇒ Roughly adjust the most important drag areas, e.g. in the bodice constructions *Tolerance horizontal+vertical* and *Line relocation*. Start with the symmetrically movable drag points.
- ⇒ Carry out the fine adjustment systematically and step-by-step. Save significant stages as shapes and rename the shape if required. Click on ← or → in the menu on the right to undo or redo step-by-step.

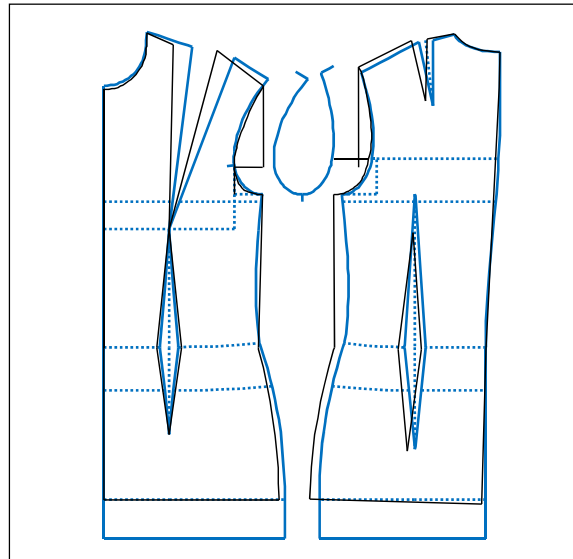
Reconstruct a proven bodice construction

Load the proven bodice construction and the interactive bodice construction you want to adjust into different parts. Position the parts to one another with <F3>, e.g. at the zero point of the interactive construction. Activate the interactive construction and adjust the most important options having clicked on *+options*, e.g. the position of bust dart and shoulder dart (Picture 13-26).



Picture 13-26

For front/back constructions activate the drag area *Positioning* and move the front and back towards one another (Picture 13-27).



Picture 13-27

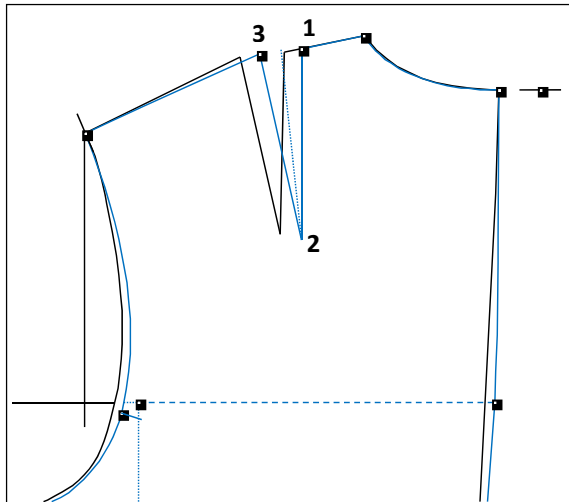
Use the **magnet function** by switching to *+magnet*. The magnet function applies to move points which will attach to existing points and lines of the construction in the background. The magnet function does not make sense for angle or percentage alter.

First, adjust the most important drag areas. In the bodice constructions this is first of all the area *Tolerance horizontal+vertical*. Adjust the tolerances for bust, waist and hip area. Then, switch to the *Line relocation* area and adjust the position of bust line, waist line, high hip and hip line. Then, switch to the *Side seam* drag area and relocate the lower armhole point. This drag point is situated at the armhole/ side seam corner in the back. The same point in the front relocates the side seam.

Adjust step-by-step:

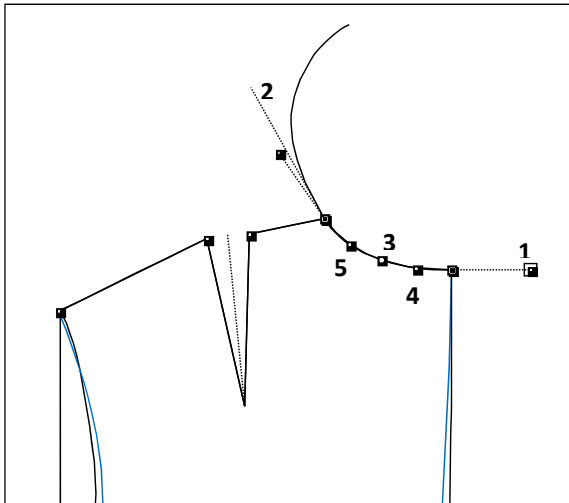
- in the *Tolerance horizontal+vertical* drag area the neck point in front and back
- in the *Bust dart* drag area the position of the bust point with *+magnet*, the position of the left dart line and the suppression angle
- in the *Shoulder* drag area the shoulder angle in front and back
- in the *Tolerance horizontal+vertical* drag area the tolerance for shoulder width in front and back.

... with a result according to Picture 13-28.



Picture 13-28

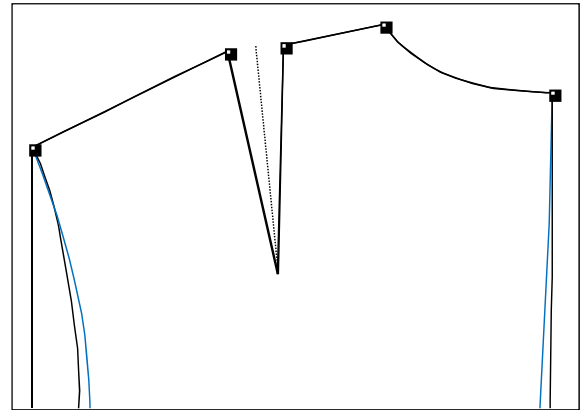
The back dart is adjusted in the *Shoulder dart* drag area (Picture 13-28). First, move the back dart with point '1', if required using *+magnet* then, point '2' and then the suppression angle with point '3'. If required, readjust the shoulder angle in the *Shoulder* drag area with a result according to Picture 13-29.



Picture 13-29

To adjust the neckline switch to the *Neckline* drag area and zoom into the back neck. In this area you can adjust dropped and widened necklines. Adjust the neckline shape by first adjusting the directions with points '1' and '2' then, reconstruct the superior central shape point '3' with *+magnet* and then, adjust the inferior auxiliary points '4' and '5'.

If you adjust interactive curves again first reset all shape points (points 3 to 5 in Picture 13-28) to 0 by e.g. selecting Raster 10 and clicking on the points. Then, readjust the directions at the beginning and end of the curve, set the raster to 0, activate magnet and readjust the shape points 3 to 5.



Picture 13-30

The result of these adjustments can be seen in Picture 13-30, where the side seam, the waist dart and finally the armhole are still to be adjusted.

Please note that after having adjusted the base size, the grading in the break sizes also has to be reconstructed from the template.

Grafis users of Versions 8 and earlier can reconstruct existing proven constructions in this way and save them as shapes.

An interactive construction can be entered into the call list together with a new shape, see the following section 13.5.

13.5 Designing the call list

Step-by-step guide

- ⇒ *call*; the dialogue *Grafis Basic blocks / Modules* opens
- ⇒ Activate *Edit* → *Edit mode*
- ⇒ Create folders/subfolders
- ⇒ Enter construction as programming language program, style, grade rule pattern or as an interactive construction in conjunction with a shape
- ⇒ Design the corresponding file card pictures and the text. The edit functions are opened respectively via the context menu.

Create new folder/subfolder

Click on *General* with the right mouse button and select *Create new folder* and enter 'my skirts'.

NB: Do not create a new folder with the name 'Grafis-...' and do not create entries or subfolders in these folders. Your data may be overwritten during a subsequent update.

Data types in the call list

The following can be entered in the call list:

- style (.MDL) = Grafis style with all parts
- program (.CPR) = Grafis programming language program of the new programming language, see Chapters 19 and 20. If this is an interactive construction, a shape can be assigned for calling.
- program (.PRG) = Grafis programming language program of the old programming language
- grade rule pattern (.SWS) = Grafis grade rule pattern saved as a template, see Chapter 16.

From Version 10, the module combination is no longer required. Use the option *save part module*, see Chapter 14 and enter the modules as styles (.MDL).

Now, create a new folder for your skirts by clicking onto *General* with the right mouse button and then click on *Create new folder*. Call the new folder 'my skirts'.

Now, create the new entry for *Skirt 20* in conjunction with the shape 'SkirtStandard'. Click on 'my skirts' with the right mouse button and select *Create new entry*. The dialogue *Insert Modules* opens (Picture 13-32). Set the button to *Basic block* and select the CPR file for *Skirt 20*, here *GraPrg_GK_RO_c002_03.cpr* and close with *OK*. Call the entry 'SkirtStandard'.

Assign *Skirt 20* with this particular shape by clicking on the new entry with the right mouse button and selecting *Set shape*. The shapes are saved centrally under \Grafis\Forms\[name of basic block]. In this particular case, select \GRAFIS\FORMS\GraPrg_GK_RO_x002_01\skirtstandard.xwf.

Unless you create a duplicate in the following dialogue, you must never rename or delete the selected shape. A duplicate is saved in the directory of the link file. Enter an appropriate image and a short descriptive text for the new entry.

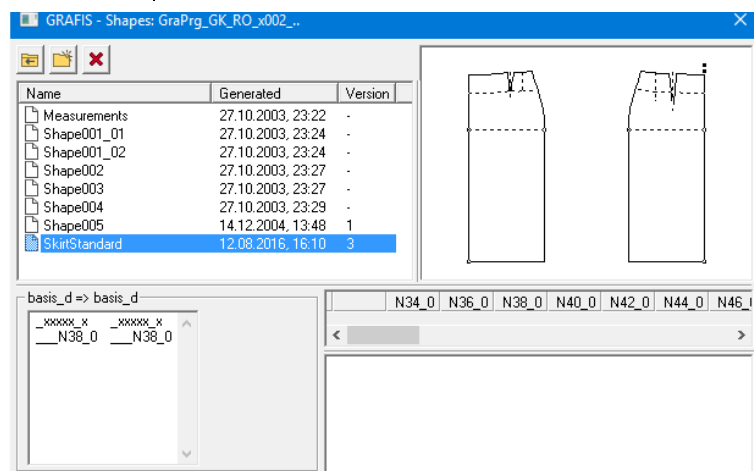
Insert entry as style

Entering styles into the call list is useful for basic types, which are frequently used as basis for style developments. Grafis transfers all parts of the style when called and inserts them into the edited styles. Create a Grafis style with a number of parts and enter it into the call list. The process is identical to *Create entry from basic block and shape* explained before, only in the *Insert Module* dialogue the button is to be set to *Style (.MDL)*, see Picture 13-32. Linking with a shape is not required.

Entering grade rule patterns in the call list ensues in the same way.

Create entry from basic block and shape

Save a shape 'SkirtStandard' for *Skirt 20*, in which the side seam adjustment has been reset and the two 2nd darts in front and back have been closed respectively, see Picture 13-31. Now, an entry for *Skirt 20* in conjunction with this skirt shape is to be saved in the call list. First, determine the name of the CPR file for *Skirt 20*. Activate *Edit* → *Edit mode* in the call list. Click on *Skirt 20* with the right mouse button and *Open link file with editor*. You will find the name of the CPR file for *Skirt 20* in the first line.



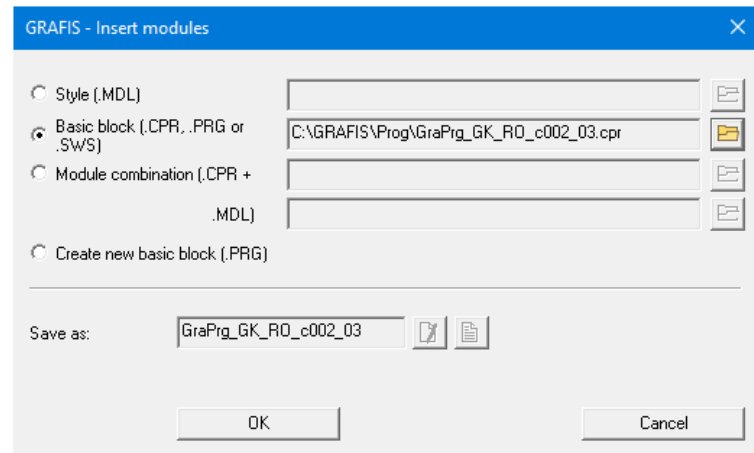
Picture 13-31

Graphics and text for the list entry

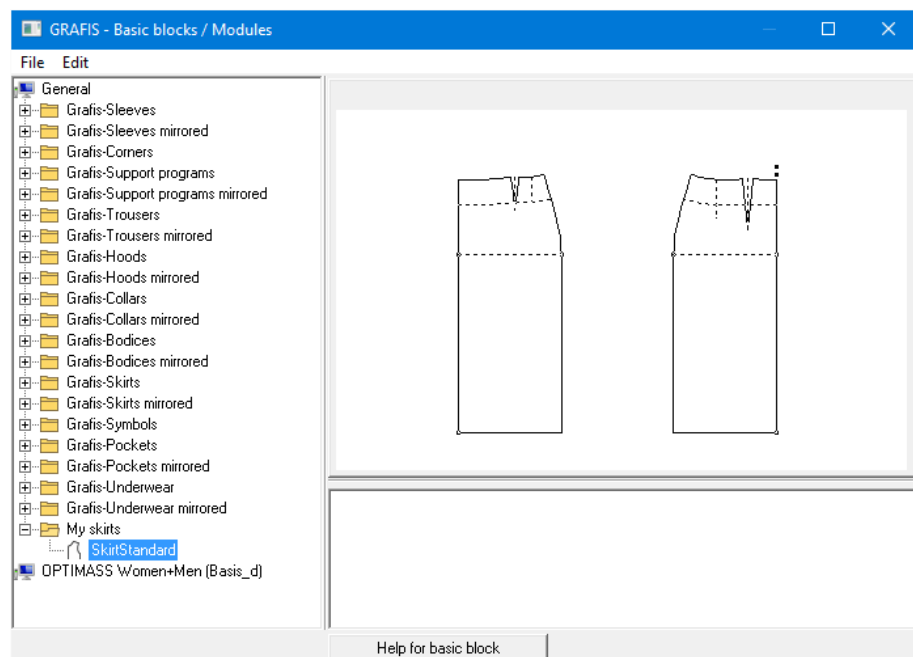
In active *Edit mode*, graphics or text can be opened for editing via the respective context menu. The graphic must be saved as a .bmp, .gif, .jpg, .tif or .png. We recommend a size of 750x500 pixels.

A new or edited graphic or text appears only after new selection of the list entry.

A quick preview can be obtained via a print screen by pressing <Print/PrtSc> with slightly reduced pattern. Insert the screen print into Paint.



Picture 13-32



Picture 13-33

Chapter 14 Part organisation

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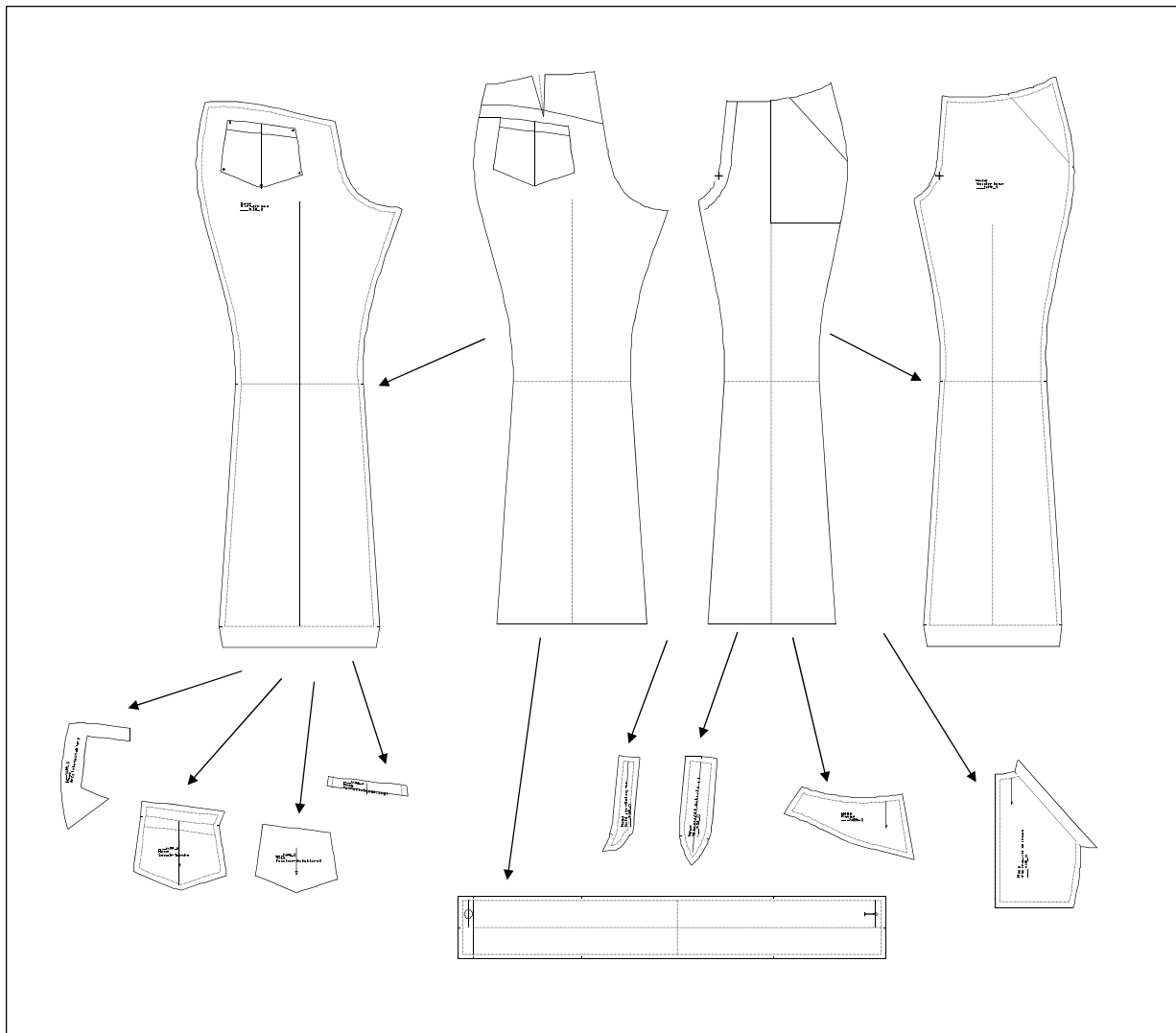
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Content of this chapter is working with parts, in particular the hereditary automatic and the differences between insert, duplicate and connection part. The section 'Modifying mother parts' is especially important as only certain modifications are permitted

for mother parts to protect the hereditary automatic.

A further large area is the application of 'Reset Clicks'.



14.1 Hereditary automatic

What does hereditary automatic mean?

The different parts of a style must fit together taking into account their interdependence. Grafis ensures this by building an automatic heredity. If, for example, a waistband is to be designed to fit the parts 'skirt front' and 'skirt back', the waistlines of skirt front and skirt back can be inserted into the new part 'waistband' and the waistband can be constructed. When grading the waistband in different sizes the insertion of the waist lines is repeated automatically. We call this heredity of the waistlines to the part 'waistband'.

Heredity is realised with the functions of the insert menu.

Inserting (heredity) always ensues into the active part out of parts with lower part number.

Grafis records the hereditary steps and displays the hereditary structure in the part organisation menu. The hereditary structure is arranged to generations.

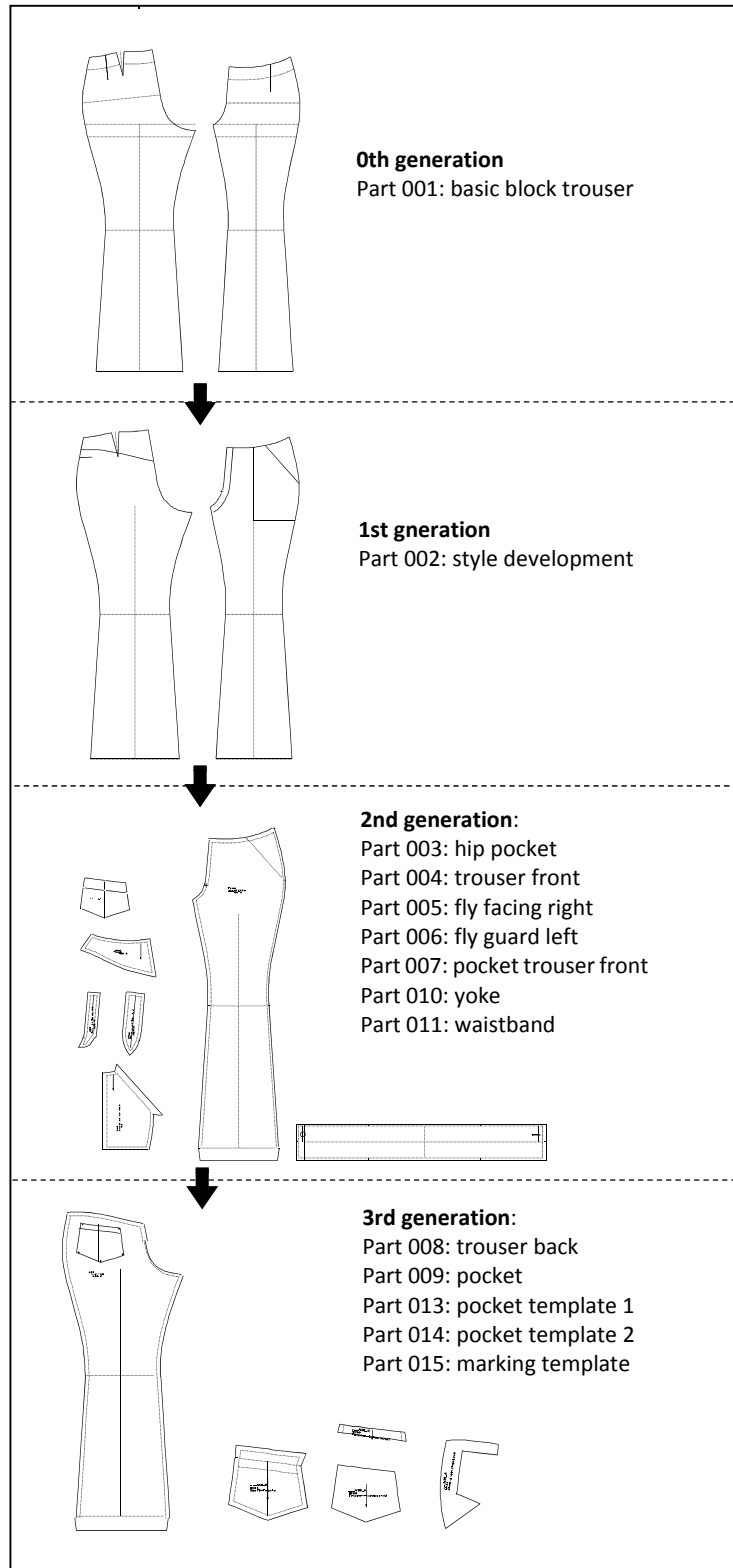
The heredity

Picture 14-1 elucidates the principle of heredity using the style 'Trousers with flared hem' as an example.

Part 001 contains the basic construction *Trouser 10*, which has been adjusted interactively.

All lines and points of the basic block were inserted from part 001 into part 002 'style development'. Thus, part 002 has become a part of the 1st generation. Part 001 has become a **mother part**. Alterations to part 001 are automatically transferred to part 002. The style was developed in part 002 with the use of x values.

The pocket module with a number of parts has been loaded into part 003. The pocket programme belongs to part 003 'back pocket'. In this part, the position, size and shape of the pocket are adjusted interactively. The parts of the 3rd generation 008, 009, 013, 014 and 015 are dependent on the pocket in part 003 and are therefore daughter parts of part 003. Part 003, in itself a daughter part has now also become a mother part. Particular rules apply for alterations to mother parts, see Section 14.4.



Picture 14-1

In part 004 'trouser front' all lines and points for the production pattern trouser front were transferred with *insert* and the trouser front was completed. Thus, part 002 has become mother part for part 004. Part 004 is now the **daughter part** of part 002 and therefore, indirectly related to part 001.

No	Part name	RS	Obj	M	Description	Cat	Source style
* 001	basic block trouser	1	66				
* 002	style development	100	120				
* 003	back pocket	1	16				
004	trouser front	42	23	0 1+1			
005	fly facing right	36	9	0 1+0			
006	fly facing left	44	13	0 1+0			
007	pocket trouser front	33	16	0 1+1			
008	trouser back	22	28	0 1+1			
009	pocket	44	7	0 1+1			
010	yoke	26	10	0 1+1			
011	waistband	111	32	0 1+0			
012	=====TEMPLATES=====						
013	pocket template 1	28	8	S 1+0			
014	pocket template 2	18	5	S 1+0			
015	marking template	20	6				
016	NN						

Generation	Part No	Part Name
00	001	basic block trouser
01	002	style development
02	003	back pocket
02	004	trouser front
02	005	fly facing right
02	006	fly facing left
02	007	pocket trouser front
02	010	yoke
02	011	waistband
03	008	trouser back
03	009	pocket
03	013	pocket template 1
03	014	pocket template 2
03	015	marking template

Picture 14-2

Alterations to part 001 are first transferred to part 002 and then further to part 004.

All other parts of the 2nd generation (Picture 14-1) were also derived by inserting lines and points from the style development in part 002.

Hereditary information can only be passed on to parts with a higher part number.

The hereditary structure

For presentation of the hereditary structure the parts are divided into generations. The following applies:

A daughter part automatically receives a generation number at least 1 up from the mother part.

This rule ensures that a part of the 3rd generation can carry hereditary information of the 0th, 1st and 2nd generation, only.

Picture 14-2 shows the *part organisation* dialogue for the example 'Trousers with flared hem'. An overview of interdependencies between the parts, also called hereditary structure, appears on the file card in the lower window. All parts of a generation are combined in a part block. Part 001 belongs to the 0 generation (first part block). It is marked with generation number '00' in the list of parts. Part 002 belongs to the 1st generation with generation number '01' and so on.

In the hereditary structure the active part is highlighted. Ancestors and successors are highlighted in grey. Parts without relation to the active part are not highlighted.

Clicking a part number in the hereditary structure activates the part. Thus, the user gets a quick overview of the hereditary structure of the parts.

Grading a number of parts

The functions *test run* and *grading* in the basic menu apply to the active part, only. Grafis also offers the option to calculate (*test run*) or grade all parts of the style or the successors of the active part, only. These functions can be found in the *Grading* pull-down menu. In this menu you can choose between:

Test Run Active Part

Test Run Successor Parts

Test Run All Parts

and

Grade Active Part

Grade Successor Parts

Grade All Parts

Exercise

Construct the 'Trousers with flared hem' shown in Picture 14-1. Organise your part list according to Picture 14-2. Call *Trouser 10* into part 001 and adjust the following interactively:

- contour identical side seams
- adjust waist at side seam
- no shaped seat seam

In the *Tolerances* drag area:

- tolerance at waist: 15mm
- tolerance at hip: 20mm

Apart from the base size N38, also enter sizes N40 and N42 into the size table and activate them.

In the *Finished measurement* drag area enter the break sizes N38 and N42 and adjust:

	size	value
knee width	N38	391
	N40	400
	N42	409
hem width	N38	515
	N40	520
	N42	525

In the *Line relocation* drag area:

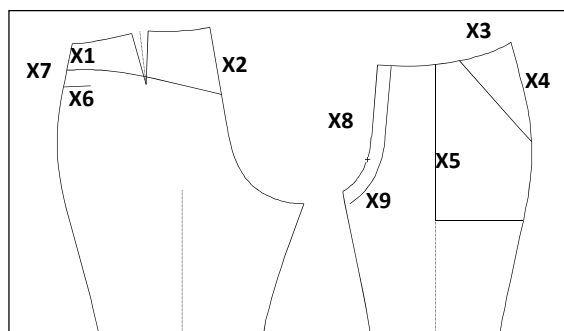
- waist relocation: -50mm

In the *Dart front* area close the dart. In the *Dart back* area close the second dart and move the first dart to 50% of the waist. In the *Waist and waist edge* area reduce the centre front by 30mm (to -30mm). In the *Hem* area set the hem position to 0mm.

Insert all lines and points from part 001 into part 002. Activate part 002, select *parts* in the *insert* menu and click on an object from part 001. Part 001 is selected and is inserted into part 002 after having clicked on *without transformation*.

Create the following x values in part 002 and design the trousers, using the x values (Picture 14-3):

- x1 yoke ss from waist in mm
_xxxxx_x = 40.000
- x2 yoke CB from waist in mm
_xxxxx_x = 100.000
- x3 pocket position waist from ss in %
_xxxxx_x = 40.000
- x4 pocket position ss from waist in mm
_xxxxx_x = 150.000
- x5 pocket length in mm
_xxxxx_x = 230.000
- x6 back pocket position from ss in mm
_xxxxx_x = 40.000
- x7 back pocket position from waist in mm
_xxxxx_x = 65.000
- x8 zip length in mm
_xxxxx_x = 140.000
- x9 fly facing width
_xxxxx_x = 30.000



Picture 14-3

Now, start extracting the pattern pieces from the style development in part 002. Open a new part for the trousers front and insert the objects of the trousers front from the style development. Create global x values for general seam allowance and the hem respectively:

GLOBAL x-values

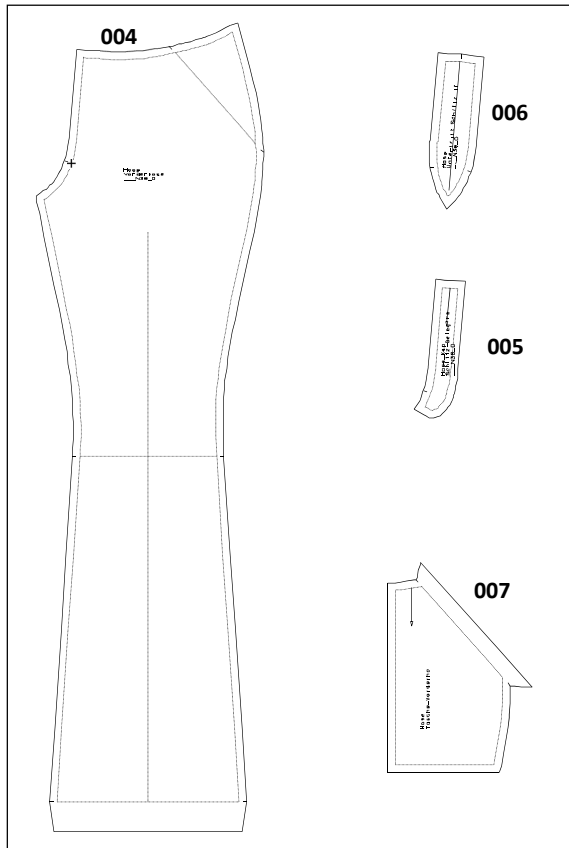
- x1 seam allowances in mm
_xxxxx_x = 10.000
- x2 hem in mm
_xxxxx_x = 30.000

Construct the seam allowance and the hem with xg1 and xg2. Create the mirrored hem corners with the corner tool *Corner 10*.

Construct the fly facing and the fly guard in the same way. Insert the lines of the pocket into a new part and construct the seam allowances and the facing (Picture 14-4). You can also use the part assistant for generating the production pattern pieces.

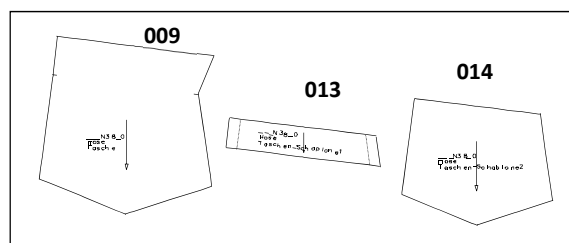
Leave part 002 'style development' visible. Call the *Grafis-Pockets* → *without lining* → *patched* → *Facing* → *001* into part 003. The first positioning point for the pocket is the end of the auxiliary line of the trousers back in the style development. Adjust the pocket

and its grading interactively. The pattern pieces for the pocket (parts 009, 013, 014 in Picture 14-5) were generated automatically by the pocket module. After having adjusted the pocket, start *test run all parts*. Insert the lines for the yoke from the style development. Close the dart with *insert with transformation turn and move*. Link the yoke line with the *Link 10* tool.



Picture 14-4

Construct the waistband with the help of z values. Create an x value for the waistband height. Then, construct the marking template for the back pocket. Start *test run all parts* and *grade all parts*. Modify an x value in the style development. After *test run suc-*



Picture 14-5


cessors, the modification will be transferred onto all related parts (successors).

14.2 Part organisation

The basics of part organisation were introduced already in section 3.1. In this chapter all information on part organisation is collated.



Clicking on a part in the part rack, a part number or a part text in the part list or clicking on a part number in the hereditary structure **activates this part**. It is highlighted with a yellow bar in the part list and marked in yellow in the part rack. The part can be processed after having quit *part organisation*. When activating a mother part (see Section 14.4) a warning message appears in the status bar.

Clicking on **open** or  in the part list creates a new part with the name 'NN' and the next highest number after the last part. The new part is active straight away.

Clicking on **insert** generates a new part before the selected part.

Duplicate or **duplicate with successors** creates a copy of the active part and all daughter parts, see section 14.3.


After **delete** and a security question the record steps of the selected part are reset to 0. The last part in the list is reset and removed.

Removes an empty part (with 0 record steps) from the part list. The following parts move up in the list.

With **reduce** the active part is graded in the sizes of the size table and 'frozen' in this state. Having reduced a part, it no longer has any dependency to mother parts, has no x values and no record steps. Daughter parts remain unchanged. Uses **reduce** only after speaking with a Grafis expert.

With the function **hide all** all parts apart from the active selected part are removed to the background memory. Hidden parts are no longer visible on screen, but are not deleted.

It is recommended that only parts required for work are visible on screen.

Individual parts can be called from the background memory to the screen by clicking in the  column. Clicking **show all** recalls all removed parts from the background onto the screen. Via the button **show parts** pattern development parts, construction pattern pieces, mother parts of the active parts, daughter parts of the active part or parts of a selected material can be called.

With the functions **insert connection** and **update connection** parts from a different style are inserted, see section 14.3.


Edit → Copy (clip board) copies the part list to the clipboard.


Clicking **print** starts printing the part list, provided the printer is switched on.


Activating **text** and clicking a part in the list allows for editing the part text. After <ENTER> entry can continue with the next part text. A part text can be edited, also with double-click on the text. In this case, <ENTER> does not switch to the next part text. Take care of your part names. This makes your work easier and avoids mistakes.


With the function **save part module**, the selected parts are saved as a module. When saving a part module, the system checks which parts must be saved in addition to ensure a correct hereditary structure when calling the module. Possible 'click' connections to mother parts are automatically reset. Modules saved in this way can be stored in the call list, see Section 14.5, Example 3.

With **call part module**, the modules can be called into new or existing styles.

 **piece parameter** opens the file card for piece parameters relevant for the layplan (see Chapter 17)

 **text box** opens the file card in which comments on the selected part can be stored.

 **exchangeable parts** opens the file card for determination of permitted sizes in the part, see separate explanation in Chapter 18.13.

 opens the overview of the **hereditary structure**.

The number of parts per style is limited to 500. The active part is displayed in blue on a white background. Only this part can be edited. All other parts remain unchanged.

14.3 Difference between the functions of the menus insert and duplicate/connection part in the part organisation

The most important differences

Basic menu → insert... performs a hereditary step between two parts. Grafis automatically repeats this hereditary step when grading other sizes. The source part becomes a mother part and the target part becomes a daughter part.

Part organisation → duplicate ... creates a copy of a part in the same generation. Existing relations to mother parts remain intact. The part is gradeable in the same way as x and z values are also duplicated. The daughter parts are not duplicated! The part has no daughter parts after duplication. The **duplicate** function can be found in the part organisation menu.

Part organisation → insert connection part(s) ... transfers parts from another style. This function can also be found in the **part organisation** menu. When inserting a connection part, the switch **insert with complete record** decides whether or not the part is inserted with its complete construction record.

If this switch is set, at least the parts of the 0th generation can be graded unchanged, provided the global x values of source and target style have been aligned.


If the switch is not set, objects are only transferred in the existing sizes. Adding new record steps is not possible. These parts can be used for measuring, stacking and comparison.





Further information on connection parts can be found in the Textbook Chapter 18 'Layplanning II', section 18.1.

Part identifiers

The first column in the part list of the style contains an identification symbol with the following significance:

'*'	The part is a mother part, other parts depend on it.
' '(without)	No other parts depend on this part. It can be a daughter part.

The indicators in the fifth column  of the part organisation have the following significance:

	This is a connection part.
	This is a connection part. The source style is no longer available.
	This is a connection part. The part in the source style has been changed.
	The part is reduced.

When to use which function?

Insert without transformation is the most frequently used of the functions. It is always required when information from one part is to be passed onto another part. Use the alternative tools *Insert lines* or *Insert points* if the following construction is to be released and saved in the call list at a later stage.

Part organisation → *Duplicate* is used to create a copy of a part. The copied part serves either as a starting point for a new development variation or simply as a comparison for further changes. Modifications to x values are clearly visible when original and copy are displayed and placed on top of one another. The duplicated part can easily be deleted or reset step-by-step in the record.

Part organisation → *Insert connection* is used if temporary templates are required or if company-specific standard pieces are to be loaded.

14.4 Modifying mother parts

Organisation of the heredity

Each object (point, line, text) of a part has a Grafis internal name. When inserting objects into other parts Grafis relates to these internal names. When inserting a line out of part 003 into part 010 the internal Grafis record of part 010 reads for example: 'The 4th line out of part 003 is inserted.' A modification to the mother part 003 resulting in a changed or deleted 4th line can possibly lead to insertion of a completely different line when running through the record of part 010. All record steps relating to this inserted object could now be faulty. Part 010 appears damaged on screen. In this case the only cure is resetting the construction record of part 003 to the state before the modification. Therefore, the following applies: **Modifications in mother parts must not disturb the recorded hereditary steps.**

As a rule, each construction step which does not delete objects can also be applied to mother parts. After the modification the recorded construction must still be executable in a meaningful manner.

The following functions can be used for modifications without problems:

- *x values*
- *modification of curve shapes, see Chapter 9*
- *call*
- *attributes*
- *replace curve. After setting starting point and final point of the new curve, a green arrow appears. The curve to be replaced must be clicked in the direction of this arrow.*

Modifications with any other functions of the basic menu are to be applied with care as they can lead to errors.

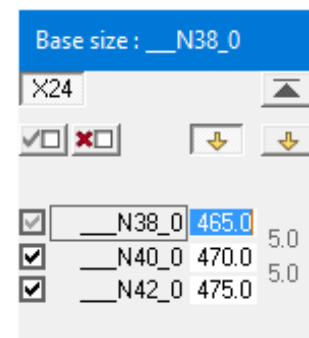
After each modification in a mother part, daughter parts have to be tested thoroughly with test run and grading! If errors occur, the record must be reset by the modification steps!

Typical alterations to the mother part

The style 'trousers with flared hem' from section 14.1 is altered as follows:

Modify interactive construction

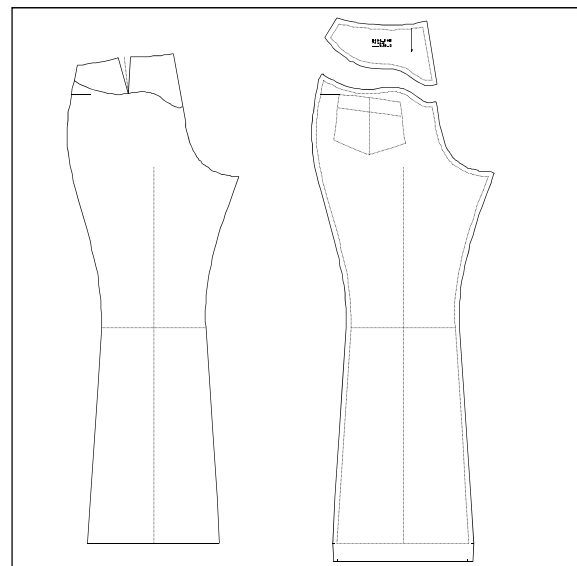
Change the hem width of the interactive trouser construction in part 001 from 515mm to 465mm in base size N38. The grade is to remain unchanged. After *test run successors* this modification has been transferred to the related parts 'trouser front' and 'trouser back'.



Picture 14-6

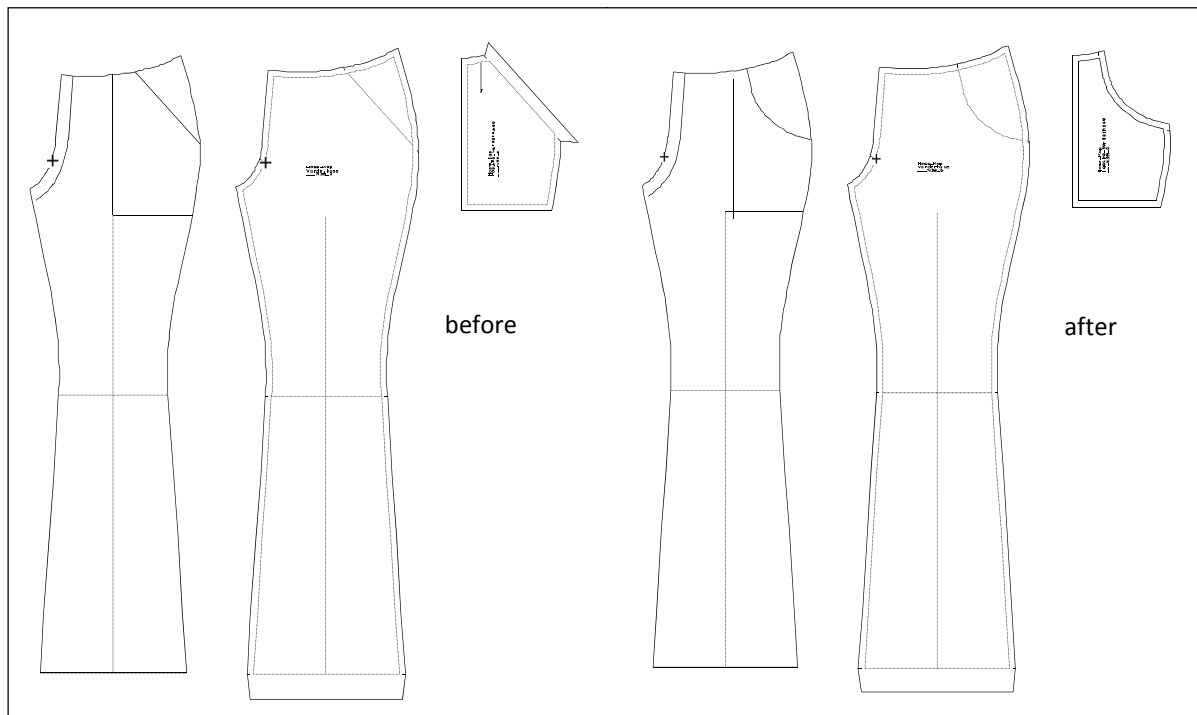
Curve correction

In part 002 of the style development activate the yoke curve of the trouser back and modify it interactively according to Picture 14-7.



Picture 14-7

After *Grading* → *Test run successors* the modified curve shape has been transferred to the production patterns 'trouser back' and 'yoke'.



Picture 14-8

Replace curve

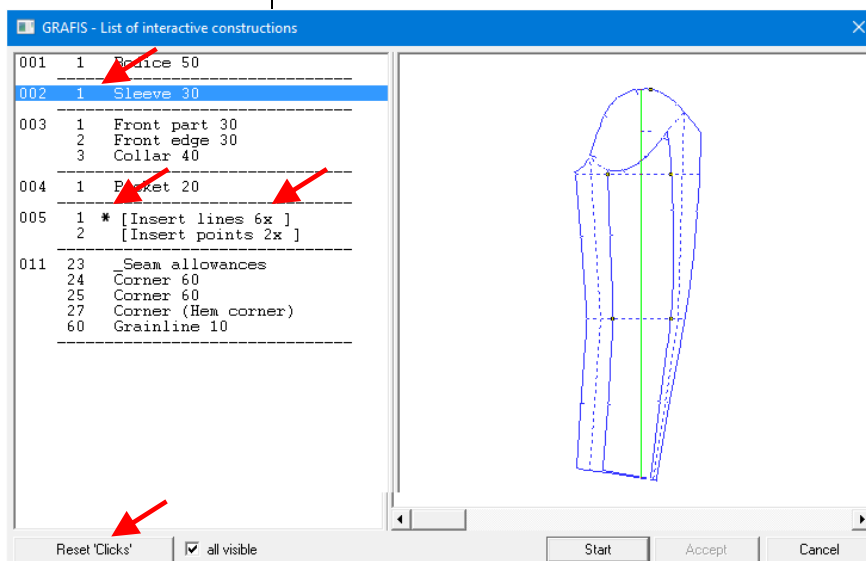
Change the pocket mouth of the trouser front from a straight line to a curve. In part 002 of the style development construct a new curve with replace curve, which is bound to the original pocket mouth with *intersection*. Having constructed the starting point and final point of the new curve, a green arrow appears.

The currently straight pocket mouth must be clicked in the direction of the green arrow. Shape the curve. After *Test run successors* this alteration has been transferred to the related parts 'trouser front', 'trouser back' and 'pocket trouser front'. The global x value $xg2$ 'seam allowance2' was used for the seam allowance at the pocket mouth. For the new shaped pocket mouth, adjust the seam allowance2 from 20mm to 10mm and let part 007 'pocket trouser front' be calculated again. The result of the modification is shown in Picture 14-8.

14.5 Reset 'Clicks'

From Grafis Version 10, all point, line and direction 'clicks' set within constructions from the call function can be reset and re-called. Binding the new 'clicks' ensues automatically during the next test run for the respective part.

The *Reset 'Clicks'* function can be found in the *List of interactive constructions* dialogue, accessible via the <F12> key or via the *Extras* pull-down menu, see Picture 14-9. The list in the window on the left contains all interactive constructions of the style and all non-interactive 'click' constructions. The non-interactive click constructions are indicated with []. The constructions are organised according to part number in



Picture 14-9

the first column and record step in the second column. In the right window, a preview of the construction selected on the left appears.

Select some constructions of the list, one after the other. The *Reset 'Clicks'* button is only active if the construction contains clicks. When calling a bodice, no objects had to be clicked. Therefore, the *Reset 'Clicks'* button remains inactive for these constructions.

Select a construction for which *Reset 'Clicks'* is active and click on the *Reset 'Clicks'* button a number of times. With each click, the mark '*' changes for this construction. The mark '*' indicates that this construction is available for *Reset 'Clicks'*. The clicks of the selected construction are reset with the *Accept* button. The respective parts have to be bound again onto the construction after a subsequent test run.

Call *Bodice 10* into part 001 and *Sleeve 30* into part 002. Adjust the bodice and the sleeve interactively. Open the *List of interactive constructions* via <F12>, select *Sleeve 30*, click once on *Reset 'Clicks'* and then, on *Accept*. Open *part organisation*. Part 001 is no longer marked as mother part for part 002 as resetting the 'clicks' has broken the hereditary interdependence. Activate part 002 and start test run. After a prompt, you can now bind the sleeve to the bodice again.

Reset 'Clicks' offers the following applications:

- 'Click' constructions can be bound onto the mother part again after having been altered.
- 'Click' constructions can be bound to an alternative part within the style
- chains of parts can be released and saved as modules containing a number of parts in the call list.

In the following, you will find four examples for new applications of *Reset 'Clicks'*.

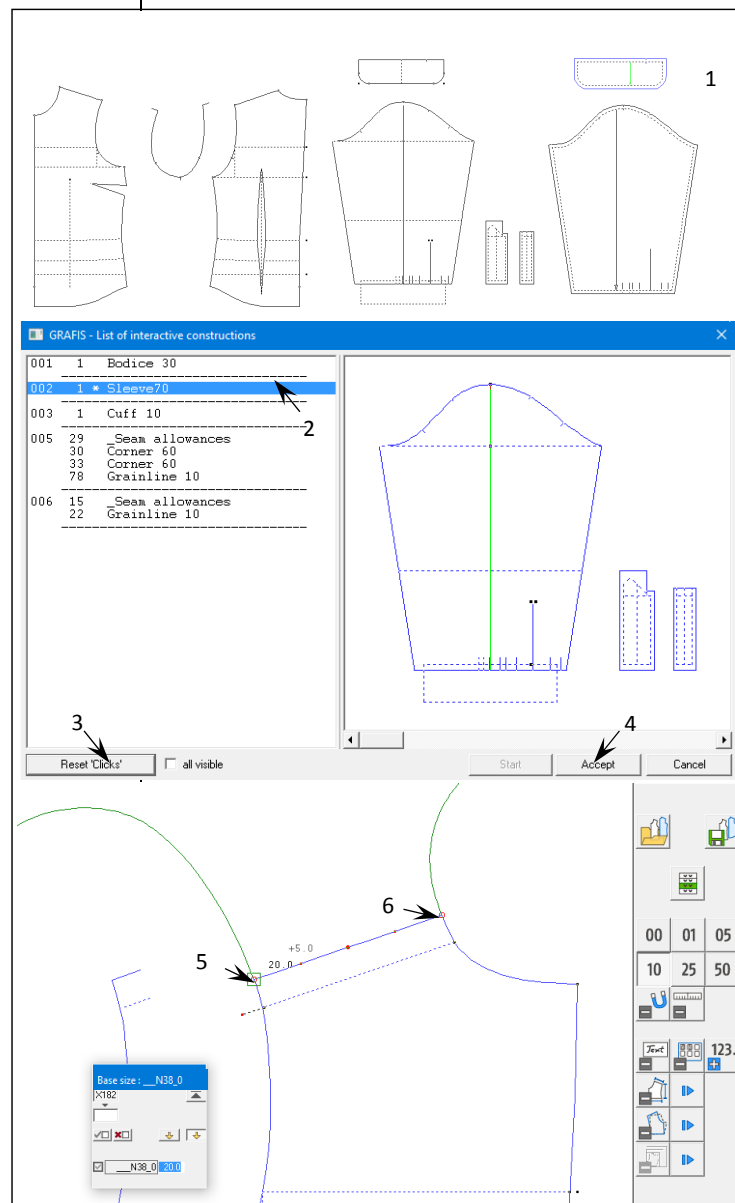
Example 1:

Bind 'click' construction onto mother part after alteration

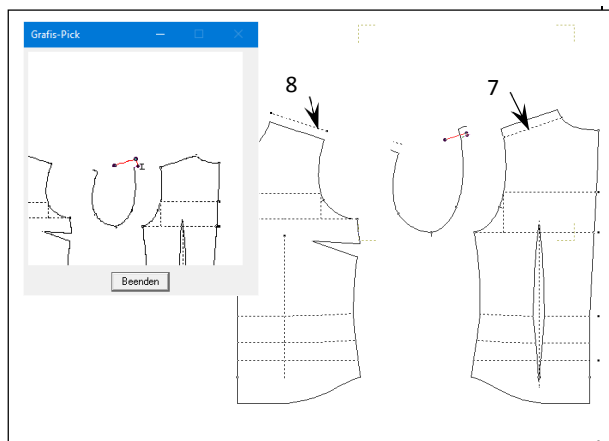
Sleeve 70 is bound to *Bodice 30*. The shoulder of *Bodice 30* had originally not been relocated, see Picture 14-10. Therefore, when calling the sleeve, no difference had been made between natural shoulder and shoulder line of the part. This is important for correct distribution of notches in the sleeve.

To bind the sleeve to the natural shoulder, the following steps are required:

- release 'clicks' of the sleeve,
- relocate the shoulder of *Bodice 30* towards the front,
- re-activate the part with the sleeve and bind the sleeve to the bodice again with test run. During clicking, the dashed natural shoulder is to be clicked.



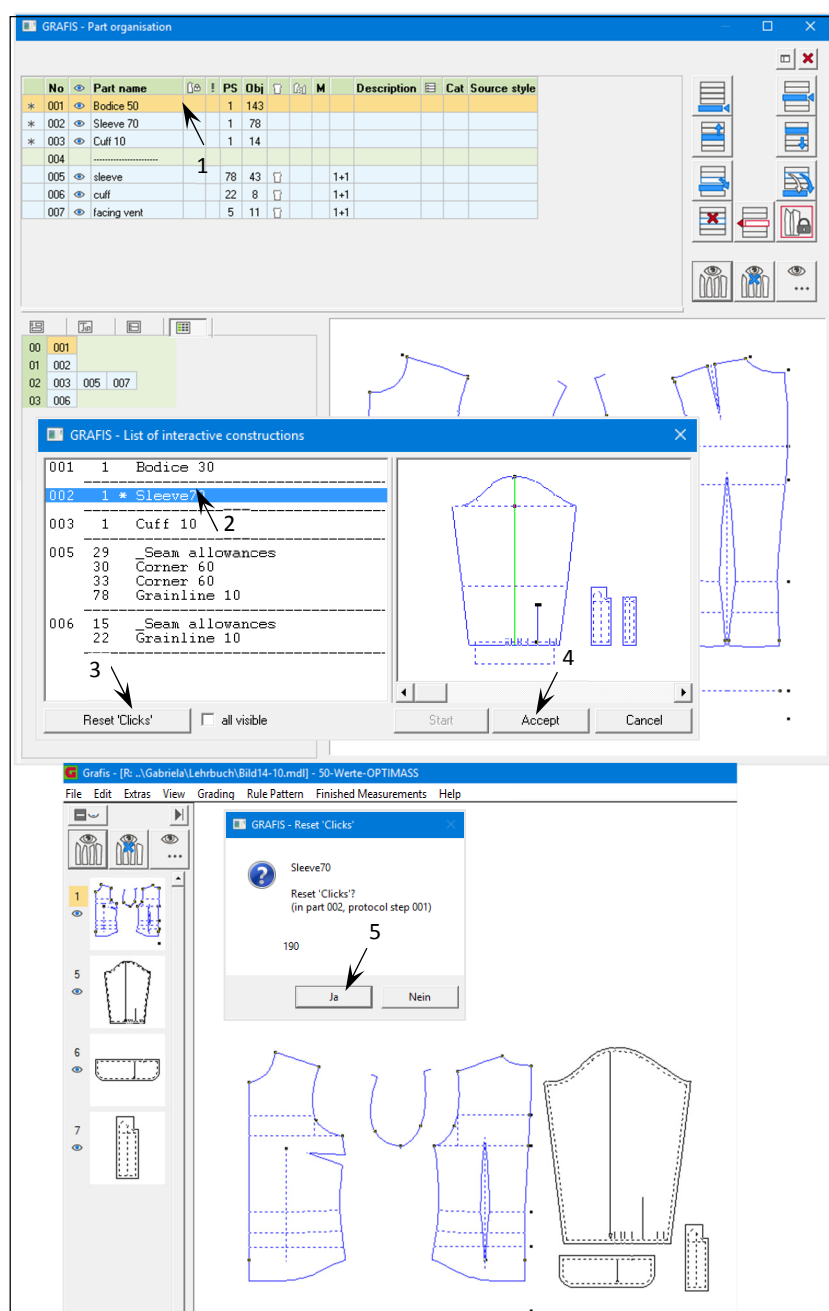
Picture 14-10



Picture 14-11

It is also possible to relocate the shoulder first and then, reset the 'clicks' in the sleeve.

To release the 'clicks', open the *List of interactive constructions* with <F12>, select the sleeve (2), press *Reset 'Clicks'* (3), *Accept* (4) (Picture 14-10). Then, activate the bodice and relocate the shoulder towards the front in the *Shoulder* drag area (5 and 6). The natural shoulder is now visible as a dashed line. Then, activate the sleeve and start *test run*. The sleeve is now being bound again. During clicking, ensure that for 7 and 8 (Picture 14-11) you click the natural shoulder displayed as a dashed line.



Picture 14-12

Example 2:

Bind 'click' construction onto a different basic block within the style

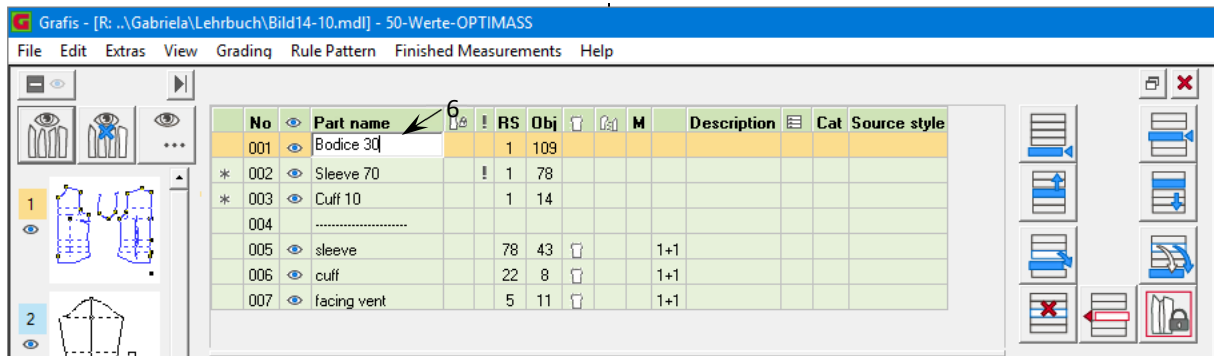
Sleeve 70 with its dependent parts is bound to *Bodice 10*. The body measurement construction *Bodice 10* is now to be replaced by the finished measurement construction *Bodice 30*.

Step-by-step guide:

- Release the 'clicks' of the sleeve
- Reset the part containing *Bodice 10*
- Call *Bodice 30* into this part
- Adjust *Bodice 30* to be grade-able
- Activate the part with the sleeve
- Bind the sleeve to the new bodice with *test run* of the sleeve

It is also possible to bind the sleeve to the bodice, first and then, adjust the bodice.

To release the 'clicks', open the *List of interactive constructions* with <F12>, select the sleeve (2), press *Reset 'Clicks'* (3) and *Accept* (4), see Picture 14-12. Then, activate part 001 and reset *Bodice 10*. Call the finished measurement *Bodice 30* into part 001 and adjust the construction interactively. Then, activate part 002 with *Sleeve 70* and start *test run*.

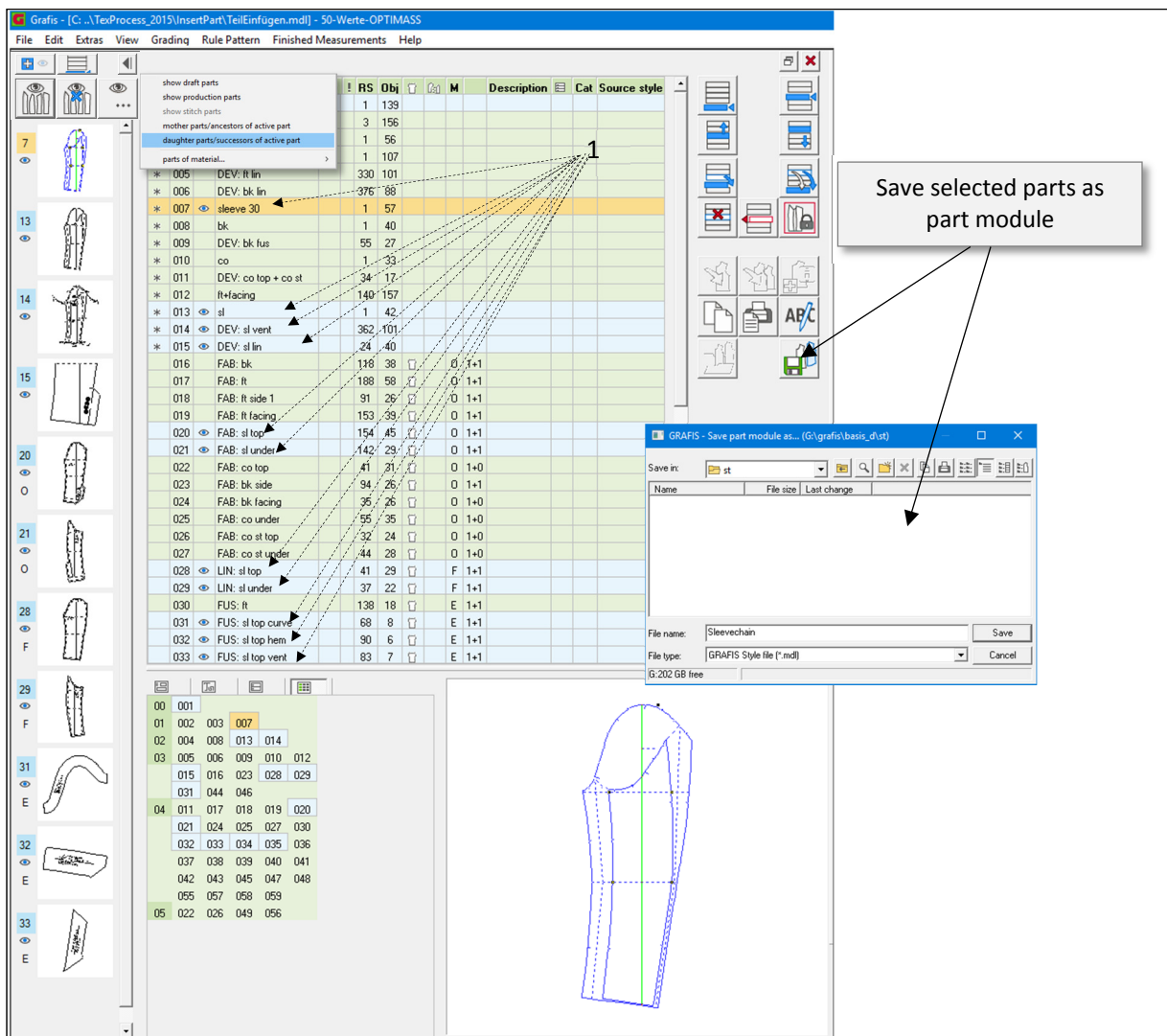


Picture 14-13

The sleeve is now being bound again (5), see Picture 14-12. Label part 001 in the *part organisation* (6), see Picture 14-13.

Example 3:

Release sleeve with dependent parts from a style and save in the call list





Picture 14-14

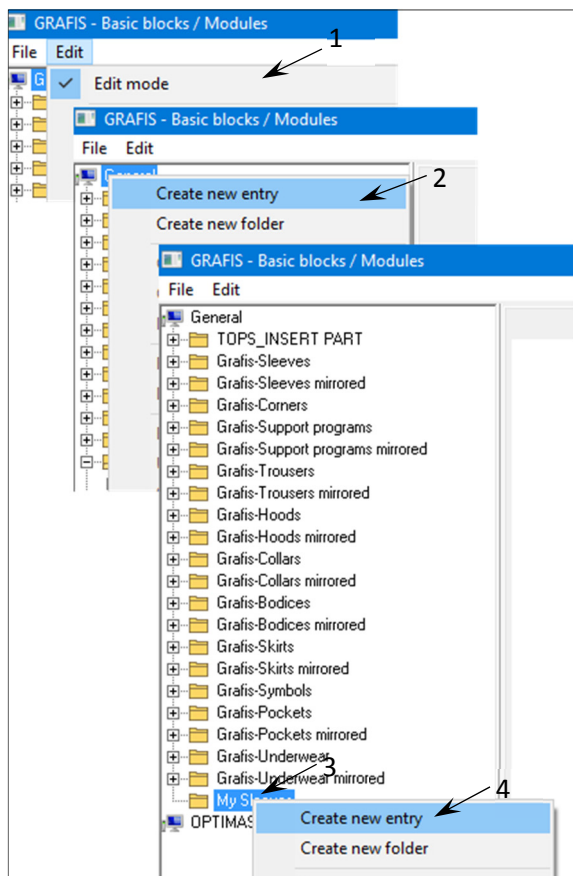
In a style, *Sleeve 30* has been developed as a sleeve with vent, lining, interfacing and templates.

This sleeve is now required in another style. It is to be stored as a part module.

Step-by-step-guide:

- Activate the sleeve construction in the part organisation.
- All parts belonging to the sleeve development are automatically highlighted in colour.
- For a quicker control of the parts, you can have only daughter parts displayed in the part rack of the active part.
- Save part module 

The saved part module can be loaded into another style via call module .



Picture 14-15

Store module in the call list**Step-by-step-guide:**

- Open new style.
- Open call list and activate edit mode.
- Add a new entry for the module and make the connection to the previously saved style.

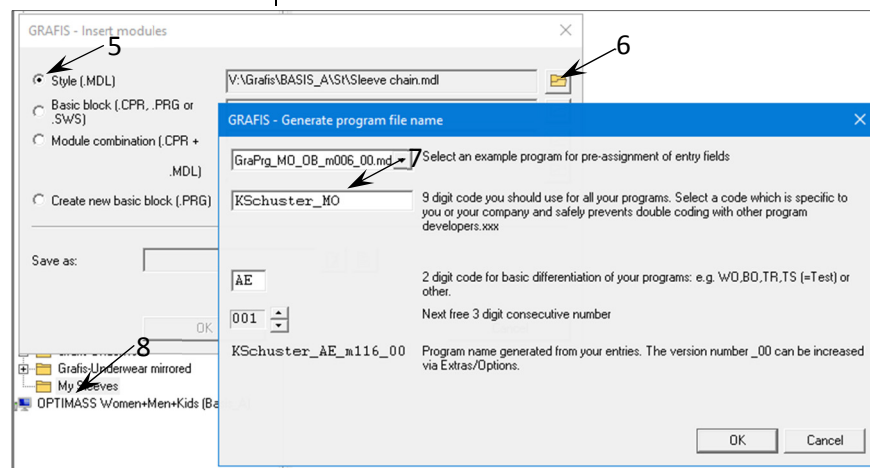
Open the style with the sleeve development (1), see PiPicture 14-14. Activate the basic block *Sleeve* 30.

Save the part module , as 'sleevechain01.mdl'.

Create a new style 'test' and open the call list. Activate the edit mode via *Edit* → *Edit mode* (1), see Picture 14-15. In case your computer does not yet contain a folder for sleeve construction, click onto *General* with the right mouse button and then, onto *Create new folder* in the context menu (2) and rename the new folder to 'My sleeves' (3). Avoid special characters during naming. Click on the new folder 'My sleeves' with the right mouse button and select *Create new entry* from the context menu (4). The *Insert module* dialogue opens, see Picture 14-16. Activate *Style (.MDL)* (5) and select the recently saved style 'sleevechain01.mdl' from (6). A copy of the style is saved in the central folder \Grafis\Prog.

Assign a unique name according to the naming convention. We recommend a 9-digit abbreviation of your name or company name (7). After having assigned the name, close the dialogue with *OK*.

Also, assign a name for the style in the call list (8).




Picture 14-16

Example 4:**Application of the insert tool for development of a shaped waistband**

A shaped waistband for trousers and skirts with one dart in the front and back respectively is to be developed and saved in the call list.

Step-by-step guide:

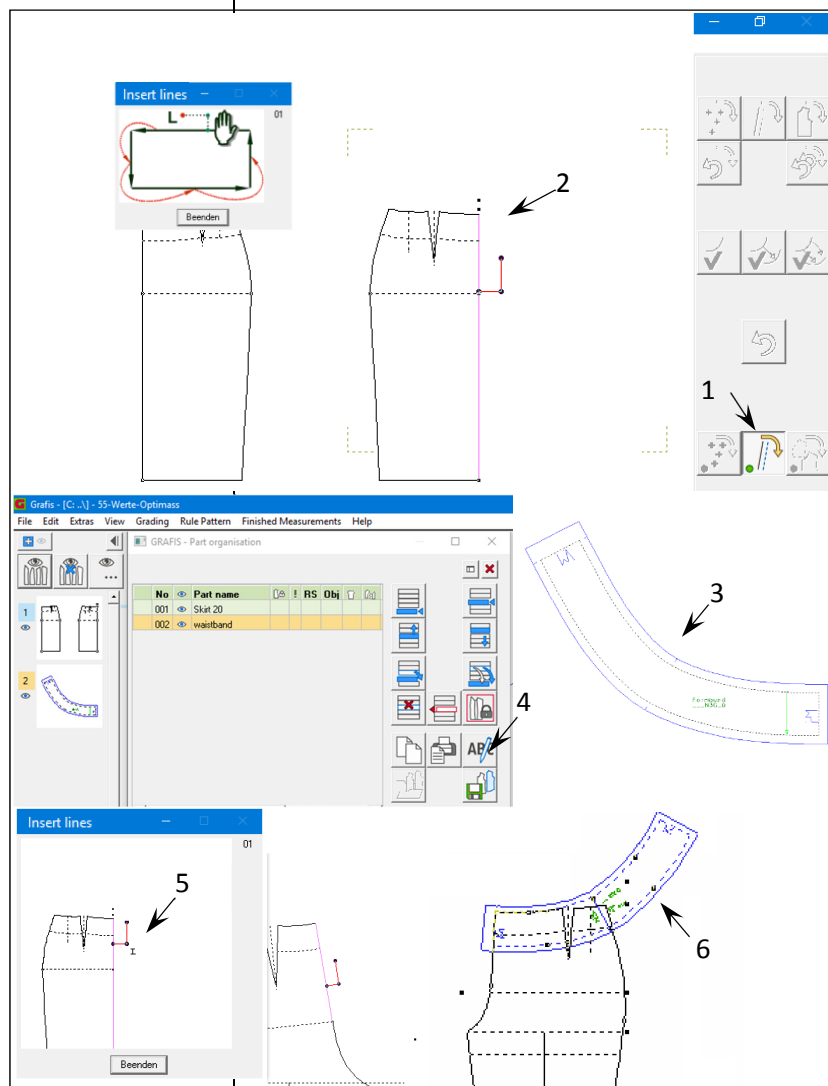
- Generate a skirt basic block with one dart respectively in part 001
- Insert all required lines of the skirt front and back into part 002 with the *Insert lines* tool. **From version 11 onwards when calling the insert lines tool, the click situation is photographed automatically, marked by a photo frame. Ensure that the required objects are visible within the frame. Shrink the view if required.**
- Construct a shaped waistband with variable width from the lines inserted into part 002. Use either the *Parallel 10* tool or the *new curve* tool. Complete the shaped waistband with seam allowances, grain line, symbols and text. Set the part parameter.
- Activate the shaped waistband in the part organisation and save the part as a part module .
- Open a new style, open the call list and activate the edit mode
- Create a new entry for the shaped waistband and link it with the recently saved style.

This shaped waistband can only be used for skirts and trousers with exactly one dart in the front and the back. In the same way, construct shaped waistbands for two darts in front and back respectively and for two darts in the back and one dart in the front.

Open a new style and call *Skirt 20* into part 001. Interactively, close the second dart in the front and back skirt, respectively. Link the waistline across the closed second dart with *link single*. Open a new part 002 and activate it. Quit part organisation. In the *insert* function from the basic menu, click onto the *tools* button and select *Insert lines* (1), see Picture 14-17. Now, all lines required for development of a shaped waistband must be


clicked one after the other (2). Develop a systematisation in which order the lines are to be clicked. For example, according to Picture 14-17 all lines were clicked from the outside. Click in the following order:

- centre back
- waist back 1
- dart back towards apex
- dart back away from apex
- waist back 2
- waist back 3
- side seam back downwards
- side seam front upwards
- waist 1 front
- waist 2 front
- dart front towards apex
- dart front away from apex
- waist 3 front
- centre front



Picture 14-17

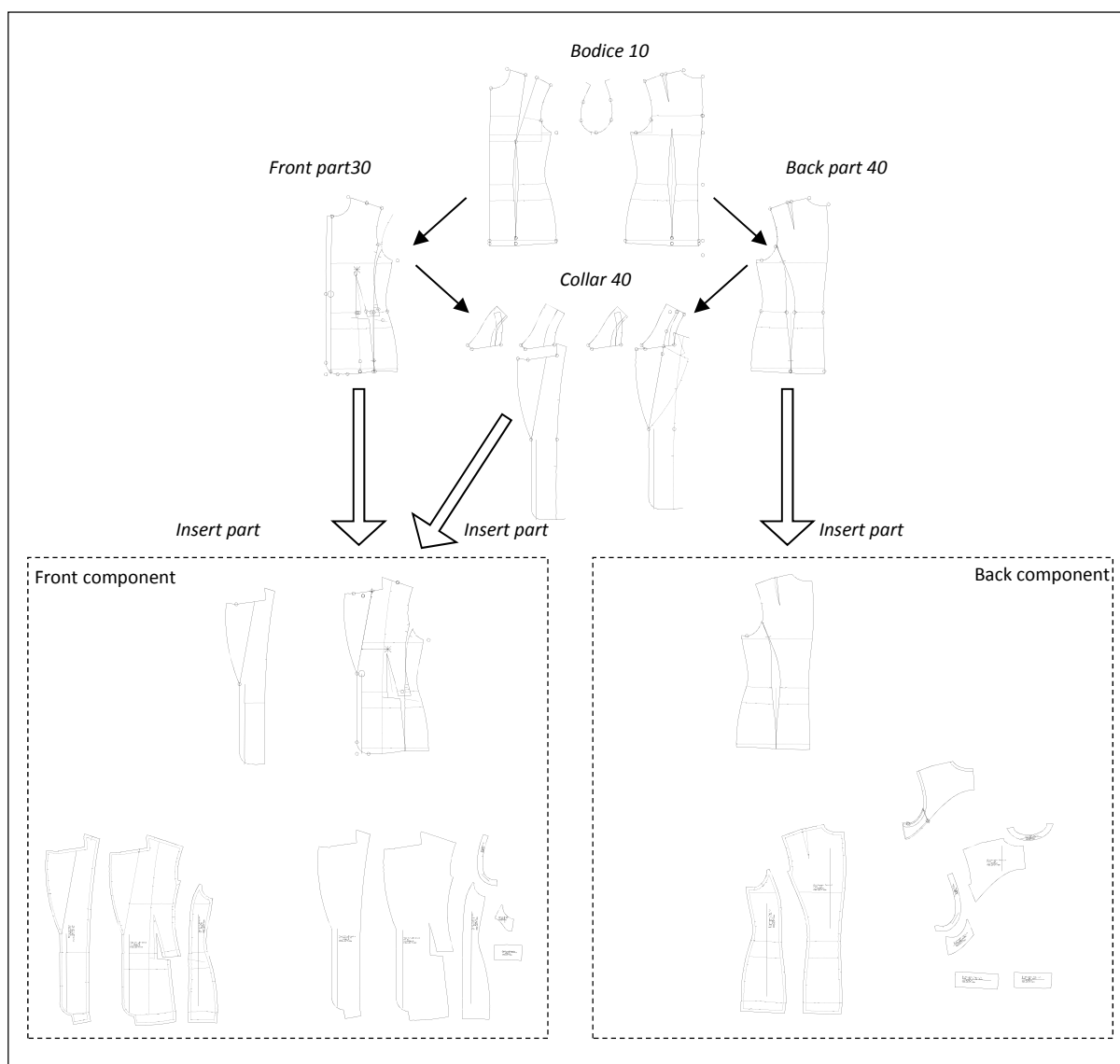
Transform the waist lines with side seam, centre front and centre back towards one another in part 002. Construct a parallel to the waistline with *Parallel 10* or *new curve*. Carry out the corner treatment and complete the shaped waistband with seam allowances, grain line, symbols and text (3).

Open the part organisation and save the style as part module 'shapedwaistband.mdl' (4) . Create a new entry in the call list as described in the step-by-

step-guide in 14.5 example No.3 and link it with the recently saved style 'shapedwaistband.mdl'.

To test the shaped waistband, open a new style, call *Trouser 10* into part 001, close the second darts and link the waist lines across the closed second darts. Call the shaped waistband from the call list into part 002. Note the click situation in click window (5) photographed by you. The trouser back is situated to the left of the trouser front. If you have clicked all lines correctly, the shaped waistband to fit the trousers appears (6).

Example 5: Use of the *Insert part* tool for development of construction sets



Picture 14-18

The *Insert part* tool (also called 'part click') allows for insertion of all objects of a part with one single click. This click connection can be released and reinstated with one single click. **Please note that the part click requires an exact object structure of lines and points.** If *Bodice 30* is clicked when calling *Insert part*,

after releasing the part click, only *Bodice 30* can be clicked again.

In Picture 14-18 shows a front component and a back component. The front component is based on *Bodice 30* and *Collar 40*, both clicked with the *Insert part* tool and thus, transferred into the development part

for the front component. From this development part, three production parts for main fabric and six production parts for fusing were developed.

For a construction set, a number of components based on the same or different constructions are developed and stored in the call list. Additional information such as text, dimensions and part parameter can also be stored at this point. This way, component sets enable a standardisation of processes. At the same time, company-specific knowledge is saved. Through the use of part click, the parts remain connected to the basic block so that alterations are automatically transferred through the development parts onto the production parts.

When calling the *Insert part* tool, the click situation is automatically photographed, marked by a photo frame. Please ensure that all required objects are visible inside the frame. If required, zoom out the view. Before building a construction set, we recommend that you seek advice as further styling possibilities are available.

14.6 Complex exercises

1st Exercise 'Skirt with yoke'



Design specification:

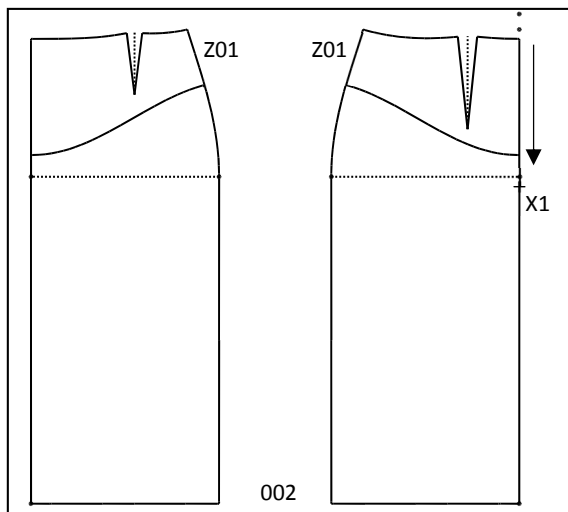
From *Skirt 20* a skirt with yoke in front and back, a waistband and a zip in the centre back is to be constructed.

Part list:

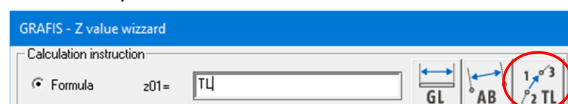
- 001 basic block Skirt 20
- 002 style development
- 003 PP yoke ft
- 004 PP yoke bk
- 005 PP skirt ft
- 006 PP skirt bk
- 007 waistband

Call the *Skirt 20* into part 001 and interactively close the second dart and set the hem reduction to 0.

Open part 002 'style development' and insert all objects from part 001.



Construct the yoke in the front with the interactive curve. The yoke curve in the back is to be constructed at the side seam with $z01 = TL$ (yoke width front skirt side seam).



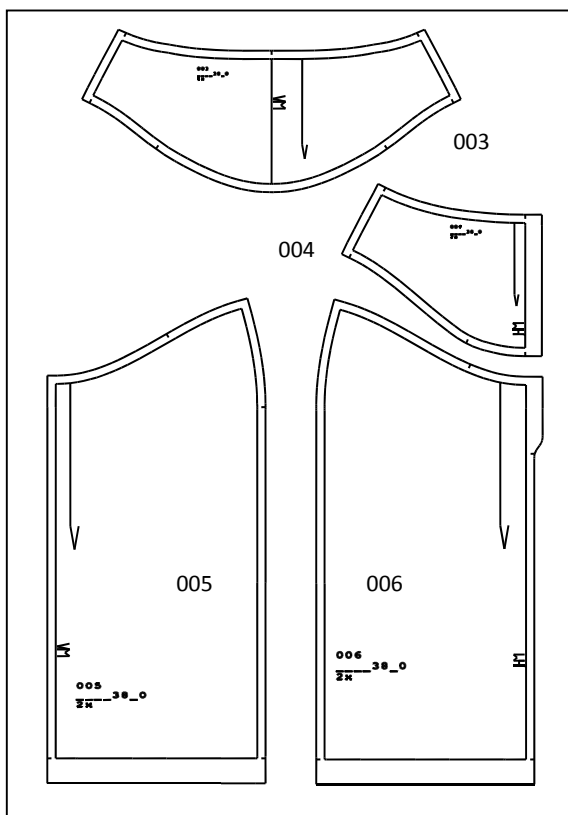
For the end of the zip, construct a point on the centre back with the x value of part 002 'style development':

x1 zip length from waist in mm (180)

Open parts 003 to 006 and insert all required lines and points from part 002. Lengthen the darts to the yoke line in part 'yoke ft' and 'yoke bk' and close the darts. Link the yoke curves, construct the seam allowance, the notches and set the text. Use the following global x values:

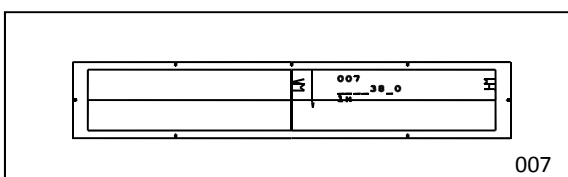
Global x values:

- xg1 seam allowance in mm (10.)
- xg2 overlap width zip in mm (25)
- xg3 hem in mm (20.)



To conclude, open part 007 and transfer all waist lines of the front and back skirt from part 002. Use z values to construct the waistband.

Construct the waistband height with a continuous interactive parallel.



2nd Exercise 'Skirt with separate box pleat'



Design specification:

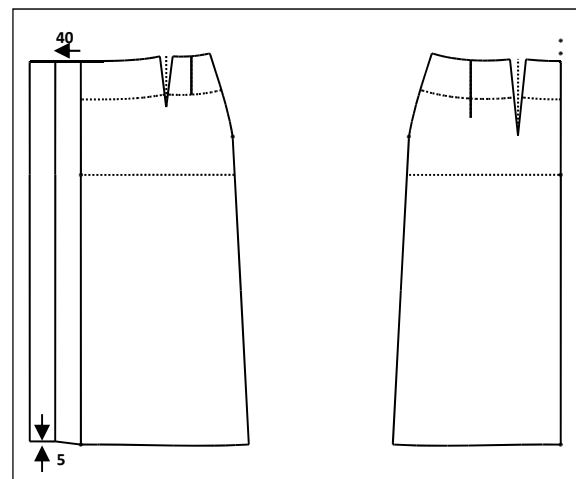
From *Skirt 20* a straight skirt is to be constructed with separate box pleat in the centre front and flared side seam. A vent and a zip are to be constructed at the centre back.

Use the following global x values:

- x1 seam allowance 1 (10.)
- x2 seam allowance hem (20.)

List of parts:

- 001 basic block Skirt 20
- 002 style development
- 003 skirt front
- 004 pleat
- 005 skirt back
- 006 waistband



Call the *Grafis Skirt 20* into part 001 and interactively close the second dart. Adjust the following interactively:

Drag area *Hem*:

- flare side seam by 20mm
- rotation point side seam: 60mm

Drag area *Dart front*:

- close 2nd dart
- position for 1st dart: 66%

Drag area *Dart back*:

- close 2nd dart
- position for 1st dart: 33%

Open the part 002 'style development' and insert all objects from part 001. Construct the box pleat in the front skirt with *Parallel 10* and shorten the pleat and the pleat back by 5mm with *Line 20*.

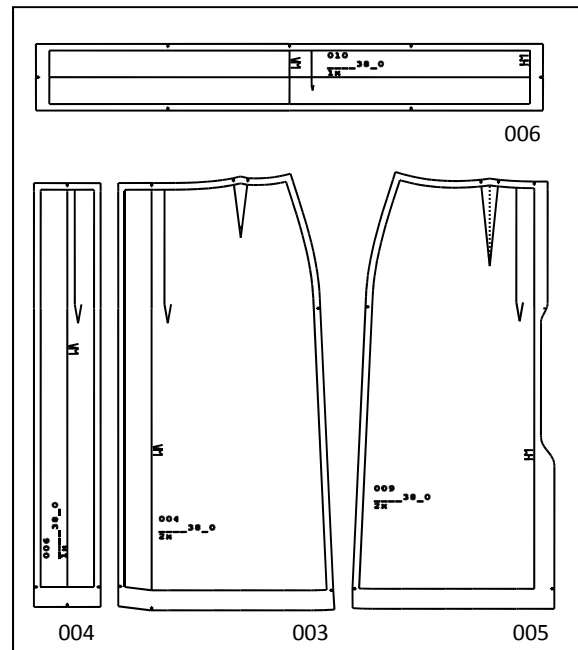
Open the part 003 'skirt front' and insert all required lines and points from part 002. Construct the dart hood, the seam allowance and set the symbols and the text.

Close the hem corner with *Hem corner 80*.

Create part 004 in the same way.

Now, open part 005 'skirt back' and insert all required lines and points from part 002. Finish the skirt back according to part 003. Use *Vent corner 30* for the zip facing and the vent facing.

Open part 006 and construct the waistband using *z* values and *Parallel 10* for the waistband height.



3rd Exercise 'Shirt blouse with pin-tucks in the front and various back variations'



Design specification:

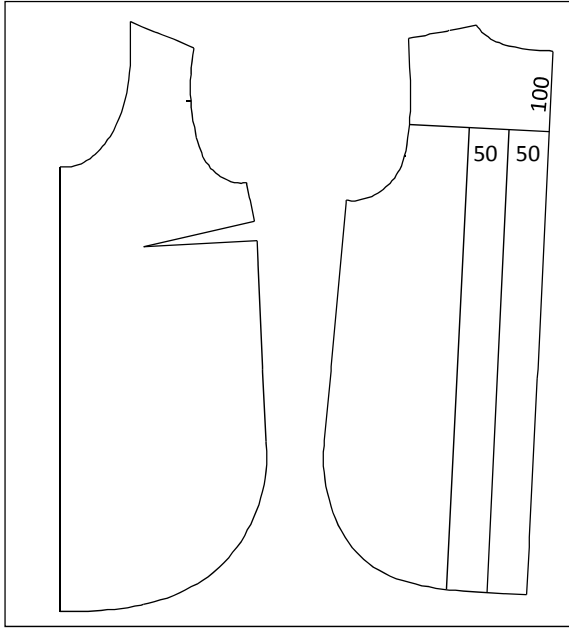
From the basic block *Bodice 10* a blouse with front, yoke and four different back variations is to be designed. The front is to have 3 pin-tucks, a button-stand and an overlap. The back is to have four variations:

- back with pleats from yoke,
- back with flared hem,
- back with gathering at the yoke,
- back with different spread amount in yoke and hem.

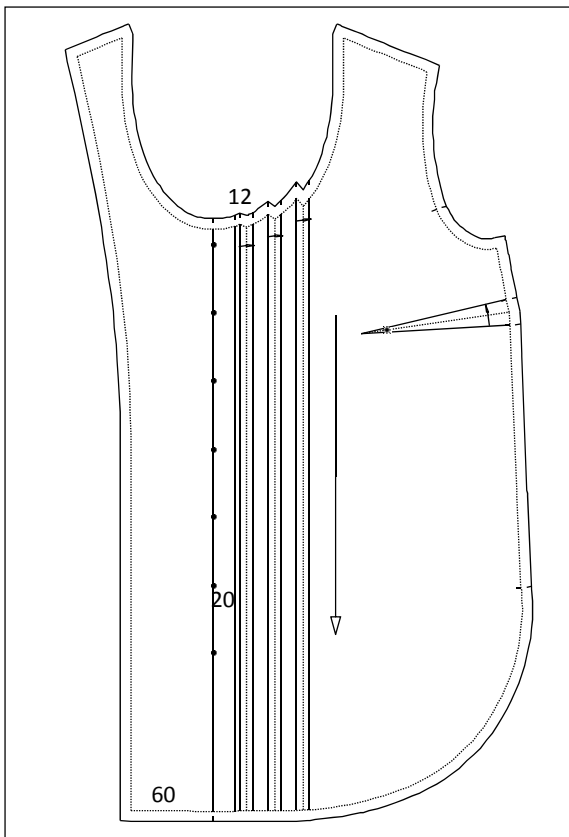
Part list:

- 001 Bodice 10 shirt blouse
- 002 style development
- 003 PP ft
- 004 PP bk yoke
- 005 SD bk
- 006 PP bk with flared hem
- 007 PP bk with pleats
- 008 PP bk with gathering
- 009 PP bk with variable pleats

Call the *Bodice 10* into part 001 and load the shape 'shirt blouse', see section 2.5.



Open part 002 and insert all objects from part 001. Construct the yoke and the spread lines for the pleats in the back with *Line 10*. For the curved hem, use *Co-ordinated corner 50*.



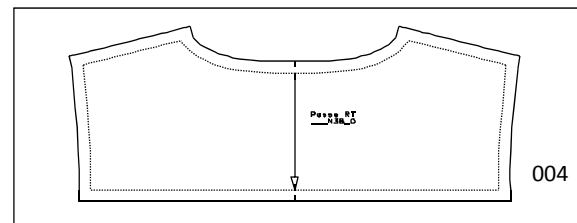
Open part 003 and insert all required lines and points from part 002. Construct the position for the first pin-tuck, the further pin-tucks and the overlap with *Front edge 30* and then, the facing. Spread the pin-tucks after having constructed the facing.

For the seam allowance use a global x value:

Global x values:

 xg1 seam allowance in mm (10.)

Open part 004 'PP bk yoke' and insert all required lines and points from part 002. Construct the seam allowance with the global x value and mirror the piece. Set the symbols and the text.



Open part 005 and insert all lines and points required for the back construction from part 002. Raster the yoke line equally and construct the spread lines. Spread the back using the following x values for the pleat content:

X values of part 005 'SD bk':

 x1 pleat content yoke (40.)

 x2 pleat content hem (40.)

Duplicate part 005 four times. The two x values for the pleat content are also duplicated. Adjust the part name and the value of the x values as follows:

X values of part 006 'PP bk with flared hem':

 x1 pleat content yoke (0.)

 x2 pleat content hem (40.)

X values of part 007 'PP bk with pleats':

 x1 pleat content yoke (50.)

 x2 pleat content hem (50.)

X values of part 008 'PP bk with gathering':

 x1 pleat content yoke (40.)

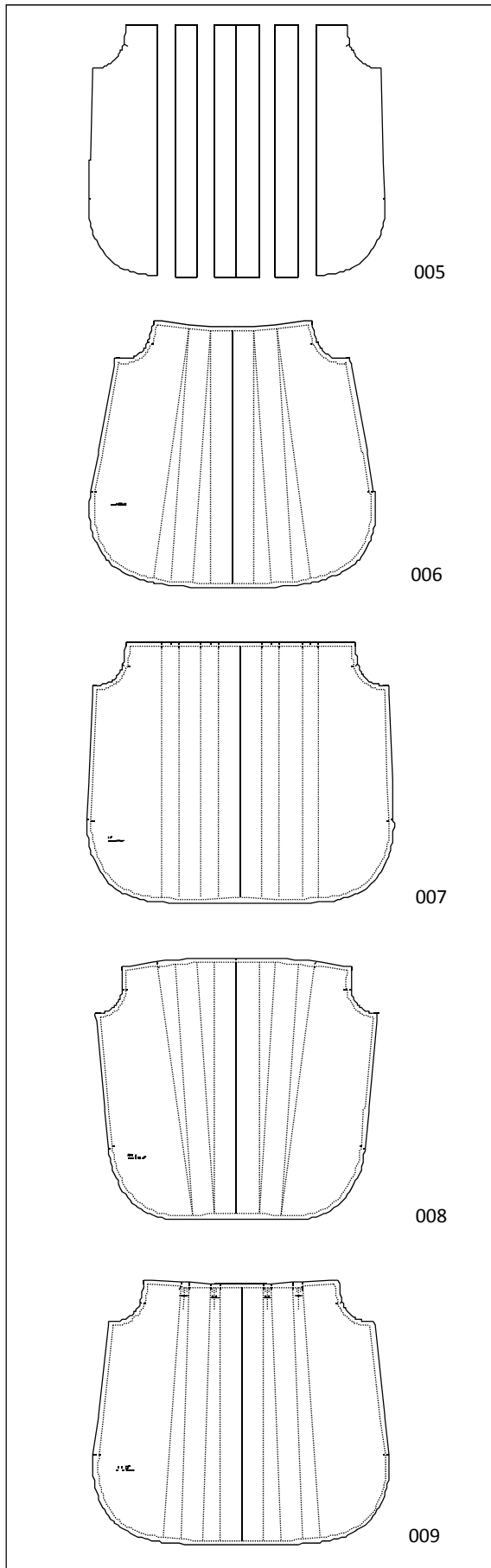
 x2 pleat content hem (0.)

X values of part 009 'PP bk with variable pleats':

 x1 pleat content yoke (30.)

 x2 pleat content hem (70.)

Develop production patterns for the backs in parts 006 to 009. Construct dart hoods, link if necessary, set symbols and text.



4th Exercise 'Flared skirt'



Design specification:

From the basic block *Skirt 20* a paneled skirt with flared hem, concealed zip in the side seam and variable seam allowance is to be constructed.

Use global x values for the seam allowance, the hem and for the spread amount of the pleats.

Part list:

- 001 basic block Skirt 20
- 002 style development
- 003 PP skirt ft left
- 004 PP skirt ft right
- 005 PP skirt ft centre
- 006 PP skirt bk left
- 007 PP skirt bk right
- 008 PP skirt bk centre
- 009 waistband

Call the *Skirt 20* into part 001, close the second dart, reset the hem reduction and position the darts in front and back at 40% respectively.

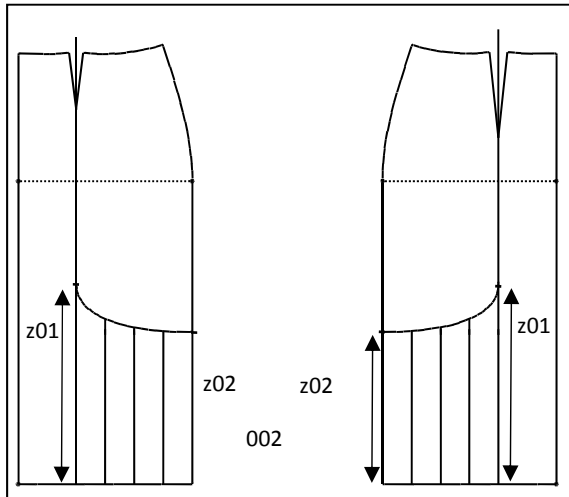
Open part 002 and insert all objects from part 001. Construct a panel seam, using *Line 10* parallel to the centre front and centre back.

Construct the curve in the front with 250 mm from the dart at the panel seam and with 250 mm from the hem.

The curve in the back is to be constructed with

- Z01 = AB distance from dart end at panel seam
- Z02 = AB distance from hem at side seam

Raster the hem of front and back from the side seam to the panel seam respectively with *number of points on line section* into 5 points. Construct vertical lines upwards from this points and 'cut on' the lines to the curves.



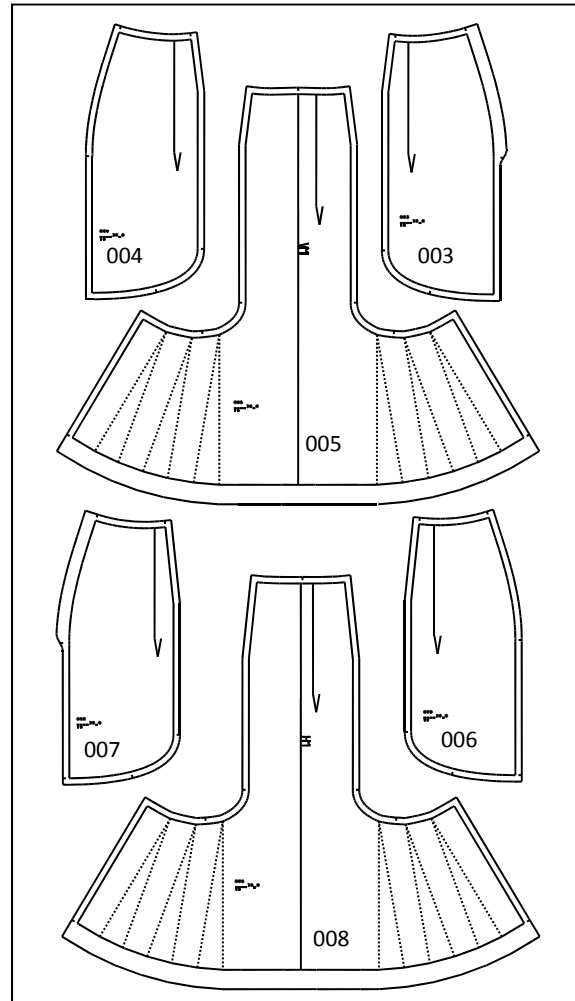
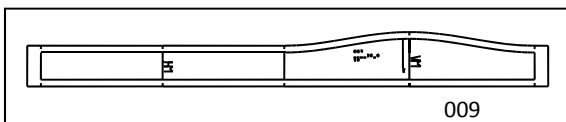
Open part 003 and transfer all required lines and points from part 002. Then, duplicate part 003, creating part 004. Continue with parts 005 to 008. Use the following x values for construction of the pleats:

X values of part 005 'PP skirt ft centre':

- x1 spread amount top (0.)
- x2 spread amount hem (40.)

Finally, open part 009 and transfer all waist lines of front and back skirt from part 002. Use z values to construct the waistband.

Construct the waistband width with the interactive parallel and the raised centre front with interactive *Line 10*.



5th Exercise 'Culottes with pleats'



Design specification:

From the basic block *Trouser 10* culottes with pleats in the front, a yoke, raised hem and concealed zip in the side seam are to be developed.

Use the following global x values:

- x1 seam allowance 1 (10.)
- x2 hem (20.)

Part list:

- 001 Basic block Trouser 10
- 002 style development
- 003 -----
- 004 --- PATTERN PIECES
- 005 -----
- 006 yoke front
- 007 trouser front left
- 008 trouser front right
- 009 yoke back left
- 010 yoke back right
- 011 trouser back left
- 012 trouser back right

Call the *Trouser 10* into part 001 and adjust the following interactively:

Options:

- display measurements: yes
- side seam countour identical: yes
- side seam as curve
- adjustment waist at side seam: yes
- adjustment curve at crotch seam: yes

Drag area *Finished measurements*:

- knee width 650mm
- hem width 700mm

Drag area *Line relocation*:

- position hem line for shorts: 600mm
- inclination of hem line at side seam/front: 70mm

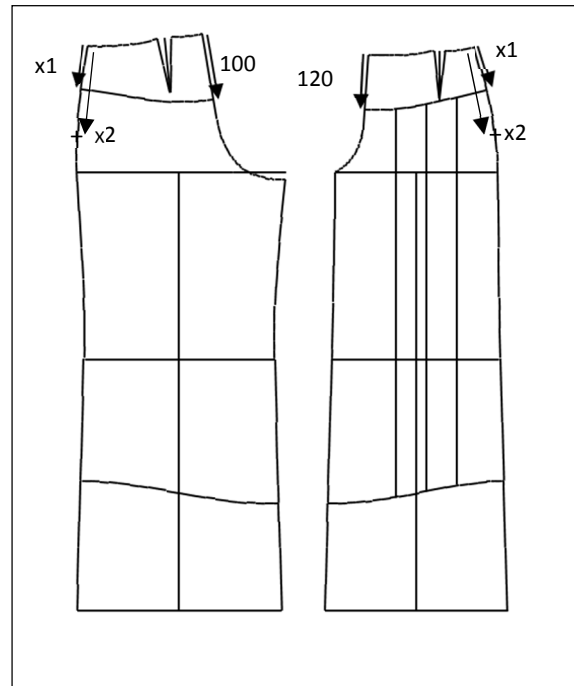
Drag area *Dart back*:

- 2nd dart: 0mm

Drag area *Hem*:

- hem line: 0mm
- shape hem line as curve

Open part 002 'style development' and insert all objects from part 001. Construct the yokes in the front and back trouser and the points for the zip length, applying the following x values:



x values part 002 'style development':

- x1 yoke ft ss from waist in mm (80.)
- x2 zip ss from waist in mm (160.)

Raster the yoke line in the front trouser to draw the spread lines. Construct the spread lines and cut them at the hem line.

Open part 006 'yoke front' and insert all required lines and points from part 002. Note that a zip is to be inserted into the left side. Rotate the dart closed and construct the seam allowances.

Open part 007 and insert all required lines and points from part 002. Spread the pleats with the following x values:

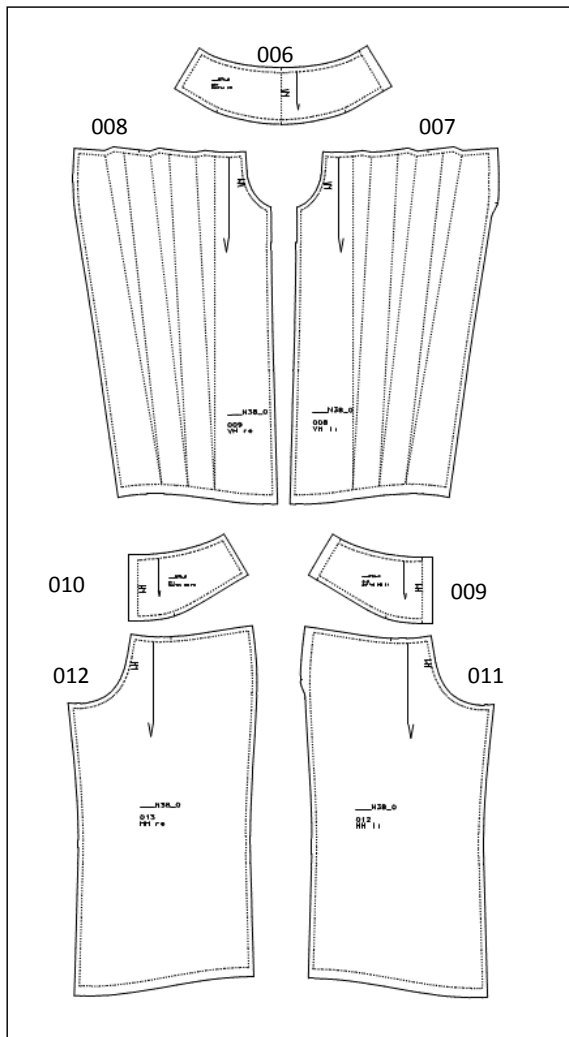
x values part 007 'trouser front left':

- x1 pleat content top in mm (40.)
- x2 pleat content bottom in mm (40.)

Construct the pleat hoods and seam allowances. Duplicate part 007 before constructing the zip facing with *Vent corner 30*.

Part 008 'trouser front right' simply has to be mirrored at the grainline.

Generate parts 009 to 012 in the same way.



6th Exercise 'Dress with panel seams'



Design specification:

From *Bodice 10* a dress with panel seams and concealed zip in the centre back is to be developed.

Use the following global x values:

- x1 seam allowance 1 (10.)
- x2 seam allowance centre back (20.)
- x3 hem (40.)

Part list:

- 001 Basic block Bodice 10
- 002 FP-Tool 20
- 003 BP-Tool 20
- 004 -----
- 005 style development
- 006 -----
- 007 --- PATTERN PIECES
- 008 -----
- 009 bk centre panel
- 010 bk side panel
- 011 ft side panel
- 012 ft centre panel
- 013 ft facing
- 014 bk facing
- 015 armhole facing

Call the *Bodice 10* into part 001 and adjust the following options interactively:

- CB shaped
- CB length measured from waist
- side seam contour identical
- position waist dart relative to waist
- length waist dart to hem
- bust dart into armhole
- armhole direction linked at shoulder
- hem direction linked at side seam
- panel seam in the back: yes
- 4 segments

Drag area Tolerances:

- tolerance at bust: 50mm
- tolerance at waist: 50mm
- tolerance at hip: 50mm
- tolerance at across bust: 10mm
- tolerance at across back: 5mm

Drag area Line relocation:

- length: 500mm

Drag area Bust dart:

- position from front pitch: 50mm

Drag area Shoulder dart:

- position at 60 %

Drag area Waist dart:

- relocate towards side seam by 10mm

Drag area Neckline:

- drop neckline bk: 30mm
- increase neckline at shoulder: 50mm
- drop neckline CF: 150mm

Adjust the neckline to your preference.

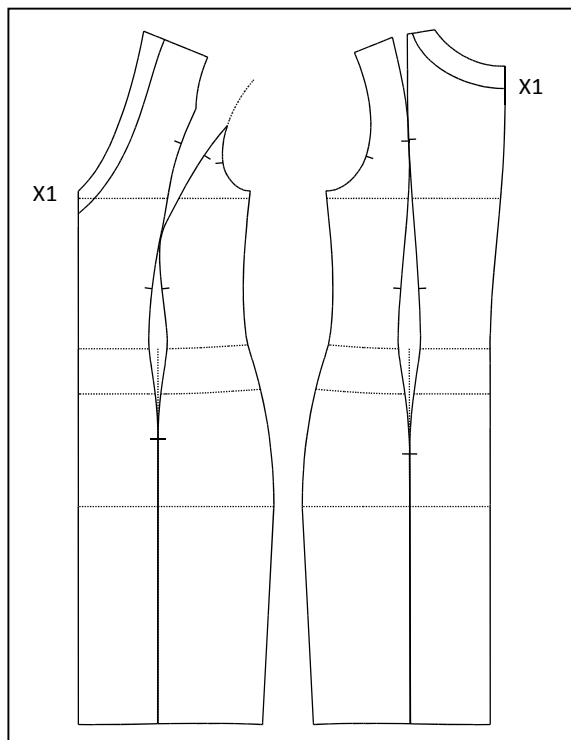
Drag area Hem:

- side seam reduction at hem 15mm

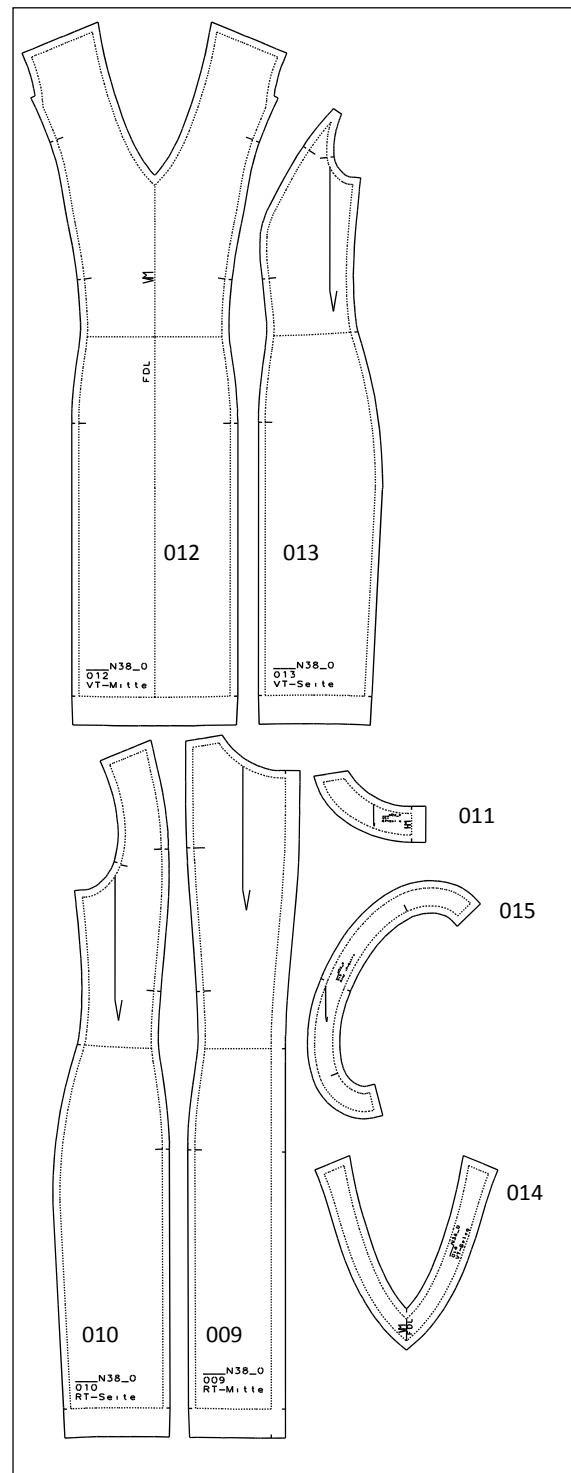
In the part organisation, open two further parts and call tool *Front part 20* and tool *Back part 20*. Set the following options and drag areas interactively:

Front part 20**Options**

- princess seam
- panel seam 2 visible: no
- base point hip curve in mm

**Drag area Panel seam from shoulder**

- move bust point by 5mm in positive x-direction
- base point hip curve in mm: 120

**Back part 20****Options**

- panel seam from shoulder
- panel seam visible: no
- base point hip curve in mm

Drag area Panel seam from shoulder

- base point hip curve in mm: 140

Open part 005 'style development' and insert all objects from part 002 and part 003. Create the following x values:

X values of part 005 'style development':

x1 facing width neck (30.)

Extract the pattern pieces as displayed. Create global x values and construct the seam allowances, set symbols and texts.

Structure the part organisation.

Name part 009 'back centre panel' and insert all required lines and points from part 005.

X values of part 009 'bk centre panel':

x1 zip length (530.)

Continue with part 010, 012 and 013 in the same way.

In part 012 'front centre panel', construct the seam allowances and mirror the part. Use corner tools *Corner 60 (angle)* and *Corner 70 (angle coordinated)* for the construction of the angled corner at the princess seam/armhole. For the hem, use *Corner 80 (hem corner)*.

For part 015 'armhole facing' insert the lines of the armhole step-by-step from part 005, starting with the shoulder, upper armhole front, princess line. Transfer the further armhole lines with *insert with transformation*. Alternatively, transformation can ensue after all required lines and points have been inserted

7th Exercise 'Long dress with godets'



Design specification:

From *Bodice 10* a long dress with straps, band and godets is to be developed.

Use the following global x values:

x1 seam allowance 1 (10.)

x2 seam allowance centre back (20.)

x3 hem (40.)

Part list:

001 Basic block Bodice 10

002 front part tool 20

003 back part tool 20

004 style development

005 -----

006 ---PATTERN PIECES

007 -----

008 bk centre panel

009 bk side panel 1

010 bk side panel 2

011 ft centre panel

012 ft side panel 1

013 ft side panel 2

014 bk neck band

015 ft neck band

016 strap

Call the *Bodice 10* into part 001 and adjust the following options interactively:

- CB seam shaped
- CB length measured from waist
- side seam not contour identical
- position waist dart relative to waist
- length waist dart to hem
- bust dart in shoulder
- armhole direction linked at shoulder
- hem direction linked at side seam
- 4 segments

Adjust the following in the drag areas:

Drag area *Tolerance*:

- tolerance at bust: 30mm
- tolerance at waist: 30mm
- tolerance at hip: 30mm
- tolerance at across bust: 10mm
- tolerance at across back: 5mm
- ss/waist ft 12.5mm (half dart suppression ft)
- ss/waist bk 15mm (half dart suppression bk)

Drag area *Line relocation*:

- length: 950mm
- armhole relocation: -15mm

Drag area *Bust dart*:

- position from neck: 40%

Drag area *Waist dart*:

- reduce waist darts in ft + bk by half (ft: 12.5, bk: 15mm)

Call *Front part 20* and *Back part 20* into parts 002 and 003, respectively. Design and modify the panel seams in the interactive area.

Front part 20**Options**

- panel seam from shoulder
- panel seam 2 visible: yes
- panel seam at waist in: %

Drag area 2nd side panel seam

- position panel seam at 50%
- contour identical adjustment in facing area

Back part 20**Options**

- panel seam from shoulder
- panel seam visible: yes
- panel seam at waist in: %

Drag area Panel seam from shoulder

- shorten upper dart point interactively to facing

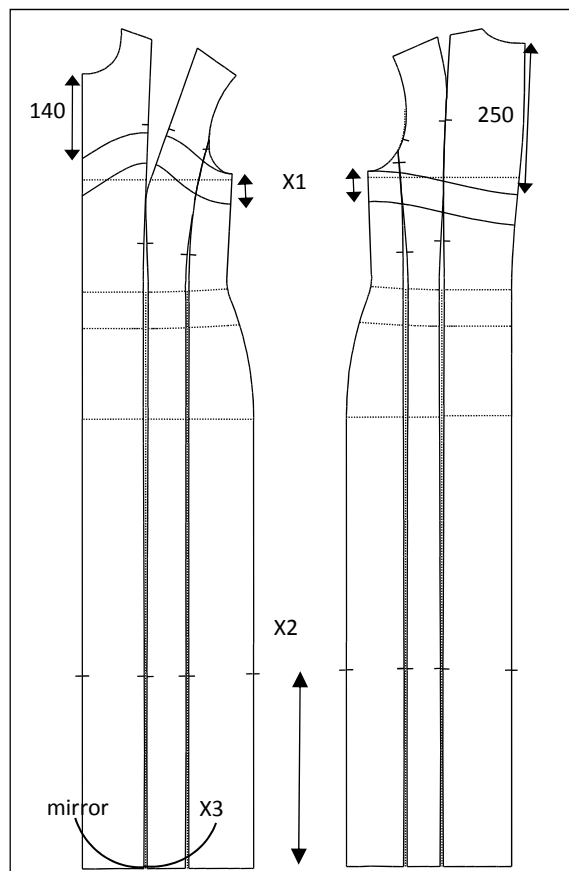
Drag area Side panel seam

- position panel seam at 50%
- contour identical adjustment in facing area

Open part 004 'style development' and insert all objects from part 002 and part 003. Create the following x values:

X values of part 004 'style development':

- | | | |
|----|-------------------------|--------|
| x1 | band width | (50.) |
| x2 | godet position from hem | (400.) |
| x3 | godet width | (25) |



Transform the panel seams together at facing level and construct the facing line with *curve* and the facing width with *parallel* and x1.

Then, transform the panel seams back to their original position with *reverse transformation*.

Construct the godets at all panel seams, CF, CB and side seam with the interactive *Circle 20*. Set the circle arc to 0 at one side and use x3 for the other circle arc side. Mirror the circle arc at the panel seams.

Open part 008 'bk centre panel' and insert all required lines and points from part 004. Create an X-value:

X values of part 008 'bk centre panel':

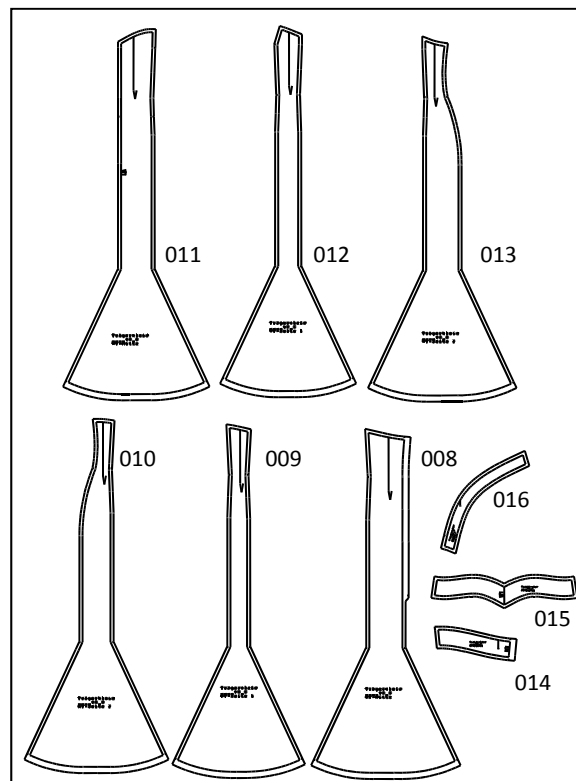
- x1 zip length (500.)

Construct the seam allowances and the hem. Set the symbols and the text.

Open the next part 009 'bk side panel 1' and insert all required lines and points from part 004. Construct the seam allowances and the hem. In the area of the zip at the centre back use the X-value XG2. Set the symbols and text.

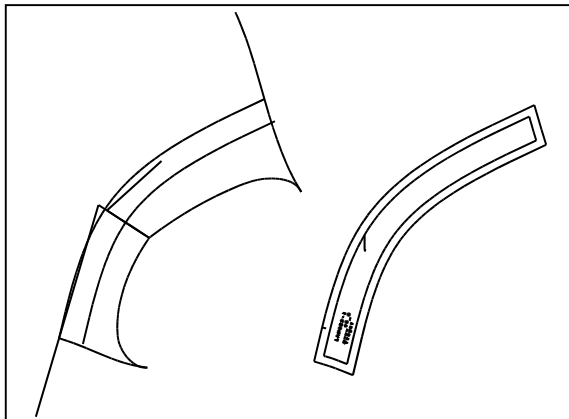
Construct parts 009 'bk side panel 1', 010 'bk side panel 2', 011 'ft centre panel', 012 'ft side panel 1' und 013 'ft side panel 2' in the same way.

For part 014 'bk neck band' and 015 'ft neck band', insert the lines for the neckband step-by-step from



part 004. The individual parts of the facing are transformed toward each other. Construct the seam allowances and symbols and mirror the 'ft facing' at the centre front.

To construct the strap transfer the lines in the bust dart area, the shoulder, armhole ft and bk. Trans-



form the back shoulder onto the front shoulder and construct a curve for the strap shape. Construct the strap width with the interactive *Parallel 10..*

8th Exercise 'Casual trouser with two zips in the legs and patch pockets'



Design specification:

From *Trouser 10* new trousers are to be designed with two zip detachments and patch pockets.

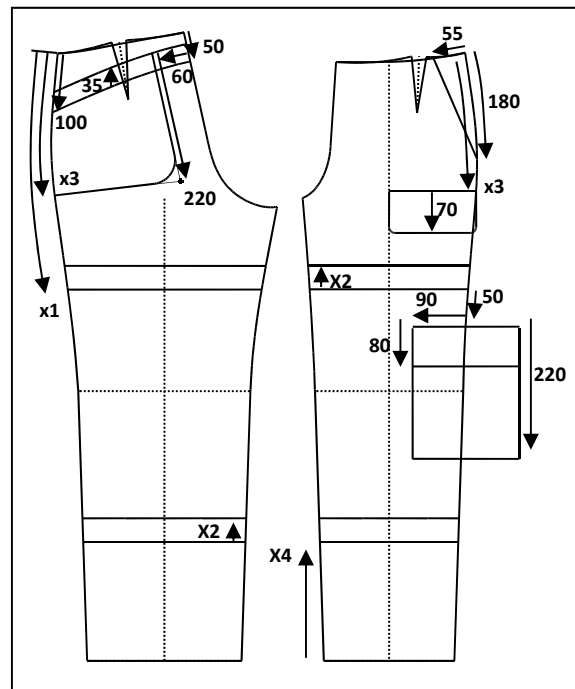
Use the following global x values:

- x1 seam allowance 1 (10.)
- x2 seam allowance 2 (5.)
- x3 hem allowance (30)

Part list:

- 001 basic block Trouser 10
- 002 style development
- 003 -----PATTERN PIECES-----
- 004 trouser ft part 1
- 005 trouser ft part 2
- 006 trouser ft part 3
- 007 pocket 1
- 008 decorative flap
- 009 -----
- 010 yoke trouser bk

- 011 yoke facing
- 012 trouser bk part 1
- 013 trouser bk part 2
- 014 trouser bk part 3
- 015 pocket 2
- 016 pocket 3
- 017 flap pocket 3
- 018 -----
- 019 waistband



Call the *Trouser 10* into part 001 and adjust the following options interactively:

- side seam contour identical: yes
- adjustment waist at side seam: yes
- adjustment curve at crotch seam: yes
- waistband pleats: no

Adjust the following in the drag areas:

Drag area *Tolerances*:

- tolerance at waist: 10mm
- tolerance at hip: 20mm

Drag area *Finished measurements*:

- knee width: 540mm
- instep width: 480mm

Assign the finished measurements with one or more break sizes and adjust a suitable grade, see Chapter 11.2.

Drag area *Line relocation*:

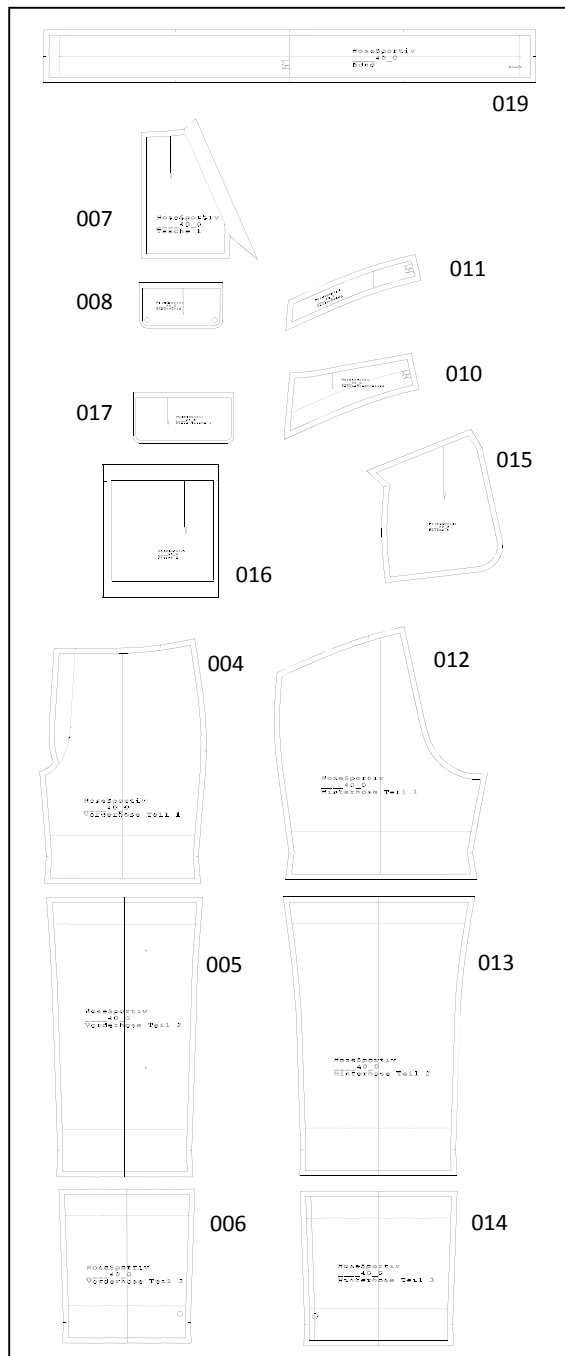
- waist: -40mm

Drag area *Dart back*:

- 2nd dart: 0mm

Drag area *Hem*:

- hem line: 0mm



Open part 002 'style development' and insert all objects from part 001. Create the following x values:

X values of part 002 'style development':

- x1 separation for zip at thigh at ss (400.)
- x2 overlap width for zip at thigh (40.)
- x3 pocket position ss from waist in mm (240.)
- x4 separation for 7/8 length from hem in mm (200.)

Construct the style development using the interactive functions and the x values. Then, develop the completed production pattern pieces.

9th Exercise 'Fitted jacket with panel seams'



Design specification:

From the basic block *Bodice 50* a fitted jacket with panel seams and pocket is to be developed.

Part list:

- 001 basic block Bodice 50
- 002 front part tool 20
- 003 back part tool 10
- 004 style development
- 005 basic block Sleeve
- 006 basic block Flap

Call the *Bodice 50* and adjust the following options:

- display measurements: yes
- CB seam: shaped
- ss contour identical: yes
- ss straight: no
- ss grading centred: no
- preset ss shaping at waist: yes
- ss direction at waist: linked
- ss direction at hip: linked
- position waist dart in bk: relative to waist
- dart length to hem: no
- position shoulder dart as bust dart: yes
- dart with bust angle
- bust dart in shoulder
- armhole direction at shoulder: linked
- armhole direction at ss: right angle
- armhole direction at front pitch: free
- hem direction at ss: linked
- hem extension in: mm
- panel in back: no
- bust line: transformed
- number of segments: 8 segments

Adjust the following in the drag areas:

Drag area *Tolerance*:

- tolerance at bust: 80mm
- tolerance at waist: 80mm
- tolerance at hip: 80mm
- tolerance at across bust: 15mm
- tolerance at across back: 10mm
- tolerance at shoulder width: 10mm

Drag area *Line relocation*:

- drop armhole: -20mm
- style length: 720mm

Drag area *Bust dart*:

- loosen armhole: 5mm
- position bust dart at 50% of shoulder

Drag area *Waist dart*:

- move back dart to 60 %
- shape waist curves

Drag area *Shoulder dart*:

- reduce dart suppression to 15mm

Drag area *Shoulder*:

- move shoulder by 10mm at neckline and armhole.

Open part 002 'front 20' and call *Front part 20*. Activate *Front part 20* and adjust it according to your ideas.

Then, open part 003 'back 20', call *Back part 20* and adjust it interactively.

Open part 004 'style development' and insert all lines and points from part 002 and part 003.

Construct the overlap, position the 1st button and the curved hem with the tool *Front edge 30*. Adjust as follows:

Options

- lapel (revers)
- front point as curve
- direction linked
- resulting button distance: no
- place buttons from CF
- single-breasted (1 button line)

Drag area *Overlap*:

- overlap width: 25mm
- revers from waist: 130mm

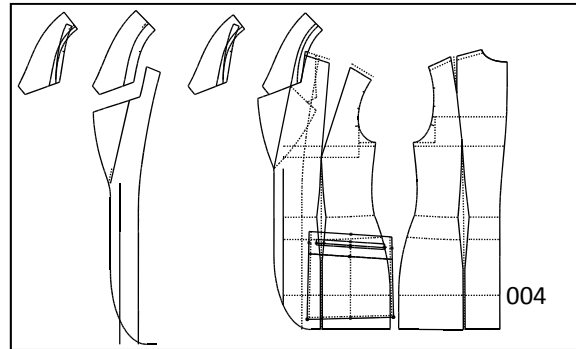
Drag area *Front point*:

- curved hem at CF: 200mm
- curved hem at hem: 100mm

Drag area *Buttons*:

- number of buttons: 4
- distance 1st button to revers: 20mm
- distance between buttons: 70mm

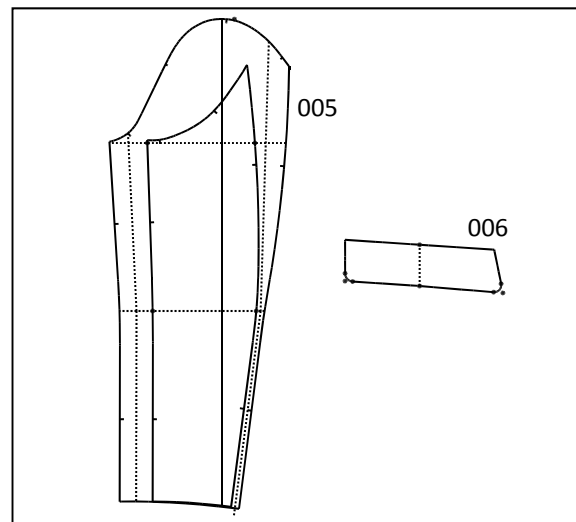
Call the interactive *Collar 40* into the style development. Adjust the collar interactively according to your ideas.



When extracting the pattern pieces, ensure that the new neckline is inserted. This had been altered by shoulder relocation and created as a new object.

Open part 005 'basic block sleeve' and leave part 001 visible. Call *Grafis sleeve 30* into part 005, clicking the corresponding lines and points of the relocated armhole from part 001. Adjust the sleeve interactively according to your ideas. Adjust the wrist width using break sizes.

Call the *Grafis-Pocket* → *with lining* → *cut* → *single jet* → *001* into the style development and adjust it. Alternatively, you can open a separate part for the collar and the pocket and attach it to the style development when clicking. The corresponding pattern pieces are automatically loaded into the part organisation when calling the pocket.



Open a further part 006 'basic block flap' and keep part 004 with the basic pocket shape visible. Call the *Grafis-Pocket 60 (Pocket flap)* and adjust it interactively.

Now open further positions for the other pattern pieces. Create global x values for seam allowance and hem and construct.

Global x values:

- x1 seam allowance 1 (10.)
- x2 seam allowance 2 (20.)
- x3 seam allowance 3 (5.)
- x4 hem (40.)

Use the following interactive corners when closing the corners:

- Hem corner
- Vent corner
- Angle corner
- Angle corner coordinated

Part list:

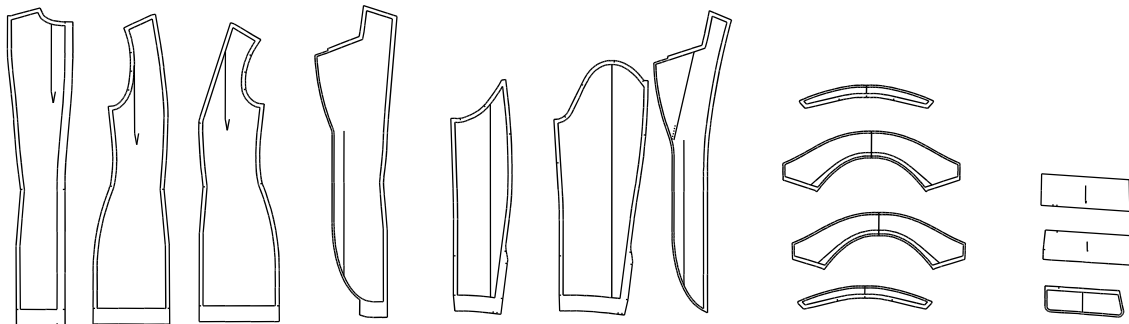
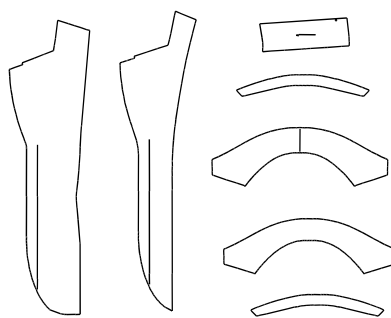
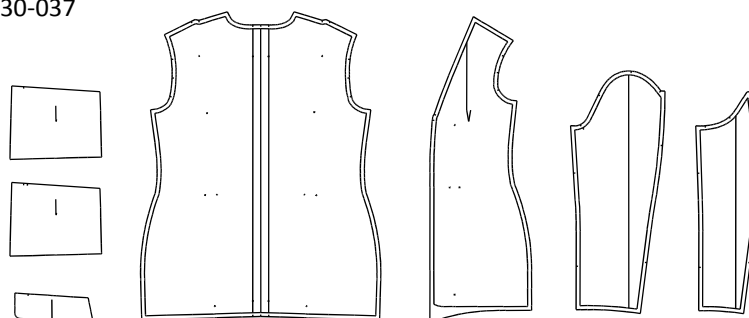
- 001 basic block bodice 50
- 002 front part tool 20
- 003 back part tool 10
- 004 style development
- 005 basic block sleeve
- 006 basic block flap

007 ==MAIN FABRIC==

- 008 back
- 009 back side panel
- 010 front side panel
- 011 front
- 012 undersleeve
- 013 top sleeve
- 014 facing
- 015 under collar stand
- 016 under collar
- 017 top collar
- 018 top collar stand
- 019 pocket flap
- 020 jet
- 021 facing

022 ==INTERFACING==

- 023 interfacing front
 - 024 interfacing facing
 - 025 interf. u collar stand
 - 026 interfacing under collar
 - 027 interfacing top collar
 - 028 interf. top collar stand
 - 029 interfacing jet
- 030 ==LINING==
- 031 flap lining
 - 032 pocket bag lin. bottom
 - 033 pocket bag lining top
 - 034 bk lining
 - 035 ft lining
 - 036 top sleeve lining
 - 037 undersleeve lining

**Main fabric parts 008-021****Interfacing parts 022-029****Lining parts 030-037**

Chapter 15 Export/ Import and Pixel images

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Content

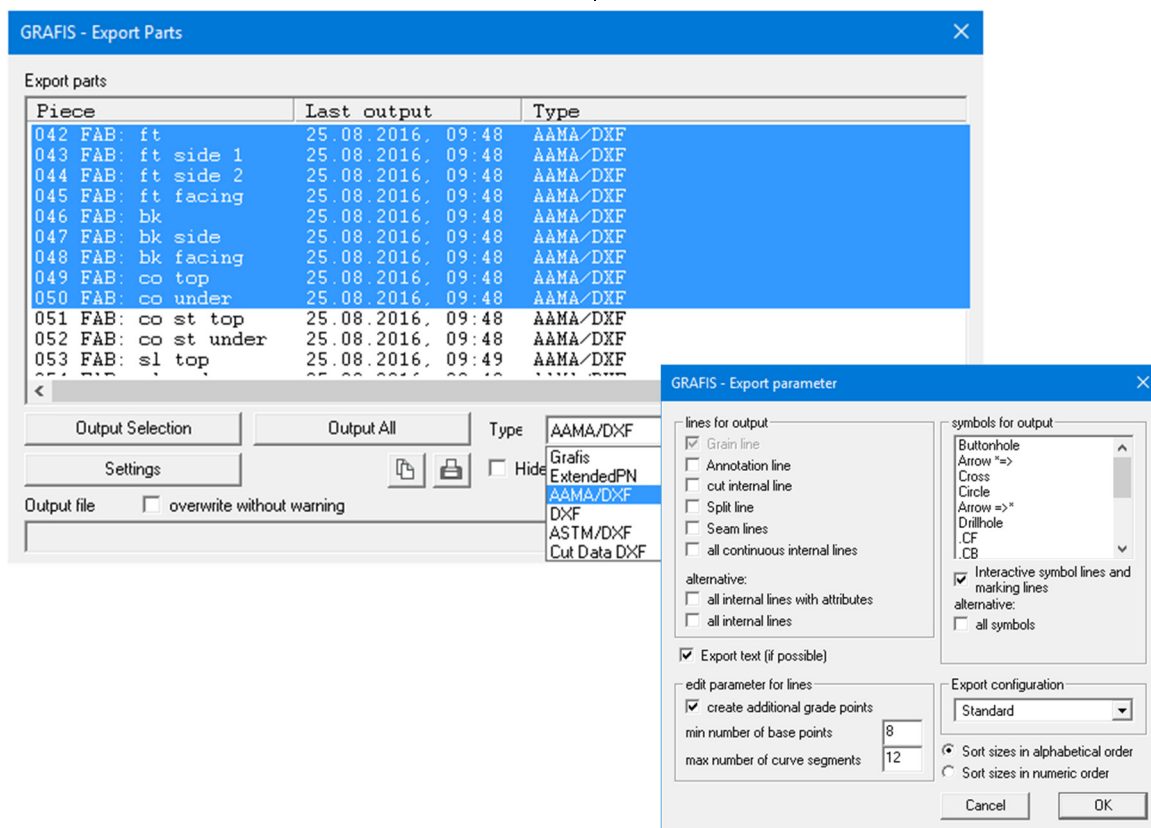
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All Grafis users who deal with production abroad or provide pattern services for companies will have to deal with export and import. As a rule, during data exchange between CAD systems a loss of information occurs as the patterns are reduced to an agreed data format.

During export, the interactively adjustable patterns in Grafis are converted to a contour with grade rules plus additional information on grain line, notches, text and symbols. The exported patterns contain no

information on x values, body measurements and piece interdependency.

Patterns from foreign systems can be imported into Grafis only as grade rule patterns. Grade rule patterns consist of a pattern perimeter with grade points. Each grade point is assigned a grade rule table with size dependant point movement in x and y direction.



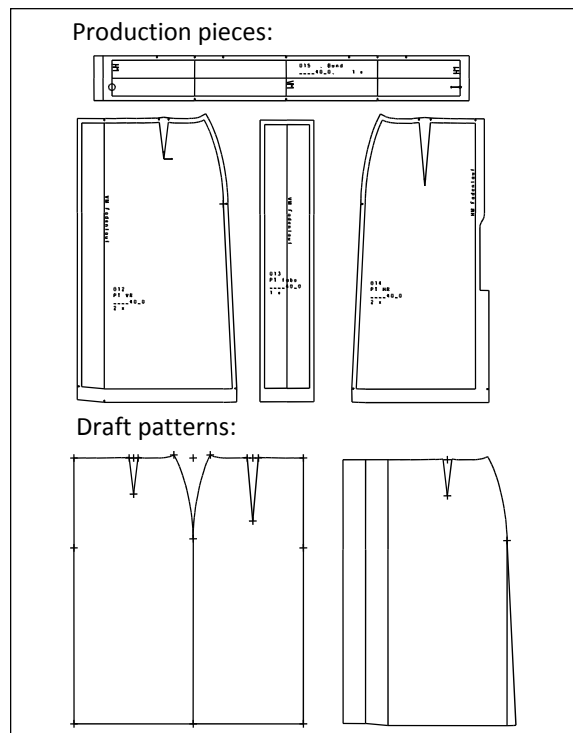
15.1 Preparation for export in the Grafis Patternmaking program

Step-by-step-guide

- ⇒ Generate production patterns with closed perimeter
- ⇒ Set grain line as symbol or as attribute line
- ⇒ Set piece parameter *production piece* for all production pieces
- ⇒ Enter all sizes to be exported in the size table and grade all pieces.

Construct production pieces with closed perimeter

During pattern development draft patterns are created from which the actual production patterns are derived, see Chapter 14 Part organisation. Only pieces with closed perimeter can be exported.



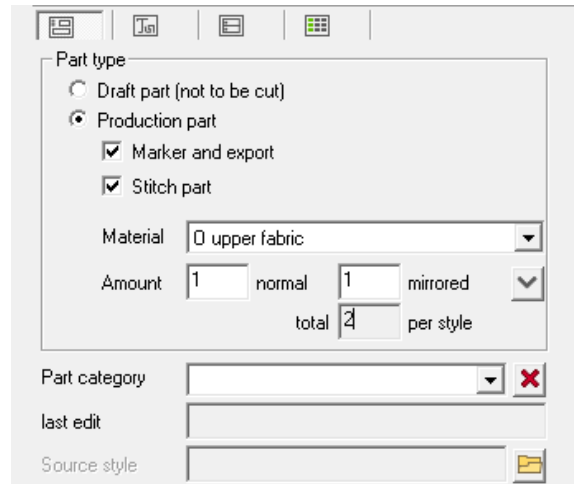
Picture 15-1

Set grain line


The Grafis symbol grain line or the interactive *Grain line 10* should be set in the pattern pieces. Alternatively, an internal line can be declared as grain line in the *attributes* menu. If no grain line has been set, the negative y direction (direction downwards) is assumed as the grain direction as standard.

Assign piece parameter

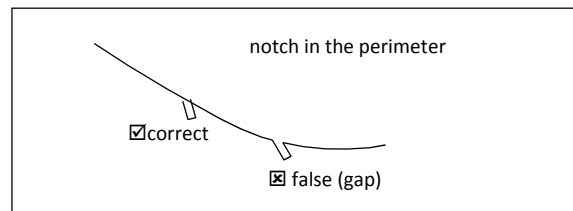
In the *part organisation* dialogue open the file card *Piece parameter* (Picture 15-2). For export, all production pattern pieces must be declared as *Production piece*. Only these pieces are captured during automatic export.



Picture 15-2

With the button  the piece parameters of the selected piece are transferred to the next piece. This relates to the attribute *Production piece*, the material type and the amount per style in normal/ mirrored position. These parameters are required for marker making, see Chapter 17.

Grafis checks for closed perimeter of the pieces when setting the piece parameter *production piece* and again during export. If Grafis finds gaps (>0.5mm) in the perimeter or protruding lines, an error message appears. Gaps can usually be found at corners, joints of lines or at symbols.



Picture 15-3

Line symbols such as notches are ignored during checking of the perimeter (Picture 15-3).

To avoid problems, the slit notch should be used.

To learn about the export function, prepare a simple style with pattern pieces, for example a skirt as shown in Picture 15-1.

Grade production pieces

All sizes to be exported must be entered in the size table. One entry per size is sufficient. Grade all production patterns with *Grade all Parts*.

15.2 Export formats and their particularities

Grafis can export in the following formats:

1. AAMA/DXF
2. ASTM/DXF
3. DXF
4. ExtendedPN
5. Grafis export format

With the exception of the Grafis and DXF export formats, during export, all pattern stacks are reduced to a base size with grade rules. As all sizes are constructed individually in Grafis, this leads to a loss of information. The target system calculates the contours of the different sizes from these reduced data with its own mathematical algorithms. Therefore, the shape can differ from the original shape in Grafis, particularly in extreme sizes.

1. AAMA

The AAMA format, also called AAMA/DXF format, is currently the most widely used format. It is based on the DXF data format used by the AutoCAD software for transfer of vector graphics. The AAMA standardisation determines which content is to be deposited in which DXF data structure (contour, internal lines, notches, drillholes etc.). The contour of the base size is normally written into the .DXF file and the graded sizes are written into a separate .RUL file. Unfortunately, the AAMA format is not clearly defined in all points so that significant differences may occur during interpretation by different CAD systems.

Grafis has accommodated this particularity. During export in AAMA/DXF format you can choose between different *Export configurations*. The correct *Export configuration* for a particular case has to be tested. The addition 'noRUL' means that all sizes are contained in the DXF file as perimeters. No separate .RUL file is created.

2. ASTM

The ASTM format, also called ASTM/DXF format, is the further development of AAMA format. It is more standardised but not available in all CAD systems. Furthermore, ASTM contains a number of new notch types and supports descriptive text. The *Export configuration* 'GradedNest' generates a .DXF file and no separate .RUL file, analogous to 'noRUL'. All sizes are contained as perimeter in the DXF file.

3. Extended PN (EPN)

EPN is an interim format determined by Gerber Garment Technologies (GGT). Exactly one pattern piece with all grade rules is captured per file.

For transfer to a Gerber Accumark system database a conversion is required.

4. DXF

The DXF format is used for export of data to engineering CAD e.g. AutoCAD or drawing programs e.g. Corel Draw. The DXF format exported by Grafis uses a small amount of the standardized data types only. Thus, the exported data will be readable in many systems. The single sizes are exported to consecutive layers

5. Grafis format

The Grafis format is a format for transfer of pattern pieces determined and published by Grafis. This data format is currently supported by only one foreign system.

NB: Data exchange with other Grafis users should ensue via: Grafis styles, Grafis styles with reduced pieces, Grafis production styles, Grafis grade rule patterns or Grafis markers!

6. Other data formats

There is no alternative to the above formats for transfer of pattern pieces in a number of graded sizes.

Individual pieces can be output in HP/GL vector graphic format, see explanation on 'output to file' in section 3.3.2.

With the Grafis Marker making, data can be output in ISO format to drive cutters. This interface is released for particular cutters as part of a maintenance contract.

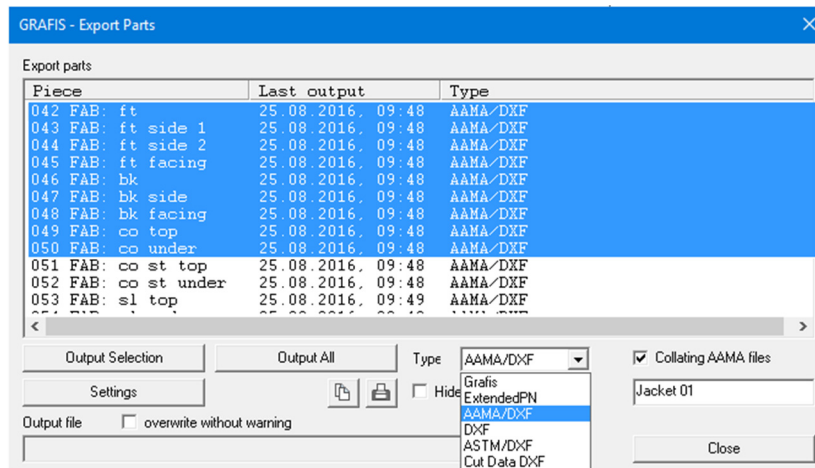
15.3 The export dialogues

The Grafis export parts dialogue

The *Grafis Export parts* dialogue (Picture 15-5) opens via *File* → *Export parts*. This dialogue controls which parts, in which data format and with which specific settings are to be exported.

Settings opens the *Export parameter* dialogue with the selection of *Export configuration*, among others. Check in this dialogue whether the parameters for the envisaged export are set correctly.

The switch **Hide seam allowances** can temporarily hide seam allowances of the patterns. The pre-requisite is that the net perimeter of the pattern has been assigned the attribute *seam line*. Having quit the export function, the seam allowances are re-instated.



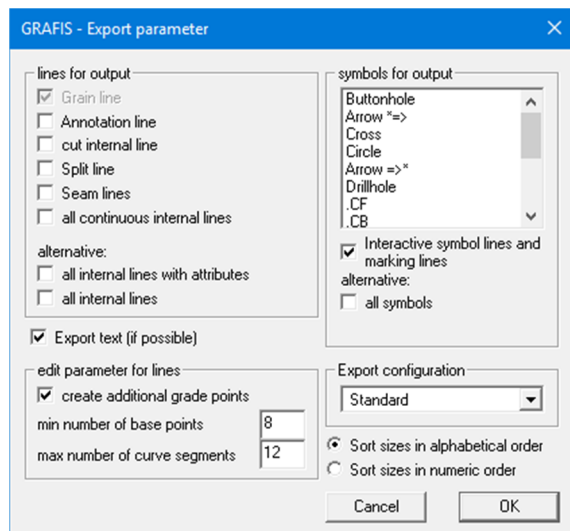
Picture 15-4

Output selection initiates the export of all currently selected parts. **Output all** starts the export of all parts in the list. If the switch **overwrite without warning** is set, existing files with the same name will be overwritten without notification.

With the buttons **Copy** and **Print** the list of export parts with details of export type and time of last export is copied to the clipboard or printed directly. The **output file** field indicates the name of the export file during the export process.

The Export parameter dialogue

The *Grafis-Export parameter* dialogue (Picture 15-5) opens via the button *Settings* in the *Grafis-Export part* dialogue.



Picture 15-5

Lines for output

The section **lines for output** controls which lines are to be written into the export file. You can select the line attributes *grain line*, *annotation line*, *cut internal line*, *split line* and *seam lines*, which have been assigned with the *attribute* function. The selection *all continuous internal lines* captures all lines without

any particular line attribute. Alternatively, you can use the global switches **all internal lines with attribute** for all lines with special attribute or **all internal lines**. If one of the global switches is set, specific line types can no longer be selected.

Symbols for output

The section **symbols for output** controls which symbols are to be written into the export file. This section captures all point and line symbols which have been set with the *symbols* function. The

grain line and line symbols are not captured, here. Symbols which are known in the target data format, such as the drillhole, are written as symbols into the export file. All other symbols are transferred as continuous lines. If the switch *all symbols* is set, all point symbols are exported. Alternatively, the symbols to be exported can be selected individually in the list. The switch *interactive symbol lines and marking lines* controls the export of the interactive seam symbols.

Division of curves with additional grade points

To ensure accurate curve representation in all sizes in the target system, additional grade points are set automatically along the curve during *Export parts*. The options under **edit parameter for lines** influence this automatism. The switch **create additional grade points** should only be deactivated in exceptional circumstances as it switches off the above automatism. The additional grade points are set at the following points of the perimeter:

1. at real corner points,
2. always at notches even if *create additional grade points* is switched off and
3. at turning points of the curve.
4. All remaining curve sections are divided according to the parameters *min number of base points* and *max number of curve segments*.

The parameter *min number of base points* indicates the minimum number of base points to be contained in a curve section between two grade points. Normally, Grafis generates an appropriate number of base points automatically. In tight curvatures the points are denser and in long stretched curve sections, they are placed further apart. The smaller the *min number of base points*, the closer the grade points on the curves. A value between 4 and 8 has proven to be successful. A value below 3 is not meaningful. The parameter *max number of curve segments* limits the division of curves through grade points. The last division step creates no more than the stated number of curve sections. If this parameter is to be void, a high value, e.g. 99 can be entered.

A value between 8 to 12 has proven to be successful. A value below 2 is not meaningful.

Export configuration

Depending on the selected export format, different options are displayed in the export configuration section. For AAMA and ASTM, the export configuration can be chosen. Thus, the export is adjusted to the different requirements of the target system. For export of Gerber EPN (ExtendedPN), further conversion and possibly the export target can be selected, see section 15.5.

Additional settings

Experienced users can further control the export with the following switches of the Grafis.ini, section [INTERFACE]:

DXFEXP_NAMEMODE controls the allocation of the file name for Autocad-DXF files.

DXFEXP_STARTLAYER determines start layer for output in Autocad-DXF. The layers for the specific sizes are then counted upward by 1.

Mit OPTNSALWY=1 automatically opens the export parameter dialogue for each export.

AAMASAVEAS permits saving DXF files with the 'Save as...' dialogue.

15.4 Step-by-step guide for export in AAMA/ASTM/DXF format

This step sequence applies to export in AAMA/ASTM/DXF format and in Grafis export format. The analogous step-by-step guide for export in Gerber EPN format can be found in section 15.5.

1. Every part of the style to be exported need to be marked as *Production piece* at file card *Part parameter*. It is possible that a number of parts are marked as production pieces as the parts will be chosen for export, later.
2. The parts must be available and graded in all sizes to be exported. Select all sizes to be exported in the *Size table* and then start *Grade All Parts* or *Grade Production Pieces*.
3. Open the export dialogue via *File | Export Pattern Pieces*. All productions pieces will be automatically prepared and displayed in all available sizes, see Picture 15-4.

4. Choose export type *AAMA/DXF*, *ASTM/DXF* or in exceptional cases *DXF* or *Grafis*. Please take note of the information on export data formats in section 15.2.
5. Clicking on the *Settings* button opens the *Export parameter* dialogue (Picture 15-5). Depending on the selected format *AAMA/ ASTM/ DXF/ Grafis*, this dialogue differs only in the export configurations available. You must test which export configuration is suitable for which CAD system. Choose the required export configuration and close the *Export parameter* dialogue.
6. In the cases *AAMA/DXF* and *ASTM/DXF*:
In dialogue *Grafis Export Parts* check if *Collating AAMA files* is active and enter an appropriate name. Only if *Collating AAMA files* is checked then all selected parts will be combined into one *.DXF file and one *.RUL file. It is important that the name has no more than 8 characters and does not contain any spaces or special characters. Otherwise the file name of the exported files might be changed during transfer by email.
7. Now choose the parts to be exported in the list of parts. Mark an area of parts by clicking the part at the end of the required area with pressed <Shift> key. Pressing the <Ctrl> key marks or unmarks single parts.
8. Then all selected parts will be exported with *Output Selection*. According to the settings under *Export Parameter* the grain line, the symbols and the inner lines are included, also. Alternatively all parts can be exported with *Output All*.
9. The export files are stored in the directory \Grafis\Basis_A\Interfac\Alpha\. The following applies: 'Basis_A' is the current measurement system and 'Alpha' the current collection. During output this path is displayed at *Output file* lower left of the window.
10. The *.DXF file as well as the *.RUL file of the same name have to be passed on together ideally packed into a *.ZIP file. Both files are complementary. The *.DXF file contains the contour data and the *.RUL file the grade rules of the sizes.

File names must not be changed after export as they are synchronised!

15.5 Step-by-step guide for export in EPN format and transfer to Gerber

The step-by-step guide for generation of EPN files is identical to the step-by-step guide in section 15.4 where the export data type *ExtendedPN* is selected. The transfer to Gerber can ensue with the following variations:

- A) transfer of EPN files without conversion
- B) direct access to Gerber Accumark via a network
- C) transfer via USERROOT
- D) single Gerber export files *.TMP

Check with the recipient in which form the data is to be supplied.

Please note! We can take no responsibility for error-free data acquisition in Gerber or any mistakes or conflicts arising from the import into Gerber.

The configuration ensues in the *EPN conversion* dialogue which is opened from the *Export parts* dialogue via *Settings* → *EPN conversion*, see Picture 15-6. The above transfer variations are adjusted as follows:

- A) Select *no conversion of EPN files* in the *EPN conversion* dialogue.
- B) In the *EPN conversion* dialogue, select *conversion in data area (USERROOT)*. Select the target area on your Accumark system.
- C) Now, prepare the data base for Gerber with Windows Explorer. Rename an already existing area C:\USERROOT\STORAGE\FLOPPY\... to C:\USERROOT\STORAGE\YOUR_NAME\... if required.

Copy the file \Grafis\Hilfen\floppy0.exe to the root of your drive, here C:\ and start it there.

Floppy0.exe creates a new area C:\USERROOT\STORAGE\FLOPPY\... An already existing area 'FLOPPY' will be overwritten! Ideally, rename this area 'FLOPPY' immediately to 'YOUR_NAME'.

In the *EPN conversion* dialogue, select *conversion in data area (USERROOT)*. Select the target drive and the data area you have just created.

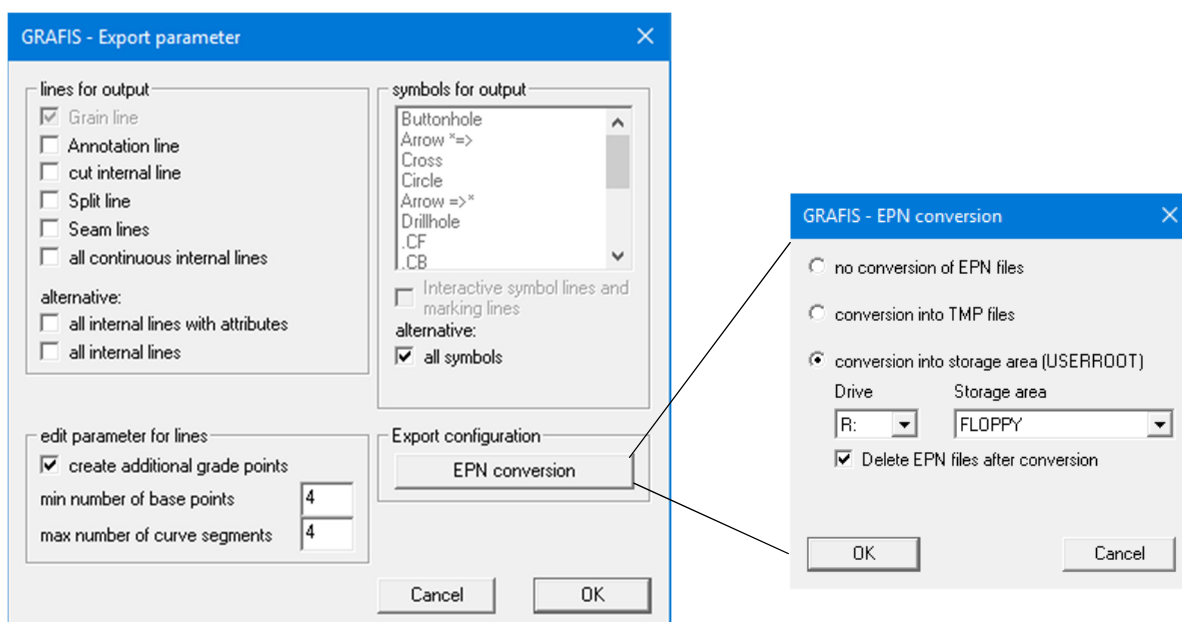
- D) In the *EPN conversion* dialogue, select conversion to TMP files.

After export, the converted data is available as follows:

- A) The EPN data is saved under \Grafis\Basis_A\Interfac\Alpha\, where Basis_A is the measurement system and 'Alpha' is the name of the collection. The EPN files are constructed from the style name and the part number. Thus, the file trouser.002 contains the data from the second part of the style 'trouser'.
- B) With direct access to Gerber Accumark via a network, the parts are immediately visible.
- C) The data is to be sent via email/ internet. The complete data area from \USERROOT must be placed into a zip file.

NB: There may be more than one data area stored under /USERROOT which may relate to more than one customer or stem from different days. Always ensure that you send only the area(s) required by the recipient. Otherwise, data for other customers may be included.

Each export writes to the selected data area of the USERROOT. The old data is not overwritten, the data area grows. To ensure before export



Picture 15-6

that the data area contains no other data, floppy0.exe must be called. This creates the empty 'FLOPPY' area. You can write more than one style to an area..

- D) As a rule, the Gerber export files are written to the directory
 \Grafis\Basis_A\Interfac\Alpha\Skirt\ where 'Basis_A' is the measurement system, 'Alpha' is the name of the collection and Skirt is the style name. This path appears in the *output file* field at the bottom left during output. A separate file is created for each part during export, e.g. 'a1A.tmp' etc. All files in this folder (folder name = style name) must be placed into a zip file and then, transferred.

Experienced users can adjust the Gerber export individually. This concerns the transfer of notation and symbols amongst others. Further information can be found in the appendix.

15.6 Special settings and errors during export

Grade points

Grafis interprets each start and end point of a line as a grade point. These points will appear correctly in the target systems throughout the graded size range. Therefore, it is important that the perimeter of the Grafis pattern is separated at all significant corner points and base points. Internal objects which contain corners or kinks should also be separated at these points. The only exceptions are points with attached notches. All base points of notches are automatically translated into grade points so that their position can be described accurately.

Perimeter

In addition to the separated points mentioned above, the perimeter of the piece must be properly closed. The export function tolerates gaps or overlaps of a max of 0.5mm. Therefore, it is recommended to close all corners properly with the corners function before export. **But the perimeter should not be linked completely!** More difficult to find are areas with blunt overlaps. Such sources of error should be avoided during pattern development if possible. They are difficult to rectify using construction methods at a later date. Especially in the graded sizes, blunt overlaps can arise after link: single and parallel or after transformation and parallel.

Curves

At *Export pattern pieces* Grafis automatically inserts additional grade points onto the curves so that the curve shapes in all sizes appear largely unchanged in the other systems. It is not necessary to separate the curve manually like in earlier Grafis versions.

Notches and drillholes

During export there is a differentiation between two types of symbols, line symbols and point symbols. Line symbols as for instance the notch are considered in connection with the perimeter or with another base line. Point symbols, however, can be placed in any position inside a pattern piece. The drillhole is an example for a point symbol. Point symbols are divided into directional symbols (grain line, centre back, arrows etc.) and non-directional symbols (drillholes).

Of the different notch types the slit notch is most suitable for export. It can be located accurately on the perimeter as the base point is part of the notch line. It can also be used as cutting line for separating curves. When using point symbols it should be considered that not all symbols are supported in the individual data formats. For example, AAMA recognises only one drillhole.

Text

Free text is directly supported by ASTM format, only, exceptionally also in the AAMA format. In general, only the transfer of part name and style name can be controlled. In addition, the size designation is usually transferred. However, the size does not have to be identical with the original Grafis size designation. Grafis uses the Grafis style name and the part text to determine these designations. Therefore, these designations should have a connection to the designation to be used later in the target system.

Possible sources for errors

For export of individual sizes there are no further sources for errors other than the points mentioned above.

For exporting graded nests the fact that most target systems expect a clear succession of grade points and notches within the perimeter is to be considered in addition to the points mentioned above. It is not acceptable for a notch to be placed exactly on a grade point in one size and slightly off to the side of the grade point in another size.

Also, the succession of the points in the perimeter must always be identical. A notch must not move across a grade point throughout the size range! Such errors are reported in Grafis during export (Error 404) and the process is aborted.

Another possible source for errors are points positioned too closely. Gerber cutters often encounter problems if notches are placed closer together than the minimum distance allows. In other cases the import only succeeds if the base points of the perimeter have a minimum distance. If the distance falls below the minimum required relevant messages will appear during export. The limits should be tested before going into production.

15.7 Import of grade rule patterns

All patterns prepared in one of the export formats listed below can be imported into Grafis. They are imported as grade rule patterns into Grafis. Working with grade rule patterns forms the content of Chapter 16.

Overview of the import data formats:

Data formats with grading information	
AAMA	DXF and RUL or DXF without RUL with all sizes in the DXF file
ASTM	as AAMA
ExtendedPN	EPN
IBA/VET	IBA and VET
Grafis	001, 002, 003 etc.
Data formats without grading information	
DXF (AutoCAD-DXF)	DXF without RUL
HPGL	PLO, PLT, HGL and others
ISO	CUT, ISO and others

Data can be imported into Grafis Patternmaking and into Grafis Marker making. As opposed to Grafis Patternmaking, in Grafis Marker making the size range cannot not be rebuilt. Only contours contained complete in the file are displayed in Grafis Marker making. **Therefore, import from data formats with grading information must always ensue into the Grafis Patternmaking program first. Import into the Grafis Marker making program can only serve as a control measure. One exception is 'DXF without RUL with all sizes in the DXF file'.**

Unfortunately, a completely automatic import is not possible. The main reason is that the definition of the AAMA format is not clear and is interpreted differently by different CAD suppliers, see more detailed explanation in section 15.2. In addition, in Grafis the size range must be checked during import.

Step-by-step guide

- ⇒ Create a new style as the size table is usually altered during import
- ⇒ Pull-down menu *File* → *Import grade rule pattern*
- ⇒ Select file to be imported
- ⇒ A size table appears in which you can assign the sizes in the file with the usual standard sizes in Grafis.
- ⇒ During import of DXF files, a further dialogue appears with the option to select *AAMA-DXF* or *AutoCAD DXF* as well as other options. If the file comes from a clothing CAD system, select *AAMA DXF*. Otherwise select *AutoCAD DXF*. For your first import attempt leave the options in the dialogue unchanged.
- ⇒ Grade and check the imported patterns.
- ⇒ If one of the following discrepancies occurs, repeat import with changed options. Import again into an empty style.

Possible discrepancies in the case of *AAMA DXF*:

- Curves are kinked, not smooth/ soft.
- The piece description in *Grafis- Part organisation* is missing or too short.
- Import of an ASTM file has not worked.
- The perimeter seems to have been imported twice. The lines of the contour are not visible.
- All notches point in the same direction, e.g. all to the right or all upward.
- Patterns appear in the wrong scale.

Possible discrepancies in the case of *AutoCAD DXF*:

- Not all parts are visible
- ⇒ If error messages appear during import or nothing is imported, import with *File* → *Import (reduced)*. *Import (reduced)* does not transform the data into a gradeable pattern but shows exactly the content of the file.

Import of HPGL, ISO and DXF data without RUL ensues always into the first size. The size table remains unaltered.

Check size range

To ensure that the imported pattern can be graded in Grafis as a grade rule pattern, the sizes in the file must be assigned to the Grafis standard sizes of a figure type.

A dialogue according to Picture 15-7 opens. A suitable base size must be entered into the first position of the size table. Enter all other sizes in the desired order. The section *discarded import sizes* contains the sizes existent in the import file but not assigned with a size. If you continue import with *close*, the *discarded import sizes* are not imported.

Individual sizes can also be entered into the size table. In this case, a correct reference size must be entered in the x reference column as the grade rules are associated with these reference sizes. A shift of the size run during import also is possible, see Picture 15-8.

	Size	X ref	Import sizes
<input checked="" type="checkbox"/>	01	M	N40_0 <== 38
<input checked="" type="checkbox"/>	02	S	N36_0 <== 34
<input checked="" type="checkbox"/>	03	L	N38_0 <== 36
<input checked="" type="checkbox"/>	04	XL	N42_0 <== 40
<input type="checkbox"/>	05		<== 42
<input type="checkbox"/>	06		<== 44
<input type="checkbox"/>	07		<== 46
<input type="checkbox"/>	08		<== 48
<input type="checkbox"/>	09		

Picture 15-8

If the *AAMA format* button is greyed out, no data in AAMA or ASTM format is present. In this case only the *AutoCAD DXF format* option can be selected. Simultaneous with the *Grafis-Import* dialogue, the *Grafis DXF/AAMA/ASTM import* information window appears, containing information from the file.

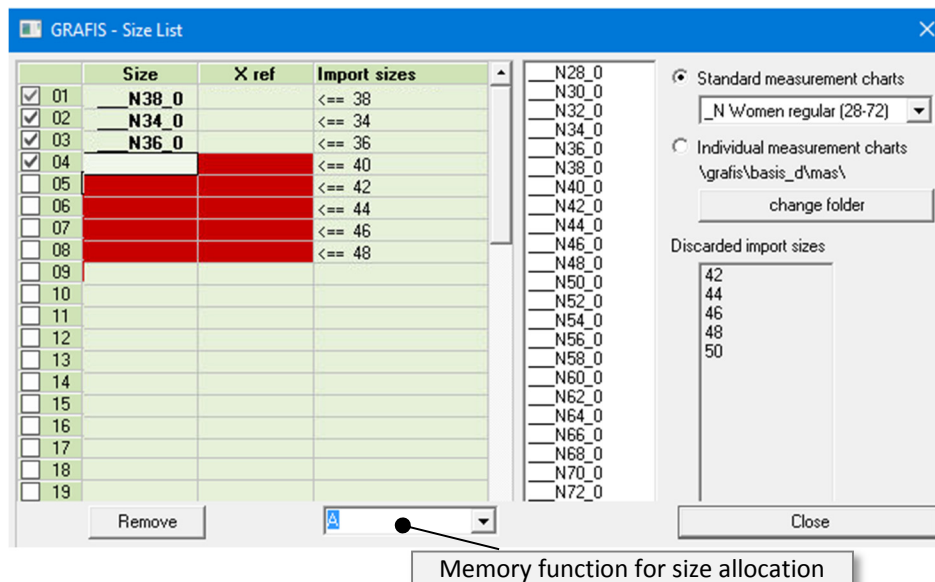
If the data comes from a clothing CAD system, select 'AAMA-DXF'. Otherwise, select 'AutoCAD- DXF'.

Before starting the import process, you can select

different options. For a first import attempt, leave the options unchanged as Grafis has already preset them based on information from the file.

Measurement unit

In the AAMA/ASTM format, normally only *metric* or *inch* is permitted as measuring units. Depending on the CAD system, *metric* could be interpreted in millimetres, centimetres or metres. Therefore, the



Picture 15-7 Measurement unit is

The memory function for size allocation in Picture 15-7 is only visible if this option has been activated at the index card *Options for experts* in the setup. Before quitting the size table with *close* you can enter a suitable name for this allocation, e.g. 'women' or 'men'. You can then select one of the memorised allocations for your next import.

The Grafis Import dialogue

The *Grafis- Import* dialogue (Picture 15-9) appears only for import of ASTM/AAMA/DXF files. It is required as data could be presented in AAMA or ASTM or AutoCAD DXF format.

preset based on information in the file. The user can alter these settings. Entry of a user-defined unit in millimetres is possible. For metres, the value 1000. should be entered.

Interpolate curve points [only AAMA/ASTM]

Depending on the CAD system, sufficient or relatively few curve points are delivered for a curve. Set this option if the curves appear to have been imported slightly kinked during the first import attempt. Additional curve points will be interpolated so that the curve appears softer/ smoother.

Us Annotation as piece name [only AAMA/ASTM]

In the AAMA format, two text entries are available: PIECENAME for the identification of the piece and ANNOTATION for a description. This switch determines whether the text in PIECENAME or in ANNOTATION is used for the part description in part organisation. Normally, this switch is not set. However, some CAD systems assign PIECENAME with very short and not very informative text. In this case, it is advisable to activate the switch.

Ignore Quality-Layer [only ASTM]

Only ASTM files contain an additional quality layer. This layer contains the contour with individual auxiliary points and had been introduced as an aid for comparison in the target systems. If a quality layer is available, Grafis uses this more accurate data. In case the import with ASTM does not work, activate the option *Ignore Quality Layer*.

Ignore seam lines [only AAMA/ASTM]

Some CAD systems export the seam line as well as the contour. If the seam allowance has been set to 0mm, the contour and the seam allowance are doubled up and leave each other invisible. In this case or if too many auxiliary lines have been imported, activate *Ignore seam lines*.

Notch angles relative [only AAMA/ASTM]

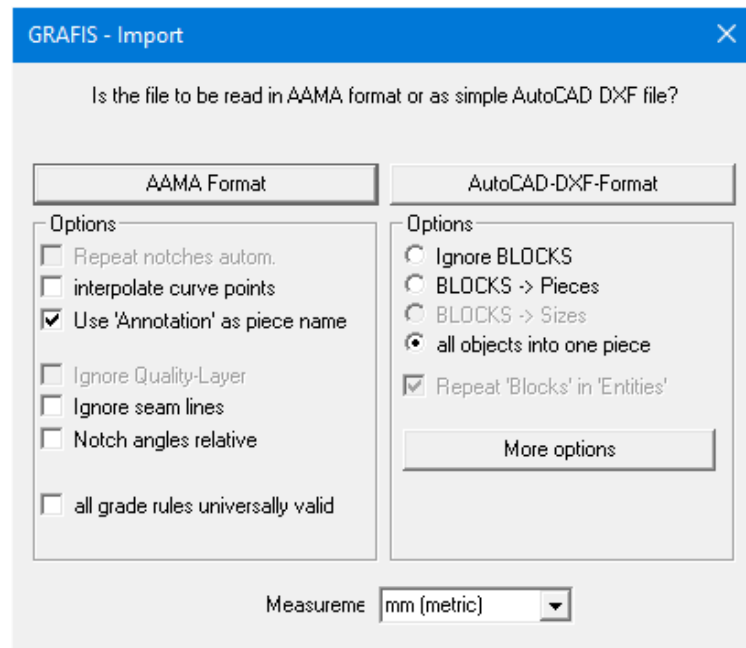
Normally, the notch direction is calculated absolute in relation to the co-ordinate system. Some versions of CAD systems interpret this setting as relative to the base line of the notch. Therefore, the following applies: If all notches point in the same direction at the first import attempt, e.g. all to the right or all upward, activate *Notch angles relative*.

Automatic notch repetition

This option serves only as a display for treatment of notches during import of AAMA /ASTM data from Lectra. Here, it may be necessary to transfer the notch position from the base size automatically to the graded sizes. The pre-selection of this switch ensures via the GRAFIS.INI [INTERFACE]/IMPNONLECTRA.

Use ATTDEF [ASTM only]

The new data type ATTDEF is not fully implemented in Grafis. If errors occur during reading of ASTM files or if elements such as notches are missing, this option can be selected.



Picture 15-9

Ignore BLOCKS etc. [only AutoCAD DXF]

In DXF files, lines and points are combined to BLOCKS. Furthermore, there is an ENTITIES area in which the individual BLOCKS areas are activated and other objects may be stored. Unlike in AAMA and ASTM files where a part is always combined in a BLOCKS area which is activated in the ENTITIES. This organisation is not always clear in other DXF files. Therefore, the following option for this import are available:

- *Ignore BLOCKS* hides everything defined in BLOCKS and shows only the objects from the ENTITIES area.
- *BLOCKS → pieces* behaves like import of an AAMA/ASTM file and imports each BLOCK into a separate part. The ENTITIES area is also imported into a separate part.
- *BLOCKS → sizes* imports everything into one part but stores the different BLOCK areas in different sizes.
- *All objects into one piece* ignores the organisation into BLOCKS or ENTITIES and saves all lines and points in one part.

If you are unsure how the different BLOCKS are interpreted, first select *all objects into one piece*. This shows everything contained in the file. Then, test the AutoCAD DXF import with all other options one after the other and check with which option all information appears in the desired order.

All grade rules universally valid

If the perimeter or internal lines of the piece in an import file are not continuous lines, different grade rules may be calculated at points of contact with the perimeter during conversion to a grade rule pattern.

During grading, gaps may therefore appear in the perimeter. In this case, the option *all grade rules universally valid* may assist. It ensures that one grade rule only is permitted for each position. On the other hand, new problems may occur if internal lines touch the perimeter but are to be graded differently from the perimeter.

Additional options in the Grafis.ini [only AAMA/ASTM]

Experienced users can control the import via the following switches in the Grafis.ini section [INTERFACE]: MIN_SLITNOTCH and MIN_VNOTCH controls the minimum length of notches.

IGN_GRADE_REF ignores grading reference line

IGN_PLAID_REF ignores repeat markings for check material

IGN_STRIPE_REF ignores repeat markings for stripes
DUPL_PCE_MODE controls the treatment of double piece names

AAMA_CHK_DOUBLE_RULES checks for double grade rules on a point

AAMA_ACCEPT_FFPTS accepts free function points

Direct import of data

From version 11 onwards, importable files can be opened with double-click in Grafis. The file extensions, e.g. DXF for AAMA/ASTM/DXF files, are linked with the Grafis.exe. Double-clicking on a DXF file starts Grafis, requests the desired measurement system and begins direct import of the file.

15.8 Load and manage Pixel images

Pixel images can be loaded into a Grafis Patternmaking or into a Grafis Marker making. When saving the style file or the marker file, the images are saved with this file. Loading and managing pixel images is identical in both applications and is explained in the following.

Using pixel images in Grafis is optional. It is enabled and set up by the Grafis Team.

Load pixel images

Pixel images in bmp, gif, jpg, tif and png can be loaded in to Grafis.

Step-by-step guide

- ⇒ Open a style or marker file
- ⇒ *Extras or Marker information* → *Manage pixel images*
- ⇒ *Load image* in the menu

Manage pixel image menu

load image ▪ delete image ▪ +/- show image list

Image	Part	Path	Properties	Image type	Position
Fox.png	<input checked="" type="checkbox"/>	001 NN R:\Sabine\CI		Background image	...

Image selected in the list of images...

vertical ▪ mirror horizontal ▪ nil

rotate +90° ▪ rotate -90° ▪ fine turning

width/height of image in pixel

reference point (X/Y) in image in pixel

solution in dpi

target width/height in Grafis in mm

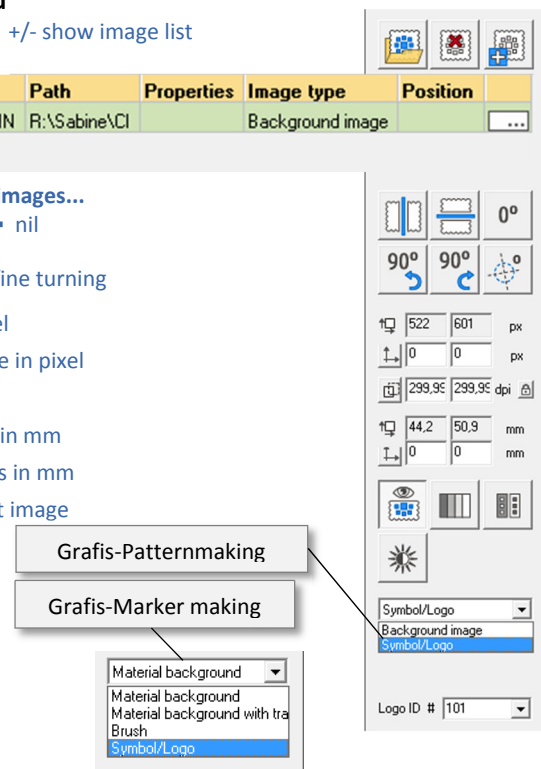
reference point (X/Y) in Grafis in mm





visibility ▪ greyscale ▪ invert image

gamma correction

select type of use

select symbol/logo ID



- ⇒ Select the pixel image file
- ⇒ possibly, assign the image to a part
- ⇒ select type of use for the pixel image
- Select in Grafis Patternmaking:
 - Background image
 - Symbol/ Logo
- Select in Grafis Marker making:
 - Material background
 - Transparent material background
 - Fill/ brush
- ⇒ Symbol/ Logo
- ⇒ possibly, assign ID for symbol/ logo
- ⇒ possibly, flip or rotate pixel image
- ⇒ possibly, determine reference point in pixel image
- ⇒ possibly, determine image size in Grafis
- ⇒ possibly, determine reference point in Grafis
- ⇒ possibly, adjust visibility, greyscale, transparency or invert image
- ⇒ End with 
- ⇒ With the functions    pixel images are loaded into the image list or removed from this list and the list is opened and folded. All further functions on the right of the menu relate to the image selected in the image list.

Functions of the image list

Clicking on the last column in the image list opens a context menu with further functions for the pixel image. The pixel image can be assigned to a part or moved up/ down in the image list. *With save image file as...* it is sorted from the style/ marker file and saved outside of Grafis. The function *duplicate image...* is needed if the image in the current style/ marker is also required in other parts or as a duplicate with other settings.

Flip/ rotate image

With this block of functions, the selected pixel image can be flipped, rotated or returned to its original state.

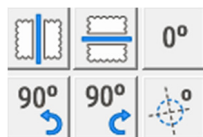

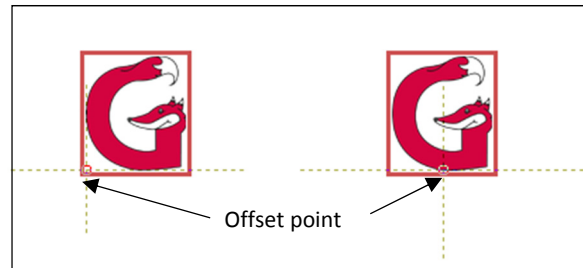
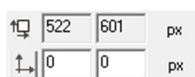






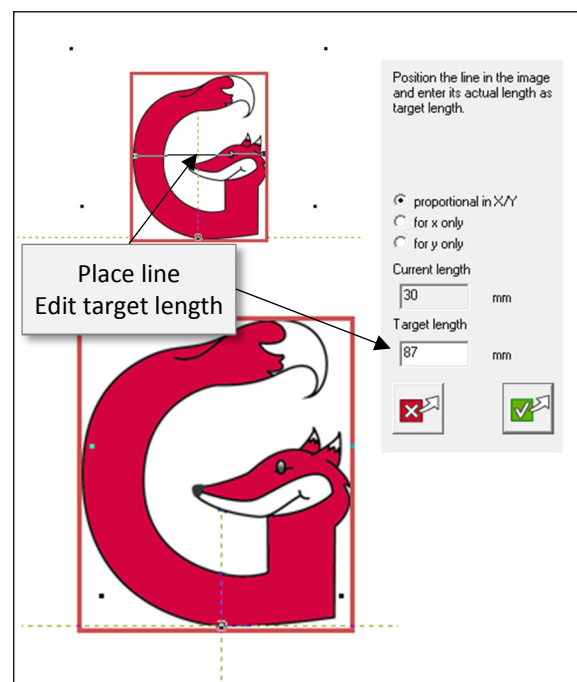
Image size and image position

With the following functions in the menu, the target size in Grafis and the position of the image in Grafis are determined. The value in the first row shows the actual size of the pixel image. For transformation in Grafis, the offset point in the image can be selected specifically with  in the second row (Picture 15-10).




Picture 15-10

For **size/ scale** in Grafis, the dpi  200 200 dpi  value in the third row is critical. It determines the calculation from pixel to inches and thus, indirectly into mm. If the dpi value of the pixel image is not known, it can be established in its own dialogue via the button  to the left of the dpi value, see Picture 15-11. In this dialogue, the start and end point of a line is placed in the pixel image and the known target length of this line is entered. You can select if the scale is to be applied proportionally in x and y direction or in one direction only. If  is active in the

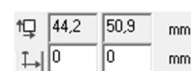



Picture 15-11

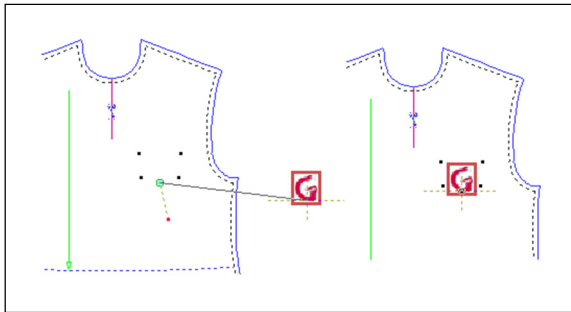
menu, the scaling is carried out proportionally.

 accepts the scaling. The dpi value results from these data.

The size of image in Grafis in mm, shown in the fourth row, results from the dpi value.







The **target position of the offset point** can be determined through value entry in the fifth row or through clicking  and constructing the target point in Grafis (Picture 15-12).



Picture 15-12

Visibility, colour values, greyscale, transparency, repeat

Activating  determines that the pixel image is visible in the style/ marker. The tick ☒ only controls visibility of the image and the corresponding part during work in the *Manage pixel image* menu.

 converts the image into greyscale. Clicking on  inverts the colour values of the image.  is for gamma correction. Clicking again on the respective icon reverses the correction. Further settings for background images are available in Grafis Marker making, which are explained in Section 15.10.

15.9 Pixel images in Grafis Patternmaking

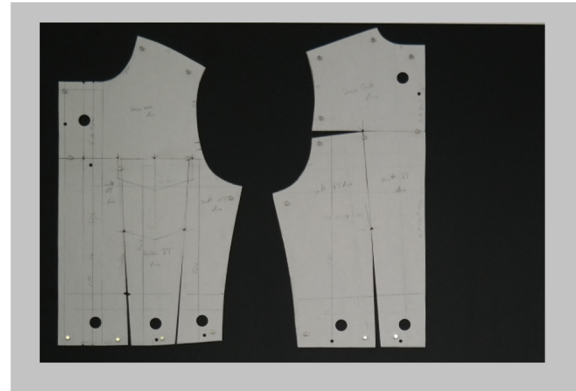
Pixel images can be used in Grafis Patternmaking as

- background images or
- symbol/ logo.

Background image for digitizing and tracing

This option is required for tracing photographed or scanned pattern templates. It is important that the pixel image is free of distortion through optical lens or perspective and that the image contains markings/ lines from which the actual size in mm can be determined.

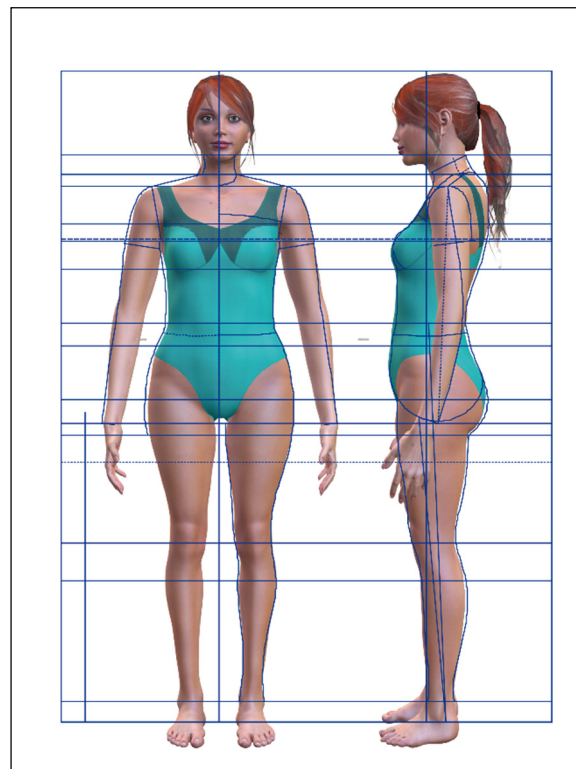
The pattern pieces in Picture 15-13 have been photographed. Then, the lens distortion and the perspective have been recalculated with the PFP Photo add-on. These processed photos can be loaded into Grafis as pixel images. They are then used as templates for digitizing of the background image or as templates for tracing an interactive construction, see Section 13.4.



Picture 15-13

Background image for derivation of body measurements from photographed persons

The person in Picture 15-14 has been photographed. Here also, the lens distortion and perspective have

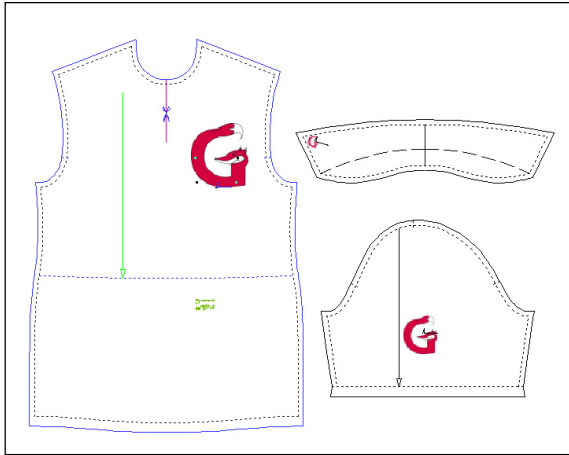


Picture 15-14


been recalculated with the PFP Photo add-on. This pixel image is now used as a template for the interactive add-on construction *PFP Profile 10* for determination of body measurements of specific individuals from photos.

Pixel image as symbol/ logo

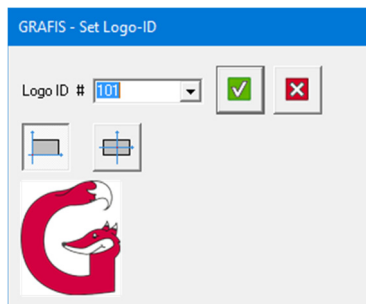
With the symbol/ logo type, a pixel image is placed onto a number of parts of a style in various positions.



Picture 15-15


First, load a logo similar to Picture 15-15, in the *Manage pixel image* menu, set the type *symbol/ logo* and assign ID 200. Set the width of the logo to 80mm. For the sleeve in Picture 15-15, the logo is required to be a little smaller. Duplicate the logo with  and *duplicate image*, assign ID 201 to the duplicate and set the width to 40mm; treat the logo for the collar in the same with ID 202 and a width of 10 mm.


Then, the symbol *text label* must be set in the different parts with the *symbol* menu. The position of the text label is constructed with the point construction sub-menu and the direction is constructed with the direction construction sub-menu. When setting the symbol, the dialogue according to Picture 15-16 opens. Select the ID of the loaded logo, the offset position bottom/ left or centred and confirm the settings. For the back and the sleeve in Picture 15-15, select ID 200 and for the collar select ID 202. The logos now appear in the construction (Picture 15-15).



Picture 15-16

A pixel image is to be loaded once only in the *Manage pixel image* menu if it is to be placed in various parts in the same size. The pixel image must be loaded a number of times or duplicated, if it is to be used in different sizes. A symbol/ logo is not assigned to a part. A logo is assigned exclusively via the logo ID.

The ID assigned to the *text label* symbol can be altered subsequently. Activate the expert switch *manipulate symbols* in the Setup. Open the dialogue for editing non-interactive symbols via *Extras* → *Change Symbols*. Select the required symbol from the list, enter the new ID and/or the new offset point. Accept the changes for the selected symbol with .

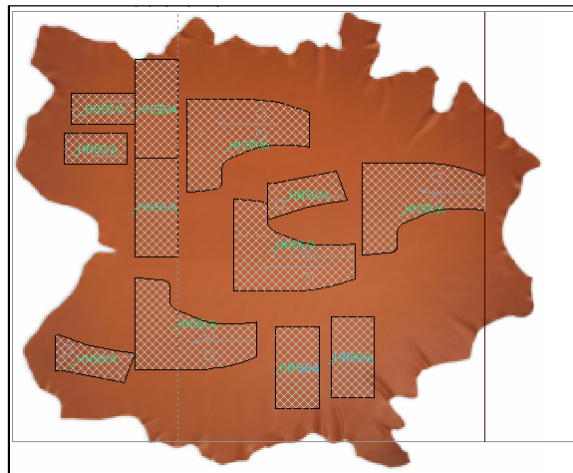
With  the changes are applied to all affected symbols in the style.

15.10 Pixel images in Grafis Marker making

Pixel images can be used in Grafis Marker making as

- Material background without transparency
- Material background with transparency
- Fill/ Brush
- Symbol/ Logo

In Grafis Marker making, pixel images have many applications. Images of patterned fabrics can be positioned in the background of the material to enable material matching of pattern pieces. Outline images of leather skins (Picture 15-17) or particularly shaped material as material background facilitate the appro-



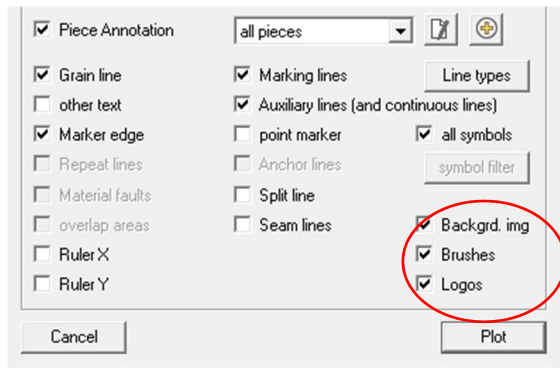
Picture 15-17

appropriate positioning of pattern pieces. Digital print adapted to pattern pieces can be prepared and correct positioning of logos is easily implemented.

Material background without transparency is useful for matching patterned fabric with the marker and for positioning pattern pieces on particular cutting material. *Material background with transparency* is equally used for matching patterned fabric with the marker. *Fill/ brush* is especially suitable for digital print as a pixel image is directly assigned to a pattern pieces and the fill can be moved within the pattern piece. With *symbol/ logo* pixel logos are output at various positions previously prepared in Grafis Patternmaking.

Material background *without transparency*

One or more images can be loaded into a marker as background without transparency. They appear on the material in the position assigned as offset point in the *Manage pixel image* menu. These can be marker templates or images of cutting material such as truck tarpaulin or leather skins.



Picture 15-18

During output of the marker, the switch *Material background* determines whether the background is printed or not, see Picture 15-18.

Material background *without transparency with repeat*

The pixel image type *Material background without transparency* offers the additional switch *repeat x* and *repeat y*. This switch activates the repeat of the image at the repeat lines of the marker. NB: the image is not repeated on the basis of its own size but at the repeat lines of the marker. Prerequisite is a set repeat in the marker and the option *repeat x* and/ or

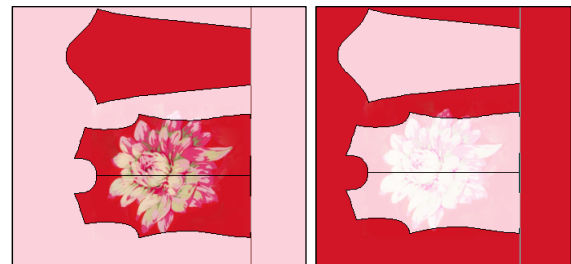


Picture 15-19

repeat y is activated for the background material (Picture 15-19).

Material background with transparency


The pixel image type *Material background with transparency* offers an additional switch *on the background* and a slider for the *gamma* value. The switch *on the background* determines whether the pixel image appears on the pattern pieces or only on the



Picture 15-20

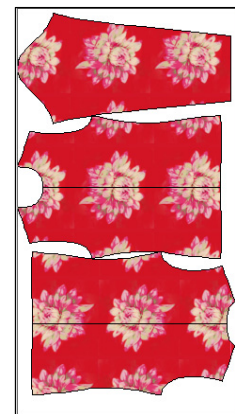
background, see Picture 15-20. The *gamma* value determines the transparency in the area of the pattern pieces.

Fill/ brush

For the pixel image type *fill/ brush* (Picture 15-21) an additional function is available in the list of images  for *display images in piece*. With this function, one or more pattern pieces can be selected to be filled with this fill/ brush in the marker.

A further button in the menu sets whether the fill is to be mirrored in mirrored pattern pieces.

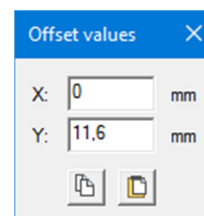
The offset for the fill is set to the bottom left corner of the pattern pieces as standard.







Picture 15-21

In the *Marker making* mode, the offset for the fill can be moved interactively or via value entry for each pattern piece separately. Switch to *Marker making* mode and open *Marker information*

Picture 15-22 → *Move fill*. The *Offset value* dialogue opens, see Picture 15-22. Now click on the fill.

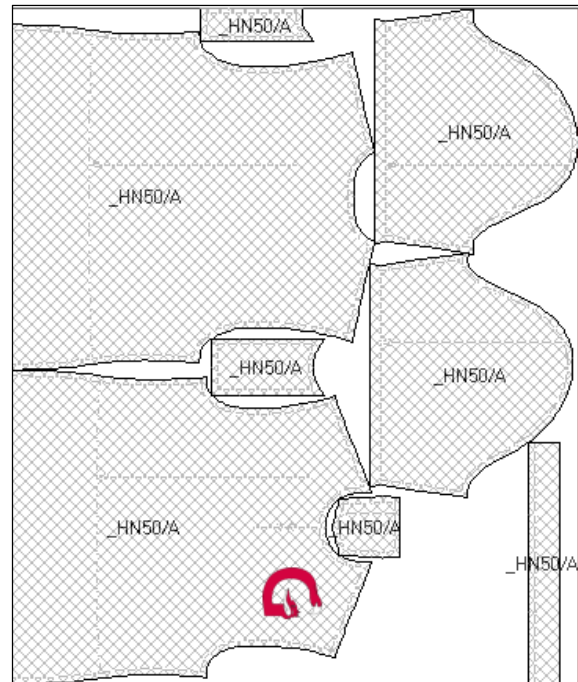


The offset values can be altered by dragging the fill with the mouse or by entering new offset values. With  and  the offset values can be transferred from one fill to another fill. Click the source fill and then on the button  in the dialogue. Then, click on the target fill and on  in the dialogue. During output of the marker, the switch *fill /brush* determines whether the fill is printed or not, see Picture 15-21.

Symbol/ logo

The logo position and their direction and logo IDs must already be constructed or assigned with the *text label* in Grafis Patternmaking. In Grafis Marker making, pattern pieces cannot be assigned new logo positions or new logo IDs. During transfer of data from Grafis Patternmaking to Grafis Marker making, pixel images are not transferred. The pixel images for logos must be loaded in Grafis Marker making in the *Manage pixel images* menu and assigned an ID.

During output of the marker, the switch *logos* determines whether the logos are printed or not, see Picture 15-23.



Picture 15-23

Chapter 16 Grade Rule Grading

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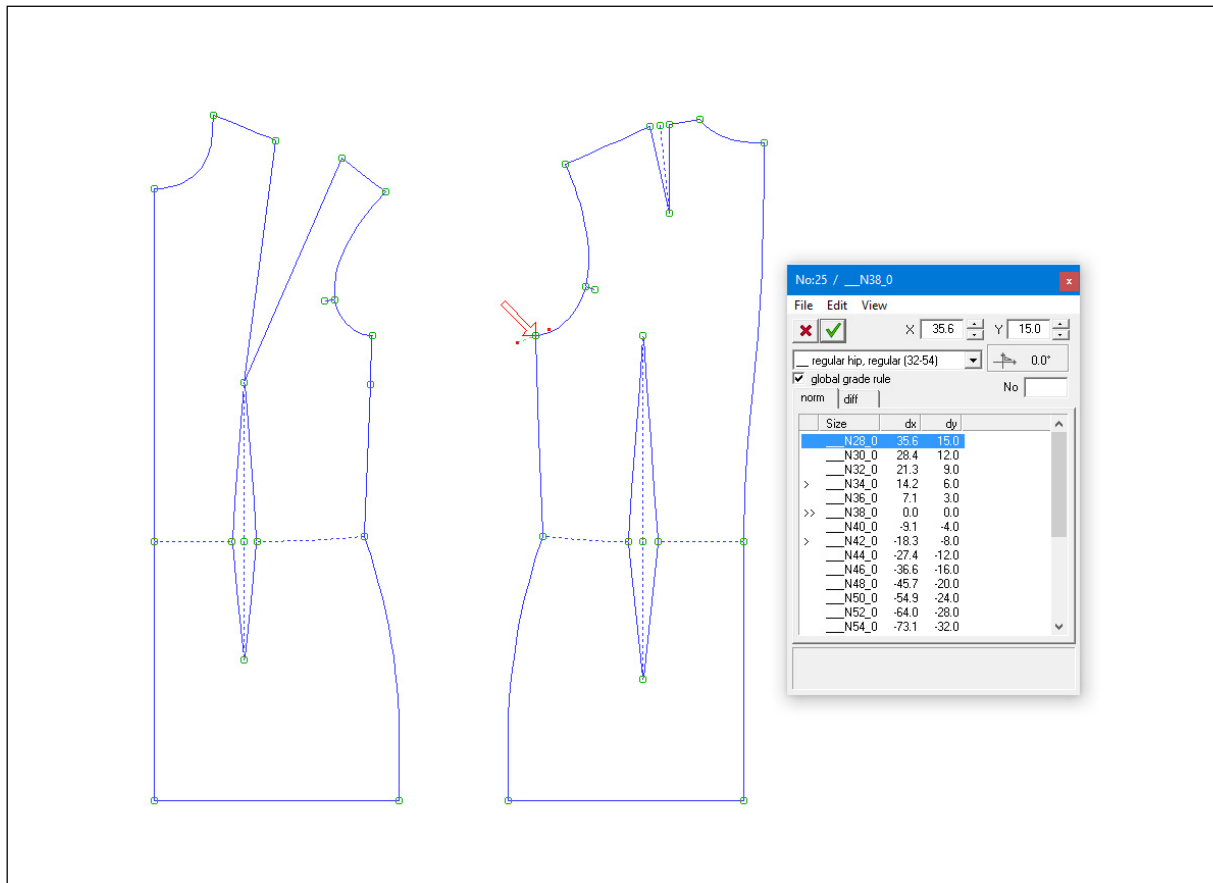
Construction patterns as well as **grade rule patterns** (Rule Patterns) can be used for pattern development.

Construction patterns are generated on the basis of body measurements. Grade rules are not required for grading, see Chapter 12.

A grade rule pattern consists of a pattern perimeter with grade points. Each grade point is linked to a

grade rule table with size-related point movement in x and y direction.

Grade rule patterns can be accepted into the record to form the basis of style development just like construction patterns. As opposed to construction patterns, grade rule patterns cannot be graded made-to-measure.

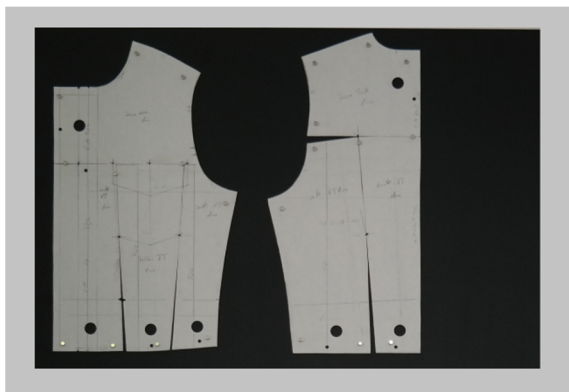


16.1 Digitizing the pattern perimeter

For many years, paper patterns could only be digitized with the help of a digitizer tablet. A digitizer tablet with a 16-button digitizer mouse and a WinTab driver matching the operating system were required. The new, alternative method is digitizing of photographed pattern pieces within Grafis without a digitizer tablet. Pattern pieces are photographed with a standard digital camera, processed with an add-on software and then loaded into Grafis as a background image and digitized or traced.

Digitizing with a digitizer tablet has a theoretical accuracy of 1 mm and is only dependent on the waviness of the template. However, a digitizer requires a lot of space, has high investment cost and is heavy and bulky. Big problems occur when switching to a new operating system, as normally a new driver for the digitizer tablet is required from the manufacturer.

When **digitizing photographed pattern pieces** the accuracy depends on how the photo was taken and how well it was reworked. First, the pattern pieces are placed on a rectangle of known measurements (Picture 16-1). The pattern pieces are photographed with a digital camera with a good lens. Reworking the



Picture 16-1

photo with the add-on programme is necessary to subtract out the lens distortion through the camera lens and the perspective and to enter the correct dpi value for the pixel image. This process is not one hundred percent exact. The higher the lens distortion, the higher the risk of discrepancy. Lines on a pixel image no longer have the accuracy of a pencil stroke. Therefore, digitizing on-screen is slightly less accurate than digitizing with a digitizer tablet. As a rule, the accuracy is sufficient and the advantages outweigh the disadvantages, in particular the location-independence when photographing the pattern pieces, the low investment and space requirement.

The add-on programmes PFP Photo and digitizing background images are optional and are enabled and set up by the Grafis Team.

Prerequisites for digitizing with a digitizer tablet

Prerequisite for digitizing is a **digitizer with a 16-button mouse, connected and switched on**. The respective **Windows driver** must be installed. If these conditions are fulfilled, the test programme \Grafis\Hilfen\Tabtest.exe displays the current pixel position of the digitizer cursor in x and y direction when moving the digitizer mouse across the active area.

Have the overview of the **digitizer key assignment** and the **menu template** for the digitizer ready. Both can be found in the <F1> help.

Position the **menu template** at any position within the active area of the digitizer tablet. The position must be determined only at the beginning or after each change of position as follows: start the set up in the digitizing menu with the <TAB> key. Then, points P1 and P2 must be digitized.

Prerequisites for digitizing photographed pattern pieces

Prerequisites for digitizing photographed pattern pieces, 'with mouse' in the following, is a standard digital camera with minimum 7 mega pixels, a rectangular underlay of known measurements and an add-on software for image processing, e.g. PFP Photo. The rectangular underlay is fixed, one or more pattern pieces are placed on top; a photo is taken of the pattern pieces with the underlay (Picture 16-1). This photo is reworked with the add-on programme and then loaded into Grafis as a background image, see also Section 15.9.

Preparation


Digitizing is easier if the required **grade points** are **marked** on the pattern. This could be done by hand, also.

With **Rule Pattern** → **Digitize Grade Rule Pattern** digitizing ensues into an **empty part**. Therefore, activate a part with '0' record steps. The digitized pattern can be inserted into the record or the call list or can be saved as a template, later.

With **Rule Pattern** → **Edit Grade Rule Pattern** **subsequent digitizing of points, lines or grade rules** into non-edited or edited grade rule patterns or even into constructed patterns is possible. This option is not explained in detail.

Before digitizing, Grafis is to be told the size of the pattern to be digitized. The **base size** is to be entered into the first position of the size table. In the example blazer side panel (Picture 16-7) this is size 38.

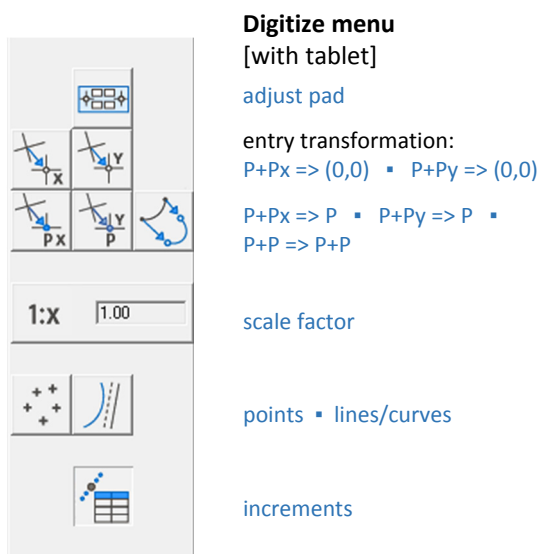
After these preparations, continue with *Rule Pattern* → *Digitize Grade Rule Pattern*. The menu for editing grade rule patterns is opened. First, open the *digitize* menu shown via the *digitize* function in the menu.

To **digitize photographed pattern pieces** click on the menu item *digitizing background image* . The displayed *digitizing* menu opens with all necessary functions. The often used functions of the first two rows are available as shortcuts on the keyboard key <1> to <8>.

To **digitize with digitizer tablet** click on the menu item *digitize with digitizer* . The displayed *digitizing* menu opens. You cannot click inside this menu.



Picture 16-2



Digitize menu

[with tablet]

adjust pad

entry transformation:

$P+Px \Rightarrow (0,0)$ ▪ $P+Py \Rightarrow (0,0)$

$P+Px \Rightarrow P$ ▪ $P+Py \Rightarrow P$ ▪

$P+P \Rightarrow P+P$




scale factor

points ▪ lines/curves

increments

The control ensues exclusively via the menu template on the digitizer tablet. In the *digitizing* menu, the current state is displayed. The top four rows from Picture 16-2 are situated on the 16-key digitizer mouse. All other functions can be found on the digitizer template to be positioned in a corner of the active area of the digitizer tablet. The digitizer mouse key configuration and the digitizer template can be found in the appendix to the Grafis Help.

Prepare digitizer

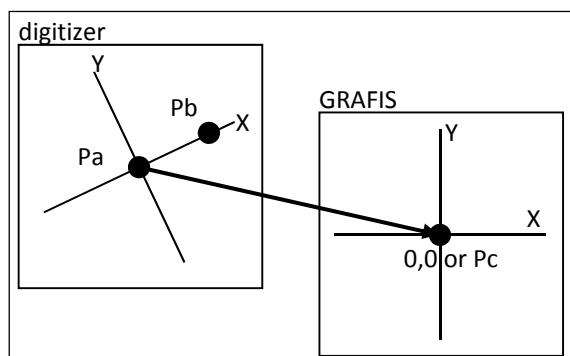
- ⇒ Prepare the pattern to be digitized, mark missing notches etc., decide whether to digitize with or without seam allowance
- ⇒ [with tablet] prepare the digitizer and place the pattern pieces onto the digitizer
- ⇒ [with mouse] place the pattern pieces inside the reference rectangle and photograph
- ⇒ [with mouse] process the photos
- ⇒ [with mouse] load the processed photos into GRAFIS as a background image., see section 15.10, align the image and check or adjust the image size.
- ⇒ Activate and annotate an empty part in the part list (possibly prepare the part list with annotations for all parts to be digitized)
- ⇒ Enter the base size of the pattern to be digitized into the first position in the size table
- ⇒ *rule pattern* → *digitize grade rule pattern*
- ⇒ click *rule pattern: digitize*  [with tablet] or  [with mouse].
- ⇒ [with tablet and at the beginning only] Set up menu pad
- ⇒ [with tablet] Determine entry transformation and define scale $Fa=...$ (e.g. 2 for patterns in half scale)
- ⇒ Digitize lines and points
- ⇒ possibly: Save digitized patterns and digitize another pattern
- ⇒ Terminate with [Quit Digitizing]
- ⇒ Edit (subsequent digitize / replace) and save the grade rule pattern (see sections 16.4 and 16.5)
- ⇒ Quit with 

Entry transformation [only: with tablet]

For **digitizing with digitizer tablet** five **input transformations** are available for the data transfer digitizer tablet → Grafis.

$p+px \Rightarrow 0,0$
 $p+py \Rightarrow 0,0$
 $p+px \Rightarrow p$
 $p+py \Rightarrow p$
 $p+p \Rightarrow p+p$

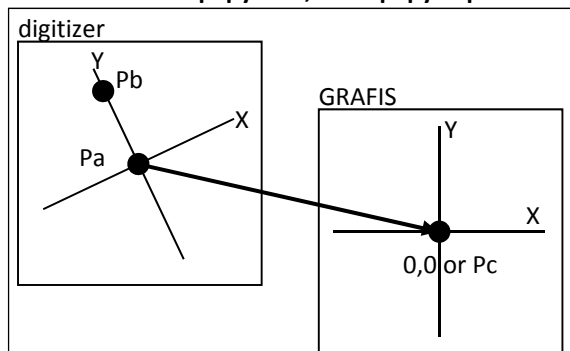
The entry transformation determines the data transfer digitizer → Grafis. It is to be updated after repositioning the pattern on the digitizer. The entry transformations are called via the menu template. They have the following significance.

Transformations $p+px \Rightarrow 0,0$ and $p+px \Rightarrow p$ 

Picture 16-3

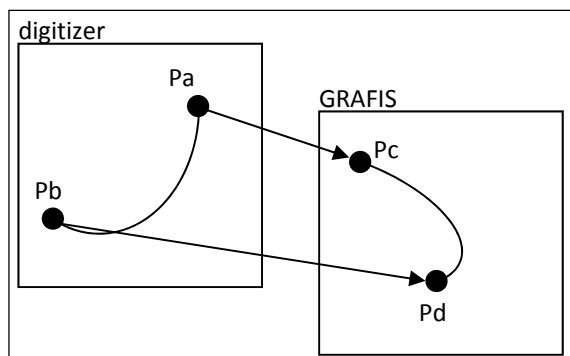
These transformations align the pattern horizontally. With $p+px \Rightarrow 0,0$ the first digitizer point Pa is set onto the zero point in Grafis. The second digitizer point Pb defines the x axis of the digitizer template (Picture 16-3).

As opposed to $p+px \Rightarrow 0,0$ the first digitizer point Pa is positioned on a point to be constructed in Grafis with $p+px \Rightarrow p$.

Transformations $p+py \Rightarrow 0,0$ and $p+py \Rightarrow p$ 

Picture 16-4

These transformations align the pattern vertically. They differ from $p+px \Rightarrow 0,0$ and $p+px \Rightarrow p$ only in the second digitizer point Pb defining the y axis of the digitizer template (Picture 16-4).

Transformation $P+P \Rightarrow P+P$ 

Picture 16-5

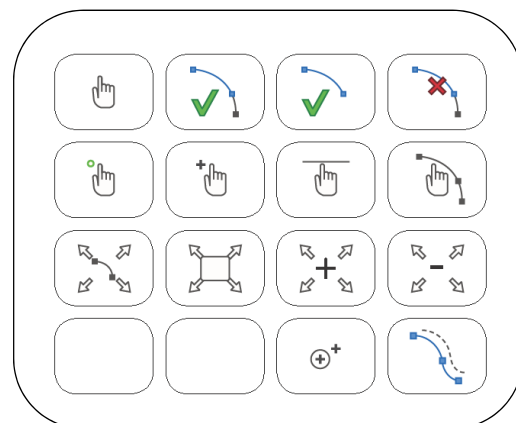
The first digitizer point Pa is set on position Pc in Grafis. The second point Pb is set on Pd in Grafis. The scale and co-ordinate rotation is calculated according to these settings (Picture 16-5). Use this transformation for inserting/replacing curves for example.

Scale factor

For all transformations other than $p+p \Rightarrow p+p$ the **scale factor** is to be set. The digitized point co-ordinates are multiplied with this factor. A pattern with scale 1:2, digitized with scale factor 2.00 appears full size in Grafis.

The digitizer mouse key functions [with tablet]

For digitizing, a 16-button mouse is required. The keys are assigned the following functions (Picture 16-6). All other functions can be found on the



Picture 16-6

digitizing template, which is found in the appendix of Grafis Help.

Overview of digitizer functions

Digitizer mouse functions



1: <digitize>

Set digi point.

2: <deposit+continue>

The active line/curve (red) or active points (black, round) are deposited. The next line/curve is linked, directly. Starting point of the next line/curve is identical to the final point of the last line/curve. It is not digitized again.

3: <deposit+start>

The active line/curve or active points are deposited. A new object with a new starting point is digitized.

4: <delete nearest digi point>

The point closest to the cursor and active (digi point or grade point) is deleted.

5: <digitize with grade point>

A digi point is digitized as a grade point.



6: <click p>

Set digi point onto a point.

7: <click l>

Set digi point onto a line/curve.

8: <click pl>

Set digi point onto the fulcrum of a line/curve.



<zoom digi area>

The screen display is zoomed so that it contains all active digi objects not yet deposited.

<zoom all>

The screen display is zoomed so that it contains all screen objects; as the function 'centre picture' with <F6>.



<move points>

Move grade points.

<re-digitize lines/curves>

Replace lines/curves. The starting and final point of the line/curve cannot be changed.

Menu pad functions



<points>

Digitize single points (applies to all active digi points).

<line/curve>

Digitize line/curve (applies to all active digi points). For a line select <line/curve>, digitize the starting and final point and deposit the object.

<grade rules ON/OFF>

Start/end digitizing grade rules from a graded nest, see section 16.6.



<set attributes>

Set attributes for the active type of object <points> or <line/curve> Click the required attribute number 1, 2 or 3.



<delete objects>

Delete points with <delete points> or lines with <delete lines>. Quit deleting with <delete objects OFF>.



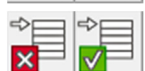
<save to part>

Save the digitized patterns to an empty part to be selected from the part list.



<part up↑> <part down↓>

Scroll in the list of parts



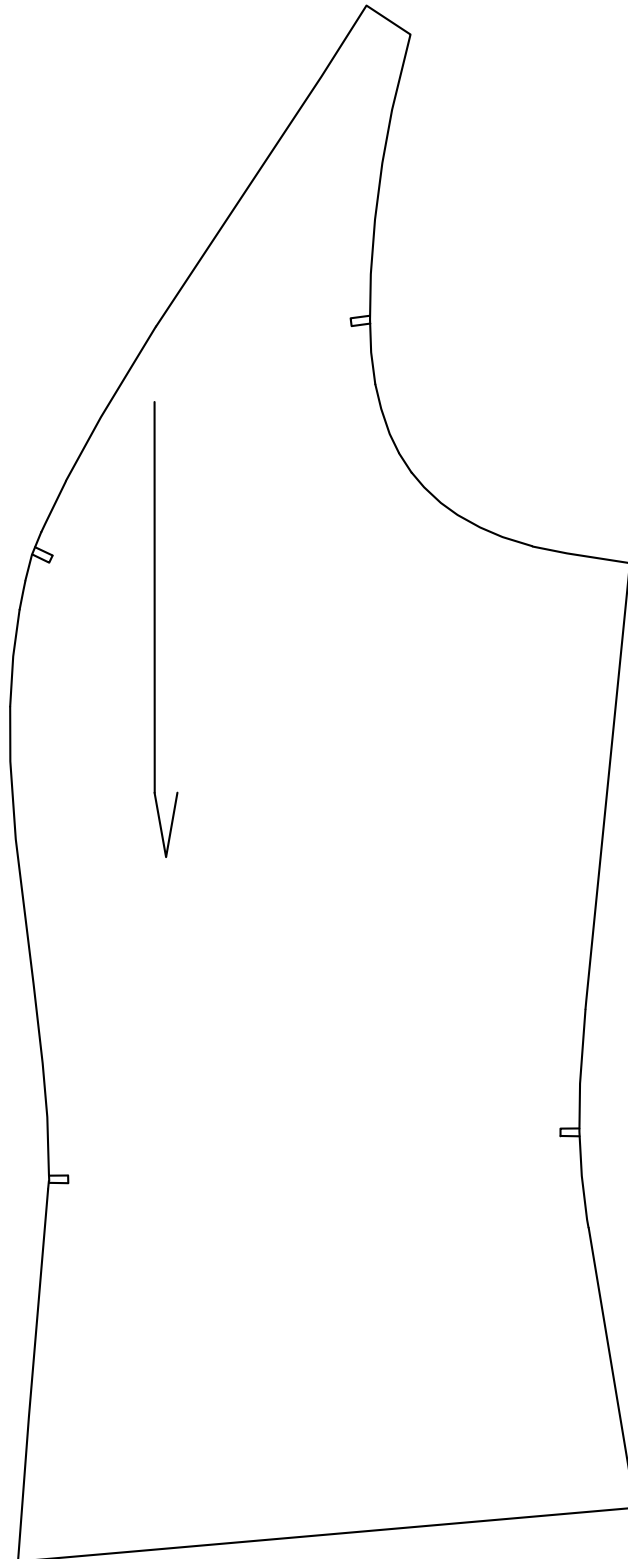
<save> or <abort>

Confirm selection in the part list or abort saving.



<quit digitizing>

Quit digitize mode.



Picture 16-7

1: <digitize>

Set digi point.

2: <deposit+continue>

The active line/curve (red) or active points (black, round) are deposited. The next line/curve is linked, directly. Starting point of the next line/curve is identical to the final point of the last line/curve. It is not digitized again.

3: <deposit+start>

The active line/curve or active points are deposited. A new object with a new starting point is digitized.

4: <delete nearest digi point>

The point closest to the cursor and active (digi point or grade point) is deleted.

5: <digitize with grade point>

A digi point is digitized as a grade point.

6: <click p>

Set digi point onto a point.

7: <click l>

Set digi point onto a line/curve.

8: <click pl>

Set digi point onto the fulcrum of a line/curve.

9: <zoom digi area>

The screen display is zoomed so that it contains all active digi objects not yet deposited.

10: <zoom all>

The screen display is zoomed so that it contains all screen objects; as the function 'centre picture' with <F6>.

11: <zoom +>

Increase screen display.

12: <zoom ->

Reduce screen display.

15: <move points>

Move grade points.

16: <re-digitize lines/curves>

Replace lines/curves. The starting and final point of the line/curve cannot be changed.

The functions <move points> and <re-digitize lines/curves> are particularly useful for editing grade rule patterns which are already incorporated in style developments.

The functions of the menu template will be explained after the exercises.

Digitizing points and lines/curves

In the digitizing mode all deposited lines appear in blue and all active lines in red. Active points are round and red filled. Deposited points are black crosses. Switching between [points] and [line/curve] (on the menu template) effects all active objects.

Each digitized line or point sequence must be deposited with <deposit+continue> or <deposit+start>. Starting and final point of a line/curve are automatically converted into grade points. It is resumed with a new object.

Check before each deposit that the digitized contour equals the template with <zoom digi area>.

Step-by-step guide

⇒ Select object type [points] or [line/curve]
⇒ if [line/curve]; at the beginning and after <deposit+start>:

- digitize starting point of the line,
- Option 1 '**form with intermediate points**':
- digitize final point of the line,
- <zoom digi area>,
- digitize intermediate points

Option 2 'digitize in sequence':

- digitize line in sequence,
- <zoom digi area>,

⇒ if <points>:

- digitize all points

⇒ Correction with <delete nearest digi point>

⇒ Deposit the digitized line or points with

- <deposit+continue>, if the final point of the digitized object is to be the starting point of the next object or
- <deposit+start>, if the next object starts at a new position.

⇒ Correction with <move points> and <re-digitize line/curve>

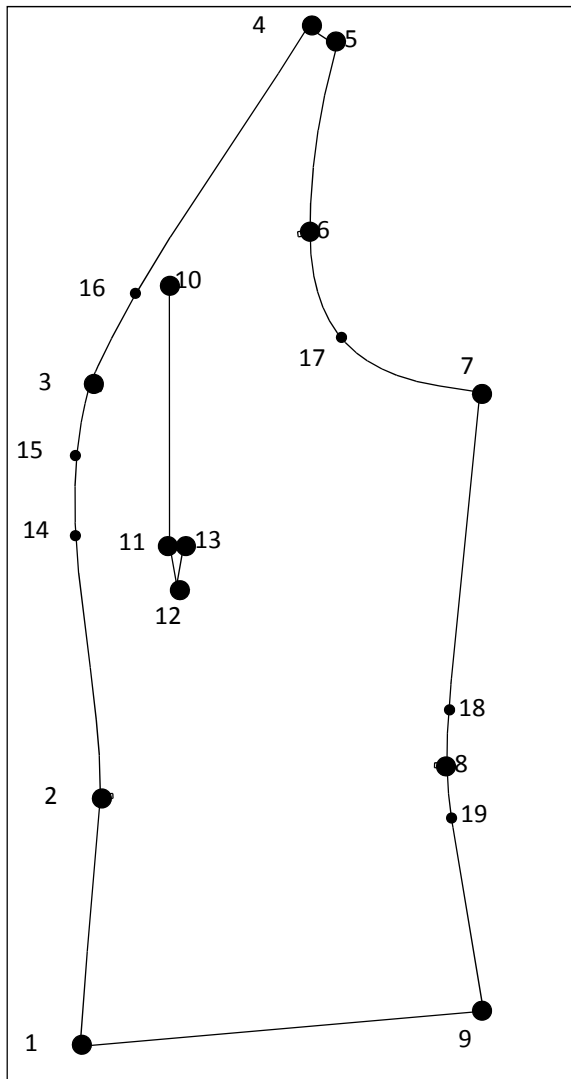
Digitize the objects of the template. The perimeter should have no gaps. It can be closed by binding the final point of the last line onto the existing objects with <click p>, <click l> or <click pl>.

Points on lines (e.g. notch positions) should be bound onto previously digitized lines with <click l>.

Exercise

Digitizing is explained using the blazer side panel depicted in scale 1:2 as an example (Picture 16-7). Note that the smaller the scale of the template, the less accurate the digitized pattern.

Fix a copy of the blazer side panel to the digitizer. Activate an empty part in the part list, annotate the part and set the base size (here: ____38_0) onto position 01 in the size table. The following steps relate to Picture 16-8.



Picture 16-8

Rule Pattern → Digitize Grade Rule Pattern digitize

<TAB> digitize points P1 and P2 of the menu template

$p+py=>0,0$ click point 11 and then point 10
Fa=2 for templates in scale 1:2

[line/curve]

P1 with <digitize>

P2 with <digitize with grade point>

P3 with <digitize with grade point>

P4 with <digitize>

<zoom digi area>

This curve was digitized 'in sequence'. The other option follows when digitizing the armhole curve.

Before deposit, shape the curve with points P14, P15, P16.

P14 with <digitize>

Should P14 not be at the required position delete P14 with <delete nearest digi point>

P14 with <digitize>

P15 with <digitize>

P16 with <digitize>

<deposit +continue>

P5 with <digitize>

<zoom all>

<deposit +continue>

Now, the second option follows. First, the final point is digitized and then, the intermediate points. We recommend this option as the rule 'the less points the smoother the curve' applies to digitizing, also.

P7 with <digitize>

<zoom digi area>

P6 with <digitize with grade point>

P17 with <digitize>

possibly additional intermediate points

<deposit +continue>

P9 with <digitize>

<zoom digi area>

P8 with <digitize>

The function <digitize with grade point> is not used, here as digitizing points is to be covered.

P18 with <digitize>

P19 with <digitize>

possibly additional intermediate points

<deposit +continue>

Digitize the notch P8 as a grade point.

[points]

click P8 with <click l>

<deposit + start>

[line/curve]

<zoom all>

click P9 with <click pl>

click P1 with <click pl>

<deposit + start>

The contour is closed. All notch positions are marked with grade points. Digitize the grain line, also.

P10 with <digitize>

<deposit+continue>

P11 with <digitize>

<deposit+continue>

P12 with <digitize>

<deposit+continue>

P13 with <digitize>

<deposit+start>

The pattern is digitized in base size 38. Carry out a final check. The function keys <F2> (zoom with digitizer mouse) and <F6> works in digitizer mode, also.

Deleting objects is possible in the *Rule Pattern* → *Digitize Grade Rule Pattern* mode, only, not in the *Rule Pattern* → *Edit Grade Rule Pattern* mode. To delete points select [*delete objects p*] from the menu template. To delete lines/curves select [*delete objects l*] (echo → right menu strip). Delete all respective objects with the digitizer mouse. Deleting is terminated with [*delete objects OFF*].

Replacing objects is possible in the *Rule Pattern* → *Edit Grade Rule Pattern* mode, also. Thus, grade rule patterns which are the basis for style developments can be altered, subsequently. To move a point click on it with the digitizer mouse key <*move points*> and digitize it again. With <*re-digitize line/curve*> you can replace a line/curve. Starting and final point of the line/curve remain unchanged. <*deposit+start*> deposits the new line/curve.

Should grade rules be digitized from a graded nest continue according to section 16.6. Otherwise, you can choose between

- digitizing all patterns and apply grade rules, later or
- entering the grade rules for the pattern, directly and then, digitizing the pattern.

The function [*save to part*] of the menu pad allows for saving the digitized pattern in the record. Grafis opens a window for display of part numbers and names. Select an empty part with the template functions [*↑*] and [*↓*] and save with [*YES*]. This saving from the digitizing mode allows for digitizing of a number of patterns without having to change between digitizer mouse and keyboard. The names for the parts to be digitized can be entered into the part list prior to digitizing.

Terminate digitizing with [*quit digitizing*] from the menu template. If you do not wish to continue to proceed with the next section of this chapter, immediately deposit the digitized pattern into the active part with *save* → *in record*. It can be processed further via *Rule Pattern* → *Edit Grade Rule Pattern*.

The functions of the menu pad

When digitizing with digitizing tablet the menu pad is to be positioned on the active area of the digitizer. The position of the menu pad is defined with <Tab> and digitizing points P1 and P2. The fields of the menu pad can, then, be activated by clicking. They have the following significance:

- [*P+Px => 0,0*] only with tablet
- [*P+Px => P*] only with tablet
- [*P+Py => 0,0*] only with tablet

[*P+Py => P*] only with tablet

[*P+P => P+P*] only with tablet

Activate one of the five described entry transformations.

[*Fa= ...*] only with tablet

Enter the scale factor (except for '*p+p => p+p*').

[*points*]

Digitize single points (applies to all active digit points).

[*line/curve*]

Digitize line/curve (applies to all active digit points). For a line select [*line/curve*], digitize the starting and final point and deposit the object.

[*grade rules ON/OFF*]

Start/end digitizing grade rules from a graded nest, see section 16.6.

[*set attributes*]

Set attributes for the active type of object [*points*] or [*line/curve*]. Click the required attribute number 1, 2 or 3. As an echo, the new attribute number appears in brackets in the menu strip on the right behind the object type, e.g. *lin/cur (3)* means the digitized line/curve is given line attribute no. 3.

[*delete objects*]

Delete points with [*delete objects p*] or lines with [*delete objects l*]. Quit deleting with [*delete objects OFF*].

[*save to part*]

Save the digitized patterns to an empty part to be selected from the part list. With [*↑*] or [*↓*] you can scroll in the part list. The selection is to be confirmed with [*YES*].

[*↑*] or [*↓*]

Scroll in the part list.

[*save*] or [*abort*]

Confirm selection in the part list or abort saving.

[*quit digitizing*]

Quit digitize mode. The dialogue resumes at the computer.

The following functions were not used in the Exercise:

- *delete objects*
- *set attributes and*
- *saving from the digitizing mode.*

16.2 Overview of assigning grade rules

Grade rules should be assigned to break sizes, only. All other sizes are calculated by Grafis by interpolation or extrapolation analogous to calculation of x values.

Overview of options for grade rule assignment

- The option enter **absolute grade rules** (section 16.3) is the most common way of assignment. Grade rules can be entered in mm or 1/10mm.
- The option **enter grade rule differences** (section 16.3) is also used.
- The option **digitize grade rules** (section 16.6) is required if grade rules are not available as numeric values but indirect as graded nest or sets of sizes.
- The option **transfer grade rules with copy or proportional** (section 16.5) is use for additional grade points for example.
- With the option **drag grade rules** (section 16.5) grade rules can be altered 'by eye' or with raster values.
- The option **apply grade rule library** (section 16.9) is interesting for companies who have many years of experience of grading and work with their own libraries.
- For the option **transfer grade rules from a template pattern** (section 16.7) proven gradeable templates have to be saved for the respective style types. Digitized first patterns without grading information can transfer grade rules from these templates.
- The **import of grade rule patterns** from other CAD systems has already been explored in Chapter 15.

16.3 Edit grade rules

Grade points are marked with a red or green circle. A red circle indicates that the grade point has not been assigned a grade rule.

The different options for assigning grade rules were mentioned briefly in section 16.2. Topic of this section is editing grade rules in the options normal and difference display.

In Grafis, grade rules are saved in grade rule tables. The window for editing grade rule tables (Picture 16-9) opens after having clicked on a grade point. A red arrow indicates the grade point for which the grade rule table is displayed. The most important elements of this window are explained in Picture 16-9.

View

Display the grade rules in millimetres or 1/10 millimetre. The active option is indicated with a tick. In the industry, the display option 1/10 mm is common.

Enter values in the line highlighted with a bar. The interpretation of the values in x and y direction depends on the display option selected under View. The values are accepted with or <ENTER>.

accepts values in fields 'X' and 'Y'. The marked size becomes break sizes.

deletes marked size as break size. The values for this size are interpolated.

Selection of a different figure type

Display of the current rotation angle for grade rules. Rotation of grade rules is activated via Edit → Rotate/ mirror grade rules permitted

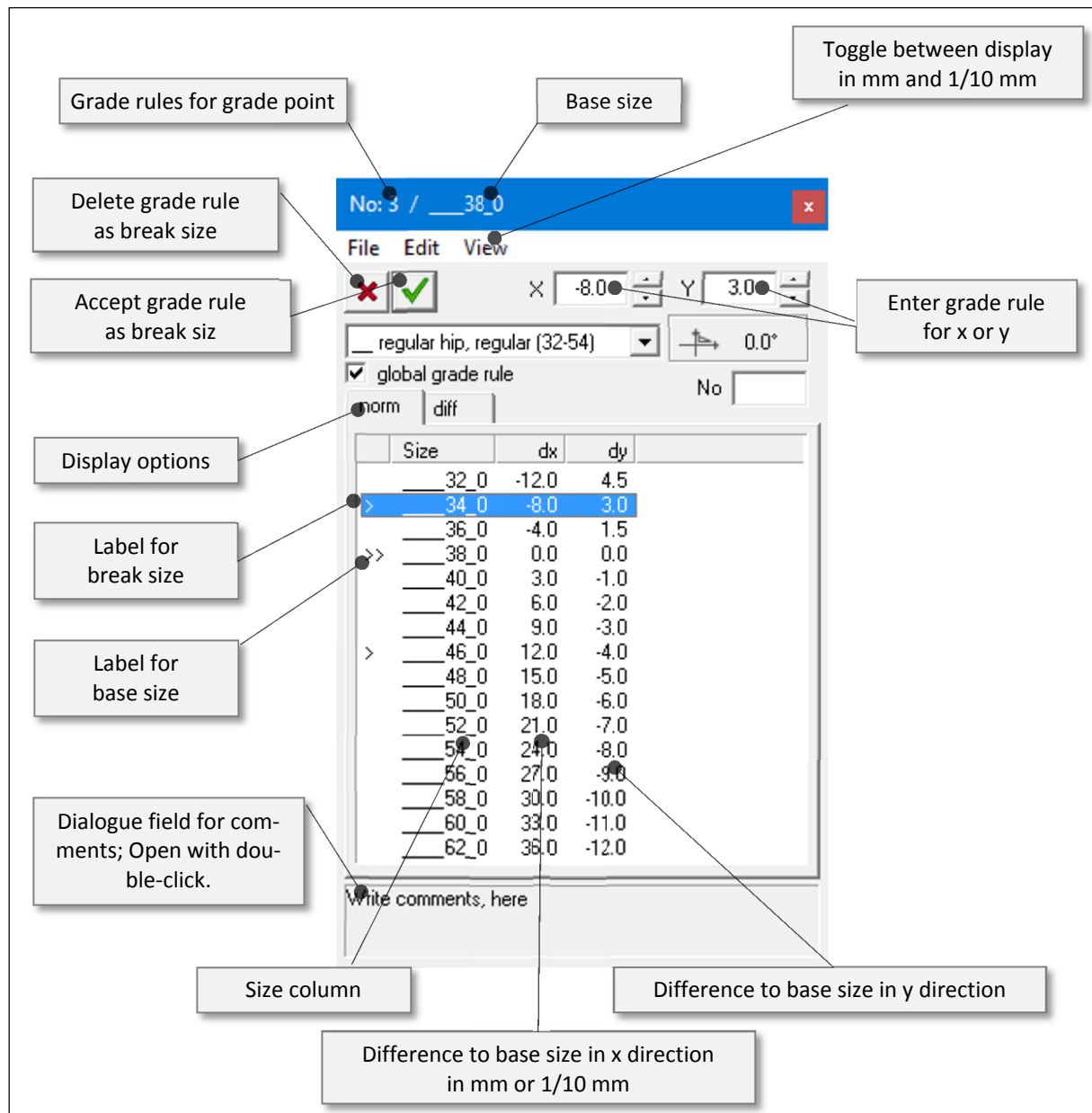
Further explanation follows in the text.

Entry of own number for grade rule (0 to 999), see also section 16.9.

The cards *norm* and *diff* contain different view options for the current grade rule table (Pictures 16-9 and 16.10). Changes to the view alter the contents of the other displays, also.

grey edit window at the lower window edge

In this edit field you can enter your own comments on the grade rule. It is opened with a double-click, clicking another function closes the field. Grafis automatically enters information on source of the rule and dragging the grade point into this field.



Picture 16-9

Topic of the following exercise is entry of grade rules in the normal view. Then, explanations on the display option 'diff' follow.

Exercise: Enter grade rules for blazer side panel

For the blazer side panel digitized in section 16.1 grade rules are to be entered for grading in a size range from 34 to 46. The following grade rules belong to the grade points numbered according to Picture 16-8 (values in mm). They may not correspond with common grade rules. Practise entry of grade rules. Later, you can determine your own values:

Point 01:

34_0	36.2	5.6
* 38_0	.0	.0
46_0	-72.4	-11.2

Point 02:

34_0	36.1	5.6
* 38_0	.0	.0
46_0	-72.1	-11.1

Point 03:

34_0	35.9	5.3
* 38_0	.0	.0
46_0	-71.9	-11.2

Point 04:

34_0	24.1	-5.1
* 38_0	.0	.0
46_0	-41.3	5.0

Point 05:

34_0	25.7	-4.7
* 38_0	.0	.0
46_0	-43.9	5.5

```

Point 06:
  ___ 34_0   28.1   1.8
* ___ 38_0    .0    .0
  ___ 46_0  -47.8  -7.0

Point 07:
  ___ 34_0   22.1   7.7
* ___ 38_0    .0    .0
  ___ 46_0  -40.1 -15.2

Point 08:
  ___ 34_0   22.2   4.7
* ___ 38_0    .0    .0
  ___ 46_0  -40.4  -9.7

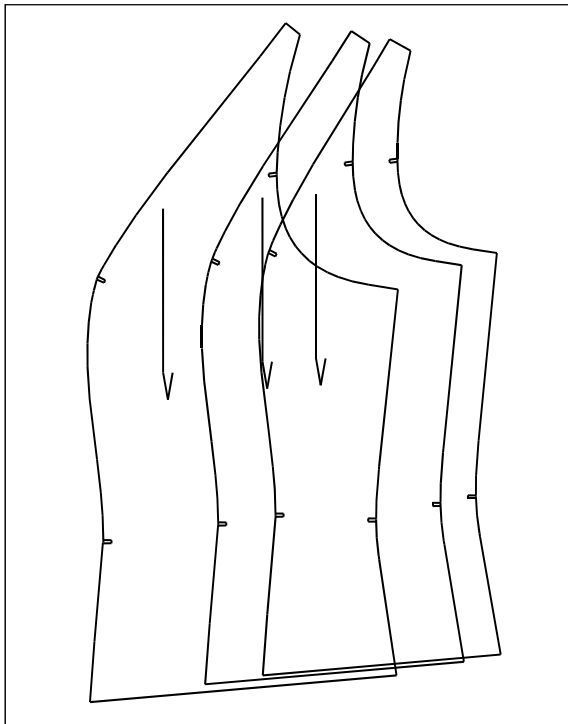
Point 09:
  ___ 34_0   23.1   4.5
* ___ 38_0    .0    .0
  ___ 46_0  -42.4  -8.6

Points 10 to 13:
  ___ 34_0   33.7   2.1
* ___ 38_0    .0    .0
  ___ 46_0  -62.4  -6.9

```

If you have quit the *Grade Rule Pattern* menu in the exercise in section 16.1 and deposited the contour with *save => in record* you have to activate the respective part, first and, then, re-open the menu via *Rule Pattern → Edit Grade Rule Pattern*.

Click on Point 01. The grade rule table analogous to Picture 16-9 opens. The grade rules are assigned with '0' originally. Set the display to mm by selecting *Display / mm*. Mark size ___ 34_0 and enter the values 36.2 into the edit field and the value 5.6 into the 'y' edit field.



Picture 16-10

Move between the two fields with the <Tab> key.

Accept the values with or <ENTER>.

Continue with the values for size ___ 46_0 by marking this size and entering -72.4 into the 'x' edit field and -11.2 into the 'y' field and accept. The grade rule table is assigned in the normal view according to Picture 16-11.

Open the grade rule table for grade point 02 by clicking this point. Enter the grade rules and continue with the other grade points. Test the grading directly from the *Grade Rule Pattern* menu with *grading* with the result shown in Picture 16-10.

Normal view 'norm'

The normal view of grade point 01 from Picture 16-8 is shown in Picture 16-11.

norm	diff			
		Size	dx	dy
		___ 32_0	54.3	8.4
>		___ 34_0	36.2	5.6
		___ 36_0	18.1	2.8
>>		___ 38_0	0.0	0.0
		___ 40_0	-18.1	-2.8
		___ 42_0	-36.2	-5.6
		___ 44_0	-54.3	-8.4
>		___ 46_0	-72.4	-11.2
		___ 48_0	-90.5	-14.0
		___ 50_0	-10...	-16.8
		___ 52_0	-12...	-19.6

Picture 16-11

The columns of this view contain:

- 1: the **indication of base and break sizes**. The sign >> indicates the base size to which the grade rules relate. > indicates the break sizes.
- 2: the **size name**,
- 3: the **grade rule of the size in x direction**, as difference to the base size. Display is in mm or 1/10 mm depending on the setting in View.
- 4: the **grade rule of the size in y direction**.

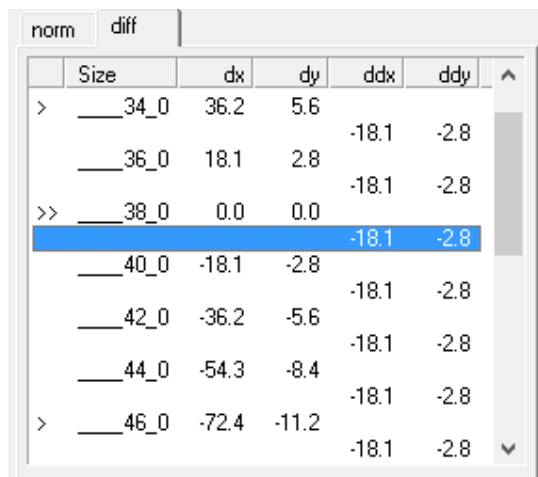
For all non-break sizes the grade rules are interpolated or extrapolated from adjacent break sizes.

A size becomes a break size by marking the size, editing the setting if required and accepting with .

Difference view 'diff'

Regard the grade rule for point 01 in the difference view (Picture 16-12).

In this view, in addition to the **values of the break sizes, the difference per size** is displayed and can be edited. In Picture 16-12 these are sizes 34, 38 and 46.





	Size	dx	dy	ddx	ddy
>	___34_0	36.2	5.6		
	___36_0	18.1	2.8	-18.1	-2.8
>>	___38_0	0.0	0.0	-18.1	-2.8
	___40_0	-18.1	-2.8	-18.1	-2.8
	___42_0	-36.2	-5.6	-18.1	-2.8
	___44_0	-54.3	-8.4	-18.1	-2.8
>	___46_0	-72.4	-11.2	-18.1	-2.8

Picture 16-12

The base size 38 is marked with >>. The line with the size name in the second column contains the grade rule for this size as difference to the base size. The respectively following line with a value in the *ddx* or *ddy* column indicates the difference value per size. Difference values should be edited in the difference view *diff*.

If you have the difference values per size proceed as follows with entry of grade rules:

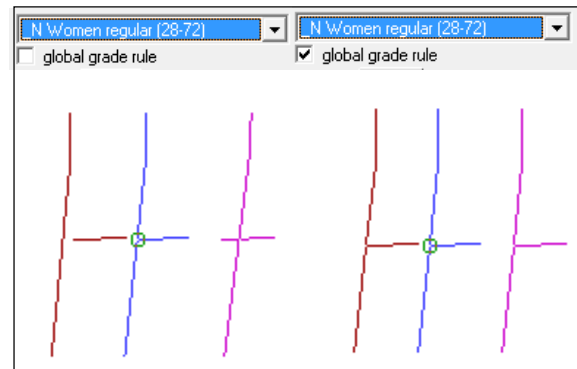
- ⇒ Mark all break sizes in the normal view by marking the respective size and accepting the value with .
- ⇒ View | Show break sizes only
- ⇒ Then, change to difference view *diff* and enter the grade rule differences in x and y.

Note: If the increments are identical for all sizes accept one size larger than the base size as a break size. If 38 is the base size accept size 40 with  and enter the grade rule for size 40 in the difference or normal view.

Global grade rule

If the switch *Global grade rule* is set, this grade rule applies to all lines within the search environment. If two lines meet in a corner, this switch must be set. The switch must not be set if a grade rule is to apply to one line/ one point only. If for example the grain line touches the contour by accident in the base size, the grade rule at the grain line must not be a general grade rule. Otherwise, the contour 'hangs on' the grain lines for grading.

A grade rule for a slit notch must be a *global grade rule* as the notch is otherwise detached from the base line, see Picture 16-13.



Picture 16-13

If the switch 'global grade rule' is removed, Grafis expects the user to click the base line for the grade rule.

Additional Functions

The functions in the grade rule window in Picture 16-9 have the following significance:

File → *Save in Library...*


saves the grade rule table in a library, provided a library is available (section 16.9).

File → *Delete from Library...*

deletes the grade rule table from the library (section 16.9).

File → *Print*

prints the single grade rule table in the active display option. An overview of all grade rule tables can be output via the *print* menu function.

File → *Close* or 

closes the window.

Edit → *Grade point becomes new stack point*

changes the marked grade point into the new stack point of the grade rule pattern.

Edit → *Reduce break sizes (all grade points)*

automatically removes the mark for break sizes from all sizes which can be calculated by interpolation from adjacent sizes without alteration. In an interim step, the user can mark the preferred break sizes, see Picture 16-14.

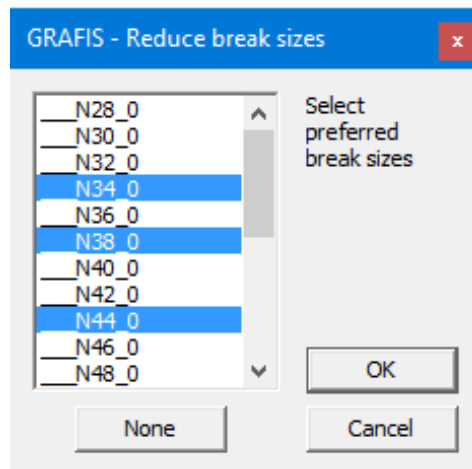
The selected sizes remain break sizes if the grades are constant. Only break sizes actually not required for grading are deleted. Grading remains unchanged after calling this function.

Edit → *Reduce break sizes (this grade point)*

as before but for the marked grade point, only.

Edit → Set x and y to 0 (this grade point)

deletes all grade rule settings. After calling this function the grade point is not graded, it remains unchanged during grading.



Picture 16-14

Edit → Set x to 0 (this grade point)

Edit → Set y to 0 (this grade point)

deletes the x or y component of the grade rule. After calling this function the grade point is graded with one component, only.

Edit → Rotate/mirror grade rules permitted

If this option is ticked grade rules of the marked point can be mirrored and rotated. A crosshair appears with the functions analogous <F3>. Rotate and mirror grade rules should be used by experienced users, only. The rotation angle and mirror are indicated in the grade rule table. The grade of the pattern is changed.

Edit → Rotate/mirror complete grade rule pattern permitted

If this option is checked, the pattern can be rotated. The grade rule tables are updated, so that the grade of the pattern remains unchanged.

Edit → Move grade one size up

The base size and the grades move one size up. The contour of the larger size becomes the basis for the grade point calculation. The graded stack changes for uneven grade runs.

View → mm or View → 1/10mm

Display of values in mm or tenth of a millimetre.

View → Show break sizes only

Only the break sizes are displayed.

View → Show individual sizes

The individual sizes entered in the size table are displayed in the position of their corresponding standard size.

Grade rule pattern menu	
	digitize ▪ digitize background image ▪ extract
	grade points... set ▪ drag ▪ group
	+/-display number
	grade rule... edit ▪ transfer ▪ drag
	+/-measurement ▪ set measurement
	delete ▪ print
	save: in call list ▪ as template ▪ in record
	test run ▪ grading ▪ stack

16.4 Save Grade Rule Pattern

Before quitting the *Grade Rule Pattern* menu the grade rule pattern is to be saved. The following three options are available.

Save => in record

The grade rule pattern is accepted into the active part. Thus, depositing this pattern is a construction step in the part and corresponds to *call* grade rule construction. Select this option if you digitize a number of new patterns. In this case, open a new style in Grafis, prepare the part list with the names of the pattern pieces to be digitized at the beginning and then, digitize the patterns. This way all pattern pieces are saved in one Grafis style. After testing each part can be saved as a template or in the call list via *Rule Pattern → Edit Grade Rule Pattern*.

If more than one grade rule pattern has been called into a part, a list of buttons appears at the bottom of the menu. Clicking these buttons switches between the grade rule patterns in the part.

Save => as template

The grade rule pattern is saved in the directory for template patterns \Grafis\[current measurement system]\SWERT or in another directory. Grade rule pattern files have the extension *.SWS. The grade rules of these template patterns can be transferred to other grade rule patterns (see section 16.7).

Save the blazer side panel from section 16.3 as a template under \Grafis\[current measurement system]\SWERT\JACKET.SWS.

Save => in call list

The grade rule pattern is saved as a grade rule construction in the call list.

Save a pattern in the call list, only after it has been tested and released.

Step-by-step guide

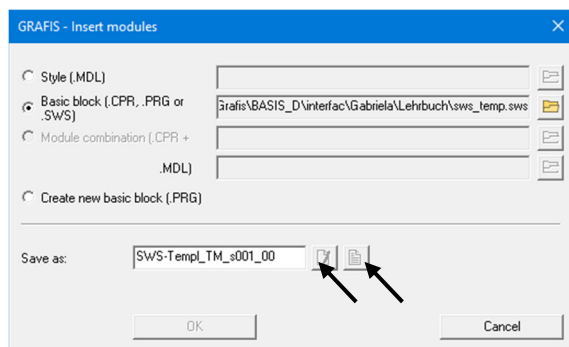
⇒ Open the *Grade Rule Pattern* menu for the grade rule pattern to be saved via *Rule Pattern* → *Edit Grade Rule Pattern* for example

⇒ *save* → *in call list*



⇒ Click on  or  and enter a suitable name

⇒ later: edit the call list, design a graphic for the construction and store text information

Save the blazer side panel from section 16.3 in the call list. After having clicked *save => in call list* the dialogue *Insert modules* opens (Picture 16-15).



Picture 16-15

For entry of a name for the grade rule pattern file click on  and you can enter the file name in the *Save as* field. Alternatively, a prepared mask can be called by clicking . This interface is explained in more detail in section 14.5.

After *OK* the file is created in the directory \Grafis\[directory of measurement system]\Prog. In the call list you can find a *New entry* in the area of constructions of the measurement system. The entry can be renamed and designed.

16.5 Edit grade rule patterns, drag and transfer grade rules

The *Grade Rule Pattern* menu (see previous page) opens for *Rule Pattern* →

Edit Grade Rule Pattern

Extract Grade Rule Pattern

Digitize Grade Rule Pattern

Depending on the selection certain functions are greyed out. The individual menu functions have the following significance.

Digitize and extract

Depending on the selection one or more of these functions are available. **Digitize** starts digitizing of contours or grade rules, see sections 16.1 or 16.6.

Extract starts extracting a grade rule pattern from the active part. The active part can be

- a constructed pattern based on body measurements or
- a grade rule pattern with or without modifications.

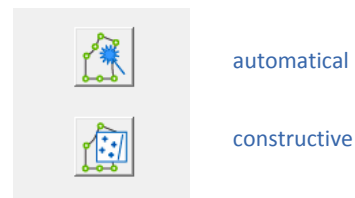
The possibilities of this function are topic of section 16.8.

Grade points

The *grade points* section contains all functions for editing grade points.

Place grade points opens the depicted menu.

With **automatical** grade points are set automatically.

Set grade points menu

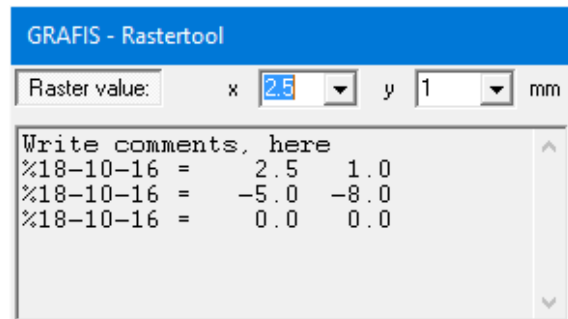
Existing grade points are not overwritten or deleted. With **constructive** individual grade points can be set with the known point construction functions.

The new grade points are marked in red as their grade rule tables are still empty. With the functions under *grade rule...* grade rules can be assigned to grade points.

Set additional grade points onto curves, especially if the curve shape has not been graded as required.

With **drag grade points** the contour of the base size can be altered. Activate *drag*. The *Grafis Raster tool* window opens (Picture 16-16). If the *Raster value* button is pushed in, the grade points are dragged in the set raster steps.

Activate *Raster value* and drag a grade point with left mouse button pushed down. You are altering the shape 'by eye'. Grafis displays the movement of the grade point in x and y direction in the *Grafis-Raster tool* window. Terminate dragging with . Only after



Picture 16-16

having confirmed the security question are the alterations accepted. For your information, Grafis registers the move values in the dialogue window of the grade rule table with code % and the alteration date, see Picture 16-16.

With **group grade points** grade associations can be formed. This special grading option is topic of section 16.10.

Switch to **+display** to show the grade point number. The screen image can be output via *Edit*→*Copy (Clipboard)* or with the functions of the *print* menu.

Grade rules

Edit grade rules opens the menu for editing grade rule tables with the following options:

Edit grade rules menu

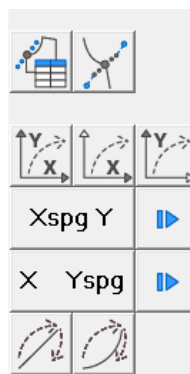
grade rules...
edit • drag

Copy grade rules...
1=>1 (XY) • 1=>1 (X) • 1=>1 (Y)

[special 1] • set special 1

[special 2] • set special 2

copy grade rules...
2=>2 (linear) • 2=>2 (curved)



With **edit grade rules** and clicking a grade point its grade rule table opens, see section 16.3.

Copy allows for transfer of grade rules from one or two grade points to another grade point with the options:

- 1=>1 ,
- [special] and
- 2=>1 .

The options '1=>1' differ as follows:

1=>1 (XY)	the complete grade rule table is copied
1=>1 (X)	only the x component value is copied
1=>1 (Y)	only the y component value is copied

For '1=>1' -copying activate one of the three copy options and click the grade point from which grade rules are to be copied. Move the cursor. An arrow appears with which you define onto which grade point the grade rules are to be copied. Quit copying with .

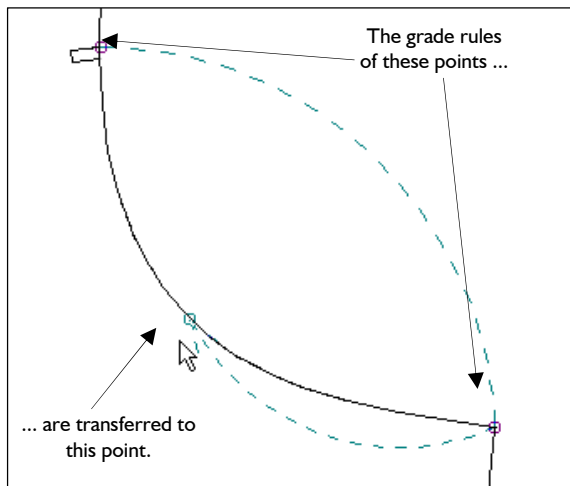
With the options '[special]' grade rules are copied from one grade point to another. When copying, the x component can be mirrored for example ([Xspg Y]). In the other case the grade rules are not overwritten but added. Double-click on *set special* allows for selection of other special options which should be used by experienced operators, only.

The options '2=>1' transfer the grade rules of two points onto a third. They differ as follows:

2=>1 (lin)	The new grade rules are calculated linear in relation to the direct connection between the two points. Use this option when the points lie on a long (imaginary) connecting line.
2=>1 (cur)	The new grade rules are calculated as components. Use this option when the points lie on a shaped (imaginary) line.


For '2=>1' -copying activate one of the two copy options and click the grade points from which the grade rules are to be copied. Define the grade points to obtain new grade rules with the arrow (Picture 16-17). Quit with .

Note the exercise in this section.



Picture 16-17

Transfer grade rules opens the menu for transferring grade rules from template patterns, see section 16.7.

Drag grade rules and clicking on a grade point opens the *Grafis-Raster* tool window. At the same time, all sizes in the size table are graded. The contour of the different sizes can now be dragged directly with or without raster. **NB: These alterations are directly transferred to the grade rule table of the active grade point!** A different grade point can be activated at any point by clicking. Dragging grade rules can be quit with .

Set measurements

With **set measurements** you can include specific measurements on a grade rule pattern. When dragging grade points or dragging grade rules, the measurements are altered immediately. Setting measurements ensues in the same way as temporary measuring in Chapter 7. The switch *+/-measurements* shows or hides the measurements.

Delete

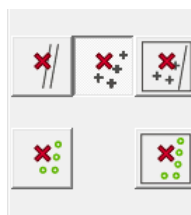
Delete opens a sub-menu. It allows for deletion of single or all points or lines of the contour. Grade points are deleted individually with *single grade points* or *all grade points*.

Deleting points and lines of the contour during alteration of a grade rule is not permitted as subsequent construction steps could relate to these objects.

Delete menu

Single lines ▪ single points ▪ all points and lines

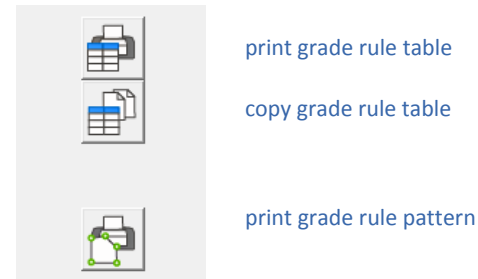
single grade points ▪ all grade points



Print

Print opens the sub-menu with the following functions:

Print menu



Print grade rule table starts output of the grade rule table for all grade points. The table contains the grade point numbers and their absolute grade rules in the break sizes.

Copy grade rule table copies the table to the clipboard. For a formatted view select a proportion typeface, e.g. CourierNew.

Print grade rule pattern starts output of the grade rule pattern with marked grade points. Should the grade point numbers be visible (*Grade Rule Pattern* menu: *+display*) these are plotted, also.

Test run / grading / stack / save

These functions are already known. *Grading* in this menu starts grading with grade rules. Saving was topic in section 16.4.

Exercise

Activate the gradeable blazer side panel from section 16.3. Set an additional grade point onto the armhole curve. Copy the grade rules of the adjacent grade points with '2=>1'-copy onto the new grade point (Picture 16-17).

part organisation

Rule Pattern → *Edit Grade Rule Pattern*

place grade points

click I Place grade point onto the armhole curve

edit grade rules

copy 2=>1(linear)

Assign grade rule according to Picture 16-17. First, click on the front pitch then, the point on the side seam and then, the new grade point.



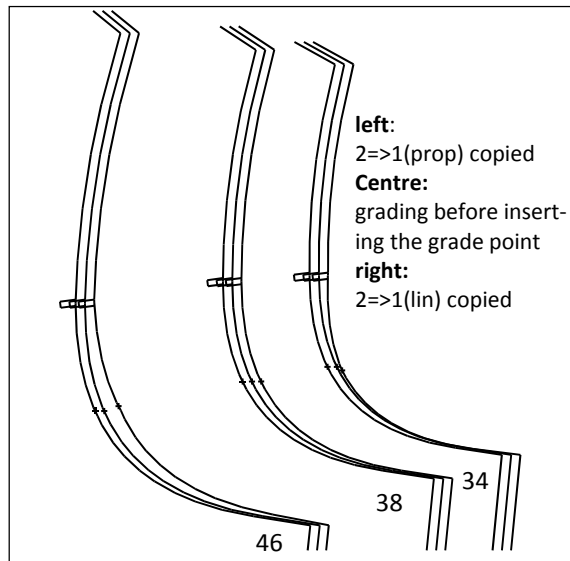
grading

Terminates copying
The grade is shown in the right nest in Picture 16-18. The curve shape is slightly flatter.

edit grade rules

copy 2=>1(curved)

Steps as above



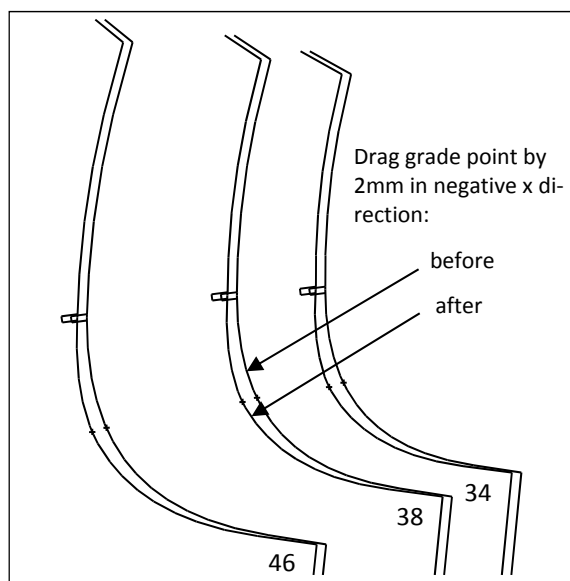
Picture 16-18

grading

The grade is shown in the left nest in Picture 16-18. The curve shape is slightly rounder terminates copying



Drag the grade point in the base size 38 by approx. 2mm 'to the left', i.e. 2mm in negative X-direction (Picture 16-19).



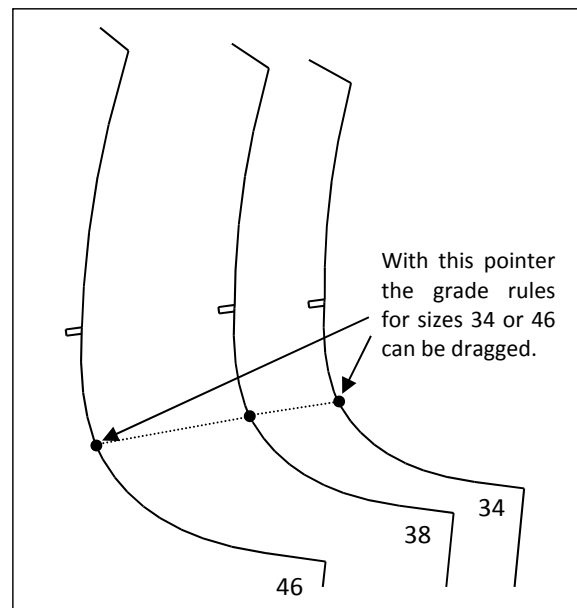
Picture 16-19

Drag grade point Drag the grade point with pressed left mouse button. The move amount is shown in the dialogue window.

By dragging the grade point you have altered the contour of the pattern in the base size. Grafis registered the move values of the grade point in the dialogue window of the grade rule table with code % and date of alteration (e.g. %31-07-98 = -2.0 0.0).

Drag the grade rules of this grade point. Note! These alterations are accepted without confirmation.

Grade Rule: drag Click on the grade point of which you want to drag the grade rule. Drag the pointer according to Picture 16-20 with pressed left mouse button. The move value is indicated in the dialogue window.



Picture 16-20

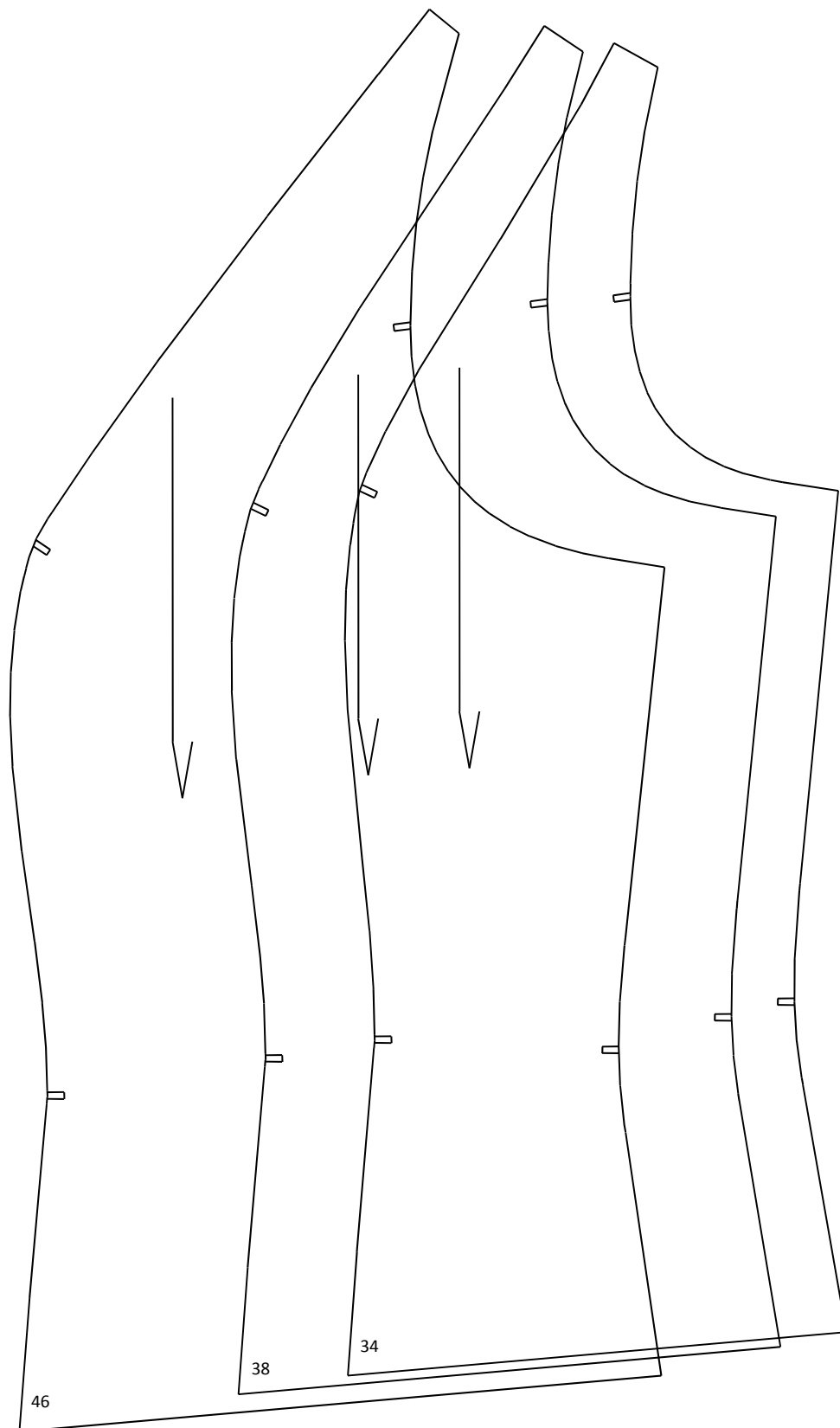
16.6 Digitize grade rules

If the pattern is available as a **graded nest**, i.e. all required sizes stacked, the grade rules can be digitized.

The nest has to contain the base size and the break sizes, only. Further sizes do not have to be digitized, they are interpolated by Grafis, automatically. Why work harder than necessary!


Step-by-step guide

- ⇒ Digitize the pattern perimeter of the base size (see section 16.1)
- ⇒ Open the size table via *Extras* → *Size table* and enter and activate the sizes of the nest in systematically order.

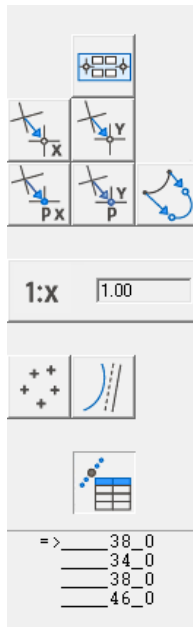


Picture 16-21

The size in position 01 is the size of the digitized contour. The grade rules of all further activated sizes are digitized in this order.

- ⇒ if the *Grade Rule Pattern* menu had been quit:
 - *Rule Pattern* → *Edit Grade Rule Pattern*
 - *Digitize*
 - Determine entry transformation and scale factor
- ⇒ Click [*Grade Rules ON/OFF*] on the menu template
- ⇒ Digitize the grade rules of all grade points, respectively with:
 - Click grade point, possibly adjust on screen; it is sufficient to click near the point.
 - Digitize position of the point in other sizes; the size to be digitized is displayed on the menu strip. The displayed order is to be followed, exactly.
 - After having digitized the last size the computer gives an acoustic signal.
- ⇒ Quit with [*Grade Rules ON/OFF*] on the menu template.
- ⇒ possibly: re-digitize lines, points or grade rules
- ⇒ Quit with [*Quit digitizing*] on the template or 
- ⇒ Edit the grade rule pattern
- ⇒ Save the grade rule pattern in the record, as a template or in the call list.

After having quit the digitize mode test the state or work with *test run* and *grading* from the *Grade Rule Pattern* menu. Should errors occur lines, points and grade rules can be re-digitized.



Exercise

Picture 16-21 shows a graded nest of the blazer side panel (Exercise in section 16.1) in sizes 34, 38 and 46. For more clarity the sizes are not stacked as usual but displayed shifted. The grade rules of the blazer side panel are to be digitized.

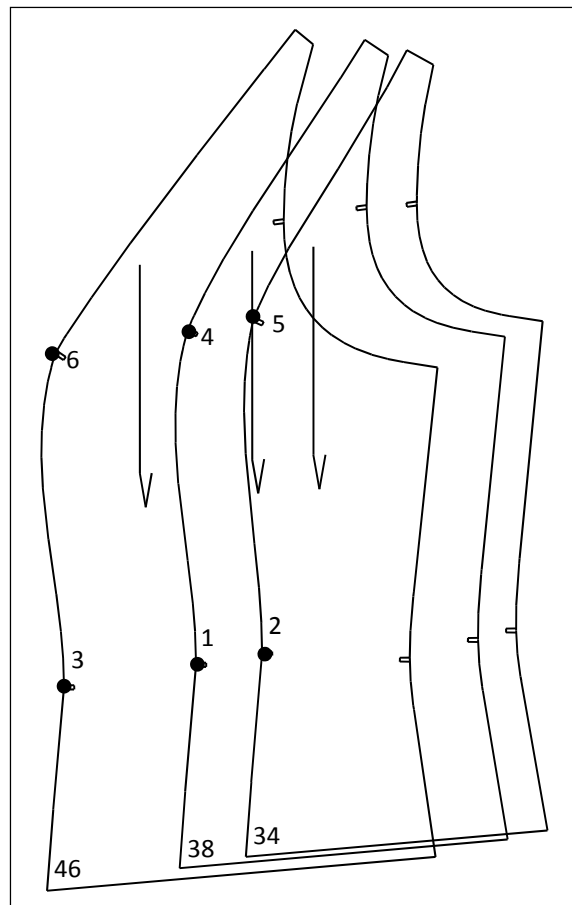
Fix a copy of the nest to the digitizer table. First, digitize the contour in size 38, see section 16.1. After having digitized the contour the grade rules are to be digitized.

The following steps relate to Picture 16-22.

<zoom all>

[*Grade Rules ON/OFF*]

Sizes 38, 34 and 46 appear below *Grade Rules* in the menu. If other sizes or a different order appear, the entries in the size table have to be altered. In this case, quit the digitizing mode but not the *Grade Rule Pattern* menu and edit the size table via *Extras* → *Size Table*. After *digitize* you are back in the digitize mode. If the pattern on the digitizer table was not changed resume digitizing the grade rules, immediately.



Picture 16-22

Point P1 in size 38 corresponds with point P2 in size 34 and P3 in size 46. The grade rules for this point are digitized as follows:

P1 with <digitize> digitize approximately

P2 with <digitize> digitize exact

P3 with <digitize> digitize exact

After P3 the computer gave an acoustic signal. It means: grade rule digitizing for this point is completed. The grade point is now marked in green and assigned with a grade rule.

You can resume with another grade point. Continue with grade point P4, still marked in red.

P4 with <digitize> digitize approximately

P5 with <digitize> digitize exact

P6 with <digitize> digitize exact

If an error occurs during those steps continue digitizing to the signal (or press digitizer mouse button no. 4) and digitize the grade rule again.

Digitize the grade rules for the grade points until all points are marked in green. Quit the digitizing mode with [Quit Digitizing] on the menu template and test the grade with *test run* and *grading*.

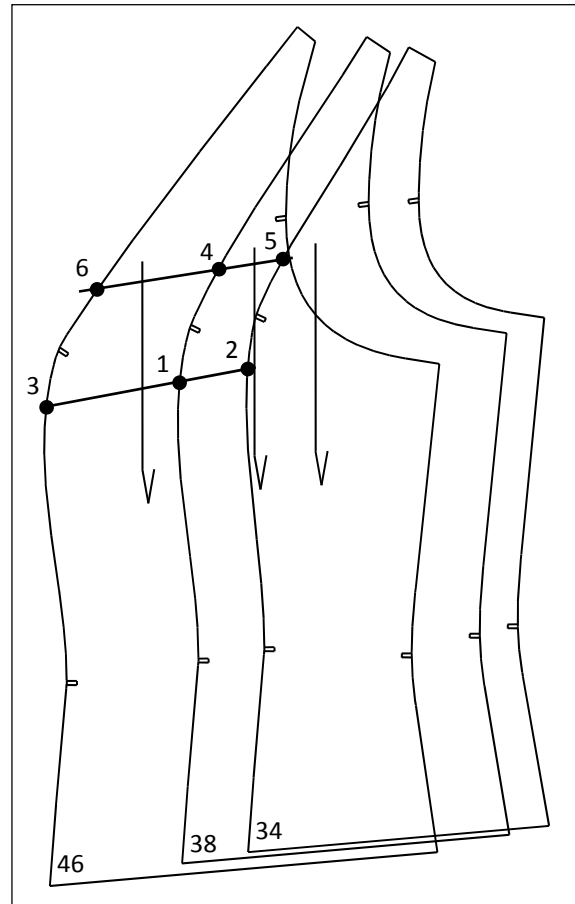
If grade rules were digitized incorrectly the graded nest can look bad. First, analyse which points were not graded correctly. If necessary deactivate size 46 in the size table so that sizes 34 and 38 are displayed, only. Re-digitize the grade rules. During digitizing grade rules, sizes 38, 34 and 46 must be active, again.

In the next step the curve shape in the graded sizes is to be checked. The shape of the panel seam in size 46 is not yet identical with the template.

To correct curve shapes set one or more additional grade points and digitize the relevant grade rules.

place grade point

click I first, set the additional grade points P1 and P4 (Picture 16-23)



Picture 16-23

Mark the additional grade points on the template in the sizes of the nest, also.

Digitize the grade rules of the new grade points.

P1 with <digitize> digitize approximately

P2 with <digitize> digitize exact

P3 with <digitize> digitize exact

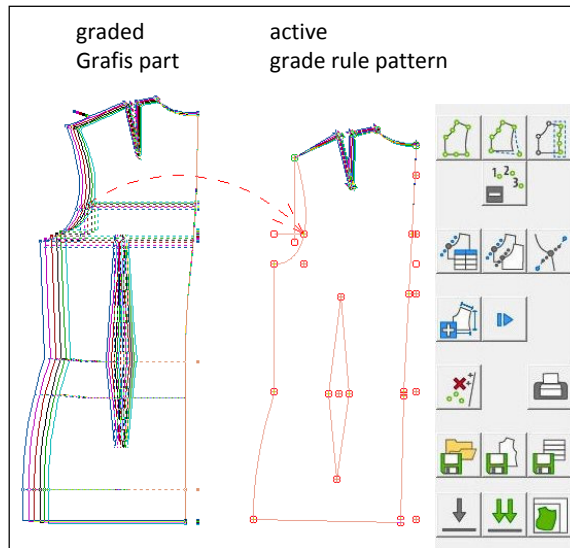
After P3 the computer gives an acoustic signal. Continue with P4, then, quit the digitizing mode with [Quit Digitizing] on the menu template and test again.

Set additional grade points until you agree with the grade result and then, deposit the grade rule pattern (see section 16.4).

16.7 Transfer grade rules

Transfer grade rules from another Grafis part

Grade rules can be transferred from another part of the Grafis style onto the active grade rule pattern in a very user-friendly manner. The required part must be graded and visible in the background, see Picture 16-24.



Picture 16-24

In the *grade rule pattern* menu directly, move the cursor over the graded Grafis part. The grade rules are visualised in form of small points. Click on a point or a line in the graded Grafis part and then move the cursor to the active grade rule pattern. Click the corresponding grade point in the active grade rule pattern. The grade rules are now assigned to this grade point. Visualise the current state with *grading* in the menu.

Transfer grade rules from a saved template pattern

With the function *transfer grade rules* in the *Grade Rule Pattern* menu grade rules can be transferred from a saved template pattern. Use this option when a pattern is available in the base size, only. Digitize the pattern in the base size and then, transfer the grade rules from an available tested grade rule pattern.

After Installation of Grafis no template patterns are available. Template patterns are generated via *save => as template* from the *Grade Rule Pattern* menu. Saving a grade rule pattern as a template is possible via *Rule Pattern → Edit Grade Rule Pattern* or *Rule Pattern → Extract Grade Rule Pattern* (see section 16.8). Clicking on *transfer* in the *Grade Rule Pattern* menu opens the sub-menu shown on the right with the following functions:

Transfer grade rules menu

edit grade rules

template...

call ▀ hide ▀ coordinate

move

turn angle

copy grade rules...

1=>1(XY) ▀ 1=>1(X) ▀ 1=>1(Y)

single ▀ guided

grade rules...

+/- display identical ▀

+/- x component ▀ +/- y component

Edit grade rules opens the grade rule table of a grade point to be clicked, see section 16.3.

Function group *template*

The functions below **template** help with preparation of the template for transferring grade rules.

First, **call** the template. Select a tested grade rule pattern saved as a template (*.SWS). The template appears with dashed lines. At the same time, Grafis asks you to *co-ordinate* both patterns to one another. *Co-ordinate* (explained in the following) is already active.

To call another template you have to **hide** the active template, first. Then, a new template can be called. It is possible to transfer grade rules from more than one template.

With **co-ordinate** you define which grade points have identical grade rules. First, the point of the template is to be defined then, the point in the active grade rule pattern.

Move allows for the template to be moved, rotated or mirrored. Functionality corresponds to the <F3> function. **During rotation or mirror of the template the grade rules are updated, also.** Therefore, rotate and mirror before copying the grade rules. The rotation angle of the template is displayed in the menu. For very small rotation drag further away from the centre of the circle. Moving the template does not affect the grade rules.

After having adjusted and positioned the template, effectively copying grade rules begins with the functions below **copy**.

Function group **copy**

With the functions below **copy** transferring grade rules from the template and copying onto the active grade rule pattern begins.

The copy options were explained in section 16.5, already. For the copy option '**1=>1**' copying can ensue either **single** or **guided**. With **guided** the grade points of the active grade rule pattern one after the other are the beginning of a thread which is to be connected with the corresponding grade point of the template. The grade points are processed in order of their numbers. Assigning can be skipped with ☐. Activating **single** terminates guided transferring.

Display options

In the option **+display identical** grade points with identical grade rules are connected with dashed lines. The following are connected:

+x components and **+y components**:
identical grade rule tables

+x components and **-y components**:
grade rule tables with identical x components

-x components and **+y components**:
grade rule tables with identical y components

Exercise

Generate a blazer side panel similar to Picture 16-25, for example by drawing and digitizing the contour. Transfer the grade rules from the template saved in section 16.4 as JACKET.SWS.

Edit the digitized pattern with the *Grade Rule Pattern* menu as follows:

transfer grade rules

call open JACKET.SWS

The prepared blazer side panel appears dashed.

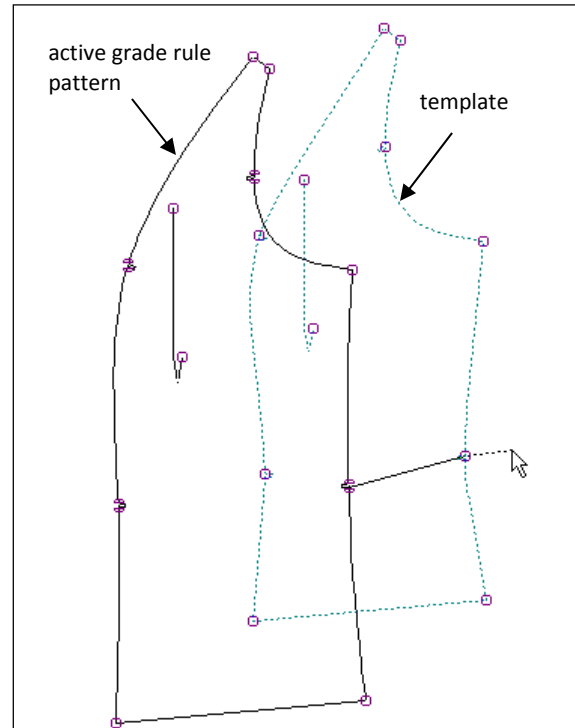
co-ordinate click in both patterns the corner points armhole/ side seam

move move and rotate the template;
reset rotation to 0

guided

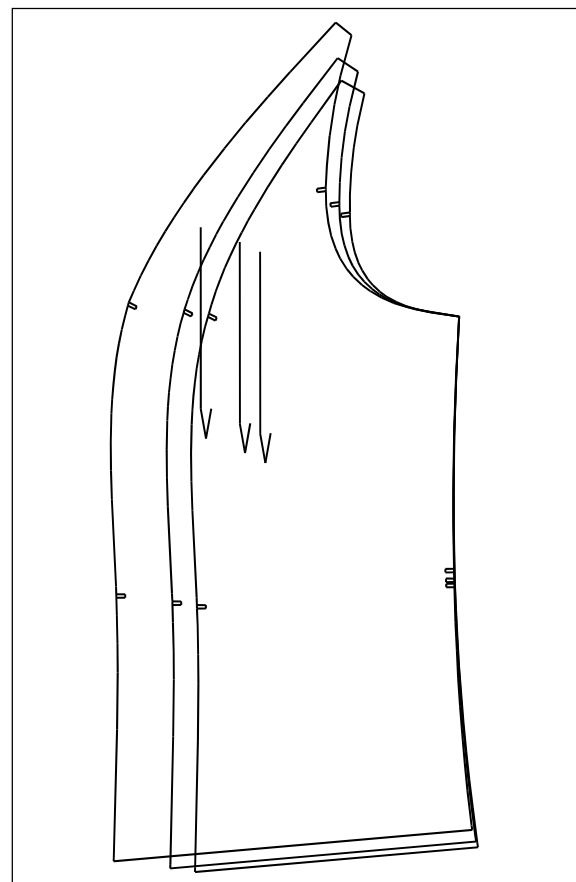
copy 1=>1 (XY)

transfer all grade points guided;
if necessary skip a point with ☐
and re-process with *single*



Picture 16-25

grading the grade corresponds with the nest in Picture 16-26 (sizes 34, 38 and 46).



Picture 16-26

If a grade point is graded incorrectly select *Grade Rule: transfer* again. The settings for transfer remain existent when quitting the *Grade Rule Pattern* menu. If necessary the pattern can be edited further with the functions explained in section 16.5.


16.8 Extract grade rule pattern

Each Grafis part can be extracted to a grade rule pattern. This applies to pure construction patterns as well as grade rule patterns which were edited with the Grafis construction functions.

Changing a part into a grade rule pattern or 'extracting' a grade rule pattern is interesting for example for:

- releasing one or more parts form a hereditary line for use in a different style or
- transferring a tested, constructed grade onto a pattern available in the base size, only.

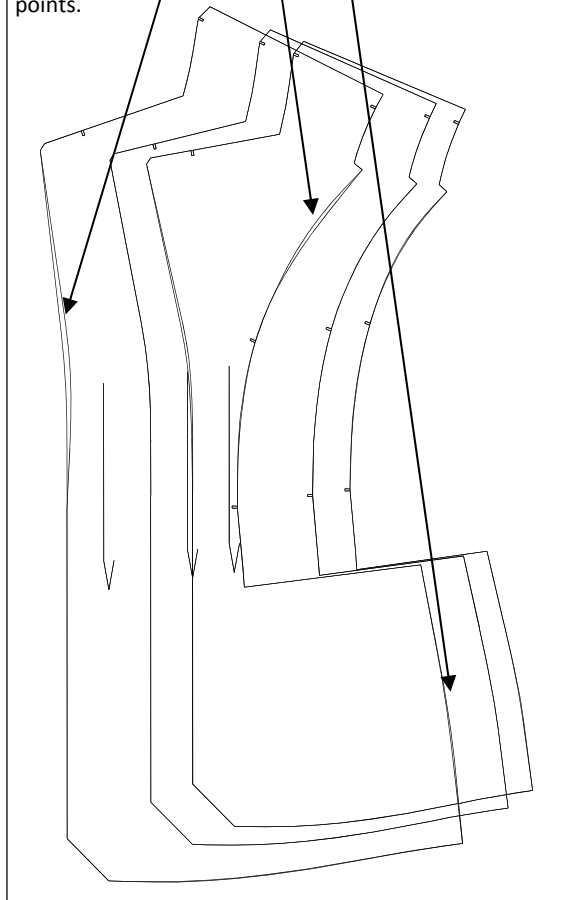
Step-by-step guide

- ⇒ Activate the part to be changed into a grade rule pattern;
- ⇒ Enter the base size into position 01 in the size table; in the following positions of the size table enter and activate all sizes from which you want to extract the grade rules;
- ⇒ *Rule Pattern* → *Extract Grade Rule Pattern*
- ⇒ *extract*, First, set the grade points automatically. Grafis takes off the grade rules for these grade points for all sizes active in the size table.
- ⇒ *grading*, the pattern is now graded as a grade rule pattern. The pattern must be identical with the original construction pattern. Especially on curves differences occur which can be rectified by setting additional grade points with *place grade point* and repeated *extract*. The grade points do not have to be set again. Click alternately on *extract grade rules* and *grading*. When no differences are visible the grade rule pattern can be saved.
- ⇒ Possibly, edit the grade rule pattern according to section 16.5
- ⇒ Save the pattern according to section 16.4
- ⇒ Quit with .

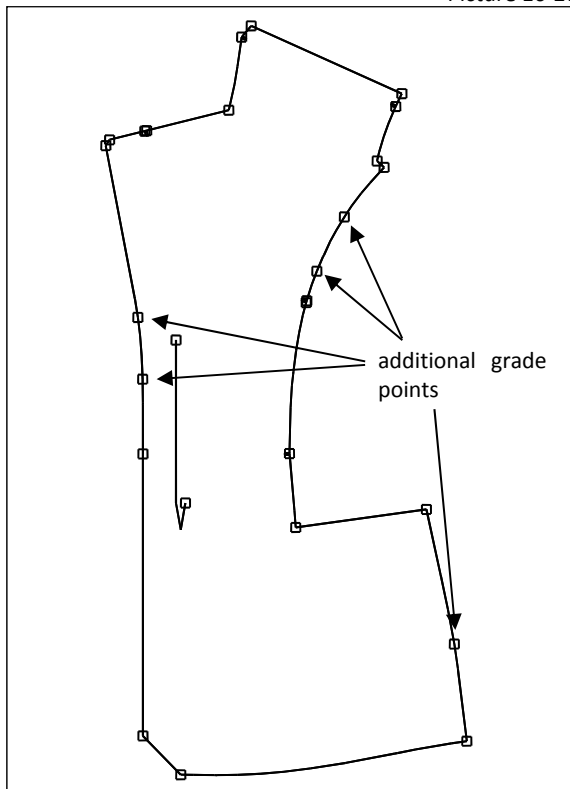
Test extracting by saving production patterns or certain development stages of a style as grade rule patterns. From the constructed blazer side panel in Picture 16-28 the grade rules for the break sizes 34, 38 and 46 were extracted with automatically set grade points. In Picture 16-27 the nest of the constructed pattern and the extracted pattern are displayed on top of one another. On the marked lines differences can be found.

After having set additional grade points with *place grade points* and *constructive* according to Pic-

These differences between construction pattern and grade rule pattern are corrected with additional grade points.

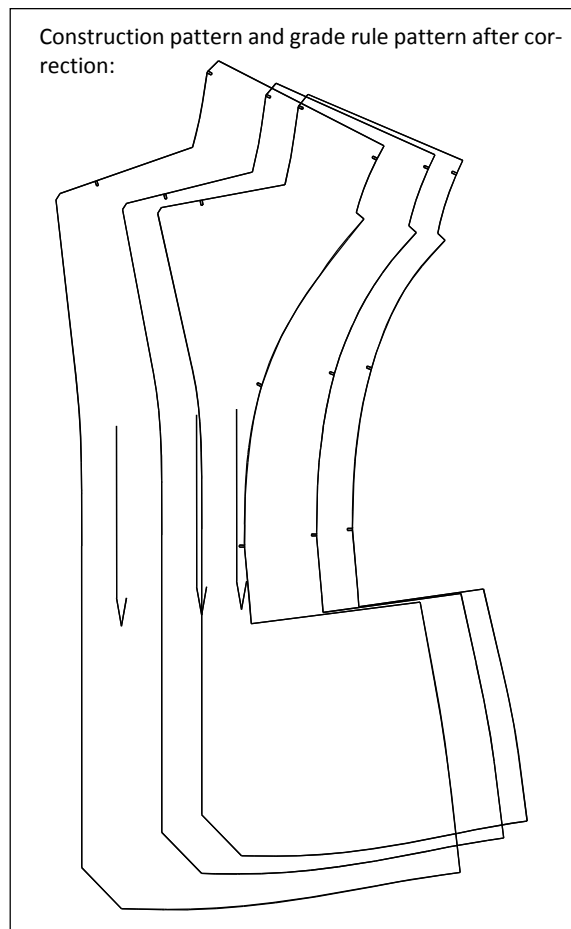


Picture 16-27



Picture 16-28

ture 16-28 and repeated *extract* the nests of the constructed pattern and the grade rule pattern are identical (Picture 16-29).



Picture 16-29

Prior to extracting, check if notches or other symbols should be replaced by points. A notch for example consists of two grade points. The base size and all break sizes must be entered in the size table and must be active. Proceed according to the step-by-step guide and save the patterns in the call list and as template grade rule patterns.

16.9 Create, use and edit a grade rule library

A grade rule library is a collection of grade rule tables. Use of a number of libraries is possible. The individual grade rule tables can obtain their own designation. A library is saved in the grade rule pattern data format (*.SWS).


This section is divided in the topics:

- create a grade rule library
- assign grade rules from the library and
- edit a grade rule library.

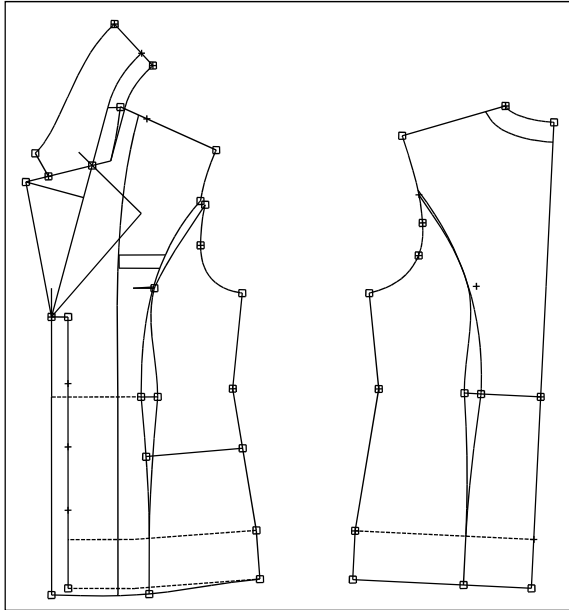
Create a grade rule library

A grade rule library can be extracted from existing patterns or created by entering the values. The former option is explained, first.

Step-by-step guide

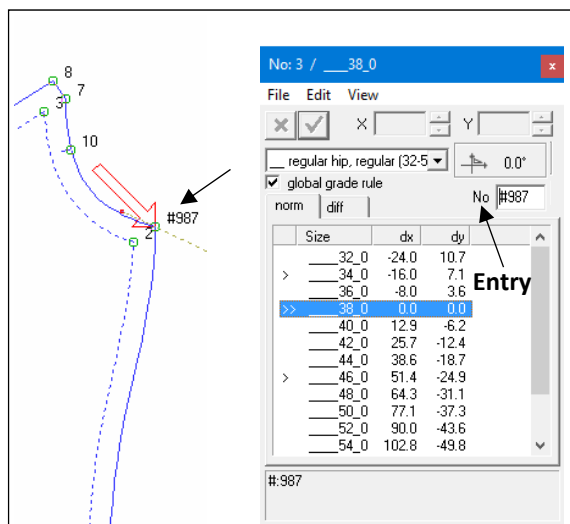
- ⇒ Prepare a pattern with all gradeable pattern pieces,
- ⇒ Enter and activate the break sizes in the size table,
- ⇒ *Rule Pattern / Extract Grade Rule Pattern*
- ⇒ Place grade points from which grade rule tables are to be inserted into the library, manually
- ⇒ *extract*
- ⇒ Possibly, set further grade points and *extract*
- ⇒ with  return to the *Grade Rule Pattern* menu
- ⇒ Label the grade rule table with a number between 1 and 999 in the *No.* Field. This number subsequently appears in the library.
- ⇒ Save grade rule pattern with *save => as template* under \Grafis\[measurement system]\ SWERT\ LIBRARY\[library name].SWS

Generate a Grafis pattern with all corresponding pattern pieces (see Picture 16-31). Activate the break sizes in the size table (here: 38, 34, 46) and start *Grading → Grade All Parts*. Then, open the *Grade Rule Pattern* menu via *Rule Pattern → Extract Grade Rule Pattern* and set **the grade points from which grade rules are to be inserted into the library** with *place grade point*. Not all grade points have to be set! Then, click on *extract*. The grade rule tables for the grade points were calculated.



Picture 16-30


Click on a grade point; the grade rule table window opens (Picture 16-31). Double-click on the dialogue window at the lower edge of the table. Enter a number between 0 and 999 into the No. field as a name for the grade rule. This number appears marked with *#* as a number at the point (with *+display*), in the comment window and later in the grade rule library. Introduce your own system when naming the grade rules. Note that the grade rules are listed in alphabetical order. Enter a name for each grade point. Then, save the grade rule pattern with *save => as template* under \Grafis\ [measurement system]\SWERT\LIBRARY\BLAZER.SWS. The grade rule library is created.



Picture 16-31

If you require an empty grade rule library in which grade rules are to be saved, later the following step-by-step guide applies:

Step-by-step guide for an empty library

- ⇒ Activate empty part,
- ⇒ Enter base size into the size table,
- ⇒ *Rule Pattern* → *Digitize Grade Rule Pattern*
- ⇒ *place grade points*
- ⇒ *construct*
- ⇒ *p on x&y with x=y=0*
- ⇒ with  return to *Grade Rule Pattern* menu
- ⇒ Save grade rule pattern with *save => as template* under \Grafis\[measurement system]\ SWERT\ LIBRARY\[library name].SWS

Use grade rule library

Grade rule libraries are opened from the *Grade Rule Pattern* menu via *edit grade rules* and used as follows:

Step-by-step guide

- ⇒ Click *edit grade rules* in the *Grade Rule Pattern* menu
- ⇒ Select required grade rule library (Picture 16-32),
- ⇒ click required grade rule once and then, click the grade point to which the grade rule is to be assigned;



Digitize a pattern without grade rules. Edit the pattern in the *Grade Rule Pattern* menu (possibly: *Rule Pattern* → *Edit Grade Rule Pattern*). Open the *Grade Rule: edit* menu (Picture 16-32). All functions introduced in section 16.5 are available. Select the required grade rule library under *drag* by clicking this field and selecting one of the available libraries from the list below. The selected library is entered into the field below *drag*. The list below the field with the name of the library now contains the grade rules. Scroll in this list. Click on the first grade rule and move the cursor to the pattern without pressed mouse button. For your support an arrow to the respective nearest grade point appears. Click on the grade point to which you want to assign this grade rule.

Assigning can ensue with the three copy options *1=>1* where *1=>1 (xy)* is the default.

Edit grade rule library

Grade rules can be added to an open grade rule library as follows.

Step-by-step guide

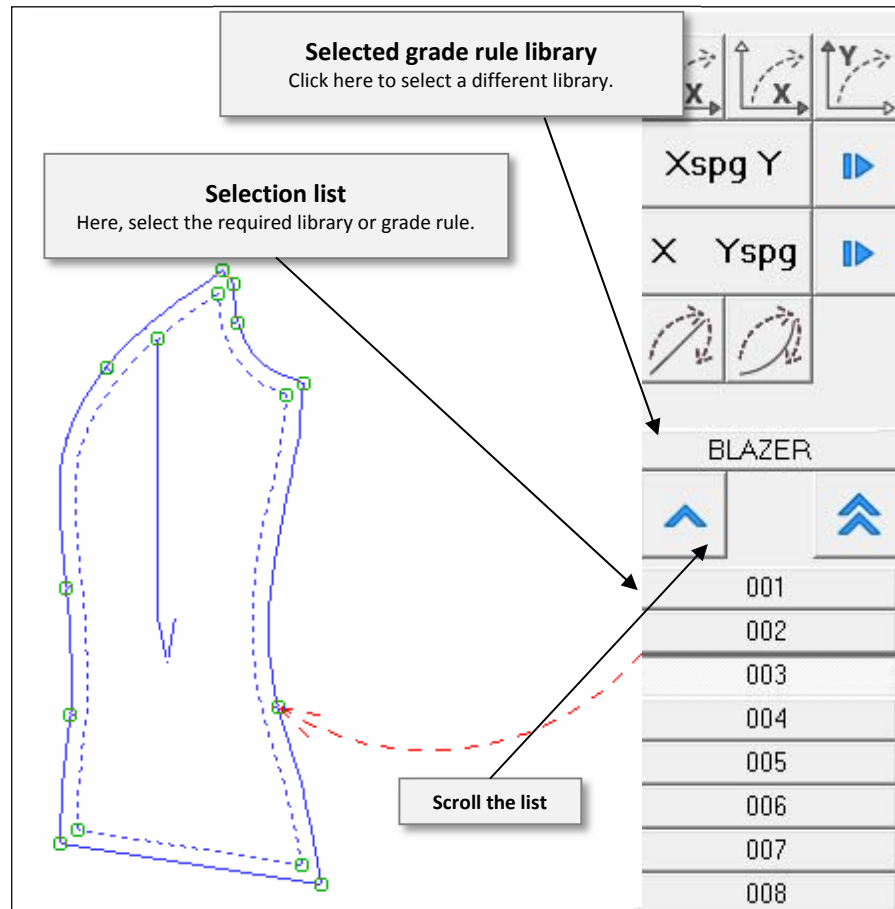
- ⇒ Click *edit grade rules* in the *Grade Rule Pattern* menu
- ⇒ Select the required grade rule library
- ⇒ Edit a grade rule: double-click on the grade rule in the right menu strip, edit the grade rule and quit with 
- ⇒ Add a grade rule: activate *edit* and double-click on a similar grade rule in the right menu, edit the grade rule, label it in the *No.* field and save it in the library with *File* → *Save to library*. Close the grade rule table with  without accepting the alteration again, as otherwise the grade rule selected as template is overwritten.
- ⇒ Delete a grade rule: double-click on the grade rule in the right menu strip and *File* → *Delete from Library*.

Edit the library according to the step-by-step guide. The alterations are saved in the library, immediately.

16.10 Group grade points

Grouping grade points is a powerful and sophisticated function. It is explained briefly in this section using a simple example. It can be used far more extensively than described, here.

With the function *group* **a grade point can be graded in relation to another grade point**. The grade rule tables discussed so far relate to the pattern contour in the base size. With *group* and *assign* this relation is released and grading can be related to a grade point.



Picture 16-32

A grade point can be assigned with a number of grade points.

The grade point which has grade points assigned to it is marked with a dashed circle.

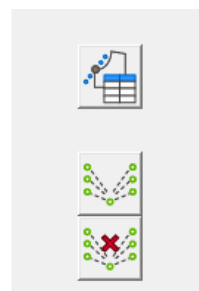
A grade point which already has grade points assigned to it can be associated with another grade point (chain of grade associations).

Group grade points menu

[edit grade rules](#)

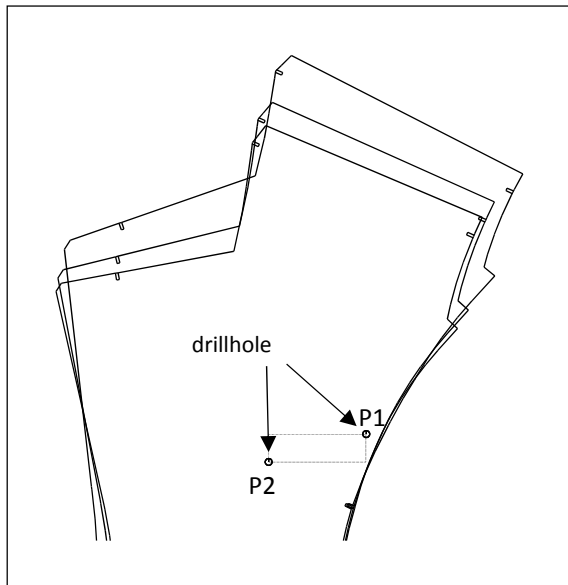
[grade point...](#)
[assign neutral](#)

[release neutral](#)



The options **Group neutral** or **additive**

Grade points can be grouped neutral or additive:



Picture 16-33

In the case of **grade point neutral** the grade rules of the grade point are calculated so that it continues to be graded as before without alteration.

In the case of **grade point additive** the grade rule table remains unchanged. The target to which the grade rule refers is changed. This option is originally not visible as it is rarely required. The option **additive** can be made available in the Grafis.ini under [OPTIONS] with the switch GRD_GRP_ADD=1.

Assign **grade point neutral** and subsequent **Release grade point neutral** restores the original state. The same applies to the **additive** option.

norm	diff			
		Size	dx	dy
		32_0	54.8	8.4
>		34_0	36.5	5.6
		36_0	18.2	2.8
>>		38_0	0.0	0.0
		40_0	-17.8	-2.8
		42_0	-35.7	-5.6
		44_0	-53.5	-8.4
>		46_0	-71.3	-11.2
		48_0	-89.1	-14.0
		50_0	-106.9	-16.8
		52_0	-124.8	-19.6

Picture 16-34

The option **grade point neutral** should be used if a grade point has already been graded correctly and now, its grading is to be checked/adjusted in relation to another point. See also the following example with Picture 16-33 and Picture 16-38.

The option **grade point additive** should be used if a grade rule is to be adjusted for a new point in relation to an existing point.

Example

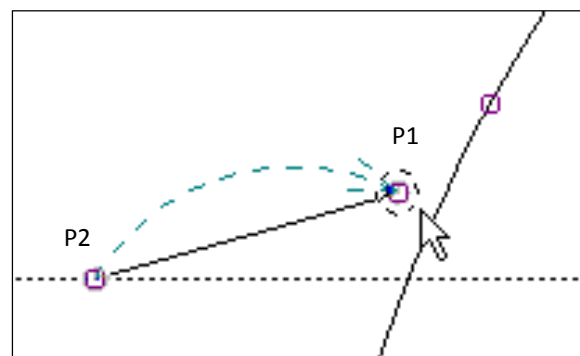
Picture 16-33 shows a front with drillholes for a welt pocket. The welt has the same dimensions for all sizes. The nest in Picture 16-33 is stacked at P1. The grade rule table for P2 is shown in Picture 16-34. The grade point P2 is associated with grade point P1 with the following steps and graded in relation to P1.

Rule Pattern → Edit Grade Rule Pattern

group grade points

assign grade points **neutral**

P2 is to be allocated to P1 according to Picture 16-35.



Picture 16-35

edit

The grade rule table for P2 after allocation is shown in Picture 16-36. The position of P2 does not change in relation to P1 in all sizes. All grade rules are zero.

norm	diff			
		Size	dx	dy
		32_0	0.0	0.0
>		34_0	0.0	0.0
		36_0	0.0	0.0
>>		38_0	0.0	0.0
		40_0	0.0	0.0
		42_0	0.0	0.0

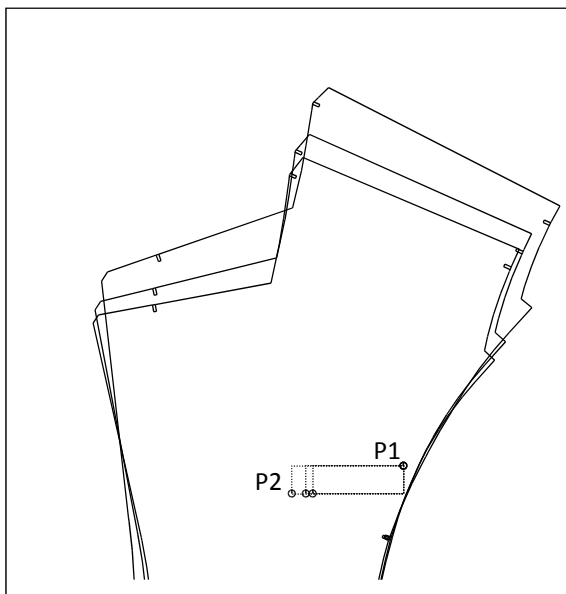
Picture 16-36

Now, the grade rules for drillhole P2 are to be changed so that the pocket is 5mm narrower in both sizes 34 and 36 and 10 mm wider from size 44. In sizes 38 to 42 the grade for the pocket is to remain unchanged. The grade rule table for P2 is to be altered according to Picture 16-37.

norm	diff			
		Size	dx	dy
		32_0	5.0	0.0
>		34_0	5.0	0.0
>		36_0	5.0	0.0
>>		38_0	0.0	0.0
		40_0	0.0	0.0
>		42_0	0.0	0.0
>		44_0	-10.0	0.0
>		46_0	-10.0	0.0
		48_0	-10.0	0.0
		50_0	-10.0	0.0
		52_0	-10.0	0.0
		54_0	-10.0	0.0

Picture 16-37

The result after grading and stacking of the pattern at P1 is shown in Picture 16-38.



Picture 16-38

Now, remove the grade association with
Grade Rule Pattern → *edit grade rules*
group grade points

release grade points **neutral**

To remove click the point to which another point was assigned; in this case click P2.

edit

The grade rule table was calculated for the relation to the pattern contour (Picture 16-39). The grade of the pattern corresponds with Picture 16-38.

norm	diff			
		Size	dx	dy
		32_0	59.8	8.4
>		34_0	41.5	5.6
>		36_0	23.2	2.8
>>		38_0	0.0	0.0
		40_0	-17.9	-2.8
>		42_0	-35.7	-5.6
>		44_0	-63.5	-8.4
>		46_0	-81.3	-11.2
		48_0	-99.1	-14.0
		50_0	-11...	-16.8
		52_0	-13...	-19.6
		54_0	-15...	-22.4

Picture 16-39

Use **additive** if you have set a new grade point and want to grade it in relation to an existing grade point. If no grade point has been set at drillhole P2 you can obtain the result in Picture 16-38 with the following steps.

Grade Rule Pattern → *Edit Grade Rule*

place grade point

constructive the centre of the drillhole

group grade points

assign grade points **additive**

P2 is to be associated with P1 according to Picture 16-33.

edit

The grade rules for P2 remain zero after allocation (Picture 16-36). Alter the grade rules according to Picture 16-37.

grading For result see Picture 16-38.

Chapter 17 Marker making

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Grafis Marker making is started as a separate application and can be open at the same time as Grafis Patternmaking.

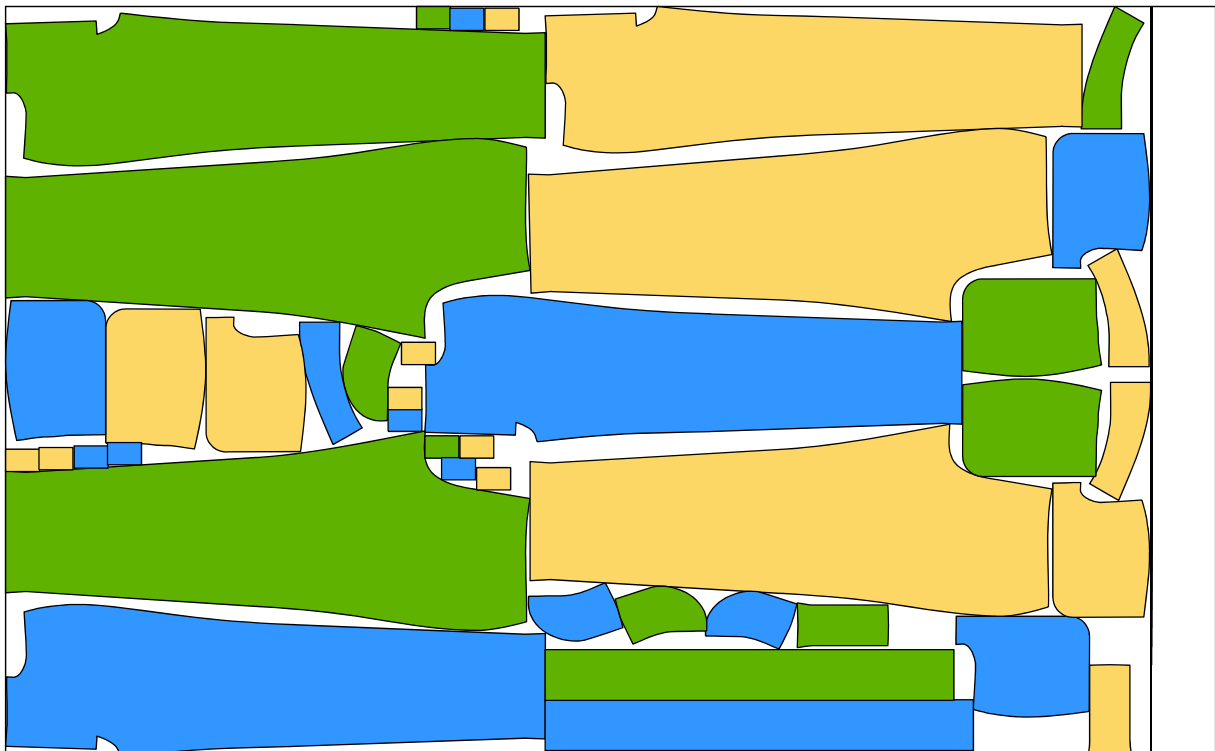
The Grafis Marker making can be used at different levels in industry, trade and education. It allows amongst other:

- marker making of all production patterns of the current style,
- combining patterns from different styles within one marker, also across different measurement systems,
- grouping of pieces,

- open and folded markers,
- transfer of optimised markers onto new markers to be generated,
- creation of fusing group and much more.

Technical parameters such as material type, grain, number of pieces per style and repeats are considered as well as planning parameters for buffer (global, piece-specific, direction-specific), shrinkage and material faults. Pieces can be rotated and flipped during marker making.

Content of this chapter are the basic functions for creating a marker from one or more styles. All other application options follow in Chapter 18.



17.1 The fastest way to a marker

For industrial application, the marker making software offers an abundance of planning and organisational options which have to be entered before the actual marker making process. Not every user, however, requires all options. Therefore, the steps for minimum requirement are to be explained, first.

Note:

If you have no suitable style with production patterns available you can prepare the following: Open a new style in the measurement system Optimass (BASIS_A). Call the 'Unisex Basic Block' into parts 001 and 002, respectively. In part 001 delete and points and lines of the back and call the part front. Part 002 becomes the back by deleting all points and lines of the front. Now, two parts with closed perimeter are available. Continue with the step 'Set part parameter'.

Steps in Grafis Patternmaking

- ⇒ Create the production pieces with closed perimeter, if necessary set the grain line
- ⇒ Set part parameter; minimum: Attribute *production piece*, material type (e.g. 'O upper fabric'), number of pieces per style (e.g. 1x normal, 1x mirrored)
- ⇒ Enter all sizes to be layed into the size table and grade all parts.
- ⇒ Save the style
- ⇒ Start marker making via *File* → *Start Marker making* or via the 'Marker making' icon on the desktop.

Steps in Grafis Marker making

- ⇒ Open the prepared style (of Version 8 or higher) via *Production Style* → *Open*. Grafis suggests converting the style into a production style. This should be confirmed. Explanations can be found in section 17.4.
- ⇒ If necessary, check or edit the part parameter via *Production Style* → *Part Organisation*
- ⇒ Open the *Material index card* via *Marker Information* → *Material*
- ⇒ Enter the material width, e.g. 1500 (entry in mm)
- ⇒ Select material type, e.g. 'O upper fabric'
- ⇒ Button *Next* to index card *Parts*
- ⇒ Optional: Select one or more pieces and enter buffer (*buffer column*) and allow rotate/flip (*allowance column*).
- ⇒ Button *Next* to index card *Sizes*
- ⇒ Click a size and set the amount of this size for the marker via *Edit Amount*. Dragging with pressed left mouse button allows for selection of a number of sizes and changing the amount to be layed in one operation.

- ⇒ Button *Lay* opens the user interface for laying the pattern pieces.
- ⇒ Lay the pieces according to section 17.6

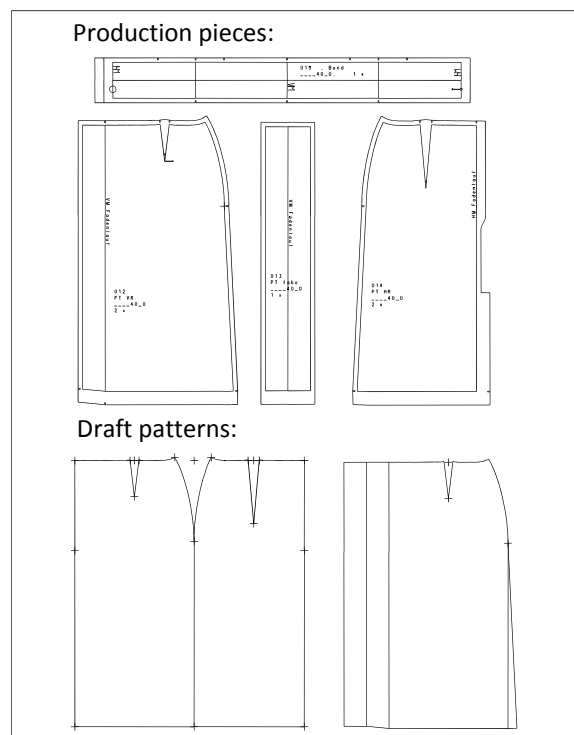
17.2 Preparations in Grafis Patternmaking

Step-by-step guide

- ⇒ Create production pieces with closed perimeter
- ⇒ Set grain line
- ⇒ Enter part parameter (material type, amount of pieces per style)
- ⇒ Enter all sizes to be layed in the size table and grade all pieces.

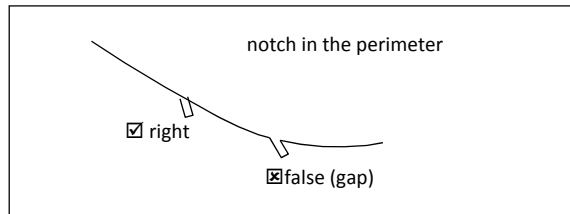
Construct production pieces with closed perimeter

During pattern development draft patterns are created from which the actual production patterns are derived, see Chapter 14. Pieces can only be layed in the marker if they have a closed perimeter. The perimeter corresponds with the cutting line on the fabric. It can be adjusted to the fabric by entering shrinkage values and buffer within the marker.



Picture 17-1

Grafis checks whether the perimeter is closed when setting the part parameter *Production Piece* (in the *part organisation* menu) and again when transferring all sizes into the marker. If Grafis finds gaps (>0.5mm) in the perimeter or protruding lines, an error message appears. Gaps can usually be found at corners, joints of lines or at symbols.



Picture 17-2

Line symbols such as notches are ignored during checking of the perimeter (Picture 17-2). For the first steps in the marker, please prepare a simple style with production pieces, e.g. a skirt as shown in Picture 17-1.

Set grain line

In the production pieces the Grafis symbol 'grain line' should be set at least.

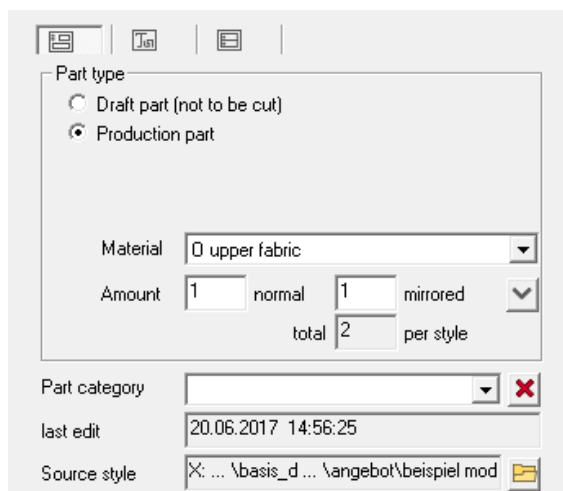
If no grain line is set, the negative y axis (direction downwards) is utilised as the direction of the grain, however, this can be changed subsequently (see 18.10). Also, an internal line can be declared as the grain line (see 18.11).

The following symbols and attributes must already be set in the style if they are required in the marker:

- grain line
- annotation line (see 18.11)
- split line (see 18.11)
- internal line to be cut (see 18.11)

Assign piece parameter

After having finished the production patterns the piece parameter for the production pieces should be assigned, already on the file card *Piece Parameter* in the *Part organization* menu.



Picture 17-3

These are:

- ⇒ Set piece type to *Production piece*
- ⇒ Determine the *Material* for the production pieces;
If the required material type is not listed, it has to be entered in the file \Grafis\MATERIAL.DAT. This file contains the code for the material type in the first column. Each code can be assigned only once. For the code one capital letter or one number can be used. Use of special characters or umlaut is not permitted. The material name follows from the third column onwards.
- ⇒ Enter the amount of this piece per style;
For right/left-symmetrical pieces (pairs) the piece is required '1x normal' and '1x mirrored'. Please note that here, not the total number of pieces to be placed is to be entered but the amount for normal and mirrored position per style.

With the button the piece parameters of the selected piece are transferred to the next piece. This relates to the attribute *Production piece*, the material type and the amount per style in normal/mirrored position.

Optionally, each piece can be assigned a category for which the buffer at top/bottom/left/right and the settings for rotate and flip during marker making are prepared. Details on work with categories can be found in section 18.7.

Grade production patterns

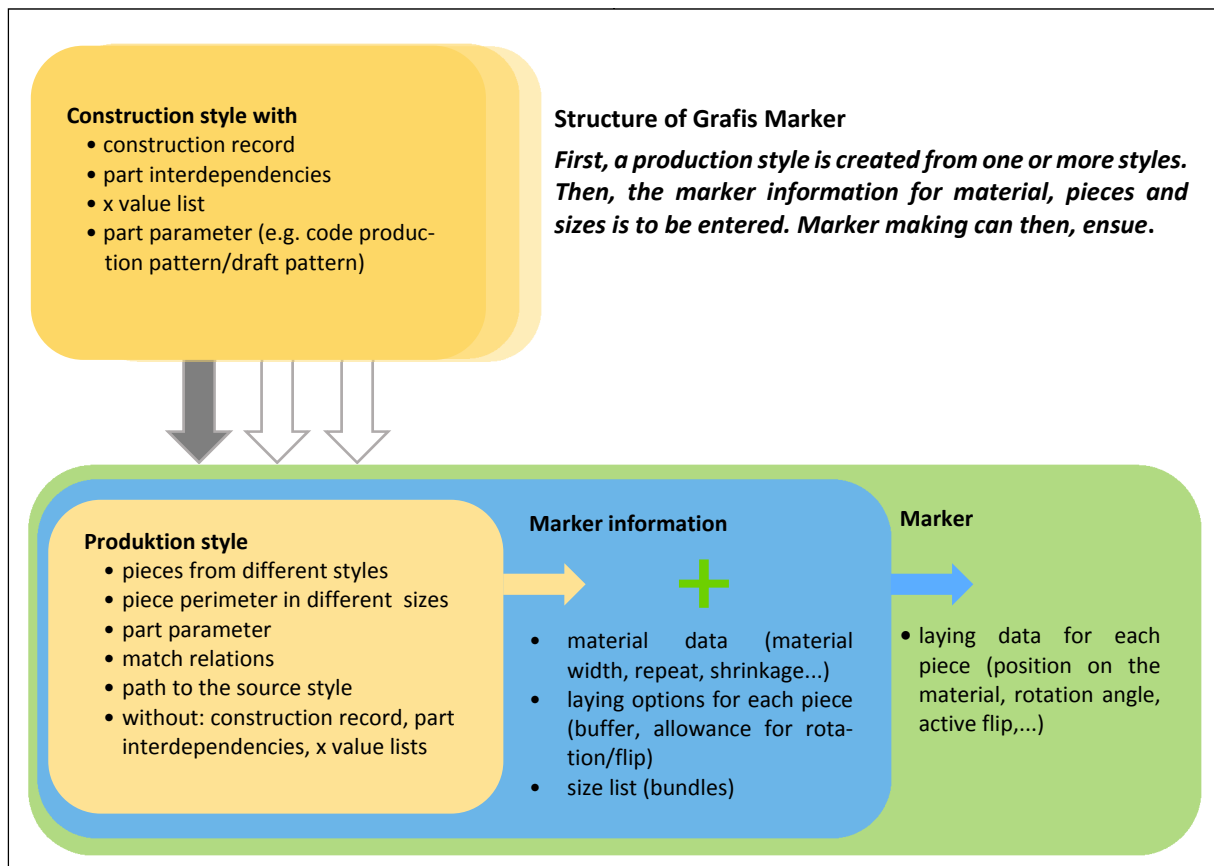
All sizes to be layed must be entered in the size table. One entry per size is sufficient. Grade all production patterns with *Grade all Parts* and save the style.

17.3 Structure of the Grafis Marker

The Grafis Marker making is started via the icon 'Marker making' or from Grafis Patternmaking via *File → Start Marker making*. Grafis Patternmaking and Grafis Marker making can be open at the same time.

Data structure of the Grafis Marker

The data of a marker is divided into production style, marker information and marker. In this order, the information for the marker is assembled. The overview in Picture 17-4 indicates the structure. The intermediate steps (production style, marker information and empty marker) can be saved, separately.



Picture 17-4

Production Style

... is the assembly of pattern pieces from different styles and different measurement systems to be layed in a marker. It contains

- all required pieces as perimeter in all required sizes,
- the part parameter for the pattern pieces,
- match relations if required and
- a connection to the source of the respective pieces.

As opposed to the styles in the Grafis Patternmaking, the construction record with x value lists and the interdependence of the parts no longer exists.

Marker information

... are the data of the production style and additionally

- all information about the material (width, repeat, shrinkage, ...)
- laying options for each piece (buffer, allowance for rotation/flip),
- sizes to be placed (bundle) and the name of the marker.

Marker

... contains the data of the marker information with the data of the production style and additionally

- the laying data for each piece (current position in the marker, rotated, flipped,...)

The data of every placed marker are saved as marker files with the extension *.scb.

Prepare marker

Step-by-step guide

- ⇒ Prepare the style according to section 17.2 and start Grafis Marker making
- ⇒ Load or assemble the **production style**
- ⇒ Assign **marker information**
- ⇒ Lay the **marker**

For each of the highlighted steps, there is a pull-down menu with all relevant functions.

Load or assemble production style:

- ⇒ Pull-down menu *Production Style*

Assign marker information:

- ⇒ Pull-down menu *Marker information*

Lay marker:

- ⇒ Pull-down menu *Marker*

To create a marker these steps are to be processed one after another. The individual steps are explained in sections 17.4 to 17.7.

17.4 Create production style

Load production style

If only pieces of one style are to be placed, the following steps are sufficient:

Step-by-step guide

- ⇒ Pull down menu *Production Style* → *Open Style*. Open a prepared style. Grafis suggests automatically converting the style into a production style. This should be confirmed. Thus, all production pieces are transferred and the alteration service is activated for each piece. Refuse this conversion only if not all required patterns have been declared as production pieces. In this case, all parts including empty parts and development parts will be transferred. However, this means that any alteration to the source style leads to updating of all pieces in the marker.
- ⇒ If necessary, check or edit part parameter via *Production Style* → *Part Organisation*, open file card *Part parameter* and check the material type and the required amount for each part.

The production style is now prepared. You can continue immediately with the marker information

NB: The alteration service (section 18.1) can work only if the source style and the complete path to the source style (drive, collection, sub-collection) have not been renamed, moved or deleted.

Assemble production style

Step-by-step guide






- ⇒ Open part organisation via *Production Style* → *New style*
- ⇒ Click *Insert connection part*
- ⇒ Select a style from any measurement system
- ⇒ The dialogue *Grafis- Part Connection* appears
- ⇒ Select the sizes required for the production style or click on *all sizes*. The order of the sizes remains intact in the marker when creating the bundles.
- ⇒ Click the button *Create connection* for all pieces required in the production style or click on *all parts*
- ⇒ Select the next style with the button *Back* or close the *Grafis- Part Connection* dialogue with the button *Close*
- ⇒ Open file card *Part parameter* and check the material type and the required amount per style for each piece
- ⇒ End with right mouse button

When assembling production styles from styles of different measurement systems, ensure identical size names. If the size names are not identical, individual measurement charts with identical names may have to be created. Ensure correct settings for the alias in the size table.

The production style is assembled with the function or the *part organisation* menu which are largely identical with the ones in the Grafis Patternmaking. All changes apply to the new production style, only. The source style remains unchanged.

Start Grafis Marker making and select *Production Style* → *New Style*. Assemble the new production style by clicking on *Insert Connection* and selecting the required style.

Select style

In the dialogue *Open Style for Insert* select the drive on which the required style is saved under *Look in:*. In the window below, all measurement systems appear, indicated as folders with the icon . Double-click changes to the required measurement system. All available collections of the selected measurement system appear, also indicated by the icon . Double-click on the required collection opens the list of all available styles of the collection. Styles are indicated by the icon . If a padlock appears at the icon , the style is currently being processed and is therefore, write-protected. Parts from a write-protected style are transferred in the state of the last save. Move up one level of folder/ collection with the button . Table 17-1 contains an overview of the icons used in Grafis and their significance.







Icon	Significance
	folder (measurement system), collection
	style (Grafis Patternmaking)
	write-protected style
	production style
	marker
	marker information

Table 17-1

The content of the window can be arranged with the buttons according to Table 17-2.





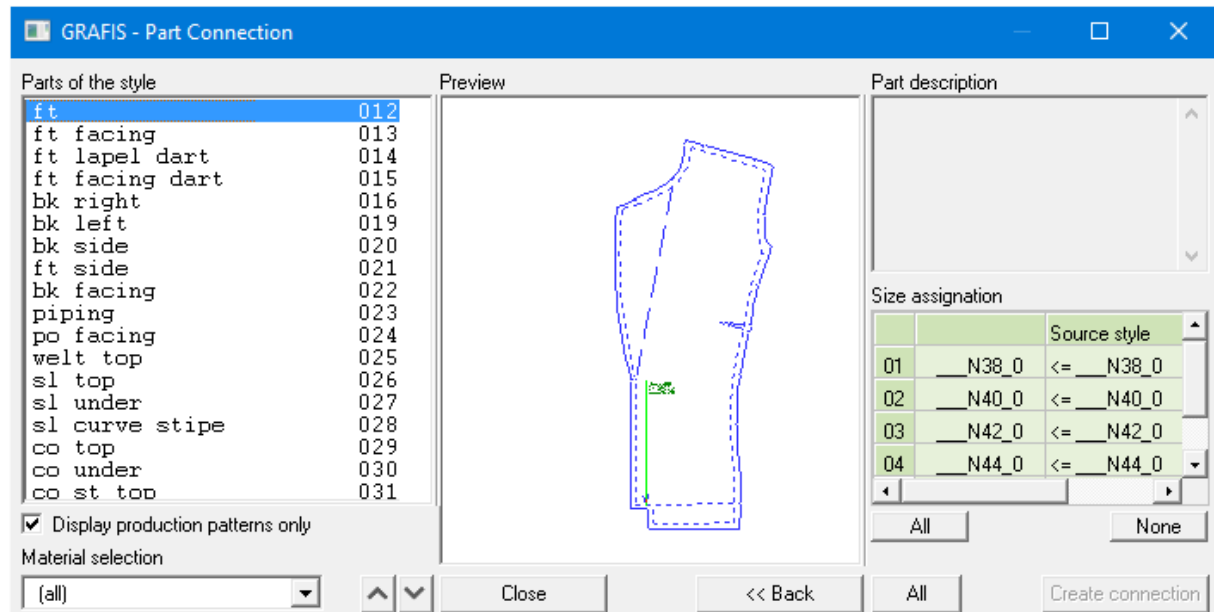
Button	Significance
	List without details
	List with details
	Show/hide text preview
	Show/hide preview of the first piece

Table 17-2



Picture 17-5

Create connection

After having selected the required style, the window *Part Connection* appears (Picture 17-5).



Step-by-step guide

- ⇒ Select all sizes to be transferred to the production style
- ⇒ Transfer pieces with: select piece and click button *Create connection* or double-click on the piece
- ⇒ Button *Back* to select another style
- ⇒ End with button *Close*

Select sizes

All sizes positioned to the left of the arrow '<=' in the section *Sizes of the style* will be available in the marker. Double-click on the respective line transfers the size to the left or excludes it again. Selecting a number of sizes in one operation is also possible with pressed left mouse button. **The bundles will be created in the order of the sizes to the left of the '<='.**

Transfer pieces

The check mark *Display production patterns only* can be set if all pieces to be layed have been assigned with the *Production piece* attribute. If the check mark is set, all draft patterns are hidden. After having clicked a piece its perimeter appears in the *Preview* area and the content of the text box - if applicable - appears under *Part description*. Clicking the button *Create connection* or double-click on the piece transfers the piece. The following piece is selected, automatically. A different insert position in the production style can be selected with the buttons  .

After having transferred all required pieces, another style can be selected with the <<Back button or the assembly of the production style can be ended with *Close*.

Edit production style

The current list of parts can be opened via *Production style* → *Part Organisation*. On the *Part parameter* file card the date of the last edit of the piece, the name and the path of the source style are now shown for each piece. This information is used to ensure that any alteration of the source style will automatically be updated in the marker. Further information on updating pieces can be found in section 18.1.

If necessary, check that


- no pieces have been transferred, twice by accident,
- the material type of the piece is correct,
- the required amount per style is correct and
- if applicable, the part category is correct.

Corrections can be made immediately with the known function from the part organisation, see Chapter 14. Adding further pieces is started by clicking *insert connection part*. The part organisation is closed with the right mouse button.

In the style view, the function keys <F2>, <F3>, <F4> and <F6> are assigned as in the Grafis Patternmaking. Pressing <F5> arranges all transferred pieces in all transferred sizes. The functions *Copy*, *Measure*, *Stack* and *Move/Zoom* are also active (pull-down menu *Edit* or toolbox).

Save production style

The production style can be saved at this stage via *Production Style* → *Save Style As...* Finished styles should be sent to the customer or the production unit in the form of production styles. Alteration through application of other body measurements or x values are no longer possible.

For saving of production styles no fixed directory structure is given as the production styles are no longer attached to a measurement system. As the target, we recommend the folder \Grafis\SB\ and its subfolders. With the button  *New Folder* a new folder/directory can be created.

17.5 Edit marker information

Step-by-step guide

- ⇒ Create or open a production style
- ⇒ Pull down menu *Marker Information* → *New* Now, three file cards are to be filled in.
- ⇒ Fill in file card *Material* (enter material width and material type minimum)
- ⇒ Fill in file card *Pieces*
- ⇒ Fill in file card *Sizes*

⇒ *Save empty marker* or lay the pieces in the marker

After preparation of the production style and before laying the pieces in the marker, all information about the marker must be entered into the file cards *Material*, *Pieces* and *Sizes*. As a rule, each of these file cards are indicated by one icon in the toolbox.

File card Material

On this file card, enter at least the **material width** and the **material type**. All other fields can be edited if required. Some of the other options are explained in the following. Further information about pre-selection of material, repeat, shrinkage values (global), fault areas and spreading types follow in Chapter 18.

Buffer (global)


The global buffer applies to all pieces in the marker. Grafis calculates a new perimeter for each piece with half of the buffer distance. Thus, the set safety margin between two pieces is ensured. If pieces are to be touching in the marker, the global buffer must be 0. A piece-specific buffer can then be entered on the next file card.


GRAFIS - Material

Material pre-selection

Material width: 1500 mm Material type: upper fabric

Repeat

☐  Distance Offset Sub repeat

☐  ☐ match only (match point not active) permitted repeat deviation

Match pieces without repeat: ☐ Warp ☐ Weft ☐ end with full repeat ☐ minus offset

Shrinkage values

☐ Warp ☐ Weft ☐ relates to grain line in pieces

Fault areas

☐ Consider material faults

Buffer (global)

0 mm

Maximum material length

☐ 7 ☒ Metre (m) ☐ Efficiency (%)

Spreading type

☒ Ri - Le ☒ two-way ☐ Ri - Ri ☐ one way ☐ folded ☐ same sizes - same direction ☐ tubular material ☐ same sizes - same direction (compe)

Anchor lines

vertical: ☒ none ☐ active plotter ☐ every mm

horizontal: ☒ none ☐ in ☐ every mm

☐ use as auxiliary lines only

Next >> Close

Picture 17-6

Maximum material length

In this field, the maximum length for the marker in metres or a minimum efficiency in % is entered. A default setting for the maximum length is entered in the Grafis.INI file and can be altered at any time.

When entering a minimum efficiency in %, the maximum material length is calculated, automatically from the area of all pieces and the width of the material.

Anchor lines

Anchor lines are laying aids which function like a border. Pattern pieces can be attached from left/ right or up/ down. Placing a piece on top of an anchor line is only permitted if the check mark **use as auxiliary line only** is set. Anchor lines can also be plotted.

With **every...mm** the distance between vertical or horizontal anchor lines can be randomly selected. For **vertical** anchor lines, the distance between the lines can correspond with the page size of the **active plotter**. This setting is useful for single sheet plotter where the pattern pieces are not to protrude over the edge of the page.

Button Next

Clicking the **Next>>** button opens the *Pieces* file card.

File card Pieces

On the *Pieces* file card, settings regarding additional direction-specific buffer, flip and rotate allowance and special settings for shrinkage value can be entered for each piece.

GRAFIS - Pieces

Piece list

Piece	Am...	B	C	Material
FAB: ft	1+1			0
FAB: ft side	1+1			0
FAB: ft facing	1+1			0
FAB: bk	1+1			0
FAB: bk side	1+1			0
FAB: co top	1+0			0
FAB: co under	1+0			0
FAB: co st top	1+0			0
FAB: co st under	1+0			0
FAB: sl under	1+1			0
FAB: bk facing	1+0			0
FUS: sl top hem	1+1			0
FUS: sl top vent	1+1			0
FUS: sl under hem	1+1	x.		0
FUS: sl under vent	1+1	x.		0

☒ Show pieces for selected material only

Fixed settings

Angle °

☐ Mirror angle with piece

☐ Flip about X (grain)

☐ Flip about Y

Allowance

Tolerance angle °

☐ Flip about X (grain)

☐ Flip about Y

☐ Rotate through 180°

☐ Rotate through +/- 90°

☐ Rotate through +/- 45°

Buffer (in mm or %)

top

le ri

bottom

☐ Cut buffer line

☐ Reduce piece

Pre-set buffer

from file

Shrinkage values for the piece

☒ for piece and buffer

☐ for buffer line only

☐ do not apply

☐ Piece can remain unplaced

☐ symmetrical piece

☐ Plot/cut piece without annot

Pre-set (all)

from file

<< Back Next >> Close

Picture 17-7

In the part list (left on the file card) the following is stated next to the piece name:

Column	Content
Piece	Piece name
Amount	Amount of the piece per style; first number indicates normal and second number flipped position
Buffer	The character 'x' indicates that a piece and direction-specific buffer has been entered for this piece. Small 'x': original perimeter is cutting line; capital 'X': buffer line becomes cutting line; character '-': the piece will be reduced.
Category	Display of category number and name assigned to this piece.
Material	Code for the material type

If only pieces of the selected material type are to be displayed, check **Show pieces for selected material only**. Thus, only pieces which will be layed out can be seen. The material type is selected on the previous file card *Material*.

The values in the entry fields *Fixed settings*, *Allowance*, *Buffer* and *Shrinkage values for the piece* apply to the selected piece(s), respectively. To select a number of pieces at the same time, press the <Ctrl> or the <Shift> key when clicking on the pieces.

Fixed settings

For each piece the following can be set:

- fixed rotation angle
The piece is rotated through this angle before entering in the marker.
- flip about x or y
The piece is flipped before laying.

Allowance

Additionally, the following rotate/flip allowances can be set:

- tolerance angle
The piece may be rotated freehand about a maximum of this angle in the marker.
- flip about x (grain line)
- flip about y
- rotate through 180°
- rotate through +/-90°
- rotate through +/-45°

The piece may be rotated/ flipped according to these settings

Buffer

The piece and direction-specific buffers are added to the global buffer from the previous file card *Material*. The settings apply to the selected piece(s). A buffer can be entered into the fields *top*, *bottom*, *left* and *right* in mm or in %. When using percentage, only the character '%' is to be entered. Move between entry fields with the <Tab> key. All settings relate to the first piece in the first bundle in unflipped position.

The check mark at **cut buffer line** results in the piece being increased by the global and piece-specific buffer and cut at the buffer line. Complex pieces or pieces which the cutter may not be able to cut, accurately can be cut roughly and can then be cut, accurately by hand.

If the check mark at **cut buffer line** is not set, the buffer is an invisible distance between the pieces.

GRAFIS - Sizes

Size	Amount
N30_0	0
N32_0	0
N34_0	0
N36_0	0
N38_0	1
N40_0	2
N42_0	2
N44_0	1
N46_0	0

Article / Marker code:

Alter amount:

☒ Keep position of bundle
☐ Step lay (free mode)

Bundle in marker:

<- A	N38_0
-> B	N40_0
<- C	N40_0
-> D	N42_0
<- E	N42_0
-> F	N44_0

Buttons:

Picture 17-8

A check mark at **reduce piece** results in the piece being reduced by the global and piece-specific buffer and cut reduced. Interlining can be reduced by 2mm all around for example, to prevent the fusing press from being soiled with glue.

In the part list (left on the file card) the current settings are indicated as follows:

Character	Significance
x	<input type="checkbox"/> cut buffer line (original perimeter is cut line)
X	<input checked="" type="checkbox"/> cut buffer line (buffer line is cut line)
-	<input checked="" type="checkbox"/> reduce piece (piece is cut reduced)

All further options are explored in Chapter 18. These are

- shrinkage values for the piece
- pre-set buffer
- pre-set (all)
- replace style/add style

File card Sizes

The file card *Sizes* determines **which sizes are placed and how often**. This information is displayed in the size list (Picture 17-8, left window). From this data, the bundles are created, automatically in the right window. Only the sizes set up in the production style can be placed. Adding unlisted sizes is only possible through reprocessing the production style. To edit the amount of the size, select one or more sizes in the window on the left. Pressing a number on the keyboard or the arrow keys next to the dialogue **Alter amount** changes the amount of the selected size(s). A number of sizes can be selected with the <Shift> and <Ctrl> keys, analogous to the handling in the part list.

In the field **Article/Marker code** a short description of the marker can be entered which can be plotted at the material edge.

Further information about *Article/Marker code* and *Step lay* follow in Chapter 18.

Save empty marker

As soon as all settings for the *Marker Information* are dealt with, this intermediate stage can be saved as an 'empty marker'. Often, a number of markers are required for the same style due to marker optimisation.

The first marker contains sizes 36 and 42, the second marker sizes 38 and 40 and so on. After having saved the 'empty marker' for the sizes 36 and 42, the sizes 38 and 40 have to be entered, only in the required amount on the *Sizes* file card. Then, the marker for sizes 38 and 40 is prepared, also.

Later, the first marker is opened with *Marker* → *Open Marker....* If consecutive names have been given when saving the markers, the next marker can be loaded, immediately with *Marker* → *Open Next Marker*.

Option Maintain bundle position

If the size list for an already placed marker is altered, the option *Maintain bundle position* appears. It controls the transfer of placement positions of already placed pieces.

If this option is active, the bundles remain at their original position. During alteration of the size run, already placed pieces may overlap. The basic structure of the marker is retained. Use this option if the basic structure of the marker must not be altered but various sizes will be changed.

If this option is inactive, the sizes remain at their original position. Use this option if single sizes are to be changed with the other sizes remaining at their original positions, even if the bundle number is changed. Example for the marker scheme *all bundles same direction (one way)*:

	before	after
1. bundle	38	40
2. bundle	40	42

If the option *Maintain bundle position* is active, size 40 will be placed where size 38 had been and size 42 is placed in size 40's position. If the option is not active, size 40 remains in its position and size 42 is unplaced in the rack.

Marker making opens the marker interface, immediately.

Edit the marker information

Via the pull-down-menu *Marker Information* the file cards *Material*, *Pieces* and *Sizes* can be opened, directly. Alterations to the file cards are possible at any time. They are automatically applied to the marker. If overlapping or gaps occur, the marker must be reprocessed.

17.6 Marker making

Step-by-step guide

- ⇒ Create or open the production style
- ⇒ Enter the marker information
- ⇒ *Marker* → *Marker making*

First, prepare the production style and enter the marker information. From the last file card *Sizes* the button *Marker making* leads to the marker. If this file card is already closed, the marker is opened via *Marker* → *Marker making*.

Marker user interface

The marker user interface (Picture 17-9) is divided into four areas:



- ⇒ the rack,
- ⇒ the pre-lay area,
- ⇒ the material and
- ⇒ the status line.

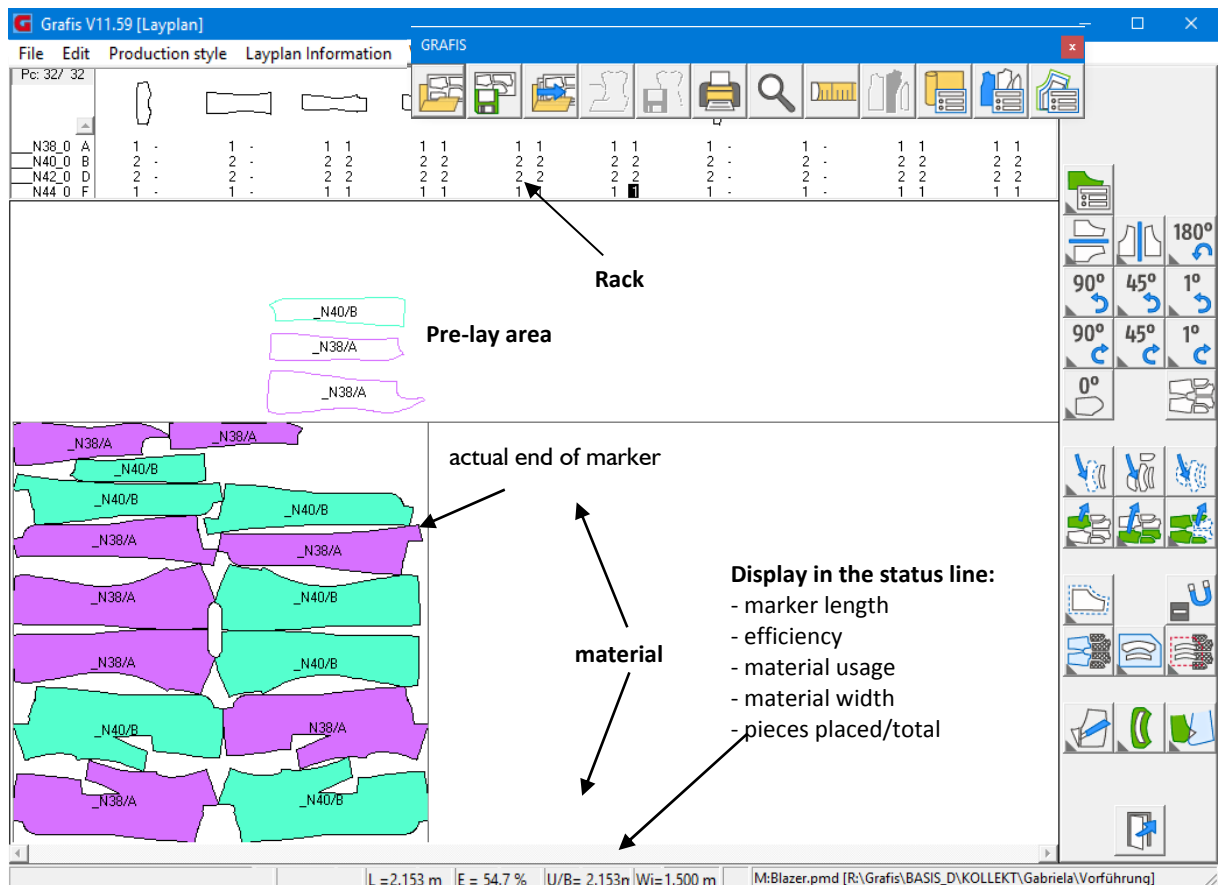
The **rack** is situated at the top of the screen. It contains all pieces to be placed in all sizes or bundles. The order of the pieces corresponds with the order in the part list of the production style.

The number of pieces in normal and flipped position and the bundle name result from the settings on the file cards in the marker information. If necessary, a scroll bar appears for scrolling to the left/right.

Below the boxes of the rack, the sizes to be placed and a capital letter for the bundle appear in the first column. The numbers in the following columns represent the amount of pieces in normal position (left) and in flipped position (right). A clicked number is highlighted in white and the respective piece of the relevant bundle in the respective position hangs on the cursor.

The **material** is situated at the base of the screen. The width of the material was determined on the *Material* file card. At the end of the material (right) a marking for the efficiency in percent can be found.

The **pre-lay area** is the area between the rack and the material. It serves as a temporary store and can be increased in size by folding the rack. Click the button  at the upper right end of the rack. Clicking  unfolds the rack.



Picture 17-9

The **status line** with information about the marker is situated at the lower edge of the screen. The individual fields show (from left to right):

- part number and name of the piece on or below the cursor
- size and a capital letter for the bundle
- current length of the marker in m
- current efficiency in %
- usage per bundle (average) in m
- material width in m
- placed pieces/total number of pieces to be placed
- placed production style

Call and place pieces from the rack

A piece is called from the rack by clicking the respective number below the box with the left mouse button. The piece hangs on the cursor and can be dropped in the pre-lay area or on the material with another short click of the left mouse button.

Only pattern pieces on the material placed without overlapping are displayed with colour fill.

A piece hanging on the cursor will cease to follow the cursor as soon as it touches another piece on the material, the selvedge or an anchor line. At the same time, a **red thread** appears between the piece and the cursor. If the thread exceeds a certain length, the piece will follow the cursor, even across the edge of the material or already placed pieces. The length of this so-called search area can be altered via *View* → *Marker options*.

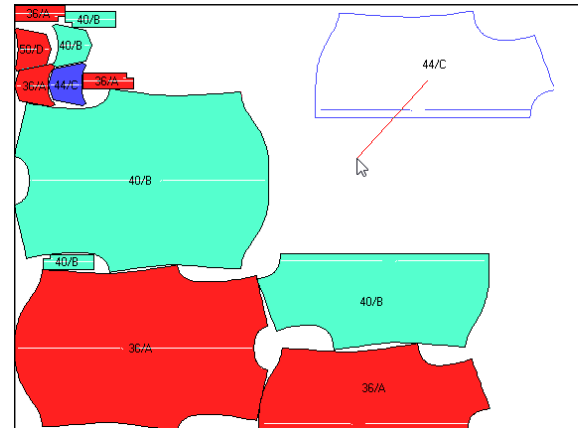
To **reposition already placed pattern pieces** move the free cursor (without pieces attached) over the pattern pieces. In the status line at the lower edge of the screen, the piece number and name, the size and the bundle appear. The size and the bundle name are also stated directly at the piece if this option is activated under *Marker* → *Options*. Clicking on a piece with the left mouse button picks up the piece.

All pieces of one size appear in one of seven **colours**. Three different shades of a colour differentiate between the bundles of one size.

A **number of pieces** can be called from the rack at the same time by moving the cursor over the numbers of the required pieces with the right mouse button pressed. The right mouse button must be released when still **in the area of the rack**. Thus, all selected pieces hang on the cursor. With the left mouse button the pieces are dropped in the pre-lay area or on the material, slightly removed. Sliding the stack is also possible.

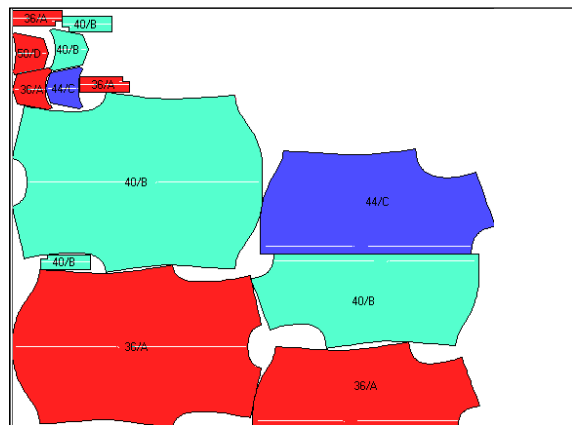
Sliding pieces

Click the piece for sliding so that it hangs on the cursor. Drag the piece with the left mouse button pressed. A red thread appears, indicating the direction of the slide (Picture 17-10).



Picture 17-10

As soon as the mouse button is released, the piece slides against already placed pieces or into the nearest gap (Picture 17-11).





Picture 17-11

The piece does not have to be picked up, first. The mouse button may remain pressed, immediately. Moving the mouse pulls the red thread. Releasing the mouse slides the piece onto already placed pieces.



Move a number of pieces

Click on a number of pieces with the <Ctrl> key pressed down, let go of the <Ctrl> key, click quickly on one of the selected pieces and move them.

Free anchor lines

In the area of the lower or left material edge the symbols  or  appear at the cursor. Having clicked and dragged, a free moving anchor line appears which can be positioned as required. The line can be placed exactly at full cm values with pressed <Shift> key. Already placed pieces in the area of the line are switched to 'unplaced'.

The free anchor lines behave in the same way as anchor lines with regular distance, see section 17.5. Depending on the setting of the switch *use as auxiliary lines only*, the lines are simple docking lines or magnetic lines.

To delete an anchor line, drag it to the edge. The symbol  or  appears at the cursor. After releasing the mouse button the anchor line is removed.

Zoom/refresh

<F6> toggles between

- zoom to optimum marker length and
- zoom to optimum marker width.

At the same time, the pieces in the pre-lay area are rearranged according to bundles and the screen is refreshed. <F6> only changes the view if you have

zoomed into a detail or if the marker is not completely visible at full marker width.

With <F4> or moving the marker to the left/right, the screen is refreshed.


To reduce/increase the size of the marker, the already known function *move/zoom* is available. It can be called from the toolbox or from the pull-down menu *Edit*. Maximum scale is 1:1.


Undo or redo laying operations


While the marker user interface has not been closed, any number of laying operations can be reset via *Edit* → *Undo* (keyboard <Ctrl> + <Z>). Reset laying operations can be reprocessed with *Edit* → *Redo* (keyboard <Ctrl> + <Y>) as long as no new operation has been performed.

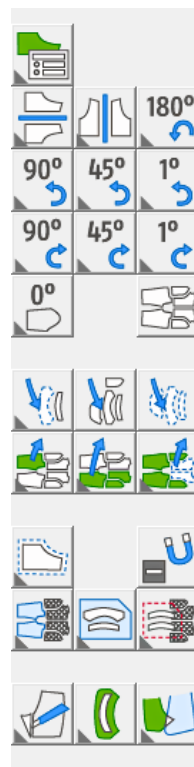
17.7 Functions of Marker making menu

Constant functions

Almost all functions of the menu strip are **constant functions** indicated by  in the lower left area of the button. For these functions the following rule applies:

If a constant function is active and the mouse hovers over a piece, a symbol at the cursor indicates which function is active. If the selected function may not be applied to the piece (e.g. rotation not permitted), the icon  appears at the piece. The active function is triggered with the right mouse button.

Example: The function *flip about x axis* is active. The icon  appears at the cursor. After having clicked a piece with the right mouse button, it is flipped about the x axis (if permitted for this piece).



Marker making menu

properties

flip about X ▪ flip about Y ▪ rotate through 180°

rotate through +90° ▪ rotate through +45° ▪ rotate through +1°

rotate through -90° ▪ rotate through -45° ▪ rotate through -1°

nil piece ▪ all unplace

place automatically...

single pieces ▪ active unplaced pieces ▪ unplaced pieces

return...

single pieces bundles ▪ pieces

buffer on/off ▪ +/-magnet

group ▪ fuse ▪ ungroup

split piece ▪ place piece in piece ▪ place piece with overlap

Overview of all functions in the menu strip

Function	Icon	Description
properties		Edit the piece properties on the <i>Pieces</i> file card
Flip:		
about x		Flip about x axis (grain line)
about y		Flip about y axis
Rotate through...		
180°		1/2 turn
+90°		1/4 turn to the left
-90°		1/4 turn to the right
+45°/+1°		45°/1° turn to the left
-45°/-1°		45°/1° turn to the right
buffer+/-		Switch buffer (global + piece-specific) on/off
+/-magnet		Activate magnet function
nil piece		Reset flip and rotation; piece appears unplaced (no colour fill)
all unplaced	none	All pieces are <u>immediately</u> marked as unplaced.
Automatic lay:		
single		The clicked piece is placed, automatically.
unplaced active	none	All unplaced active pieces are <u>immediately</u> placed, automatically.
unplaced	none	All unplaced pieces, also from the rack, are <u>immediately</u> placed, automatically.
Return		
single		Return single piece to the rack
bundle		Return all pieces of the bundle to the rack
pieces		Return all pieces with the same part number to the rack
group		Group the hatched pieces.
fuse		Fuse the hatched pieces.
ungroup		ungroup
split piece		Split piece with seam allowance.
piece in piece		place piece inside another piece
overlap		place piece with overlap

Almost all functions can also be activated via the keyboard.

Flip/Rotate

If the icon for 'function not permitted' appears at the cursor for one of the flip/rotate functions, it indicates that flip/rotate is not permitted for this piece.

To permit flip/rotate

- select *properties* from the right menu,
- click the piece with the right mouse button,
- check allowance for flip/rotate on the open *Pieces* file card,
- return to the marker with the button *Close*,
- reactivate the function for flip/rotate and
- click the piece to be flipped/rotated with the right mouse button.

Nil piece

All flip and rotate operations are reset. The piece appears in the original orientation and is unplaced (no colour fill). The fixed settings remain intact.

Laying with magnet function

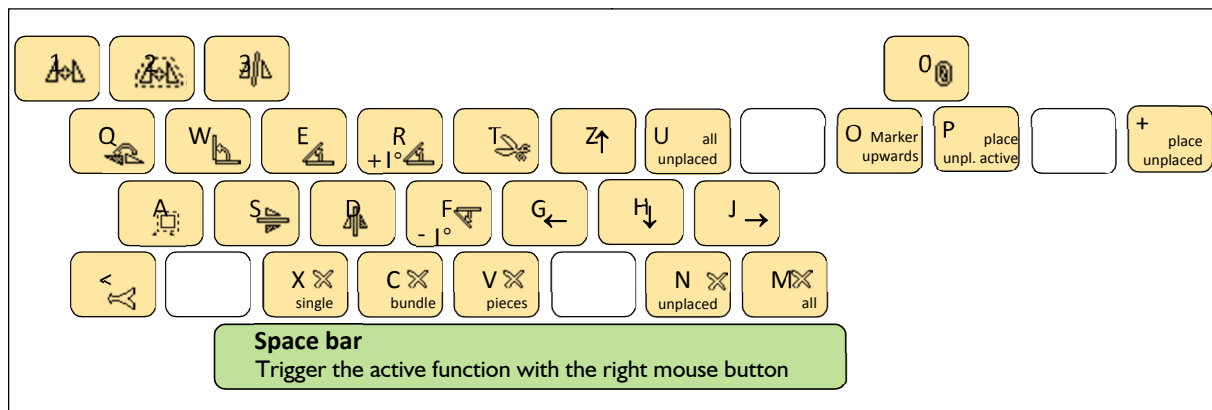
The magnet function **+/-magnet** is used for aligning pieces. The surrounding rectangle of the selected piece(s) serves as the magnet. First, activate the magnet function in the menu. Then, select the piece(s) to which other pieces are to be aligned with pressed down <Ctrl> key. Now, let go of the <Ctrl> key, pick up another piece and move it to the selected piece(s). The magnetic lines appear as an echo in the vicinity of the selected piece(s). The piece catches at the magnetic lines.

Automatic laying

The automatic laying function is not an automatic nesting. The piece or the group is placed in the first permitted position in the marker (from the left). An optimisation considering perimeter or efficiency does not ensue!

Automatic laying with the function *single* is useful for placing lots of small pieces into gaps. The piece clicked with the right mouse button is placed as far to the left as possible.

This also applies to the functions *unplaced active* (for unplaced pieces in the pre-lay area and on the material) and *unplaced* (all unplaced pieces). Further options for automatic laying can be found in the pull-down menu *Marker*.



Picture 17-12

Group/fuse pieces

Only pieces placed on the material without overlapping (with colour fill) can be grouped. To create a group, click the pieces once with the **left** mouse button while keeping the <Ctrl> key pressed. The pieces will be hatched. Then, activate the function **group** and click one of the hatched pieces with the **right** mouse button. The group can then be moved as one piece. The functions from the menu can also be applied to the group.

Only the allowances flip/rotate given to **all** pieces in the group apply. If one piece may be rotated through up to 15° and another up to 10°, the group consisting of these two pieces may be rotated through a maximum of 10°. The buffer apply to each piece of a group, individually even after grouping.

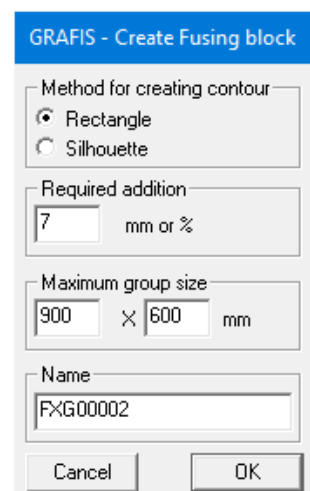
To ungroup pieces, activate the function **ungroup**. Clicking the group with the **right** mouse button dissolves the group. To release individual pieces from a group, the group must first be dissolved and then grouped again.

To create a fusing group, all relevant pieces are to be clicked with pressed <Ctrl> key, also. Then, activate the function **fuse** and click one of the pieces of the group with the **right** mouse button.

A window with the following options for the fusing group appears (Picture 17-13):

- method for **creating contour** (rectangle or silhouette),
- **addition in mm or %** around the fusing group in addition to the buffer of the fused pieces,
- **maximum size** of the fusing group, depending on the size of the fusing press and
- a **name** for the fusing group.

The fusing group is saved under the entered name as a new piece in the production style. When laying the interlining marker, the shape of the fusing group can be transferred from the main fabric marker with this piece.



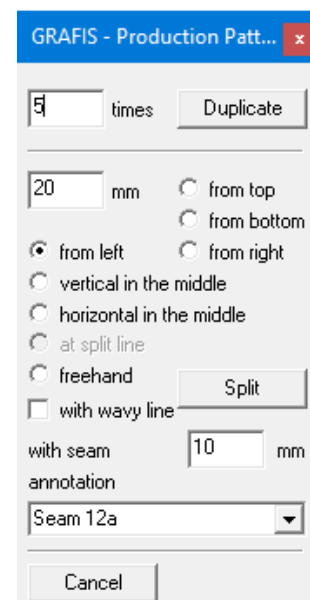
Picture 17-13

Split piece

Pieces can still be split or duplicated in any number in the **Marker making** mode.

To split or duplicate a piece, the function **split piece** from the right menu must be activated first. Then, the piece is to be clicked with the right mouse button. A window with the following entry options appears (Picture 17-14):

To **duplicate**, enter the required amount in the field **times** and click on the button **Duplicate**.



Picture 17-14



To **split** a piece first, you have to select **where** the piece is to be split. A piece can be split

- at a distance of xx millimetres from the top/ bottom/ left/ right,
- vertical/ horizontal in the middle or
- at the split line.

Then, the **seam allowance** to be added to both edges is to be entered. Clicking the button *Split* splits the piece.

Place piece inside piece

When activating the function **place piece inside**

piece, the symbol  or the symbol  **normal** appears at the cursor during marker making. The symbol indicates the set parameters for the piece. With the parameter **normal**, the piece is placed normally, without overlapping with other pieces. With the parameter **piece in piece**, the piece can only be placed fully inside another already placed piece.

This laying option is useful for multi-layer cutting if for example a piece is required only once. Thus, a different smaller piece can be cut from a different layer in the same position. Pieces placed with **piece in piece** count as 'placed' pieces. They are filled with a background pattern on the material.

Place with overlap

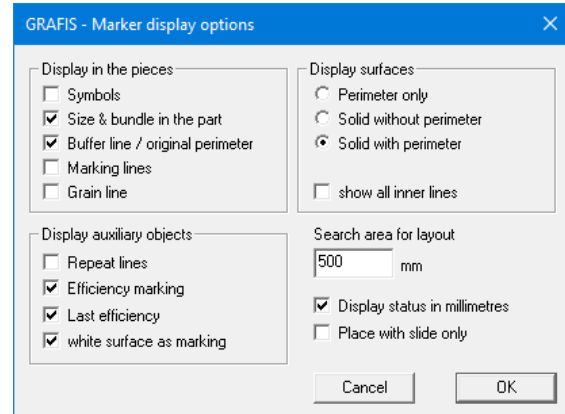
Pieces can be placed with a small overlap. First, the 'normal' pieces are placed. Then, the piece to be overlapped is placed with pressed <Shift> key. Originally the piece is shown without fill colour. Activate the function **place overlapped** and click the piece with the right mouse button. The piece now counts as placed and is displayed with fill colour. The overlap area is marked in colour on the material. The area content of the overlap is limited to 50cm². Therefore, it is not possible to create large overlaps.

End

With **End** or with the right mouse button in the menu area, the marker making function is quit after a security question. The marker user interface can be reopened at the last stage of work via *Marker* → *Marker making*

17.8 Additional functions in the Marker and View pull-down menus

Some of the functions from the pull-down menu *Marker* are only available when the marker is open or closed.



Picture 17-15

Open Marker to open a previously saved marker.

Open Next Marker to open the next marker. Markers are alphabetically ordered and the marker following the active marker will be opened.

Save Marker saves the marker, immediately under the name given.

Save Marker As... save the marker in a directory to be selected and under a name to be entered.

Remove superfluous data should be used when a marker has been layed and *Always remove superfluous data during saving* has been switched off. The perimeters of the unplaced pieces and unplaced sizes are removed from the marker. The marker file becomes smaller. *Always remove superfluous data during saving* can be switched on via *Edit | Settings*. The two remaining options *Save marker with preview* and *More columns in detail view* should be set only if not working within a network. Otherwise, the window for the *Open Marker* dialogue would build very slowly. The option *Save marker with preview* also requires sufficient memory.

Marker making opens the marker user interface.

Replace layout transfers the layout of a previously saved marker to be selected with identical amount of pieces and bundles. A preview and/or a detail information about the marker appears via the buttons (list, details, preview).

Delete layout data resets all layout data. Only the marker information settings on the file cards remain existent.

Automatic laying (as described two pages previously)

- all pieces
- all active pieces from the pre-lay area or the material
- all pieces on the material
- all unplaced pieces*
- all unplaced, active pieces*

* These functions can also be found in the right menu in the marker user interface.

Return (as described two pages previously)

- all pieces
- all unplaced pieces.

View → Marker options offer a window (Picture 17-15) with various display options in the marker and settings for handling during laying. The *Search area for layout* relates to the length of the red thread during laying.

17.9 Plot marker

Output of a marker is started via *File → Plot/Print...* The plot dialogue according to Picture 17-16 opens. In the section *output to*, select the plotter/ printer for output. With the button *Settings* further settings are offered.

If **Plot with frame** is selected, the frame of the plot image is plotted. The frame is required, only when plotting onto a number of pages which are to be joined, subsequently frame by frame; or for output in full scale to small scale printers/plotters.

If **Stop before output** is selected, the prepared plot image is displayed. Output can still be aborted at this stage.

A **margin** can be added to the left edge. This is useful if a safety margin is required between the end of one plot and the beginning of the next for output to a number of pages, e.g. for output on a roll if the plot is not cut off at the end.



Picture 17-16

In the section *Plot information* the following can be set:

The entry fields **Scale factor** and **corresponds to 1:** are aligned. If the marker is to be plotted in original size, the **Scale factor** must be set to 1 or **corresponds to 1:** must be set to 1. For reduced output in scale 1:2 the **Scale factor** must be set to 0.5 or **corresponds to 1:** must be set to 2.

If **adapt to page size** is set the scale and page orientation are optimised by Grafis, automatically.

The digit for **first bundle** determines the number for the first bundle in this marker.

Marker Annotation determines if the marker is annotated and how. The position of the marker annotation, start or end, orientation and whether the annotation is to be plotted inside or outside the marker can be selected. With the button *Edit*  the content of the marker annotation can be edited. The button  creates a new file. The marker annotation *Marker all* contains all codes which are replaced with the respective text, automatically during plot:


Date:	{Sdt}
Time:	{Szt}
Efficiency:	{Sef}%
Usage per bundle:	{Svb}m
Length:	{Sln}m {Slc}cm {Slm}mm
Marker width:	{Sbc}cm {Sbm}mm {Sbr}m
No. of bundles:	{Sbz}
Size list:	{Sgl}.....}
Production style:	{Smd}
Marker (File name):	{Ssb}
Article /marker code:	{Sar}
Material code:	{Smk}
Material:	{Smt}
Perimeter lengths:	{Sum} m
Shrinkage:	{Sdx} {Sdy}
Number of pieces:	{Snt}
Number of placed pieces:	{Sng}

Text for area weights, see section 18.15 and *Marker* → *Characteristics*:

Absolute weight:	{Stw} kg
Effective weight:	{Sew} kg
Waste weight:	{Sww} kg
Absolute weight per bundle:	{Sbw} kg
Effective weight per bundle:	{Seb} kg

The marker annotation is saved as a *.stx file in the directory \Grafis\TEXTE.

Piece Annotation determines whether and how each piece is annotated with a standard text. The content of the piece annotation can be edited via the button

Edit. The button  creates a new file. The piece annotation *Pieces all* contains all codes which are replaced with the relevant content, automatically:

Date:	{Sdt}
Time:	{Szt}
Piece text:	{Stl}
Piece text area:	{Stb0106}
Size:	{Sgr}
Bundle as letter:	{Sbd}
Bundle as number:	{Sbn}
Source style:	{Sqm}
Source collection:	{Sqk}
Material code:	{Smk}
Material:	{Smt}
Amount per style (normal+ flipped):	{Snz}
Piece category:	{Skt}
Perimeter lengths:	{Sum} m

The piece annotation is saved as a *.ttx file in the directory \Grafis\TEXTE.

Additionally, you can adjust if further information, such as

- the grain line,
- other text,
- repeat lines,
- marking lines,
- auxiliary lines,
- the marker edge or
- anchor lines

is to be included in the output.

Plot starts the actual output.

The output of cutter data is started via **File** → **Generate cutter data** see section 18.16.

Chapter 18 Marker making 2

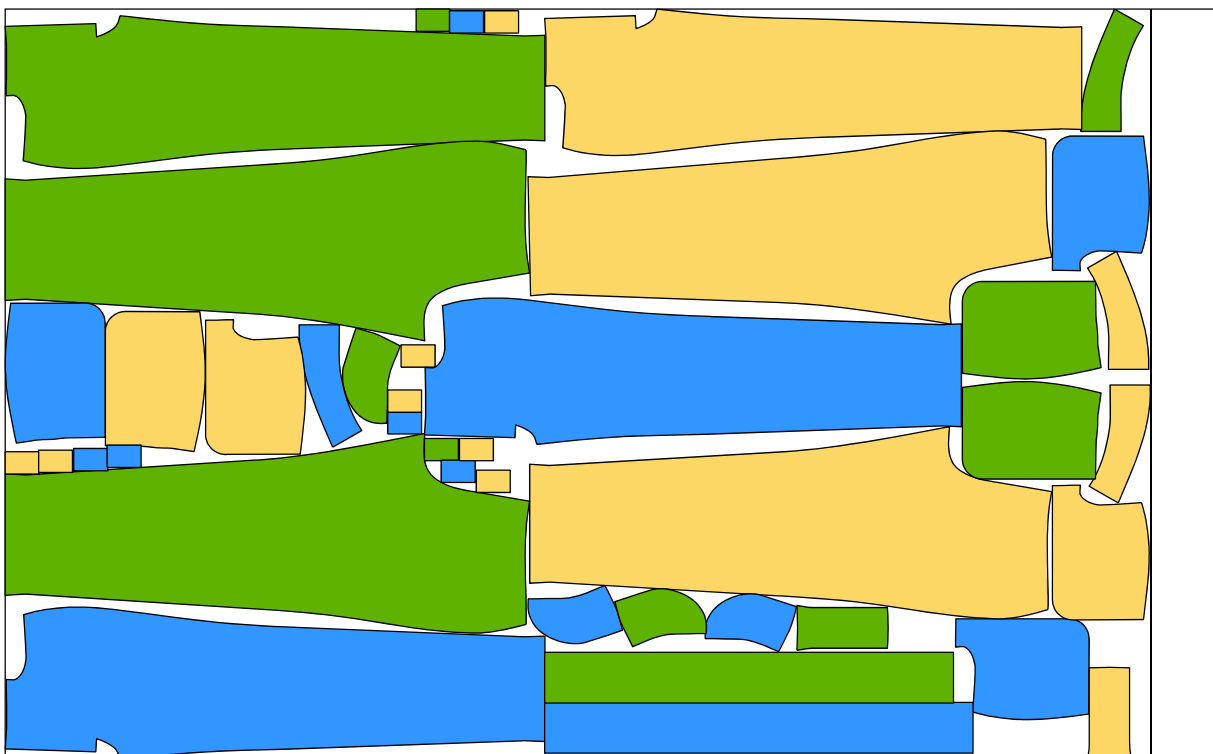
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Not every user will require all the options available for application during Marker making. The special application options are summed up in this chapter. The optimum way of working is often found, only in a direct dialogue between the expert in the company

or the user and a Grafis expert, as company-specific requirements can often be fulfilled with a number of functions and procedures. The aim is to find the fastest and safest method of working.



18.1 Alterations to the production style


Alteration service for production styles

When opening a marker which has been created from a production style without connection parts, i.e. created directly from a style of the Grafis Patternmaking, Grafis checks whether the original style has been altered and offers updating of the style, if necessary.

Alteration service for production styles of connection parts


When opening a marker which has been created from a production style of connection parts, Grafis checks for each connection part whether the source style is still available and the piece in the source style is unchanged. If this is not the case, the user is informed and asked whether the altered pieces are to be updated, if necessary.



Alteration service for connection parts

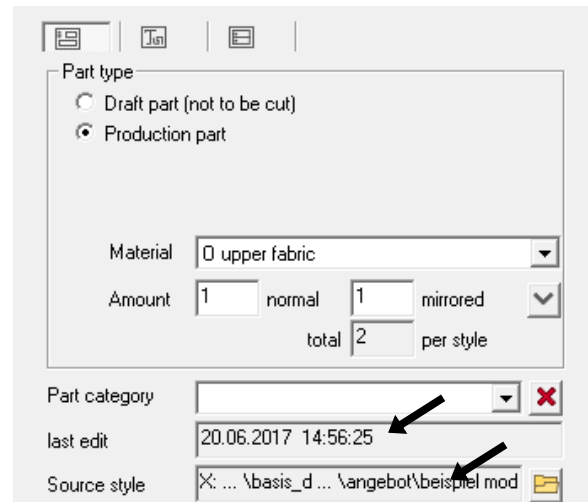
Connection parts are parts inserted into the style in the *part organisation* menu via *insert connection part*. They are marked with the icon  in the part list (Picture 18- 1). The part parameter of the selected piece appear on the respective file card

No	Part name	Obj	M	Description
001	Front	4	0	1+1
002	Back	4	0	1+1
003	collar top	4	E	1+0
004	collar under	4	E	1+0
005	pocket flap	4	0	1+0
006	pocket	4	0	1+0
007	pocket template	8	S	1+0


Picture 18- 1

. For each connection part, date/ time of last edit and the source style and path are saved (Picture 18-2).





When loading a production style, marker and opening the part organisation, Grafis checks for each connection part whether the source style is still available and whether the source part is unchanged. If a question mark  appears in addition to the connection part mark, it indicates that the source style or the source part are no longer available. The exclamation mark  indicates that the source part has been altered. A marker can continue to be layed with the already loaded pieces and sizes, irrespective of this. This also applies if the construction style is no longer available.



Picture 18-2

A new connection can be set by clicking the button  on the right of the path to the source style in the part parameter window. Select the new source style and the new connection part.

Update single part/ all parts (for connection parts, only)

To update single connection parts, open the *Part Organisation* via: *part rack* → button  or *Part Organisation* from the pull-down menu *Production Style*, select the respective part and click on *connection: update* . With the button  the part parameters are also updated. The text box is always updated. The function *connection: update* should be applied, especially if only individual pieces of the part organisation are marked with  or if some parts are to remain in their unchanged state.

Updating all connection parts of the production style is started from the pull-down menu *Production Style* with *Update All Parts* or *Update All Parts (with part information)*.

After having updated the pieces, the already placed marker remains existent. If overlapping or gaps occur, the marker must be reprocessed.

NB: The alteration service can work only if the source style and the complete path to the source style (drive, collection, sub-collection) have not been renamed, moved or deleted.

Add sizes

Before adding one or more sizes, check in Grafis Patternmaking that the parts have been graded in the respective sizes in the source style. If not, grade all parts in all sizes of the marker and re-save the construction style under the same name.

In Grafis Marker making, click on *Size Table* in the pull-down menu *Production Style* and add the missing sizes. However, the size table can only be altered without restriction if no marker information has been entered and no marker is available. The perimeters of the added sizes are only transferred after having updated the pieces with *Production Style* → *Update All Parts*.

Add pieces

Individual pieces can be added in *Production Style* → *Part Organisation* as follows. First, a new empty part is created with *open* or *insert*. The piece is inserted with *insert connection part*, provided all required sizes are available.

Replace style

Production Style → *Replace Style* replaces the complete production style with a new production style to be selected. The part parameter and the content of the text box are replaced, also. The marker information and the layout data of the marker remain intact. Prerequisite for replacing a style is that all required sizes are available and the assignment of the pieces is identical.

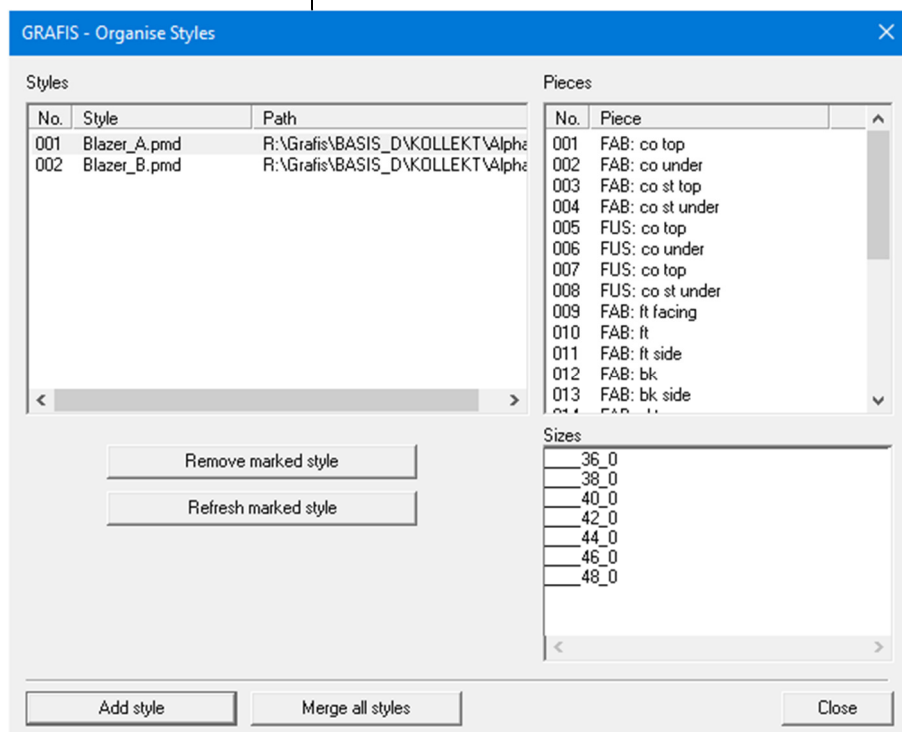
Add style

With *Production Style* → *Add Style* the part list is extended by the parts of a complete style. All parts of the selected style are added to the end of the part list. Prerequisite for adding a style is that all required sizes are available in the style.

Potentially new loaded sizes are added to the size list of the style. Alternatively to *Add style* you can use the options of *Production style* → *Organise styles*, see section 18.2.

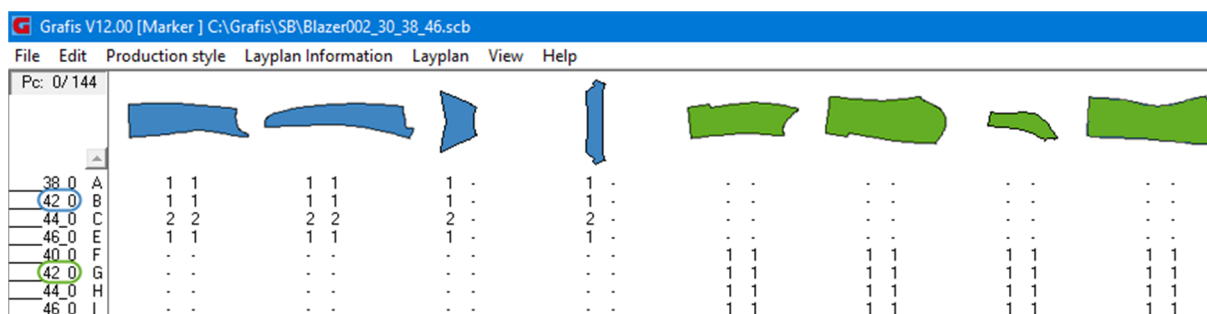
18.2 Organise styles

A marker can be compiled from different production styles with the *Organise styles* dialogue from the *Production style* pull-down menu. As opposed to *Insert connection* (via *part organisation* → *insert connection part*) all sizes of the loaded styles are organised separately. The sizes appear organised according to the loaded style on the *Sizes* file card. The amount of sizes to be layed is stated per style even if the size areas are identical in parts.



Picture 18-3

The compilation in Picture 18-3 consists of styles 'Style_A' with sizes ____36_0 to ____48_0 and 'Style_B' with sizes ____40_0 to ____46_0. Although sizes ____40_0 to ____46_0 appear in both styles, they are organised separately.



Picture 18-4

Therefore, the following can be determined:

- 1x size ____42_0 from Style _A and
- 1x size ____42_0 from Style _B
- 2x size ____44_0 from Style _A and
- 1x size ____44_0 from Style _B

The corresponding view in marker mode is displayed in Picture 18-4.

As a result, identical sizes from different styles are given different bundle names.

When generating style combinations via *Insert connection part* only the following would be possible:

- 1x size ____42_0 from Style _A and Style _B
- 2x size ____44_0 from Style _A and Style _B

The button *Merge all styles* combines all sizes and creates the same status as with *Insert connection part*.

18.3 Repeat

Step-by-step guide

- ⇒ If required: construction of additional points and lines as auxiliary objects for defining match relations
- ⇒ Compile production style
- ⇒ Set style specific match relations between pieces, independent of the fabric
- ⇒ If required: set a match point on one piece of the match group
- ⇒ If required: set match relations for left and right piece for one piece of the match group
- ⇒ Save production style for further markers
- ⇒ Enter the actual repeat information for a marker on the *Material* card
- ⇒ Layout the pieces.

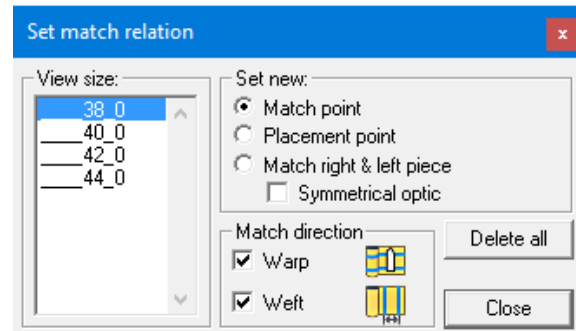
Set points/lines in the construction style

If a style is to be used for layout with fabric repeat (warp and/or weft), suitable points and lines must be constructed in the relevant pieces within the style. The actual match relations are set in the marker making software and attached to points or the beginning/ end of lines. Attaching to symbols is also possible. In this case, the base point of the symbol applies. The symbols 'RP warp' and 'RP weft' from the symbols menu are invalid for repeat but can continue to be used as points for setting match relations.

The symbols 'RP warp' and 'RP weft' from the symbols menu are invalid for repeat from Version 9 but can continue to be used as points for setting match relations.

The Set match relation dialogue

The match relations are set in the prepared production style with the *Production style* → *Matching...* menu. They are initially assigned specific to the style and independent from the fabric. Clicking *Production style* → *Matching...* opens the dialogue according to Picture 18-5.



Picture 18-5

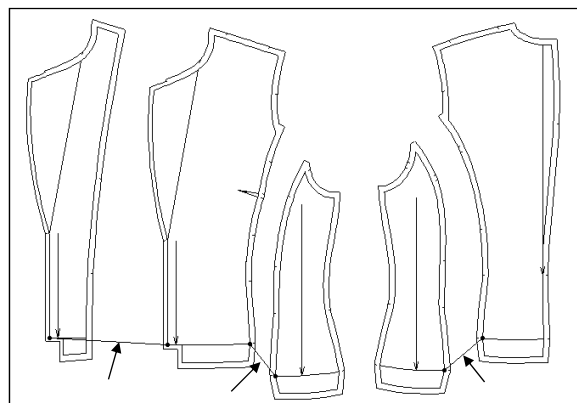
The pieces can be **moved freely** by dragging with pressed down left mouse button and should be suitably positioned first. All pieces with set match relation are basically **visible** or can be made visible with <F6>. Further pieces without match relation appear once they have been made visible in part organisation, also in the *Set match relation* dialogue. If required, press <F6>.

The **View size** area allows selection of the currently displayed size. Only one size is visible at one time. The match relations apply equally for all other sizes. Check whether the match relations have been set correctly by displaying other sizes.

The **Delete all** button deletes all available match relations.

Set match relations between different pieces

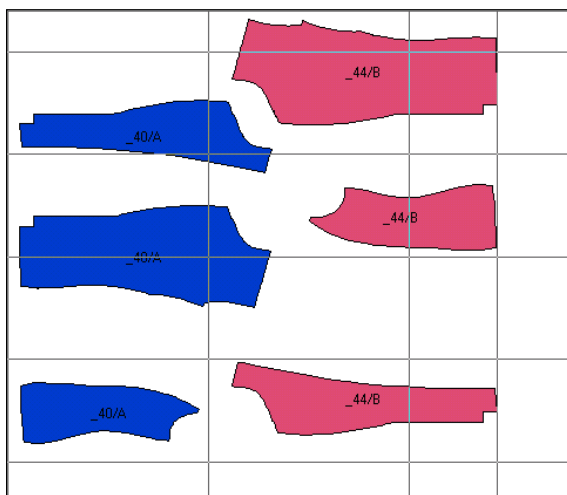
'Match point' creates a connection between different pieces. This match relation can apply to match



Picture 18-6

direction *warp* (repeat lines in grain direction) and/or *weft* (repeat lines 90 degrees to the grain). First, click a point at the beginning/ end of a line and then, click the corresponding point in the other piece.

In Picture 18-6 the pieces 'ft facing', 'front' and 'ft side panel' were matched in warp and weft. Thus, they belong to a **match group**. Another match group consists of 'back' and 'bk side panel'. **When placing the pieces in the marker, the first piece can be placed anywhere. All other pieces are matched correspondingly, see Picture 18-7.** The first three pieces from Picture 18-6 were matched for fabric repeat in warp and weft in Picture 18-7.



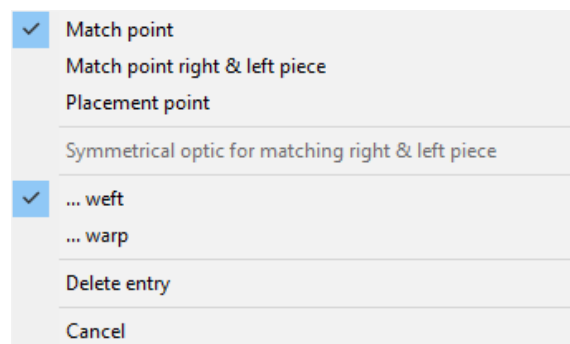
Picture 18-7

In a similar production style, open the *Set match relation* dialogue, position the pieces and activate *Match point* and *Weft* and *Warp*. Now click on the corner point centre front/ hem in the facing. The cursor indicates either P or PL. P clicks on a point, PL clicks on the beginning/ end of a line. It is recommended to click on the sewing line rather than the cut line as the repeat applies to the sewn garment. Then, click the corresponding point in the 'front' piece. The match relation is set and indicated by a green line. If no suitable points are available, they have to be constructed subsequently in the style.

When setting match relations, all possible style specific relations should be set in warp and weft direction. If a specific fabric has only one repeat, only this repeat will be utilised during marker making. If a fabric has no repeat, the style can be laid out without repeat.

Display and edit set match relations, context menu

Existing match relations are indicated with a green line. Check whether the beginning and end points of the match relation have been suitably selected by displaying other sizes with *View size* and if necessary, move the pieces freely with pressed left mouse button. When clicking on a point of the match relation with the right mouse button a context menu according to Picture 18-8 appears.



Picture 18-8

The first section and the line *Symmetrical optic...* indicate the type of point. These settings cannot be altered here.

The lines *...warp* and *...weft* indicate the match direction(s) set for this match relation. The match directions can be altered in the context menu directly by clicking.

Clicking *Delete entry* deletes the match relation.

To close the context menu click on 'Cancel'. Clicking outside the context menu sets a new relation!

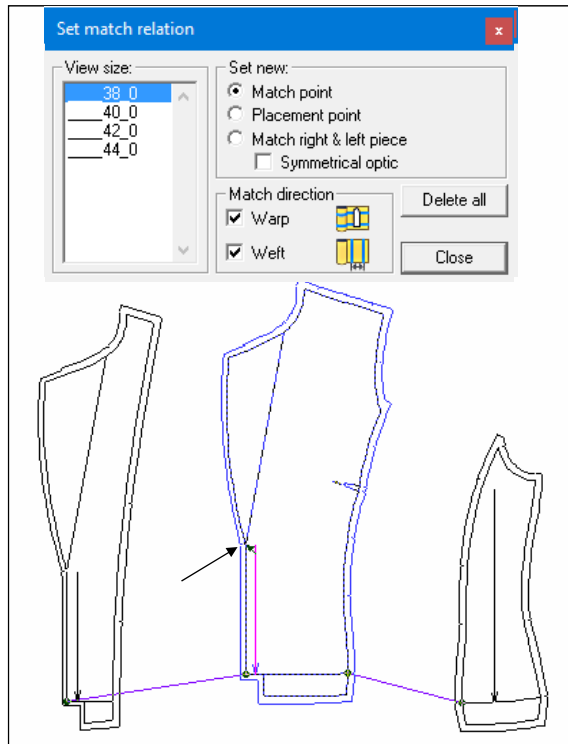
In the *Set match relation...* dialogue the following symbols apply:

Marking on the piece	Significance
	match relation with the two match points
	placement point
	match point right – left piece

Cursor	Significance
	relation applies to warp and weft
	Relation applies to warp
	Relation applies to weft

Match point right – left piece

The match relations with *Match point* apply to both mirrored and unmirrored pieces in the same way. The mirrored, matched pieces form one group and the unmirrored, matched pieces form another group. **With 'match right and left piece' a piece is matched with the mirrored piece**, see example in Picture 18-9.

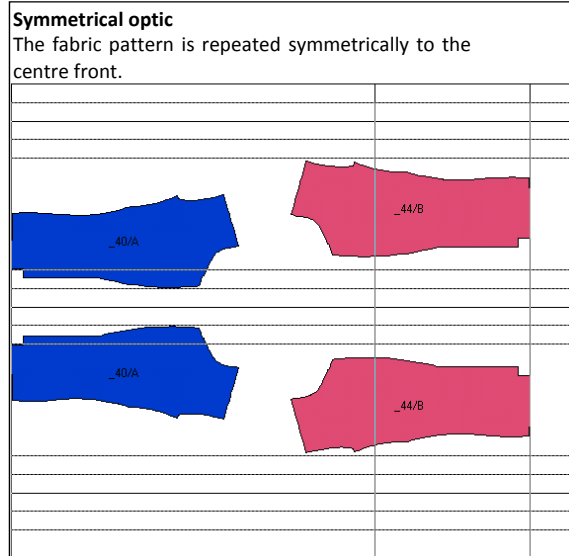


Picture 18-9

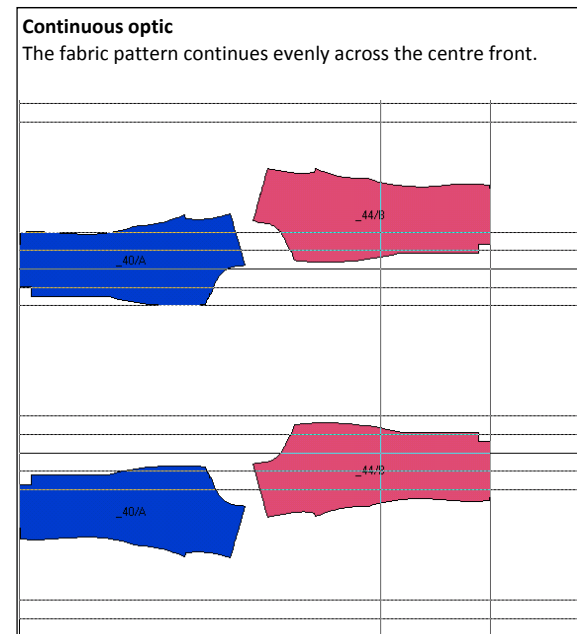
When setting a *Match point right – left piece* you can select between symmetrical or continuous optic. Symmetrical optic is used for most styles. For example for jackets or blouses where the fabric should be repeated symmetrically to the centre front or centre back.

Continuous optic is useful for panel skirts for example where the fabric pattern is continued across the centre front or centre back.

For the example from Picture 18-9 both options are indicated in Picture 18-10 and Picture 18-11.



Picture 18-10



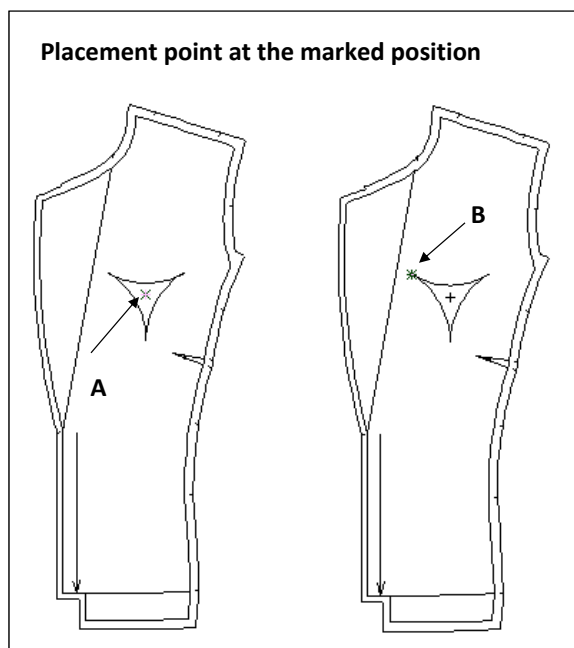
Picture 18-11

The *Match point right – left piece* is relevant for both warp and weft direction. In warp direction, the pieces are matched symmetrically or continuously to the warp pattern. If the weft direction is also active, the mirrored pieces are also matched to one another in the weft, see Picture 18-10 and Picture 18-11.

Placement point

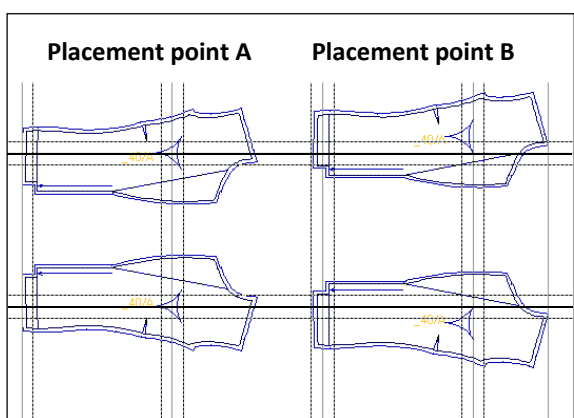
'Placement point' creates a direct link between the piece and the fabric. It is required when a fabric pattern is to be positioned in a particular place of the piece such as for appliqué or distinctive stripes. The placement point is mirrored with the mirrored piece. It will point to the same place in the repeat.

Either one 'match point right – left piece' or one placement point can be set per group.



Picture 18-12

Picture 18-12 shows a front with appliqué and a placement point in two different positions. Picture 18-13 shows the layout for Picture 18-12.



Picture 18-13

Summary and tips for setting match relations

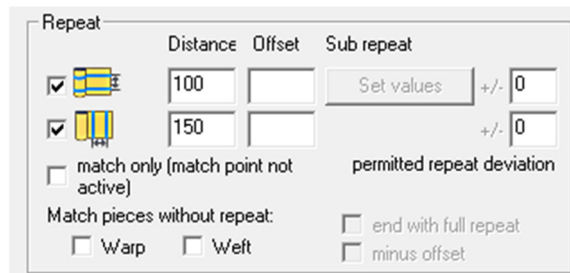
1. Match relations should be set style specifically and independent from the fabric considering all possible match directions in warp and weft.
2. First, set the match points. All pieces, which are connected through match points, form a match group. The piece placed first determines the position of the other pieces in the match group.
3. Either one placement point or one match point right – left piece can be set per match group.
4. Use the sew line for setting the match relations rather than the cut line as the repeat applies to the sewn piece and the seam allowance could vary in width.
5. Construct sufficient auxiliary lines and points for setting match relations before starting marker making. Match relations can also be attached to dashed lines and symbols. When attaching to symbols, the base point of the symbol is utilised automatically.
6. **ATTENTION!** Matching right - left (unmirrored – mirrored) pieces is often forgotten!
7. Check whether the match relations have been set correctly by displaying other sizes.

Repeat settings on the *Material* card

In the file card *Material* under *Marker information*, it is determined whether the concrete material has a repeat in *warp* (repeat lines in direction grain line) or/and in *weft* (repeat lines vertical to the grain). The fields for *Distance* and *Offset* of the repeat are only active when the check mark for *warp* and/or *weft* has been set. *Distance* gives the distance between the repeat lines. From version 11 onwards these values can be entered with decimal places. This enables laying on pin-stripe repeats. *Offset* shows the distance of the first repeat line from the edge of the material (from the left or bottom).

The match relations must be set for all pieces to be placed in a repeat!

In the Grafis Setup, *Further repeat options* can be enabled, see Picture 18-14. **Sub repeats** displays additional auxiliary lines which have no further function and which cannot be placed against. Use the sub repeat as orientation for placing the first piece. The *permitted repeat deviation* is the tolerance about which a piece is permitted to be moved outside the repeat. The option *end with full repeat* ensures that the marker always ends with a multiple of the repeat. The switch *minus offset* forms part of this option. If this switch is set, the marker ends exactly with the repeat line.



Picture 18-14

During marker making, the **repeat lines** are only displayed if they have been switched on under *Marker* → *Options*. Output of repeat lines for plot/ print is set in the *Plot marker* dialogue (Picture 17-16). For plot output, the repeat lines can be set to appear as short lines, only at the edge of the material with *Edit* → *Settings*.

The switch **match only (placement point not active)** means that the placement points are not considered for the layout. This switch is useful for example for a very small check while the match relations have been prepared for a distinctive fabric pattern.

With **Match pieces without repeat** matched pieces are matched at the same height. This option is required when the fabric has no obvious measurable pattern but for example a colour gradation or irregular repeat caused by distortion of the material.

Attention! When rotating or mirroring in Marker making mode, match points are also rotated and mirrored!

18.4 Shrinkage

Shrinkage values (global)

Many materials shrink after being steamed or washed. As the patterns are developed for the finished garment, the shrinkage of the material must be considered before cutting.

Enter the shrinkage values in warp or weft in the marker information on the *Material* file card in the *Shrinkage values* area after having set the respective check mark. Negative values are permitted, also if the material is stretched during processing. The pieces are placed in stretched/ shrunk form. Changing the shrinkage values for already placed pieces results in overlapping/ gaps. Placed pieces have to be repositioned.

Shrinkage values for the piece

Also during fusing with interlining the material may undergo changes. As not all pieces are fused, shrinkage must also be adjustable for individual pieces.

If the values for shrinkage have been set on the *Material* file card, one of the following piece-specific options can be selected on the *Pieces* file card:

- for piece and buffer
The shrinkage values relate to the piece perimeter and the buffer line.
- for buffer line, only
The shrinkage values apply to the buffer line, only. In this case, the original perimeter remains unchanged.
- do not apply
The shrinkage values are not applied to this piece.

Shrinkage value assistant

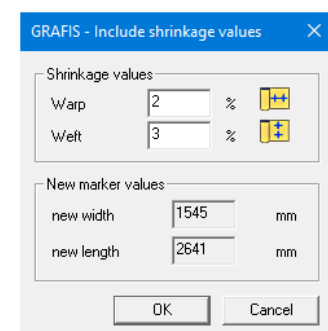
Via the menu option *Marker* → *Shrinkage value assistant*, an already completed marker can be increased as a whole by a given percentage value. **This is only useful if the material width is big enough or if there is a width reserve.** The assistant (Picture 18-15) carries out the following steps:

- Alteration of shrinkage values on the *Material* file card
- Increase of marker width by the % value in weft direction
- Moving all pieces according to the shrinkage values

Small overlaps of individual pieces may occur which usually can be fixed rapidly.

As opposed to the percentage increase of a marker during plot output with *additional stretching*, in this case, all annotation text is updated. This includes

length and width of the marker as well as perimeter lengths and area contents of the pieces.



Picture 18-15

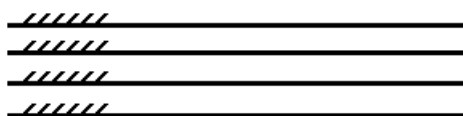
18.5 Spreading type

In the file card *Material* in section *Spreading type*, the spread type for the material and the bundle direction is selected.

Spreading types

The following *spreading types* are available for the *material*:

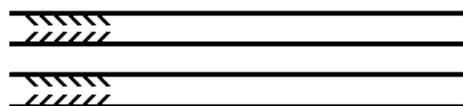
- **right-left** or '**open**' is used for single-ply and multiple-ply cutting. This is the most common spread type (Picture 18-16). The individual layers of fabric lie in the same direction with the same side



Picture 18-16

facing upwards. Automatic spreaders lay one ply, cut off at the end, return to the beginning and lay the next ply in the same way on top. Patterns or a possible pile face upwards in all layers.

- **right-right** is used for multiple-ply cutting (Picture 18-17). The individual layers of fabric all face the same direction but with the other side upwards. Automatic spreaders lay one ply, cut off at the end, return to the beginning and lay the next

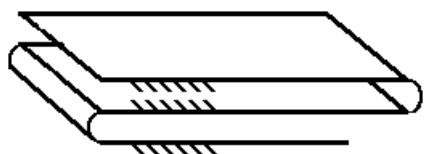


Picture 18-17

ply turned over (with the right side facing down). Patterns or possible pile face alternatively up or down (see sketch).

The pieces are placed unflipped as the flipped piece is taken from the turned ply.

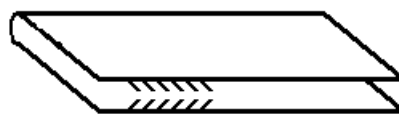
With the spreading type right-right, markers can be created for **zig-zag** lays, also (Picture 18-18). As opposed to the spreading type right-right, the ply is not cut off at the end. A right-right layer is



Picture 18-18

followed by a left-left layer. Zig-zag laying is unsuitable for materials with a sheen or pile.

Folded laying up means a material of 1.50m width is folded along its length (Picture 18-19). The marker is only 0.75m wide and has a fold.

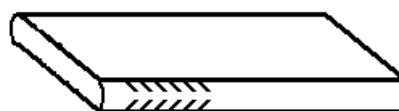


Picture 18-19

Symmetrical pieces can be placed at the fold. Symmetrical pieces must be marked with a check mark on the *Pieces* file card in the *Marker information*. This check mark can only be set for pieces which are not flipped.

In Grafis, the material appears unfolded but the pieces can only be placed on the lower half of the material. Flipped pieces automatically appear in the upper half of the material. Symmetrical pieces have to be dragged to the fold, only. They will then appear placed on the fold.

- **Tubular fabric** is material in tubular form of half width (Picture 18-20). As opposed to the spread-



Picture 18-20

ing type folded, the marker has two folds. Everything else is identical.

Bundle direction

For each of the spreading types mentioned, three **bundle directions** can be selected. The individual sizes, which may appear more than once, are arranged in bundles.

<- A	N38_0
-> B	N38_0
<- C	N40_0
-> D	N40_0
<- E	N40_0
-> F	N42_0

Picture 18-21

All pattern pieces of one garment are given one bundle letter (Picture 18-21). The options for the bundle direction relate to the question 'Where does the hem of the bundle lie?'.

- **different bundles - different direction (two-way)** is used for material without sheen/pile, without check and without a directional pattern. Bundle A has the hem on the left, bundle B on the right, bundle C has the hem on the left and so on.

- **all bundles – same direction (one-way)** is used for directional patterns (e.g. a face) which cannot be rotated.
- **same sizes – same direction** is used for material with sheen/pile but without directional pattern. This option ensures that pieces, accidentally picked from another bundle of the same size still have identical sheen direction. All bundles of size 38 would have the hem on the left, for example; all sizes 40 would have the hem on the right etc.
- **same sizes – same direction (compensational)** As opposed to the previous option, here, the bundle direction is not categorically alternated from size to size. An internal logic ensures that the number of bundles in both lay directions is largely balanced. This option is particularly useful if the quantity per size varies significantly

If the expert mode *Swap bundle direction enabled* is activated in the Grafis setup, an additional button *Swap direction* is visible on the *Sizes* file card. With this button, the bundle direction can be specifically set for each bundle. Select the bundle and switch the bundle direction with *Swap direction*. If the bundle direction is altered manually, none of the available options for bundle direction will be activated on the *Material* file card.

18.6 Fault areas

For faulty material, up to three (also regular) fault areas can be defined and considered during marker making. The respective settings are made in the marker information on the *Material* file card. After having checked *Consider material faults*, the button *Set values* is active and can be clicked. The following is to be entered in the next window for each fault area (Picture 18-22):

- *at warp (y)* start from lower edge
- *width (dy)* width of fault area
- *at weft (x)* start from left edge
- *length (dx)* length of fault area
- *repeat (in x)* distance between the starting points of regular fault areas

The entered fault areas are indicated. With the check mark *Show fault areas only* determines whether pieces can be placed in the fault areas (check mark set) or whether they are excluded from marker making (check mark not set).

The width of the **Selvedge** can also be entered in this window. It appears as a dashed line in the marker and serves as an additional anchor line.

	No.1	No.2	No.3	
at weft (y)	500			mm
width (dy)	20			mm
at warp (x)		300		mm
Length (dx)		15		mm
Repeat (in x)				mm

☐ Show fault areas only (placing allowed)

Selvedge

Width (dy) top 5 mm

bottom 5 mm

Close

Picture 18-22

The settings for fault areas and selvedge remain ineffective, if the check mark for *Consider material faults* on the *Material* file card is not set.

18.7 Categories

With categories, piece-specific layout parameters, especially buffer can be categorised. Prerequisite for the use of categories is the existence of company-specific rules for buffers, e.g. in particular for sleeves, collars, cuffs, loops etc. For each category, the parameter on the *Pieces* file card of the marker information can be set. These are:

- fixed settings: rotation angle, flip about x, flip about y
- allowances during marker making: tolerance angle, flip about x or y, rotate through $180^\circ/\pm 90^\circ/\pm 45^\circ$
- buffer at top/ bottom/ right/ left
- application of the buffer: as invisible safety margin, buffer line as cut line or reduce piece by the buffer amount
- apply shrinkage values of the material to the piece and the material, to the buffer, only or not at all

Set up categories

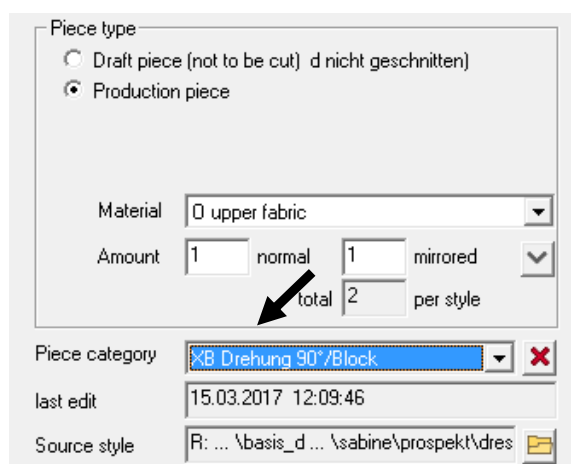
The category names are saved as measure group 999 in the file MASSCODE.DAT (directory \Grafis). Open this file with an editor, e.g. Notepad. First, the name for group '999.000.044' must be assigned.

The name of the category can contain letters and numbers. Below, an extract from a MASSCODE.DAT as example:

```
!----- Group 999
999.000.044 Category
999.001.044 -- none/none
999.002.044 -D no turn/buffer
999.003.044 -B no turn/block
999.004.044 -S no turn/reduction
999.005.044 ID turn 180°/distance
999.006.044 IB turn 180°/block
999.007.044 IS turn 180°/reduction
999.008.044 XD turn 90°/distance
999.009.044 XB turn 90°/block
999.010.044 XS turn 90°/reduction
999.011.044 OD turn by 45°/distance
999.012.044 OB turn by 45°/block
999.013.044 OS turn 45°/reduction
999.014.044 I- turn 180°/none
999.015.044 X- turn 90°/none
999.016.044 O- turn by 45°/none
```

After having saved the MassCode.dat, the categories can be assigned to pieces. Assigning ensues in the part organisation in the *piece parameter* window (Picture 18-23), in construction style or in the production style.

Assign categories with piece-specific parameters



Picture 18-23

The procedure for assigning categories, for in Grafis Patternmaking:

- Open new style.
- Construct a rectangle of any length in part 001.

- Duplicate part 001 until the part number is identical with the required number of categories.
- Set the attribute *Production piece* for each part in the part organisation and assign consecutive piece categories (part 001 becomes the first category, part 002 the second category etc.).
- Save the style.

Now, the steps in Grafis Marker follow:

- Open the new style.
- *Marker Information* → *Pieces*
- Set all parameters to apply to the first category for part 001. For part 002, set all parameters to apply to the second category etc. until the last part.
- Button *Next*, button *Close*
- Save this link between piece-specific parameters and the categories as a *.sbi file with *Marker Information* → *Save As*
- If the parameters are also dependant on the material type, a number of these files can be set up.

In the *.sbi files, not all categories must be assigned. Later, the pieces are assigned with only the categories which have been set up in the *.sbi file. A *.sbi file is basically an empty marker with an empty part list, similar to a format template for word-processing.

Load piece-specific parameter from a *.sbi file

To use pre-set marker information/ categories, the file card *Pieces* is to be opened for a loaded production style. The parameters can be transferred from the *.sbi file in two different variations:

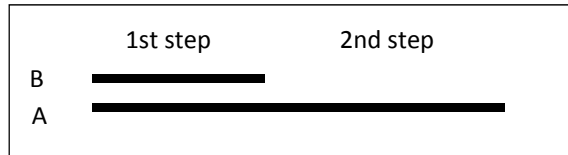
- A) All pieces of a production style which are assigned a category, are assigned with the parameters in the Buffer section, only (buffer at ri/le/top/bottom with two options). In this case, select the *.sbi file in the list or with the button *from file* directly below **Pre-set buffer**.
- B) All pieces of a production style which are assigned with a category, are assigned with all parameters in the sections Buffer, Fixed settings, Allowance and Shrinkage values for the piece. In this case, select the *.sbi file in the list or with the button *from file* directly below **Pre-set (all)**.

Edit *.sbi file

To edit a *.sbi file, load the file via *Marker Information* → *Open* and save after editing with *Marker Information* → *Save*. Alterations only become effective after re-loading the piece-specific parameter of the edited *.sbi file.

18.8 Step lay (free mode)

The marker type *Step lay* is selected under *Marker Information* → *Sizes*. In a step lay with two materials (Picture 18-24), the following sizes are to be layed:



Picture 18-24

	Material A	Material B
size 38	1x	
size 40	2x	1x
size 42	2x	1x
size 44	1x	

The distribution of the sizes onto the different steps is to be optimised by the user. The example plan can be realised as follows:

	1st step	2nd step
size 38		1x
size 40	1x	1x
size 42	1x	1x
size 44		1x

After having checked *Step lay (free mode)* on the *Sizes* file card, additional buttons appear (Picture 18-26).

After *Remove all*, first transfer the sizes for the first step and then, the sizes for the second step with double-click from the size list in the middle of the window. Then, select the first size of the second step

40_0	A	1	1	1	1
42_0	B	1	1	1	1
38_0	C	1	1	1	1
40_0	D	1	1	1	1
42_0	E	1	1	1	1
44_0	F	1	1	1	1

Picture 18-25

GRAFIS - Sizes

Size	Amount
N40_0	1
N42_0	1
N38_0	1
N40_0	1
N42_0	1
N44_0	1

Article / Layplan code:

Alter amount:

☒ Maintain bundle position

☒ Step lay (free mode)

Bundle in marker:

<- A N40_0

-> B N42_0

<- C N38_0

-> D N40_0

<- E N42_0

-> F N44_0

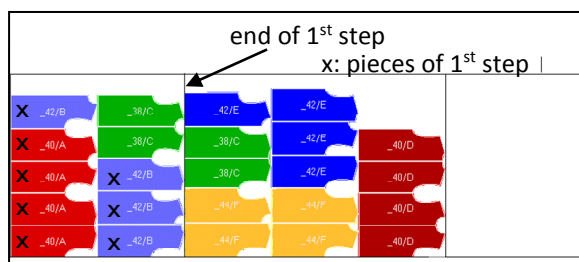
<< Back **Marker making** Close

Picture 18-26

(here: 38) and click on *Start new step*. After entry of the required amount, the bundles appear on the right. A continuous line in the left and right window marks the start of the new step. All pieces of bundles A and B belong to the first step, all other pieces to the second.

During marker making, the sizes are offered, separately for the different steps in the rack (Picture 18-25).

The end of the first step is marked, automatically in the marker. It is situated at the right edge of the piece furthestmost to the right of the first step (Picture 18-27). The marker can be interlocked. The end of the step(s) is marked at the edge when plotting.



Picture 18-27

18.9 Marker sequence

A number of markers can be plotted in sequence. This function is required for plotting multiple size markers as a marker sequence, but also for quick output of 'mini markers' for control purposes. The individual markers are to be prepared in Grafis and are

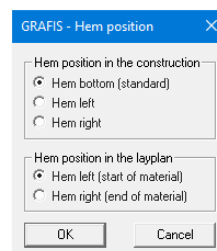
to be saved as marker. Then, the marker sequence is assembled via *File → Plot Marker Sequence* and can be output, immediately if required. The function *File → Plot Marker Sequence* is only active if no marker and no production style are open. If *File → Plot Marker Sequence* is inactive, the production style or the marker must be closed via *File → Close*.

The individual markers are loaded and arranged in the *Plot marker sequence* window (Picture 18-28). For each marker, the number of the first bundle is to be determined. An optional distance between the individual markers can also be entered.

If required, a marker sequence can be saved, temporarily with *Save list* and send for plotting, later.

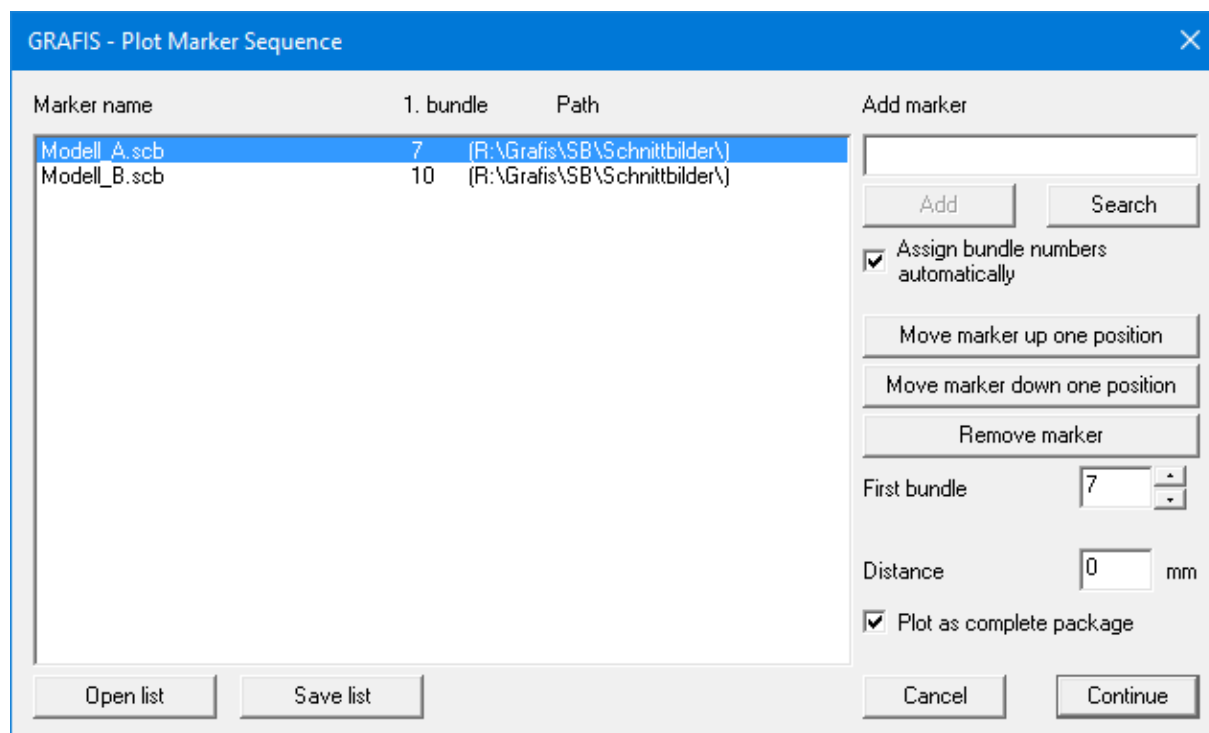
18.10 Hem position

In the Grafis Setup, the hem position can be aligned between patternmaking and marker making. Click on *Hem position* on the *Other* file card in Grafis Setup. The window shown in Picture 18-29 is opened.



Picture 18-29

The piece is aligned according to the setting under *Hem position in the construction*, only if no grain line symbol or grain line indicates the grain. The *Hem position in the marker* always applies.



Picture 18-28

The hem direction is saved in the marker. When opening a marker, the hem direction is checked. If the hem direction in the marker is different from the hem direction in the settings in the Grafis Setup, a query appears. You can decide to retain the hem direction of the marker or rotate all pieces according to the hem direction pre-set in the Grafis Setup.

18.11 Line types

With the construction function *attributes* individual lines can be assigned particular significance, which are interpreted in the marker.

The optional **annotation line** is used to attach and centre the piece text, align it and - if necessary - reduce to the length of the line.

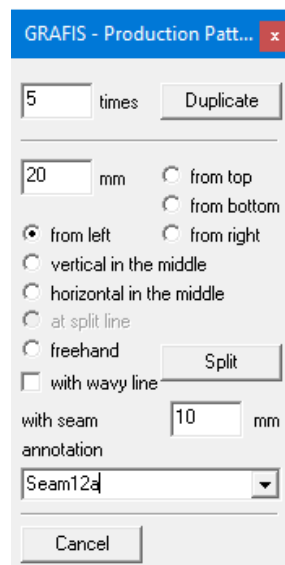
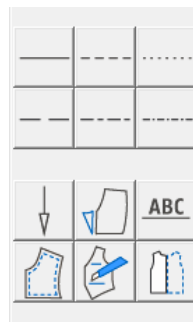
A line of the part can be assigned as **grain line**. However, the grain line symbol (set by function *symbols*) takes priority. If the grain line is to apply for a piece, no grain line symbol must be set.

The optional **split line** can be used to split a piece in the marker. During marker making, activate *split piece* from the right menu and click the piece with the right mouse button. In the following dialogue (Picture 18-30) the split line can be selected as the cut line. The seam allowance can also be set.

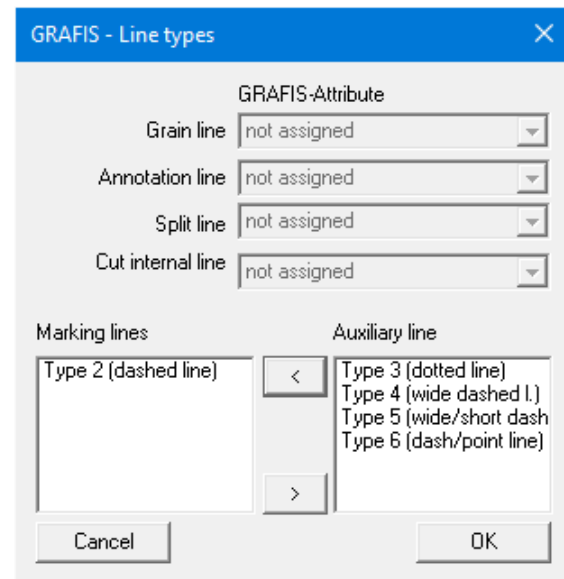
The optional **cut internal lines** are cut during cutting and are always plotted.

The **seam line** is interpreted only during export in ASTM format. It has no significance for the marker.

During plot/print from the marker, **marking lines** and/or **auxiliary lines** can be selected, additionally for output. Which line types are to be interpreted as marking lines or auxiliary lines have to be determined in the *Line type* dialogue (Picture 18-31). This dialogue is opened via the Grafis Setup on the file card *Marker* with the *Line type* button. *Line type 1* is the continuous line, *Line type 2* is the dotted line etc.



Picture 18-30



Picture 18-31

In the *Line types* dialogue, the grain line, annotation line etc should not be assigned. Only if the user has worked with particular settings in this area with Version 9 or earlier, should these settings remain in place.

18.12 Material catalogue/ material pre-selection

A material catalogue for use in the *Material* file card of the marker information can be set up. Material data saved in the material catalogue, such as material width, repeat information or material type is activated via selection in the combo box. Alteration to the material data can be transferred to the material catalogue with the button *Save*. After entry of a new catalogue designation and activating the *Save* button, a new entry is added to the material catalogue. With the *Delete* button, the selected entry is deleted. Use the material catalogue to quickly load frequently required materials.

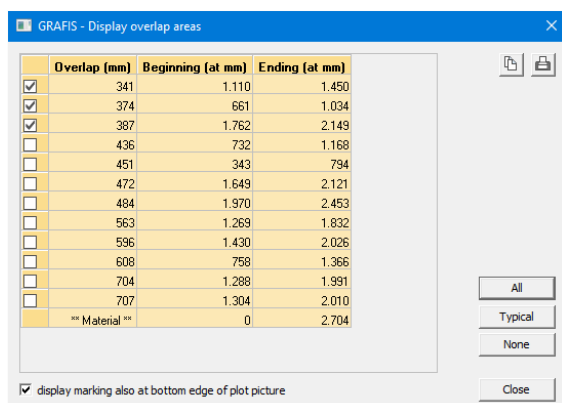
The material catalogue is saved as *Material.db* under \Grafis. The file can be edited with the editor Notepad according to the following principle: In each line, the following information is to be entered, separated by <Tab>:

- consecutive number
- name of the material
- width in mm
- material type code
- repeat in warp in mm
- repeat in weft in mm
- offset for warp in mm
- offset for weft in mm

If the value for repeat in warp or weft is 0, no repeat is applied. In the future, the shrinkage values will also be included in the material catalogue.

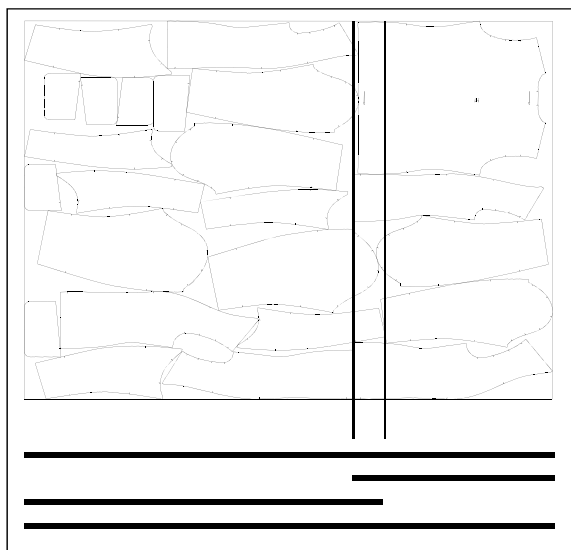
18.13 Overlap areas

Via the *Overlap area* dialogue, areas in the marker can be indicated where material can be restarted. This option is required for using up material remnants or if material has to be cut and restarted due to material flaws, see Picture 18-32.



Picture 18-32

A list of possible overlap areas appears in the *Overlap area* dialogue. You can select which overlap areas are to be shown in the marker. Initially, only the areas with the shortest overlap lengths are selected. With *All* you select all areas, with *None* all areas are switched off. *Typical* activates all areas with an overlap length of up to 30cm.



Picture 18-33

Overlap areas activated in the dialogue are shown as hatched areas in the marker. To ensure that each pattern piece is cut correctly once, the previous layer (material end) has to be layed at least to the right line and the following layer (material start) must be continued from the left line, see Picture 18-33.

In the plot picture, the overlap areas are indicated with a marking at the top edge of the marker. These markings appear at the bottom edge of the marker as well if the option *display marking also at bottom edge of plot picture* is selected in the *Overlap area* dialogue.

Even after having activated overlap areas, pieces can still be placed or positions can be changed. If however the position of a piece which defines the overlap area is changed, this overlap area is no longer valid and is removed. Replacing the piece does not re-activate the area. Open the *Overlap area* dialogue and re-activate the selected area.

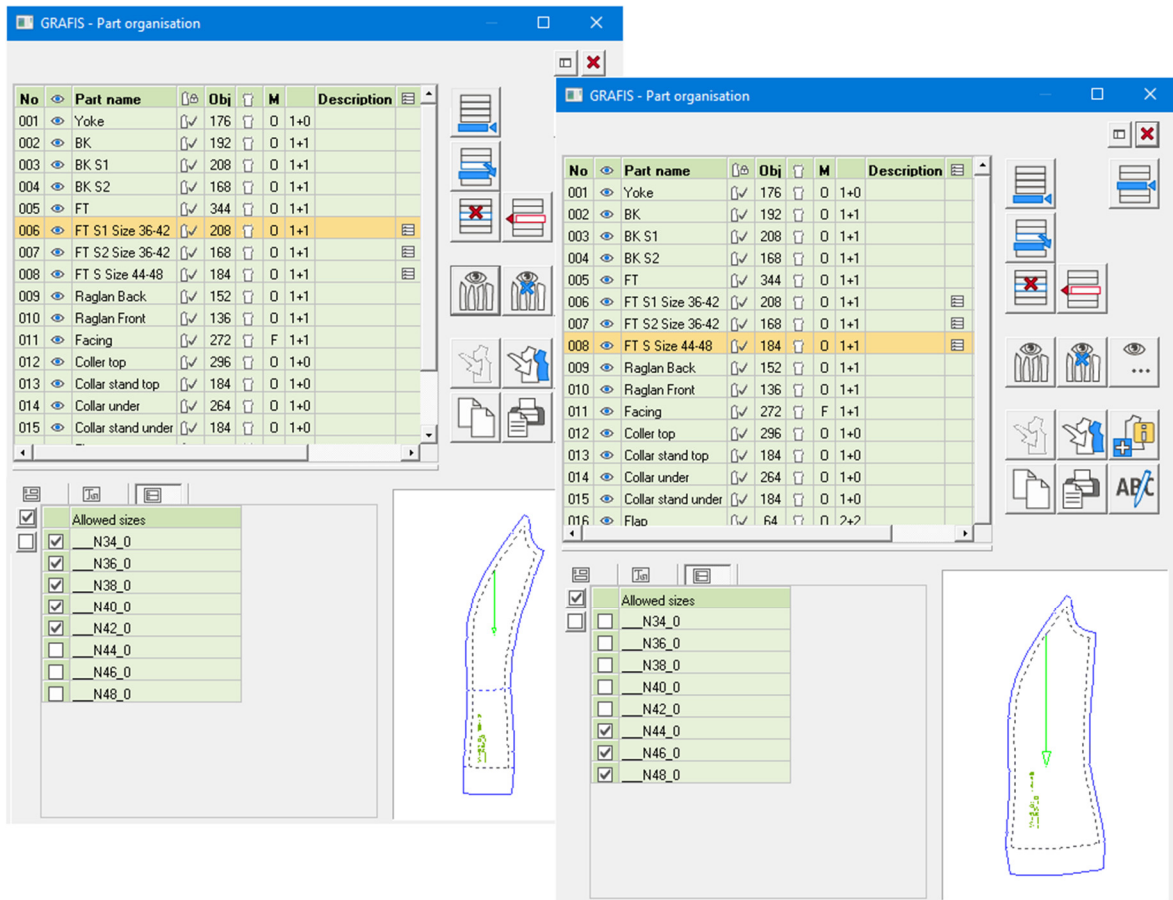
18.14 Exchangeable pieces

The *Exchangeable pieces* dialogue allows for example the production of the side panel of a jacket as a two-piece in the smaller sizes and a straighter cut one-piece for the larger sizes, see Picture 18-34 with parts 013, 014 and 015.

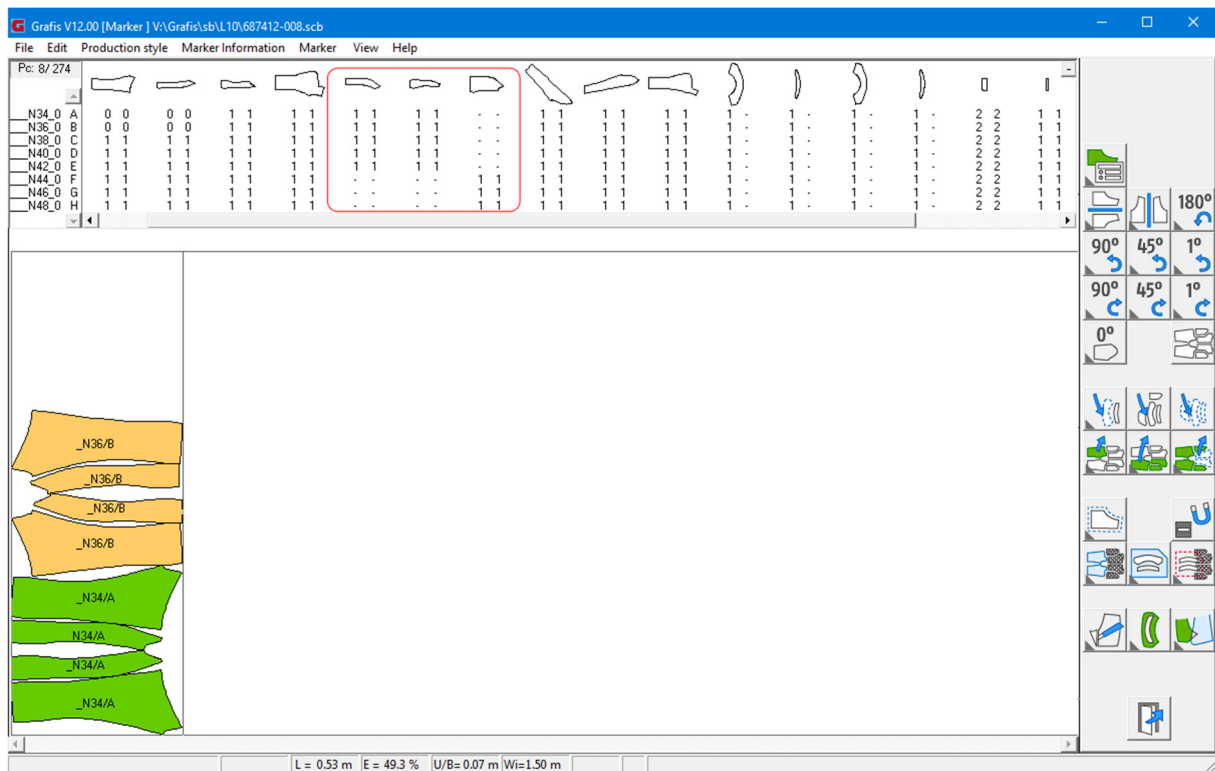
If no other selections have been made in the *Exchangeable pieces* dialogue, the three pieces appear in the marker in all sizes. The *Exchangeable pieces* dialogue appears in part organisation on the respective file card. First, all sizes are marked and thus, active for marker making. By clicking the sizes or an area of sizes, the selection can be changed. For the two-piece side panel in Picture 18-34, parts 013 and 014 must be selected one after the other and the sizes N34 to N42 must be activated in the *Exchangeable pieces* dialogue. Then, activate sizes N44 to N48 for part 015, see Picture 18-34.

During grading of the style, all parts are calculated in all sizes and exported during 'Export pattern pieces'.

The settings in the *Exchangeable pieces* dialogue are taken into account in the Grafis Marker, Picture 18-35. The settings are not significant for grading or export.



Picture 18-34



Picture 18-35

18.15 Additional options

Dialogue Marker Characteristics

Via *Marker* → *Characteristics...* the dialogue shown in Picture 18-36 opens. In the simple variation, this dialogue shows some basic information about the marker: width, length, efficiency, name of the production style and the number of pieces and bundles.

With the button *Extended>>* the dialogue switches to a more detailed version. It allows for indication and calculation of weights and costs. The entry field for area weight and price per meter are saved with the marker. A number of values are calculated on the basis of the entered data, such as total cost or the effective weight per bundle.

Picture 18-36

Toolbox

The toolbox contains the most commonly used functions. It can be turned on/off in the *View* pull-down menu. The content of the toolbox is determined via the Grafis Setup.

18.16 Cutter output

The output of cutter data is optional. It is enabled and set up by the Grafis Team.

Control data for a cutter can be created directly from a placed marker. *File* → *Generate Cutter data* opens a dialogue in which you can select the cutter and determine some options, see Picture 18-37.

Cutter-specific options

The options *cut notches* and *set drillholes* control the output of the respective symbols. The option *rotate notches inside/outside* rotates V notches and rectangle notches by 180°. If the cutter can also plot, further options are available. In this case, annotation, text and internal lines can be output as drawn objects. Adjustment of the annotation can only be made in the plot dialogue.

Picture 18-37

General options

In the lower part of the dialogue, you can find general settings. If fusing blocks are contained in a marker, their content can be saved as a separate cut file: set the option *generate separate file for fusing blocks*. These separate files are required for subsequent cutting of the small pieces.

The option *divide into file segments at split line* is useful for large marker files, longer than the length of the cutter table. To consider a cutter table length of 10m, set the display of anchor lines to *every 10m* on the *Material* file card. Considering the anchor line, you can create a marker of 12m length for example. With the set option, two cutter files are output, one with 10m length and one with 2m length.

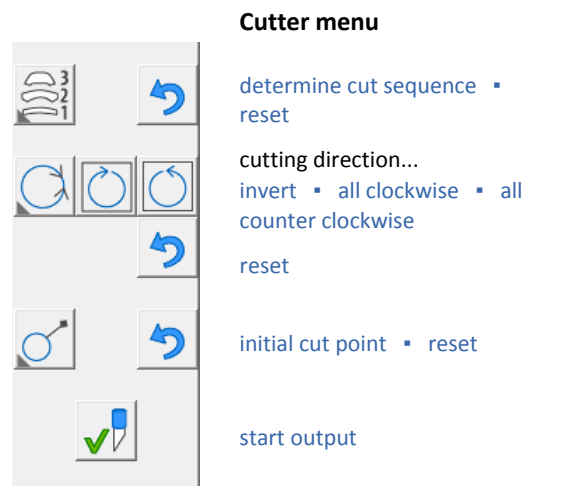
The option *generate info file* creates a text file containing information about the marker. This includes data such as length, width and name of the marker. Additionally, each part of the cutter file is assigned the original Grafis part name.

With the option *show summary*, after creation of the cutter file, a summary is displayed containing information about length, width, cut path length, free travel, amount of drillholes and amount of notches amongst others.

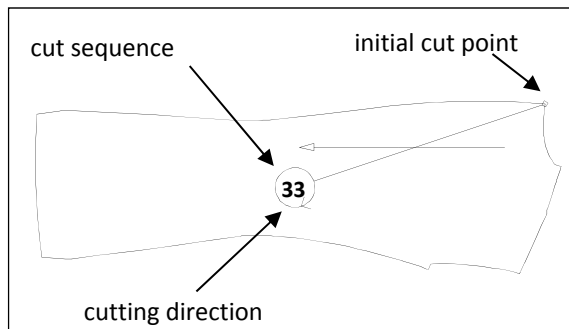
If the option *initial cut point, direction and cut sequence manually* is set, a further dialogue opens where cutting settings can be controlled and altered specifically for each piece.

The Cutter menu

The Cutter menu opens during generation of cutter data if the switch *initial cut point, direction and cut sequence manually* is set.



If the *Cutter* menu is active, the number in the cut sequence, the cutting direction and the initial cut point are indicated for each piece, see Picture 18-38. These current settings can still be altered at this stage.



Picture 18-38

With the function *determine cut sequence*, the sequence in which the pieces are cut can be re-determined. Activate *determine cut sequence* and then click on the piece to be cut first with the left mouse button, then the second and so on. With *reset* the original sequence is reinstated. If you now want to determine the first piece to be cut again, de-activate *determine cut sequence* and then re-activate the function.

The following three functions influence the cutting direction. The functions *all clockwise* and *all counter clockwise* set the cutting direction of all pieces to clockwise or counter clockwise. With the function *invert cutting direction* the cutting direction can be changed for individual pieces by clicking on the piece. With *reset* the original cutting direction is reinstated.

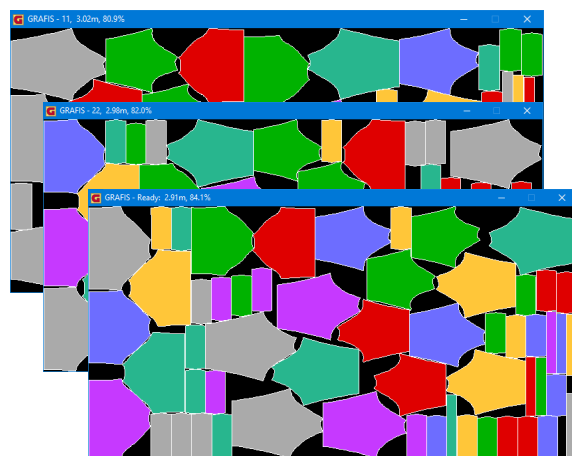
If the function *initial cut point* is active, the initial cut point for each piece can be dragged with the mouse to a different point of the perimeter. With *reset* the original initial cut point is reinstated.

18.17 Autonester

The control of Autonester is optional and is enabled and set up by the Grafis Team.

The Grafis Autonester is an optional additional software package for automatic nesting. The marker is prepared as usual. On the *Material* file card, enter the material width, the fabric type and the spreading type. On the *Pieces* file card permission for rotation or mirroring in the marker can be given. The last step is setting the desired size run. Having opened the marker making mode, the marker is sent to Autonester via *Marker* → *Send to Autonester*.

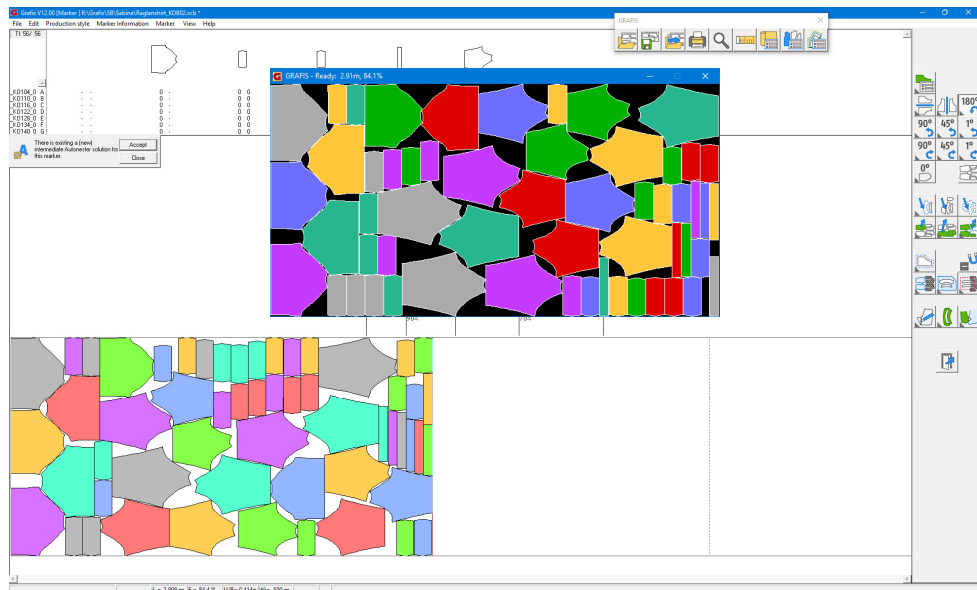
The Grafis Autonester is a separate program with its own user interface. During calculation of a marker, the interim results appear in a control window. The length and efficiency of the current interim result is shown in the title bar of the control window and in the Autonester window, see Picture 18-39. A reference to the interim result of the respective marker appears in the Grafis Marker.



Picture 18-39

As Autonester works independently of the marker making program, you can continue working parallel to the automatic nesting. As soon as the Autonester has been processed the marker, a reference appears in the marker making program and the calculated marker can be transferred, see Picture 18-40.

Often, several markers are to be created for an order. From the *Size* file card, the different size range markers can be transferred rapidly to Autonester. Select the desired size combinations and save an empty, unplaced marker. If the option *Create Autonester order during save* is active, the marker is sent automatically to Autonester when saving the marker.



Picture 18-40

Chapter 19 Programming Language I

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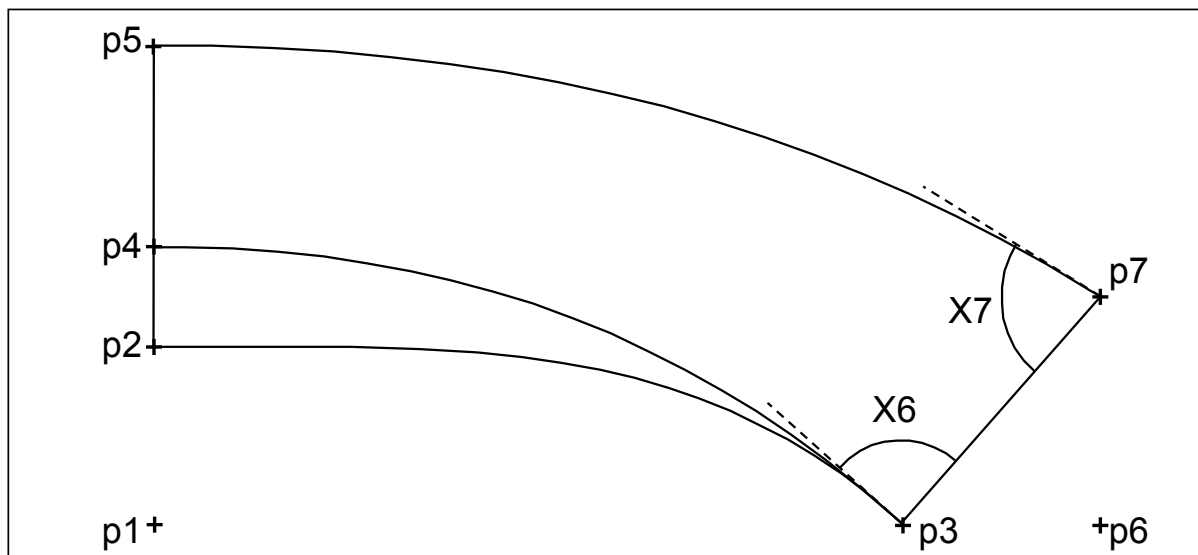
The Grafis Programming Language is used for development of basic blocks and construction components. The individual steps for generation of a basic block are entered as text.

Basic blocks should be developed in the programming language if a company-specific fit or a complete component solution is to be developed.

```

*****
Program Main()
-----
lVar
nVar
rVar rWi3,rWi7
pVar p1,p2,p3,p4,p5,p6,p7
sVar
qVar q1,q2,q3
tVar
cVar
-----
lCon
nCon
rCon rRi=0,rLe=180,rUp=90,rDo=270
rCon rClLng=150
tCon
----- x value definitions
XTitel("collar band")
Defx(1,"raise CB",35)
Defx(2,"collar fall width",20)
Defx(3,"collar width CB",40)
Defx(4,"collar point(x) to p3",40)
Defx(5,"collar point(y) to p3",45)
Defx(6,"ang neck+foldline in p3",90)
Defx(7,"ang collar edge in p7",80)
----- points at CB
p1 = pXY(0,0)
p2 = pXY(0,rX(1))
p4 = pPRiLng(p2,rUp,rX(2))
p5 = pPRiLng(p4,rUp,rX(3))
-----corner point p3 (CF)
p3 = pXY(rClLng,0)
p6 = pPRiLng(p3,rRi,rX(4))
p7 = pPRiLng(p6,rUp,rX(5))
----- neck line
rWi3 = rWiPPP(p6,p3,p7)
rWi3 = rWi3+rX(6)
q1 = qSpline(p3,rWi3,p2,rLe)
q2 = qSpline(p3,rWi3,p4,rLe)
----- collar edge
rWi7 = rRiPP(p7,p3)-rX(7)
q3 = qSpline(p7,rWi7,p5,rLe)
----- output points + lines
AusP(p1,p2,p3,p4,p5,p6,p7)
AusQ(p2+p5)
AusQ(p3+p7)
AusQ(q1,q2,q3)
-----
End Program
*****

```



It is to be considered that the programming language is an abstract form of pattern development. Apart from excellent pattern construction knowledge and experience in the application of Grafis, considerable familiarisation time is required. For development of production patterns from prepared, adjusted basic shapes, the functions of the Grafis dialogue are the more appropriate tools.

19.1 A simple program: square

Introductory notes

From version 8 onwards, the new programming language is part of the Grafis package. It is a compiler-oriented programming language. The programs are no longer processed, interpretively but in machine-similar code. The processing of the programming language program is therefore, significantly faster. The new programming language contains many tools common in other programming languages; adapted to the requirements of pattern construction. The use of sub-programs is also possible, so that repeated calculations can be saved as sub-programs. The clarity, in particular for the text display and the syntax check have become better and more accurate compared with the previous programming language. Users who have worked with the previous programming language will, at first, find the current language more complex. With further observation, it will become clear that the new techniques allow for a shorter and more transparent programming.

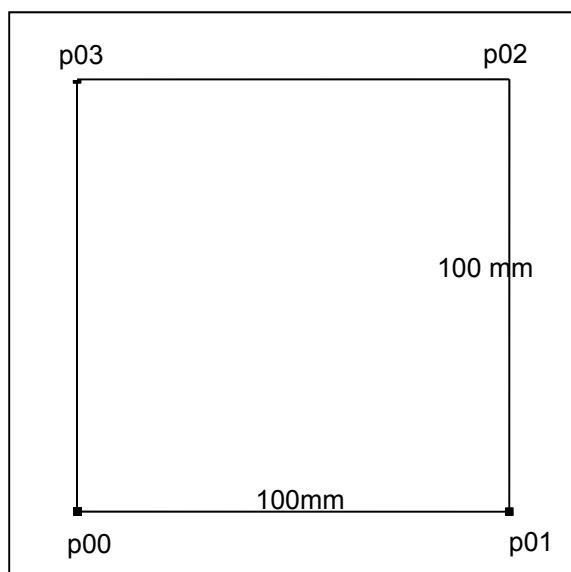
Square

In the first project a square (Picture 19-1) is to be constructed which will later be transformed into the shape of a house as in Picture 19-2.

Start the new project "square" as follows:

⇒ Extras → Programming language

⇒ Project → New...




Picture 19-1

- ⇒ Project name: square
- ⇒ enter 9-digit code for your name (according to Picture 19-4)
- ⇒ enter 2-digit code for the product group, e.g. "TB" for Textbook exercises
- ⇒ With <OK>, the project is created.

The structure of the program Main() has been set up in the edit window (Picture 19-5). Edit the program as follows:

```
*****
Program Main()
'- Program: square
'- Declaration lines
lVar
nVar
rVar
pVar
sVar
qVar
tVar
cVar
'- Constants
lCon
nCon
rCon
tCon
'- Allocations / Instructions
'- Program end
End Program
*****
```

After a first compilation with the button  or <F4>, the program thus far has been automatically formatted:

```
*****
Program Main()
'----- Program: square
'----- Declaration lines
lVar
nVar
rVar
pVar
sVar
qVar
tVar
cVar
'----- Constants
lCon
nCon
rCon
tCon
'----- Allocations / Instructions
'----- Program end
End Program
*****
```

The construction of a square can be carried out as follows:

⇒ assign points p00 to p03

⇒ output points p00 to p03

⇒ output connecting lines between the points

The following allocations/instructions lead to the result:



```
'----- Allocations / Instructions
p00= pXY(0,0)
```


```
p01= pXY(100,0)
p02= pXY(100,100)
p03= pXY(0,100)
```

The function `pXY()` constructs a point from the x and y co-ordinates to be entered. The x co-ordinate of point `p01` has the value 100 and the y co-ordinate the value 0.

```
AusP(p00,p01,p02,p03)
```

With the instruction `AusP` the listed points are output to the screen. Without this instruction line, the points are assigned in the program but are not displayed on the screen.

After entry of the five lines, compile the program with  and then test it in the test run with .

Clicking  switches to the Grafis screen and the points of the square appear. The Grafis screen can be closed with the right mouse button.

With the instruction `AusQ`, individual lines, curves or polygons are output. Select *Inner Fcn* in the variable list and click on `AusQ`. A help text for the selected function appears below the edit window. The connecting lines are output as one line, linked across the corners with

```
AusQ(p00+p01+p02+p03+p00)
```

with the lines

```
AusQ(p00+p01,p01+p02)
```

```
AusQ(p02+p03,p03+p00)
```

the connecting lines are output as individual lines from corner to corner. The line does not have to be created as a variable, first. The calculation can ensue directly in the function. The lines

```
s1=sPP(p00,p01)
```

```
AusQ(s1)
```

lead to the same result as the line

```
AusQ(sPP(p00,p01))
```

or as

```
AusQ(p00+p01)
```

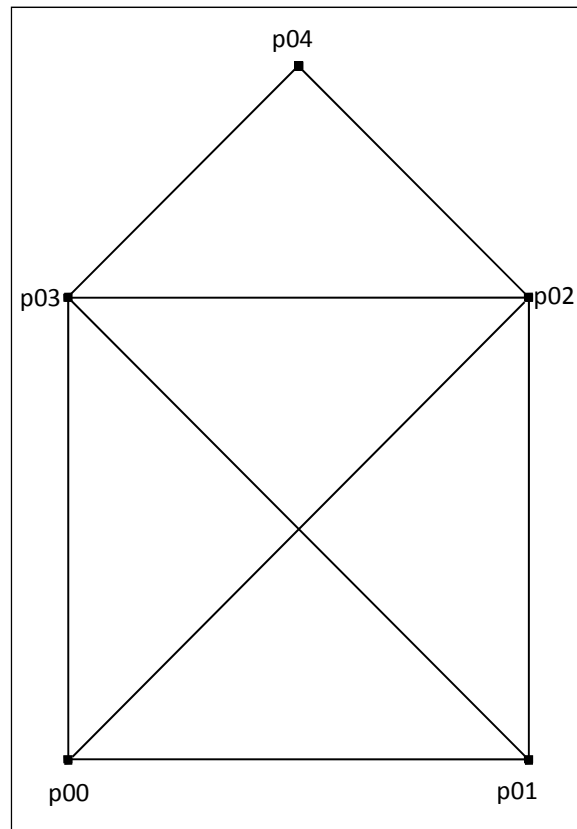
In the first option, the line is created as variable `s1`, first and then output. In the second option, the line is created directly in the instruction. The function `sPP(p00,p01)` creates a line variable as a connection between two points to be entered.

Variation "house"

The square can be transformed into a house (Picture 19-2). An additional point `p04` is to be created as the apex of the roof. The lines are to be output, continuously.

The following allocations/instructions lead to the result:

```
'----- Allocations / Instruction
p00= pXY(0,0)
p01= pXY(100,0)
p02= pXY(100,100)
p03= pXY(0,100)
p04= pXY(50,150)
AusP(p00,p01,p02,p03,p04)
AusQ(p00+p02+p01+p00+p03+p04+p02+p03+p0
1)
```



Picture 19-2

Save the project via *Project* → *Save* and quit the project user interface via *Project* → *End*.

19.2 Data basis and user interface

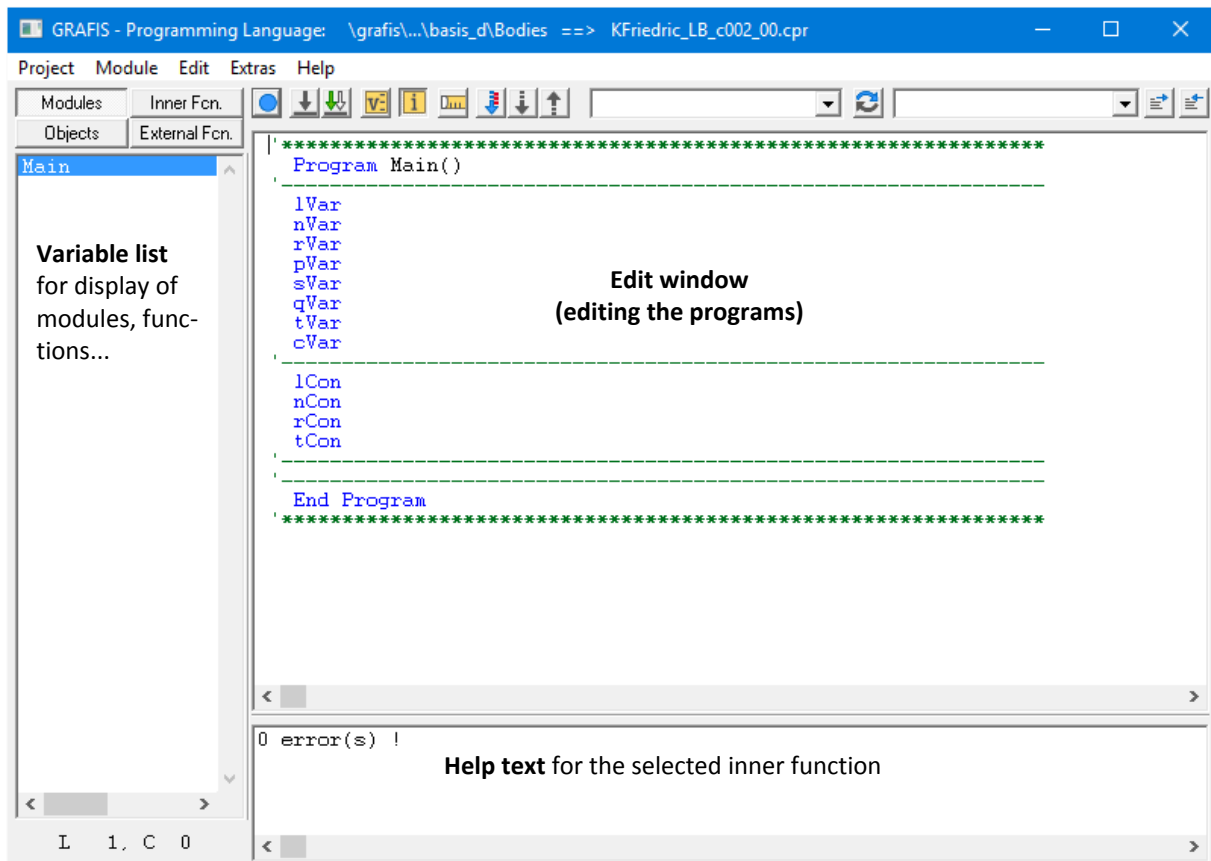
Data basis

The development of a basic block ensues in a so-called project. A project consists of

- the modules in clear text,
- the object code for the project and
- the program in the processable programming language as the result.

The project itself is saved as a directory. This directory contains the modules in clear text and the object code. The processable programming language program is saved directly in the \PROG directory of the respective measurement system. Picture 19-3 contains a detailed overview.

To **copy** or **duplicate**, it is sufficient to copy the complete directory \Grafis\Module\[meas-system]\[Project name]. All data belonging to the project are included. To **pass on** a tested and released programming language program, it is sufficient to copy the *.cpr file from the directory \Grafis\[meas-system]\PROG.



Picture 19-5

The name consists of the following codes:

KFriedric_LA_c000_00

| -- 9-digit **code for the developer**

Examples:

KFriedric for Kerstin Friedrich

BBachmann for Betty Bachmann

FSBeautyW for Fred Smith, employee at the company BeautyWear

RWRollerD for Roland Williams, working for the company Roller Design

KFriedric_LA_c000_00

| -- 2-digit **code for the product group**

Examples:

LA for ladies wear

ME for menswear

CH for childrenswear

KFriedric_LA_c000_00

| 3-digit **consecutive number**

KFriedric_LA_c000_00

| 2-digit **alteration code**

Only for the first project of a developer, the window is to be filled in, completely. This includes in particular the developer code and the code for the product

group. The consecutive number is suggested by Grafis, automatically and should only be changed if necessary.

The alteration code must be increased, if an already delivered/ applied program is to be edited. The alteration code can be increased in the project user interface with *Extras / Option*.

For further projects, a relevant name can be selected from the list of recent project names and then, adapted if necessary.

The project user interface

The three largest areas of the project user interface (Picture 19-5) are

- the edit window for entry of the programs,
- the variable list for display of available modules, functions, ... and
- a window with help texts about the selected inner function.

The program **Main** is started, immediately as an "empty" program in the required structure, see Picture 19-5. All keyboard entries and the buttons above the edit window apply only to the program text. The variable list and the window with help texts are display areas without entry option.

Edit functions

The following can be used for edit:






←→↑↓	move cursor left, right, up, down
↵ (Enter)	next line
Home	cursor at beginning of line
End	cursor at end of line
Delete	delete next/selected character
Ctrl+Home	cursor at beginning of program
Ctrl+End	cursor at end of program
right mouse button	open the context menu = pull-down menu <i>Edit</i>

Analogous to other editors, selecting one or more lines is possible by clicking at the edge of the line. Selected lines are moved with the left mouse button pressed or copied with additional pressed Ctrl key. Further edit functions can be found in the *Edit* pull-down menu which can also be opened as context menu with the right mouse button.

Buttons compile and test





The functions most commonly used during program development can be found on the buttons above the edit window.


The first block of buttons contains functions for compiling and testing of programs:



	compile (syntax check and first translation)
	create & test the program in test run
	create & test the program with grading
	show / hide VList entries; If the VList() button is switched on, the program is stopped at the VList stops during create & test. The values of the entered variable appear in the variable list.
	Display of the result of the last create & test of the program

Buttons search and replace

The second block of buttons contains functions to search and replace characters:

	select all characters in the program identical to the characters in the field on the right
 nVar	search the characters in the right field
	replace the selected characters with the term to the right of 


Select the search term, e.g. p01 in the program. It automatically appears in the search field to the right of , in which the term could also be entered. Clicking

on  or  selects the next character string found.



To replace e.g. p01 with p02, the following procedure is recommended:



- ⇒ Select the search term in the program,
- ⇒ enter the replace term (here: p02) to the right of



- ⇒ Click on  if the selected term is to be replaced with the replace term.

Button Comment out/ Uncomment program lines

	Comment out selected lines
	Uncomment selected lines


Select the program lines to be comment out and then, click the button . To uncomment selected program lines click the button .

The variable list

The buttons *Module*, *Inner Fcn* etc. above the variable list work like file card tags. After having clicked one of these buttons, the following is displayed in the variable list:

Button	Content of the variable list
Module	all program modules (*.qpt files) for the current project
Inner Fcn.	all inner functions
External Fcn.	all external functions of the current project (of all program modules)
Objects	the output objects (points + lines) with the data (o-object number, ty-object type, po-pos-number)

Automatic formatting

Each compiling started with  or <F4>, automatically formats the program text as well as checking the syntax. During automatic formatting of the program text, instructions are highlighted in blue, comments in green.

As a rule, instructions are indented by two characters; in loops by another two characters. The first letter of the variable name must be in lower case and the second letter must be in upper case.

To simplify entry of comment lines, the following rules apply:

1. **If a single inverted comma is entered in the first column, the character following the inverted comma will fill the whole line.**

'- becomes . . .

'-----

'* becomes . . .

'*****

2. If a single inverted comma is entered in the sec-

Type	Explanation	Example
lXxx	logical variable, which can adapt the value True or False	lQuery
nXxx	number (whole number) with a value between $-2 \cdot 10^9$ and $+2 \cdot 10^9$ (2.000.000.000)	nNum

and or a following column, the text is aligned right.

```
'---Initialisation becomes...
                                '---Initialisation
                                'output points becomes...
                                'output points
```

3. One single inverted comma followed by a space result in the text being unchanged.

```
' ---Initialisation remains...
' ---Initialisation
  ' output points remains...
  ' output points
```

Comments can also be entered in a program line to the right of the instruction. Here, the second and third rule apply.

Note: Test the automatic formatting and the rules for comments with the still “empty” program Main().

19.3 Rules for programming

Ground rules

- ✓ A program is set up *in lines*.
- ✓ Each line contains an **allocation** or an **instruction**.
- ✓ The **line width** should not exceed 64 characters.
- ✓ **Upper/lower case, spacing** and possible **indents at the beginning of the line** are formatted by Grafis, automatically during compiling.
- ✓ The inverted comma ' indicates that the following text is a **comment** which is not processed.
- ✓ The character “&” in the first column indicates that the line is a **continuation line**.
- ✓ The module Main() must be contained in each **project** and contain the program Main().
- ✓ Each project contains exactly one **program** with the name Main(). This program is processed, first after calling.
- ✓ Each project can contain any number of **inner functions** and any number of **external functions**. The inner functions are part of the Grafis package. External functions are programmed by the user.
- ✓ Each program begins with “Program Main()” and ends with “End Program”.
- ✓ Each function begins with “Function xXxx()” and ends with “End Function”.

Variables

In Grafis, variables of different types are used. The variable name can consist of up to 64 characters, where the first character indicates the variable type. Variables can only be used after they have been declared at the beginning of the program or the function. During declaration of variables memory is reserved and set to nil. The variable is then, available until the end of the function or program.

The following variable types are available:

rXxx	real number, accurate to 6 decimals	r01
pXxx	point with x and y co-ordinates	pSIn
sXxx	line with start and end point	sHem
qXxx	polygon / curve / line sequence (q stands for queue)	qArm
tXxx	text with up to 10.000 characters	tHelp
cXxx	container	cBox

All variables used must be declared in the program/function header. The **declaration** lines begin with lVar for logical variables, with nVar for whole number variables etc. For each variable type, a number of declaration lines may be entered.

Example:

```
nVar nIs1,nIs2,nIndex
```

The **values of the variables** are set via allocation lines.

The variable types l (logical), n (whole number), r (real) and t (text) can also be defined as **constants** at the beginning of the program/function. The definition lines for constants start with lCon for logical variables, with nCon for whole number variables etc.

Example:

```
nCon nIs1=1,nIs2=2
```

Constants may not be declared as variables at the same time.

Variables and constants apply only within the program or function in which they were declared.

All new variables used during programming, are automatically entered into the declaration lines during compiling, provided a minimum of one (also empty) declaration line is available for this variable type.

Allocation

The character “=” stands for allocation in all programming languages. As opposed to an equation in mathematics, here it means:

The value of the term to the right of “=” is assigned with the variable to the left of “=”. Therefore, to the left of “=” must be a variable.

The following line would be incorrect as a mathematical equation. As an allocation for programming it has the following meaning:

```
nNumber=nNumber+2
```

The variable `nNumber` must first be declared in the program header. When processing this line, the term to the right of “=” is calculated, first and then, assigned to the variable on the left of “=". If `nNumber` has the value 5 before processing the line, the result of the term to the right of “=” has the value 7. After processing the line, the value of `nNumber` has been increased by 2.

Instructions

With instructions, operations are carried out during programming which can effect one or more objects. In Grafis, instructions for move, rotate, flip or screen output are available for one or more objects. Instructions begin with a command word as opposed to allocations.

Inner functions

Inner functions are prepared functions which are part of the Grafis package. Inner functions which deliver a value are used in calculations. Inner functions which carry out an operation are used in instruction lines. The range of inner functions is sufficient to program all steps common in pattern construction.

After having opened a project and having clicked the button *Inner Fcn.* (above the variable list), all inner functions are displayed in the variable list. Clicking on a function highlights it. At the same time, a help text on the selected function appears below the edit window. Double-click on the function inserts it into the program.

The first character of the name of an inner function which delivers a value, is a code for the type of the delivered value. The types are identical to the variable types. The function `rG()` delivers a real value. The function `pPRiLng()` delivers a point.

Allocation of values

Declared variables are allocated a value with the following instructions:

Logical variable

```
lQuery1=False
lQuery2=True
```

Number / whole number variable

```
nIndex=1
```

Mathematical calculations (addition, subtraction, multiplication, division) of numbers, whole number/real variables and whole number/real functions are possible. If the term on the right of the “=” does not deliver a whole number value, it is rounded to the nearest whole number.

Real variable

```
rDistance=920*2/3+14
```

Here, analogous to whole number variables, mathematical calculations are also possible. However, the result is not rounded.

Point

```
p00=pXY(0,0)
```

Points are set with the use of the inner functions. Copying a point with `p31=p30` is also possible.

Line

```
sHem=sPP(p31,p42)
```

... analogous point

In addition, with `sHem=-sHem` the orientation of the line can be altered.

Curve

```
qArm=qSpline(p01,r01,p02,r02)
```

... analogous line

Text

```
tInfo="My first program."
```

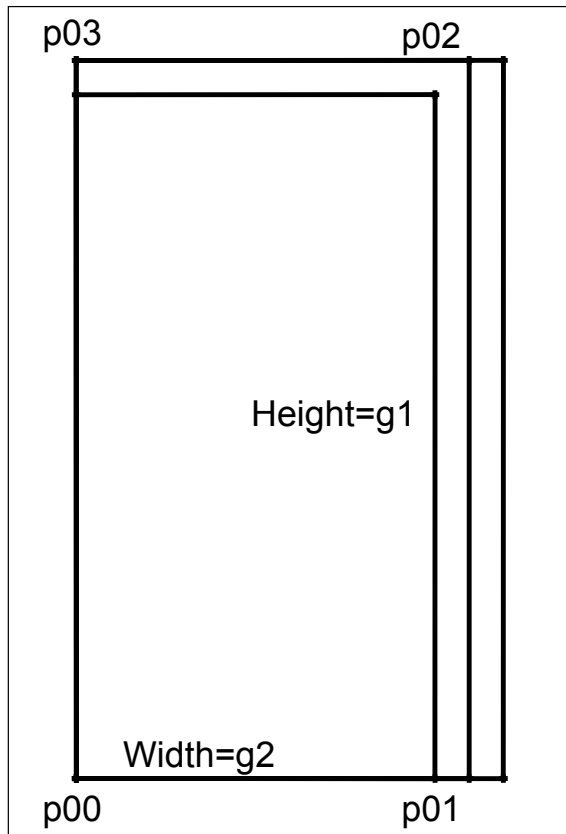
The text must always be placed between quotation marks.

19.4 Program: Gradeable rectangle

Gradeable rectangle

A gradeable rectangle (width: bust girth, height: body height) is to be constructed (Picture 19-6). The following lines generate the result:

```
*****
Program Main()
'----- Program: gradeable rectangle
'----- declaration lines
lVar
nVar
rVar rWidth,rHeight
pVar p00,p01,p02,p03
sVar
qVar
tVar
cVar
'----- constants
lCon
nCon
rCon rRi=0,rLe=180,rUp=90,rDo=270
tCon
'-----allocations / instructions
p00= pXY(0,0)
rWidth = rG(2)
rHeight= rG(1)
p01= pPRiLng(p00,rRi,rWidth)
p02= pPRiLng(p01,rUp,rHeight)
p03= pPRiLng(p02,rLe,rWidth)
AusP(p00,p01,p02,p03)
AusQ(p00+p01,p01+p02)
AusQ(p02+p03,p03+p00)
'----- Program end
End Program
*****
```



Picture 19-6

The declaration of the new variables `rWidth` and `rHeight` is carried out, automatically during first compiling. It is not necessary to enter the variables in the declaration lines, yourself.

Directions

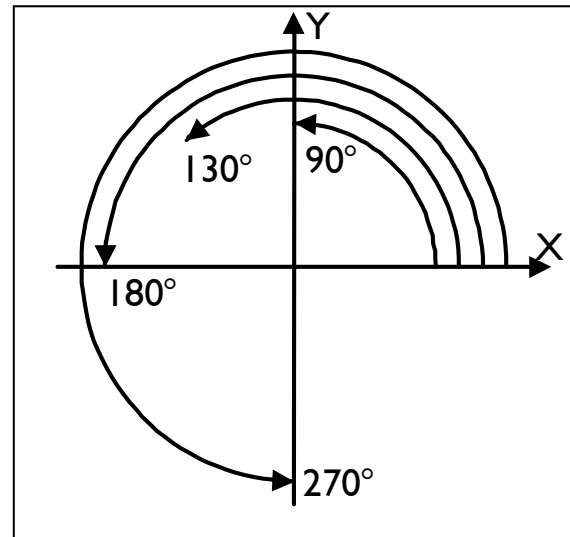
Directions are given in angle degrees. A point is set to the left if the value of the direction is 180. All angle entries relate to the positive x axis and are anti-clockwise (Picture 19-7). If you find it difficult to imagine a direction in angle degrees, you should work with direction constants, e.g. `rRi=0`, `rLe=180`, `rUp=90`, `rDo=270`; see also program example "gradeable rectangle".

The functions `pXY()`, `rG()`, `pRiLng()`

The lines in the block "allocations/instructions" have the following significance:

```
p00= pXY(0,0)
```

The variable `p00` is allocated with the inner function `pXY()`. The parameters after the open bracket state the x and y co-ordinates of the point. In this



Picture 19-7

case both co-ordinates are 0. Thus, `p00` is the zero point.

```
rWidth = rG(2)
```

```
rHeight= rG(1)
```

The new variables `rWidth` and `rHeight` are allocated with values which are calculated with the inner function `rG(n)`. **The function `rG(n)` calculates the *n*th size value of the measurement chart.** With `rG(1)` the first value of the measurement chart (in Basis_A: body height) and with `rG(2)` the second value of the measurement chart (Basis_A: bust girth) are transferred.

```
p01= pPRiLng(p00,rRi,rWidth)
```

The new point `p01` is allocated with the result of `pPRiLng(p00,rRi,rWidth)`. `pPRiLng()` calculates a new point which is to be positioned in direction `rRi` and at distance `rWidth` from point `p00`.

Instead of variables, functions of the same type and for real/whole number parameter, numbers can be entered in the parameter list of inner functions. Thus, the following lines have the same meaning:

```
p01= pPRiLng(p00,rRi,rWidth)
```

```
p01= pPRiLng(pXY(0,0),rRi,rG(2))
```

```
p01= pPRiLng(p00,0,rWidth)
```

In the lines

```
p02= pPRiLng(p01,rUp,rHeight)
```

```
p03= pPRiLng(p02,rLe,rWidth)
```

point `p02` is calculated from `p01`, upwards with the distance of the rectangle height. The same applies to `p03`.

The sign & stands for a continuation line. The x value definition line can have more than one continuation lines.

The code "Defx" with consecutive number, name and standard value can also be followed with size-specific x value allocations. In definition blocks, a size is allocated with a value which the x value is to apply for this size. The size names for standard measurement charts must start with "_"!

Programming of the points

As a rule, a program is developed in steps and tested after each step. Only when the first step has been successful, should the second step be commenced. The first step for programming of the collar band is the programming of the points at the centre back, followed by the points at the collar point.

```
*****
Program Main()
'-----
lVar
nVar
rVar
pVar p1,p2,p4,p5
sVar
qVar
tVar
cVar
'-----
lCon
nCon
rCon rRi=0,rLe=180,rUp=90,rDo=270
rCon
tCon
'----- x value definitions
XTitel("collar band")
Defx(1,"raise CB",35)
Defx(2,"collar fold width",20)
Defx(3,"collar width CB",40)
Defx(4,"collar point(x) to p3",40)
Defx(5,"collar point(y) to p3",45)
Defx(6,"ang neck+foldline in p3",90)
Defx(7,"ang collar edge in p7",80)
'----- points at CB
p1 = pXY(0,0)
p2 = pXY(0,rX(1))
p4 = pPRiLng(p2,rUp,rX(2))
p5 = pPRiLng(p4,rUp,rX(3))
'----- output points
AusP(p1,p2,p4,p5)
'-----
End Program
*****
```

The entries in the line pVar are entered by Grafis, automatically after compiling. The line rCon, however, contains the assignment for the main directions. A block with definition of the x values follows. For the first comment line, it is sufficient to enter

'- x value definitions

The remaining characters are entered by Grafis during automatic formatting. The x values are defined, consecutively in the following lines and contain no size-specific x values.

After having defined the x values, the first points are constructed.

p1 = pXY(0,0)
... defines point p1 with the co-ordinates (0,0). Thus, p1 is the zero of the construction.


p2 = pXY(0,rX(1))
... defines point p2 with the co-ordinates (0,rX(1)), where rX(1) applies the value of the first x value. Thus, p1 is positioned upwards by "raise CB".



p4 = pPRiLng(p2,rUp,rX(2))
... defines point p4, positioned upwards from p2 with the distance rX(2) –the second x value.

p5 = pPRiLng(p4,rUp,rX(3))
... defines point p5, positioned upwards from p4 with the distance rX(3) –the third x value.

Thus, the points at the CB are available within the program. They now have to be output to the screen. The following lines apply

```
'----- output points
AusP(p1,p2,p4,p5)
```

This first step should be tested, thoroughly with 

,  and . Only the points of the centre back will appear on the screen. Measure the distances between the points and also their co-ordinates, if necessary. With the right button, you return to the programming user interface. Save the project via *Project* → *Save*.

In the next step, the points of the collar point are constructed. It is recommended to instruct the screen output in a block at the end of the program. Therefore, the next program lines are inserted directly above "output points". All additions are highlighted.

```
*****
Program Main()
'-----
lVar
nVar
rVar
pVar p1,p2,p3,p4,p5,p6,p7
sVar
qVar
tVar
cVar
'-----
lCon
nCon
rCon rRi=0,rLe=180,rUp=90,rDo=270
rCon rC1Lng=150
tCon
'----- x value definitions
XTitel("collar band")
Defx(1,"raise CB",35)
Defx(2,"collar fold width",20)
Defx(3,"collar width CB",40)
Defx(4,"collar point(x) to p3",40)
Defx(5,"collar point(y) to p3",45)
Defx(6,"ang neck+foldline in p3",90)
Defx(7,"ang collar edge in p7",80)
```

```

'----- points at CB
p1 = pXY(0,0)
p2 = pXY(0,rX(1))
p4 = pPRiLng(p2,rUp,rX(2))
p5 = pPRiLng(p4,rUp,rX(3))
'----- corner point p3 (CF)
p3 = pXY(rClLng,0)
p6 = pPRiLng(p3,rRi,rX(4))
p7 = pPRiLng(p6,rUp,rX(5))
'----- output points + lines
AusP(p1,p2,p3,p4,p5,p6,p7)
AusQ(p2+p5)
AusQ(p3+p7)
'-----
End Program
'*****

```

In this example, the collar width is to be fixed. In section 20.2, the instructions required for automatic length adjustment of a collar to the neck are explained. The collar length `rClLng` is defined as a constant of 150 mm in line

```
rCon rClLng=150
```

Directly above the output of points and lines the following block was added:

```

'----- corner point p3 (CB)
p3 = pXY(rClLng,0)
... defines point p3 with the co-ordinates
(rClLng,0). p3 is positioned to the right of the
zero point at a distance of the collar length.
p6 = pPRiLng(p3,rRi,rX(4))
... defines point p6, positioned to the right of p3 at a
distance of rX(4) –the fourth x value.
p7 = pPRiLng(p6,rUp,rX(5))
... defines point p7, positioned upwards from p6 at
a distance of rX(5) –the fifth x value.
In the line for output of the points, the new points
p3, p6 and p7 were added.

```




```
AusP(p1,p2,p3,p4,p5,p6,p7)
```

With the lines

```
AusQ(p2+p5)
```

```
AusQ(p3+p7)
```

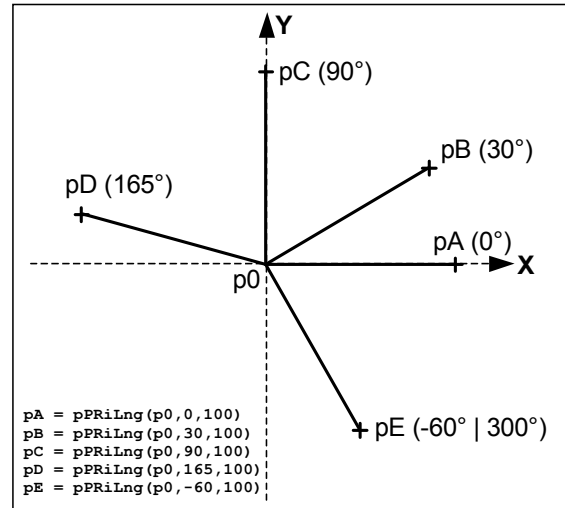
the centre back is output as a connection between points `p2` and `p5` as well as the line at the corner points between points `p3` and `p7`. With the output instruction `AusQ()`, lines and curves can be allocated for screen output. Instead of variables, the entry of line or curve functions is also permitted.

Test and check this step with ,  and . Save the project.

Calculate directions and angles

Direction and angle definitions

Directions are required for positioning of points in a direction and for construction of curves, etc. In the new programming language, directions are always defined as real numbers in degrees.



Picture 19-9

The points `pA` to `pE` from Picture 19-9 can be programmed as follows, where the distance to `p0` is to be 100 mm, respectively:

```

pA = pPRiLng(p0,0,100)
pB = pPRiLng(p0,30,100)
pC = pPRiLng(p0,90,100)
pD = pPRiLng(p0,165,100)
pE = pPRiLng(p0,-60,100)

```

Instead, a numbers in degrees, real variables can be entered as parameters.

Calculate directions

A direction can be defined as

- direction from first to second point with `rRiPP(p,p)`,
- direction of a line `rRiS(s)`,
- direction of a curve in starting or final point `rRiQanf(q)` or `rRiQend(q)` or
- direction of a curve in a curve point `rRiQP(q,p)`.

From a mathematical point of view, the direction is identical with a vector. Only when the vector is linked with a point, a straight line is created.

The direction of a point `pB` in relation to `p0` (Picture 19-9) can be calculated as follows:

```
rB = rRiPP(p0,pB)
```

After processing this line, `rB` has the value 30.

Calculate angles

An angle is calculated as

- angle defined by three points with $rWiPPP(p, p, p)$ (starting, pivot and end point) or
- angle between two lines $rWiSS(s, s)$.

For the points in Picture 19-9, the functions in the left column result in the values of the right column.

Function	Result
$rWiPPP(pA, p0, pB)$	+30
$rWiPPP(pB, p0, pA)$	-30
$rWiPPP(pD, p0, pE)$	+135
$rWiPPP(pD, p0, pC)$	-75
$rWiPPP(pE, p0, pA)$	+60

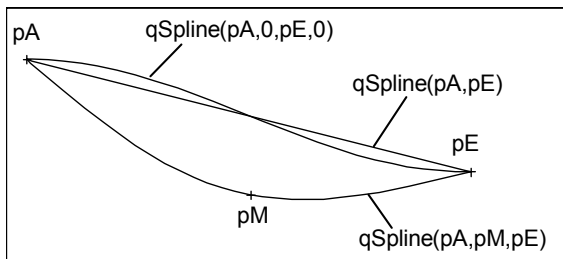
The first parameter in $rWiPPP(p, p, p)$ defines the first side of the angle. The rotation direction relates to this side (positive or negative rotation angle). The same applies to the function $rWiSS(s, s)$, where the sides of the angle must first be defined as lines.

The curve variation spline

A curve of the spline variation can run through any number of fulcrums (base points). In these fulcrums, directions can be defined for the curve. As on a steel ruler, the curve is bent so that all conditions can be fulfilled with as little bending force as possible.

For definition of a spline, a minimum of starting point and final point must be entered. The simplest variation with

$q1 = qSpline(pA, pE)$



Picture 19-10

defines a spline from pA to pE. The spline can take on any direction in these points and will therefore, appear as a line (Picture 19-10).

With the instruction line

$q2 = qSpline(pA, 0, pE, 0)$

the curve is also forced to run horizontally to the right in points pA and pE with direction 0°. For a reversed curve direction the instruction should be

$q2 = qSpline(pE, 180, pA, 180)$

Each curve has a direction!

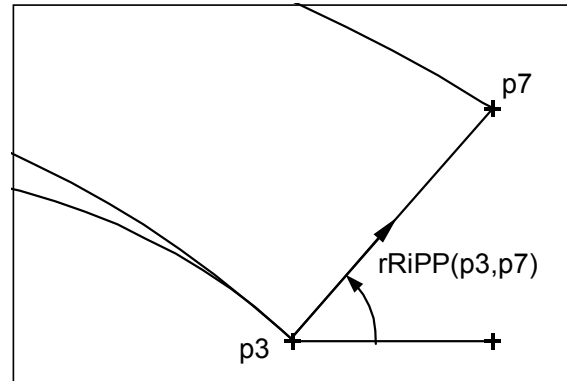
With the instruction line

$q3 = qSpline(pA, pM, pE)$

a curve through three points is created, where the directions in the points are not assigned.

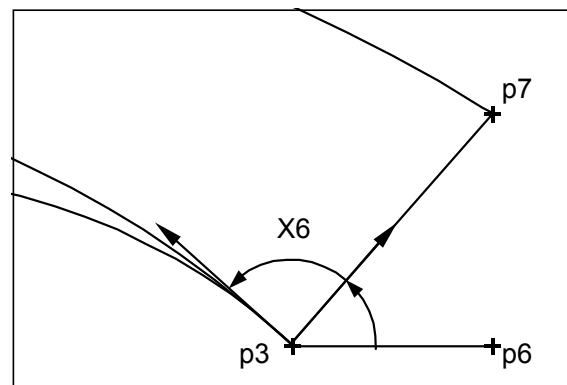
Construct neck line and collar fold line as spline with defined directions

The neck line and the collar fold line should be constructed as splines. The starting point for both curves is p3. Both curves should start at the angle x6, relating to the connection of points p3 to p7. First, calculate the direction from p3 to p7 (Picture 19-11).



Picture 19-11

The calculated direction is still to be rotated about the given angle (Picture 19-12).



Picture 19-12

The following lines generate the result:

$rWi3 = rRiPP(p3, p7)$

$rWi3 = rWi3 + rX(6)$

$q1 = qSpline(p3, rWi3, p2, rLe)$

$q2 = qSpline(p3, rWi3, p4, rLe)$

For the collar edge, it is to be considered that the angle in p7 is entered as inside the collar. The direction of the curve in p7 can be calculated either with

$rWi7 = rRiPP(p7, p3) - rX(7)$

or with

$rWi7 = rRiPP(p3, p7) - 180 - rX(7)$

After

$q3 = qSpline(p7, rWi7, p5, rLe)$

the collar edge is created but not yet, output to the screen. The output instruction for the three curves should read

$AusQ(q1, q2, q3)$

The program for the collar band with (as yet) pre-set collar length is ready:

```
*****
Program Main()
-----
lVar
nVar
rVar rWi3,rWi7
pVar p1,p2,p3,p4,p5,p6,p7
sVar
qVar q1,q2,q3
tVar
cVar
-----
lCon
nCon
rCon rRi=0,rLe=180,rUp=90,rDo=270
rCon rClLng=150
tCon
----- x value definitions
XTitel("collar band")
Defx(1,"raise CB",35)
Defx(2,"collar fold width",20)
Defx(3,"collar width CB",40)
Defx(4,"collar point(x) to p3",40)
Defx(5,"collar point(y) to p3",45)
Defx(6,"ang neck+foldline in p3",90)
Defx(7,"ang collar edge in p7",80)
----- points at CB
p1 = pXY(0,0)
p2 = pXY(0,rX(1))
p4 = pPRiLng(p2,rUp,rX(2))
p5 = pPRiLng(p4,rUp,rX(3))
----- corner point p3 (CF)
p3 = pXY(rClLng,0)
p6 = pPRiLng(p3,rRi,rX(4))
p7 = pPRiLng(p6,rUp,rX(5))
----- neck line
rWi3 = rWiPPP(p6,p3,p7)
rWi3 = rWi3+rX(6)
q1 = qSpline(p3,rWi3,p2,rLe)
q2 = qSpline(p3,rWi3,p4,rLe)
----- collar edge
rWi7 = rRiPP(p7,p3)-rX(7)
q3 = qSpline(p7,rWi7,p5,rLe)
----- output points + lines
AusP(p1,p2,p3,p4,p5,p6,p7)
AusQ(sPP(p2,p5))
AusQ(sPP(p3,p7))
AusQ(q1,q2,q3)
-----
End Program
*****
```

19.6 Program: Skirt

The basic block skirt according to Picture 19-13 is to be programmed with the application of the given x values. The generation of the program ensues in four steps. In each step, there are construction steps (table), a picture, and the program up to the stage displayed. The steps should initially be developed by yourself and then, compared with the prepared program text.

When creating the skirt, you may have the following questions:

What do I do if an error message appears?

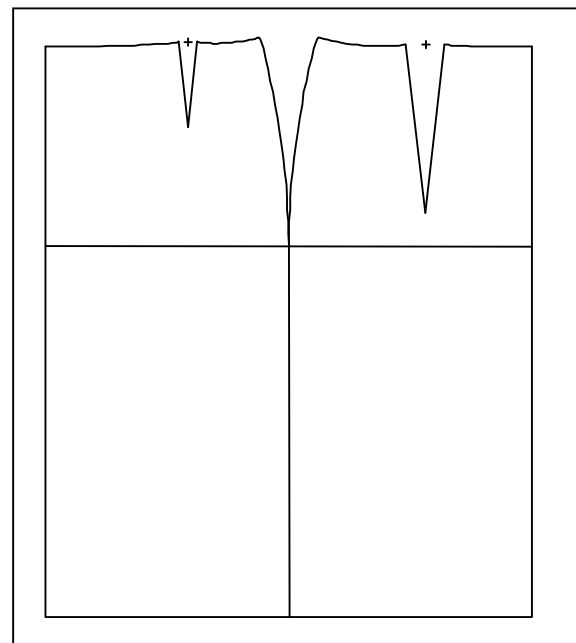
How can I find the relevant function ?

What is to be considered for release of a program ?

What is to be considered for alterations / corrections of a program ?

The answers to those questions can be found in the last section 19.7 of this chapter.

X	Definition	Value
1	skirt length from waist	600mm
2	addition to half hip girth	10mm
3	addition to half waist girth	10mm
4	relocate sided seam to front	0mm
5	raise side seam	10mm
6	dart length front	90mm
7	dart point from hip line in bk	35mm

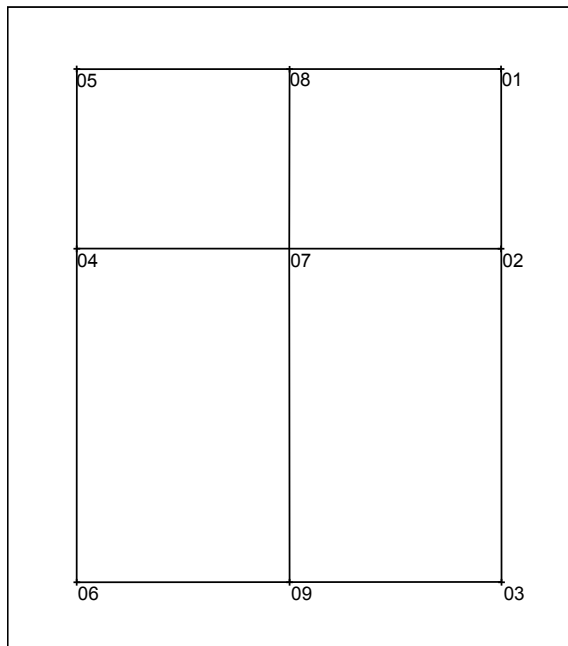


Picture 19-13

1st step: construct points of the centre back, centre front and side seam (Picture 19-14)

from	to	direction	distance
01	02	↓	G8 (waist to hip)
01	03	↓	x1 (skirt length from waist)
01	05	←	G5/2+X2 (half hip girth + ease)
02	04	←	G5/2+X2
03	06	←	G5/2+X2
02	07	←	½ distance p02⇔p04 + X4
01	08	←	½ distance p02⇔p04 + X4
03	09	←	½ distance p02⇔p04 + X4

```
*****
Program Main()
-----
lVar
nVar
rVar rZ
pVar p01,p02,p03,p04,p05,p06,p07,
& p08,p09
```

Picture 19-14

```

sVar
qVar
tVar
'-----
lCon
nCon
rCon rRi=0,rUp=90,rLe=180,rDo=270
tCon
'----- x value definitions
XTitel("skirt")
Defx(1,"skirt length f. waist",600)
Defx(2,"addition 1/2 hip girth",10)
Defx(3,"addition 1/2 waist girth",10)
Defx(4,"relocate side seam to ft",0)
Defx(5,"raise side seam",10)
Defx(6,"dart length front",90)
Defx(7,"dart p. f. hip line bk",35)
'----- points at CB
p01 = pXY(0,0)
p02 = pXY(0,-rG(8))
p03 = pXY(0,-rX(1))
'----- points at CF
rZ = rG(5)/2+rX(2)
p05 = pPRiLng(p01,rLe,rZ)
p04 = pPRiLng(p02,rLe,rZ)
p06 = pPRiLng(p03,rLe,rZ)
'----- points at side seam
rZ = rAbstPP(p02,p04)/2+rX(4)
p07 = pPRiLng(p02,rLe,rZ)
p08 = pPRiLng(p01,rLe,rZ)
p09 = pPRiLng(p03,rLe,rZ)
'----- output points
AusP(p01,p02,p03,p04,p05,p06,p07,
& p08,p09)
'----- output lines
AusQ(p01+p03)
AusQ(p03+p06)
AusQ(p06+p05)
AusQ(p04+p02)
AusQ(p05+p01)
AusQ(p08+p09)
'-----
End Program
'-----

```

2nd step: calculate & distribute ease (Pict. 19-15)

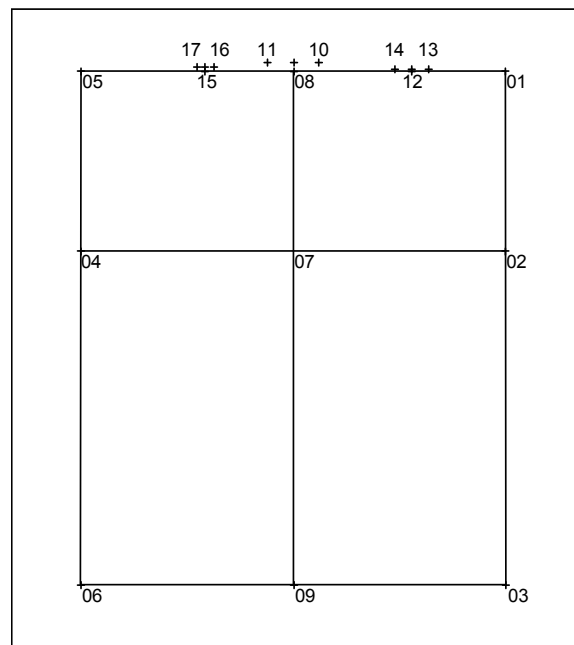
ease $Ea=(G2/2+X2)-(G4/2+X4)$

portion side seam $3/6$ ease

portion skirt back $2/6$ ease

portion skirt front $1/6$ ease

from	to	direction	distance
08	08	↑	X5 (raise side seam)
08	10	⇒	$\frac{1}{2} * \frac{3}{6} * ease$
08	11	⇐	$\frac{1}{2} * \frac{3}{6} * ease$
01	12	⇐	$\frac{1}{2}$ distance p01⇐p10
12	12	↑	$\frac{1}{4} * X5$ (raise waist)
12	13	⇒	$\frac{1}{2} * \frac{2}{6} * ease$
12	14	⇐	$\frac{1}{2} * \frac{2}{6} * ease$
05	15	⇒	$\frac{2}{3}$ distance p05⇐p11
15	15	↑	$\frac{1}{2} * X5$ (raise waist)
15	16	⇒	$\frac{1}{2} * \frac{1}{6} * ease$
15	17	⇐	$\frac{1}{2} * \frac{1}{6} * ease$



Picture 19-15

```

'-----
Program Main()
lVar
nVar
rVar rZ,rEa,rSs,rBk,rFt
pVar p01,p02,p03,p04,p05,p06,p07,
& p08,p09,p10,p11,p12,p13,p14,
& p15,p16,p17
sVar
qVar
tVar
cVar
'-----

```

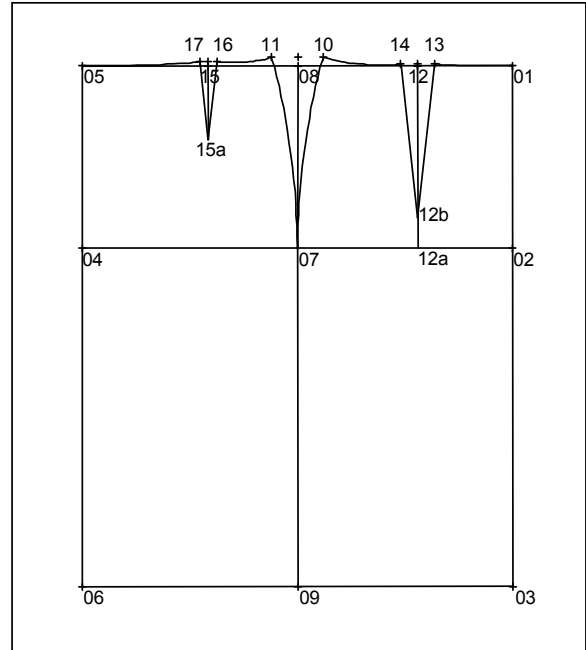
```

lCon
nCon
rCon rRi=0,rUp=90,rLe=180,rDo=270
tCon
'----- x value definitions
XTitel("skirt")
Defx(1,"skirt length f. waist",600)
Defx(2,"addition 1/2 hip girth",10)
Defx(3,"addition 1/2 waist girth",10)
Defx(4,"relocate side seam to ft",0)
Defx(5,"raise side seam",10)
Defx(6,"dart length front",90)
Defx(7,"dart p. f. hip line bk",35)
'----- points at CB
p01 = pXY(0,0)
p02 = pXY(0,-rG(8))
p03 = pXY(0,-rX(1))
'----- points at CF
rZ = rG(5)/2+rX(2)
p05 = pPRiLng(p01,rLe,rZ)
p04 = pPRiLng(p02,rLe,rZ)
p06 = pPRiLng(p03,rLe,rZ)
'----- points at side seam
rZ = rAbstPP(p02,p04)/2+rX(4)
p07 = pPRiLng(p02,rLe,rZ)
p08 = pPRiLng(p01,rLe,rZ)
p09 = pPRiLng(p03,rLe,rZ)
'----- distribute ease
rEa = (rG(5)/2+rX(2))
&      - (rG(3)/2+rX(3))
'----- on half skirt
rSs = 3/6*rEa 'portion in side seam
rBk = 2/6*rEa 'portion in Bk
rFt = 1/6*rEa 'portion in Ft
'----- reduce side seam at waist
p08 = pPRiLng(p08,rUp,rX(5))
p10 = pPRiLng(p08,rRi,rSs/2)
p11 = pPRiLng(p08,rLe,rSs/2)
'----- darts in Bk
rZ = rAbstPP(p01,p10)/2
p12 = pPRiLng(p01,rLe,rZ)
p12 = pPRiLng(p12,rUp,rX(5)/4)
p13 = pPRiLng(p12,rRi,rBk/2)
p14 = pPRiLng(p12,rLe,rBk/2)
'----- darts in Ft
rZ = rAbstPP(p11,p05)*2/3
p15 = pPRiLng(p05,rRi,rZ)
p15 = pPRiLng(p15,rUp,rX(5)/2)
p16 = pPRiLng(p15,rRi,rFt/2)
p17 = pPRiLng(p15,rLe,rFt/2)
'----- output points
AusP(p01,p02,p03,p04,p05,p06,p07,
&      p08,p09,p10,p11,p12,p13,p14,
&      p15,p16,p17)
'----- output lines
AusQ(p01+p03)
AusQ(p03+p06)
AusQ(p06+p05)
AusQ(p04+p02)
AusQ(p05+p01)
AusQ(p08+p09)
End Program
'*****

```

3rd step: draw dart lines (Picture 19-16)

from	to	direction	distance
12	12a	perp.	perpendicular from p12 onto line p02⇔p07
12a	12b	↑	X7
15	15a	↓	X6
			draw dart lines



Picture 19-16

```

'*****
Program Main()
'-----
lVar
nVar
rVar rZ,rEa,rSs,rBk,rFt
pVar p01,p02,p03,p04,p05,p06,p07,
&      p08,p09,p10,p11,p12,p13,p14,
&      p15,p16,p17,p12a,p12b,p15a
sVar sZ
qVar
tVar
cVar
'-----
lCon
nCon
rCon rRi=0,rUp=90,rLe=180,rDo=270
tCon
'----- x value definitions
... as before ...
'----- darts in Ft
rZ = rAbstPP(p11,p05)*2/3
p15 = pPRiLng(p05,rRi,rZ)
p15 = pPRiLng(p15,rUp,rX(5)/2)
p16 = pPRiLng(p15,rRi,rFt/2)
p17 = pPRiLng(p15,rLe,rFt/2)
'----- dart point Bk
sZ = sPP(p02,p07)
p12a= pLotPS(p12,sZ)
p12b= pPRiLng(p12a,rUp,rX(7))
'----- dart point Ft
p15a= pPRiLng(p15,rDo,rX(6))

```

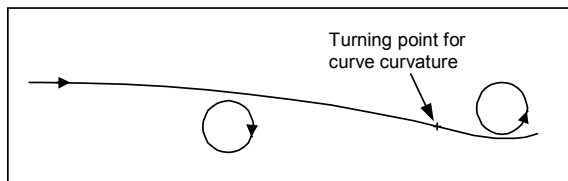
```

'----- output points
  AusP(p01,p02,p03,p04,p05,p06,p07,
&      p08,p09,p10,p11,p12,p13,p14,
&      p15,p16,p17,p12a,p12b,p15a)
'-----output lines
  AusQ(p01+p03)
  AusQ(p03+p06)
  AusQ(p06+p05)
  AusQ(p04+p02)
  AusQ(p05+p01)
  AusQ(p08+p09)
  AusQ(p12b+p13)
  AusQ(p12b+p14)
  AusQ(p15a+p16)
  AusQ(p15a+p17)
'-----
  End Program
'*****

```

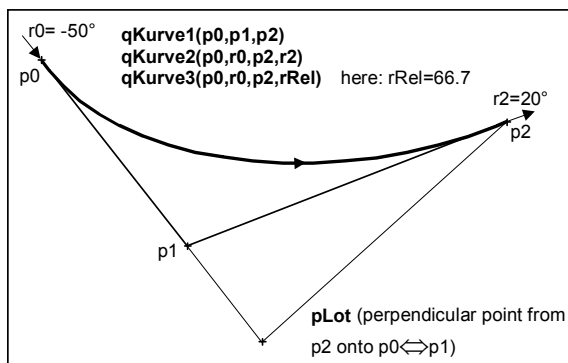
The curve variation circle arc

The curve type circle arc curve is based on distorted, degenerate circle arcs. One of the main differences to the curve type spline is that a circle arc curve has no turning points (Picture 19-17). A curve shape according to Picture 19-17 can only be constructed with the curve type spline.



Picture 19-17

For the curve type circle arc curve, three definition options are available which deliver the same curve shape if comparable parameters are entered. **Circle arc curves give relatively shallow curves. They are especially suitable for hip and waist curves. If the curve shape with one of the circle arc options is not satisfactory, the only alternative is a curve of the spline type.** The curve in Picture 19-18 was constructed with one of the three definition options, respectively.



Picture 19-18

qKurve1(pS,pD,pE)

The curve is created from pS to pE. The parameters

- starting point pS,
- direction point pD and
- end point pE are to be entered.

The direction point pD determines the direction of the curve in pS and pE. In pS the curve has the direction $pS \Rightarrow pD$ and in pE the direction $pD \Rightarrow pE$. Thus, the curve nestles against the lines $pS \Rightarrow pD$ and $pD \Rightarrow pE$.

qKurve2(pS,rS,pE,rE)

The curve is created from pS to pE. The parameters

- starting point pS,
- direction in the starting point rS,
- end point pE and
- the direction in the end point rE are to be entered.

The directions in starting and end point, create the direction point of the first definition option.

qKurve3(pS,rS,pE,rRel[,rE])

The curve is created from pS to pE. The parameters

- starting point pS,
- direction in the starting point rS,
- the end point pE,
- a relative value for the curve shape rRel and
- optional, as result value the direction in end point rE are to be entered.

The direction of the curve in the end point is calculated from the relative value with the following rule: From the end point, a perpendicular is dropped onto the line starting point with starting direction. The distance $pS \Leftrightarrow$ direction point (analogous curve type1) is calculated from $rRel/100 * \text{distance } pS \Leftrightarrow \text{perpendicular point}$.

The value rRel, indirectly adjusts the direction in the end point. The curve shape can thus be altered very delicately. However, it is unsuitable if particular directions must be considered in the starting point and end point.

4th step: draw side seam and waist lines

For the construction of the side seam, the construction option "qKurve3" is applied as the direction of the side seam at waist is still free. Thus, the hip curve can be adjusted to the optimum shape with the parameter rRel. The hip curve in the front skirt is created with

```
qSs_ft = qKurve3(p07,rUp,p11,60)
```

Alter the numeric value 60 in steps of 5 and after

followed by (also with a number of sizes) and adjust a nice hip curve.

With mirror at $p07 \leftrightarrow p08$, the hip curve in the skirt back is created.

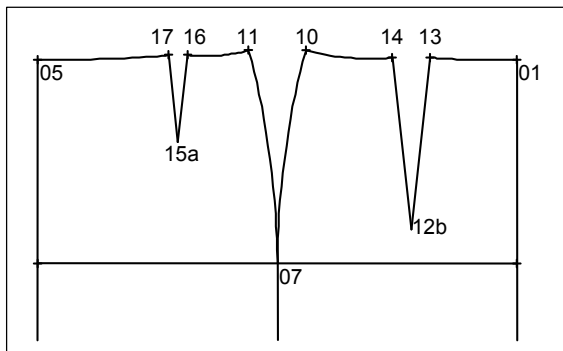
```
qSs_bk = qSs_ft
Spgl(sPP(p07,p08):qSs_bk)
```

Before mirroring, it is first switched to the new curve variable `qSs_bk`. With

```
Spgl(sPP(p07,p08):qSs_bk=qSs_ft)
```

the switch would ensue directly in the mirror function.

The waist lines are to run at right angle to the side seam, the darts and the centre front and centre back, respectively. Before the individual sections of the waist can be created, the direction of the waist line in starting and final point must be calculated.



Picture 19-19

The waist line from centre back starts at point $p01$ in horizontal direction to the left (180°) and ends in $p13$ at right angle to the direction $p12b \rightarrow p13$ (Picture 19-19). The direction is calculated with $rRiPP(p12b, p13)$ and rotated through 90° in a mathematically positive direction with $+90$.

```
rRi13 = rRiPP(p12b, p13) + 90
```

Then, the waist section from the centre back can be constructed with

```
qWa_bk1 = qKurve2(p01, rLe, p13, rRi13)
```

The waist line is to be at right angle to the side seam. With $rRiQend(qSs_bk)$, the direction in the end point of the side seam is calculated. $+90$ rotates the direction again through 90° in mathematically positive direction. The result is the required direction of the waist $rRi10$ in the end point.

The waist section from the dart in the skirt back to the side seam can then, be constructed with

```
qWa_bk2 = qKurve2(p14, rRi14, p10, rRi10)
```

Analogous, the construction of the waist sections in the front skirt follows.

```
*****
Program Main()
-----
lVar
nVar
rVar rZ, rMw, rSn, rHr, rVr,
&    rRi13, rRi14, rRi10,
&    rRi17, rRi16, rRi11
pVar p01, p02, p03, p04, p05, p06, p07,
&    p08, p09, p10, p11, p12, p13, p14,
&    p15, p16, p17, p12a, p12b, p15a
sVar sZ
qVar qSs_ft, qSs_bk,
&    qWa_bk1, qWa_bk2,
&    qWa_ft1, qWa_ft2
tVar
cVar
-----
lCon
nCon
rCon rRi=0, rUp=90, rLe=180, rDo=270
tCon
----- x value definitions
... as before ...
----- dart point Ft
p15a = pPRiLng(p15, rDo, rX(6))
----- draw and mirror side seam
qSs_ft = qKurve3(p07, rUp, p11, 60)
qSs_bk = qSs_ft
Spgl(sPP(p07, p08):qSs_bk)
----- draw waist line in skirt bk
rRi13 = rRiPP(p12b, p13) + 90
qWa_bk1 = qKurve2(p01, rLe, p13, rRi13)
rRi14 = rRiPP(p12b, p14) + 90
rRi10 = rRiQend(qSs_bk) + 90
qWa_bk2 = qKurve2(p14, rRi14, p10, rRi10)
----- draw waist line in skirt ft
rRi17 = rRiPP(p15a, p17) + 90
qWa_ft1 = qKurve2(p05, rRi, p17, rRi17)
rRi16 = rRiPP(p15a, p16) + 90
rRi11 = rRiQend(qSs_ft) + 90
qWa_ft2 = qKurve2(p16, rRi16, p11, rRi11)
----- output points
AusP(p01, p02, p03, p04, p05, p06, p07,
&    p08, p09, p10, p11, p12, p13, p14,
&    p15, p16, p17, p12a, p12b, p15a)
----- output lines
AusQ(p01+p03)
AusQ(p03+p06)
AusQ(p06+p05)
AusQ(p04+p02)
AusQ(p05+p01)
AusQ(p08+p09)
AusQ(p12b+p13)
AusQ(p12b+p14)
AusQ(p15a+p16)
AusQ(p15a+p17)
AusQ(qSs_ft, qSs_bk, qWa_ft1, qWa_ft2,
&    qWa_bk1, qWa_bk2)
-----
End Program
*****
```

19.7 General guidelines

With the instructions and functions introduced so far, the majority of basic blocks can be translated into programming language programs. An overview of all available functions can be found in the Grafis Help.

How can I find the relevant function?

First, establish the variable type for the result. If a point is required, only functions beginning with “p” are relevant, for lines, only the functions with “s” etc. As a rule, a code for the result type appears in the name of the function

Code	Result type	Example
Wi	angle	rWiSS(s,s)
Ri	direction	rRiPP(p,p)
Lng	total length	rLngQ(q)
Tlng	partial length	rTlngSP(s,p)
Rlng	relative length	rRlngSP(s,p)
Lot	perpendicular	pLotPS(p,s)
Tang	tangent	pTangPQ(p,q)
...

followed by the required parameters in capital letter.

What do I do if an error message appears?

There are two types of errors:



- **syntax error** = error in the writing convention (“spelling error”) and
- **logical error**, which appears during processing of the program.


Syntax errors are reported during compiling. The respective line is highlighted and a suggestion is made. Syntax errors are for example missing opening / closing brackets, unknown functions or incorrect parameter types in the functions. Syntax errors can usually be rectified, quickly.

A logical error occurs, when the program does not deliver the expected result. **Logical errors are easier to be found, if the program is developed in small steps and each step is tested, thoroughly (also in small/large sizes).** In this case, the error is to be found in the last step. For long programs, it is definitely useful to print and annotate the points, lines and curves at a particular interval, analogous to Pictures 19-14, 19-15, 19-16 and 19-19.

A few tips for identifying errors:

- The value of a variable of any type can be checked with the instruction `VList()`. With the instruction line
`rRi11 = rRiQend(qSs_ft)+90`
`VList(rRi11)`

the value of the variable `rRi11` is displayed in the variable list after  or .

- The line in which a variable has been allocated with the current value can be found by selecting the variable in the current line and then searching for it with .
- To identify a searched point `pW`, output a line from the zero point to the searched point: `AusQ(pXY(0,0)+pW)`
- If a point is generated as an intersection between a circle and a line, output the circle and the line, temporarily and observe the result, also in small/large sizes. With a “’” in front of this temporary output, the line becomes a comment line.
- During compiling, a message appears querying whether undeclared variables are to be declared. Check for each query whether the variable has actually been used or whether it has been “created” through a typing error.
- After successful compiling, unused variables will be stated in the message window. In tidy programming, unused variables are often an indication of a mix-up.

What is to be considered for release of a program?

Before releasing a program, it should be checked whether

- the program runs in all sizes, also extremely small/ large/ individual sizes without errors,
- all x values are set up, calculated and commented, correctly. An “addition to the waist girth” must not operate as “addition to the half waist girth”. A positive value for “increase side seam” must not lead to the side seam being reduced,
- only necessary objects (points, lines, curves) are output. Objects which are not required by the user should not be output,
- all line lengths are correct. In the skirt construction of the previous section, for example the lengths of the side seams in skirt front and back should be compared and the sum of the waist lines should be measured, also in other sizes.

After releasing the program, the program file *.cpr is to be entered into the call list and an info mask is to be generated.

Furthermore, generate a documentation of the following content:

- a print-out of the construction in which all objects are annotated. All used objects should be output, including auxiliary points and lines not appearing in the released construction.
- a print-out of the program,
- the program as file and
- a copy of the construction instructions.

What is to be considered for alterations/ corrections of a program ?

Corrections in released programs must be carried out very circumspect manner, as styles developed from this program will always fall back on it.

Before any alteration of released programs, the alteration code must be increased in the project user interface via Extras → Options! This applies, especially to alterations for object output.

For explanation, the record principle of Grafis is to be described at this stage. Each output instruction of a programming language program transfers objects (points, lines) to the Grafis record. The objects obtain Pos-numbers in order of their transfer. The Pos-number is an identification for the objects in the Grafis record.

The output instruction

```
AusQ (qHem, qInsideleg, qCrotch)
```

transfers the hem, the inside leg and the crotch seam to the Grafis record which will allocate these lines with the consecutive Pos-Numbers 1, 2 and 3. If now, a parallel is created to the inside leg seam, this record step relates to the object with Pos-Number 2.

If later on, the instruction is altered in the programming language program to

```
AusQ (qInsideleg, qHem, qCrotch)
```

and a test run is carried out in the style, the parallel appears at the hem instead of the inside leg. This alteration will result in errors only in styles which have been developed from the programming language program before the alteration.

The objects must always be output in the same order for identical object types, irrespective of sizes and x values. Therefore, output instructions within IF-ENDIF structures should be avoided.

The alteration code should also be increased before correcting any numbers or formulae. A user of your program may have already corrected the basic shape with construction steps. These construction steps are also carried out in the altered program.

Chapter 20 Programming Language II

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With the instructions and functions introduced in Chapter 19, the majority of basic blocks can be translated into programming language programs. In the first section of this chapter, a number of special programming structures and functions are explored.

Content of the second section is the automatic length adjustment using a collar as an example; followed by the application of external functions and the generation of construction components.

```
*****
Program Main()
-----
' Collar construction with automatic length adjustment .
-----
nVar n,nNextPos,nT
rVar rZl,rA,rL,rA1,rL1,rA2,rL2
pVar p0,p1,p2,p3,p4,p5
qVar q1,q2,q3,qF,qB,qQqq
cVar cF,cB
----- x value definitions
XTitel("x values for shirt collar construction")
Defx(1,"direction for collar neck",-45)
Defx(2,"direction for collar stand",-55)
Defx(3,"raise collar",35)
Defx(4,"stand width",15)
Defx(5,"collar width back",45)
Defx(6,"point length",60)
Defx(7,"point height",60)
Defx(8,"direction collar edge curve",-30)
----- query length of neckline
qF = qKop(pXY(0,0)+pXY(100,0)) ' allocate qF
qB = qKop(pXY(0,0)+pXY(50,0)) ' allocate qB
cF = cPick(1,4,"Click FRONT neckline !","collar","!",nT)
qF = qCo(cF,"qq")
cB = cPick(2,4,"Click BACK neckline !","collar","!",nT)
qB = qCo(cB,"qq")
----- calculate target length
rZl= rLngQ(qF)+rLngQ(qB)
----- task cannot be solved
If(rZl<=rX(3)) Then
    n = nIBox("The collar cannot be constructed !")
    Exit Program
End If
----- starting adjustment P0 => P1 (=rA)
rA = rZl
----- 0.approximation with construction of collar edge
p0 = pXY(0,0)
p1 = pXY(rA,0)
p2 = pXY(0,rX(3))
q1 = qSpline(p2,0,p1,rX(1))
rL = rLngQ(q1) ' curve length calculation
----- automatic length adjustment in cycle
rA1= 0 ' allocate function values for 1st approx.
rL1= rX(3)
rA2= rA
rL2= rL
For n = 1,10,1 ' maximum 10 approximation steps
    rA = rNahInt(rA1,rL1,rA2,rL2,rZl) ' next approximation
    p1 = pXY(rA,0)
    q1 = qSpline(p2,0,p1,rX(1))
    rL = rLngQ(q1) ' curve length calculation
    If(rAbs(rL-rZl)<<0.01) Then ' achieved accuracy ?
        Exit For ' if YES => quit loop
    End If
    rA1= rA2 !re-allocate function values for next approximation
    rL1= rL2
    rA2= rA
    rL2= rL
End For
```

20.1 Subjects for advanced users

IF-THEN structure

The IF-THEN structure is a control structure which carries out calculations or construction steps only, if a certain condition is fulfilled.

The simple structure is

```
If (logical term) Then
    [instruction]
End If
```

Only if the logical term is true (has the value True), are the instructions processed.

The logical term can either be a direct logical variable

```
lSwitch=true
If(lSwitch) Then
    [instruction]
End If
```

or the result of a comparison operation between whole / real numbers or variables.

```
If(rEa<<0) Then
    rSs = rEa
    rBk = 0
    rFt = 0
End If
```

The following comparison operators are permitted for whole number / real variables:

Character	Significance
<<	smaller than
>>	greater than
==	equal
<=	smaller or equal
>=	greater or equal
<>	not equal

For connection of logical variables the following is permitted:

Character	Significance
NOT	"not"
AND	"and"
OR	"or"

The operations "==" and "<>" are only suitable for whole numbers as the numbers are compared up to the 6th decimal, inclusive.

Example:

For extreme individual sizes, the waist girth may be greater than the hip girth. In this case, the negative ease must be added, completely to the side seam. This case is considered in the program as follows:

```
'----- distribute ease
rSs = 3/6*rEa 'portion in side seam
rBk = 2/6*rEa 'portion in Bk
rFt = 1/6*rEa 'portion in Ft
If(rEa<<0) Then
    rSs = rEa
    rBk = 0
    rFt = 0
End If
```

Within IF-THEN structures, no objects may be output, as the number of objects, the object type or the order of the objects may change. Changes in the object output may lead to errors during style development. The notes on linking programming language ⇔ construction record in the previous chapter apply.

The detailed structure is

```
If (logical term 1) Then
    [instruction 1]
Else If (logical term 2) Then
    [instruction 2]
Else If (logical term 3) Then
    [instruction 3]
Else
    [instruction 4]
End if
```

Explanations can be found in Picture 20-1. The "Else If() Then" queries can follow "If() Then" a number of times. "Else" is only permitted once before "End If".

```
If (logical term 1) Then
    [instruction 1]

Else If (logical term 2) Then
    [instruction 2]

Else
    [instruction 3]

End If
```

```
If (logical expression 1) Then
    The instruction 1 is only processed if "logical term 1" is true. The IF-ENDIF structure is quit.

Or If (logical term 2) Then
    The instruction 2 is only processed if "logical term 2" is true and "logical term 1" was false. The IF-ENDIF structure is quit.

Otherwise
    The instruction 3 is only processed if the previous queries were false.

End If
```


Example:

In a skirt block for individual sizes, the ease is to be distributed differently, if the ease for half of the skirt is greater than 40mm. Enter the following in the program:

```
'----- distribute ease
'           rSs portion in side seam
'           rBk portion in Bk
'           rFt portion in Ft
'----- case rEa<0
  If(rEa<<0) Then
    rSs = rEa
    rBk = 0
    rFt = 0
'----- case rEa<40
  Else If(rEa<<40) Then
    rSs = 1/6*rEa
    rBk = 3/6*rEa
    rFt = 2/6*rEa
'----- case rEa>=40
  Else
    rSs = 1/4*rEa
    rBk = 2/4*rEa
    rFt = 1/4*rEa
  End If
```

FOR-NEXT structure

With the FOR-NEXT structure, loops can be created. The loops begins with

For nLauf = nA,nE,nStep
and ends with

End For

nLauf is the loop variable. During the first run, it has the value nA. After each run, nLauf is automatically raised by nStep or reduced if nStep is negative. The instructions between For and End For are processed, repeatedly during each run of the loop.

The loop is only quit when the loop variable has exceeded the end value or Exit For has been instructed. The variables nLauf, nA, nE and nStep must be whole number variables.

The complete structure in an overview is shown in Picture 20-2.

```
For nLauf = nA,nE,nStep
  [instruction]
[Next For] (next loop run)
  [instruction]
[Exit For] (quit loop, immediately)
  [instruction]
End For
```

Picture 20-2

Example:

```
'-----check if x1 to x5 negative
nA=1
nE=5
For nLauf=nA,nE,1
  If(rX(nLauf)<<0) Then
    t1="The x value x"+tFormat(nLauf)
    & "+" is negative !" +tc(13,10)+
    & "The collar cannot be
    & constructed."
```

```
nBox= nIBox(t1,31)
Exit Program
End If
End For
```

These program lines check whether one of the x values x1 to x5 is negative. If one of the values is negative, the program is immediately aborted with a message.

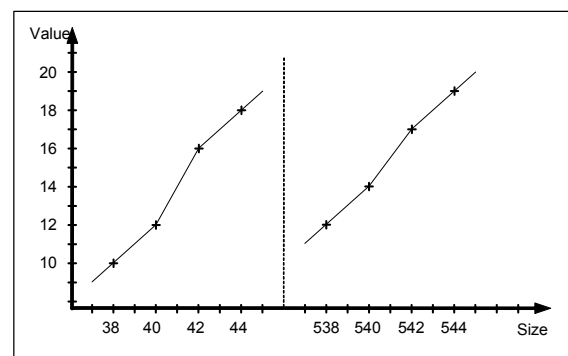
Size interpolation

The function rGroInt() carries out a size-related interpolation. In the previous programming language, y values were defined for this process. Size-related interpolation is useful, if a value is to be altered depending on the current measurement chart. The same result is achieved through use of size-related x values. As opposed to the x values, values calculated with rGroInt() can only be adjusted in the programming language program. The user of the released program has no access to these values. (S)he cannot alter them.

A size-related value of the real number type can be defined at any point in the program with the following instruction:

```
rCorr1=rGroInt("Size",value
& [, "Size",value,])
```

As parameters, any number of pairs made up from size and the relevant value can be entered. The function calculates the value for the current measurement chart from the value pairs size/value. Size names must be entered in inverted commas, where the underscore "_" indicates a standard size. It is recommended to enter the sizes in ascending order. If no value pair is entered for a figure type, the value of the first entered value pair is applied to all sizes of the figure type. Please note the following example:



Picture 20-3

A correction value for the figure types normal and broad hip is to be defined according to Picture 20-3. The following instruction defines the value r1 as required:

```
r1 = rGroInt("_38",10,"_40",12,
& "_42",16,"_44",18,"_538",12,
& "_540",14,"_542",17,"_544",19)
```

The following overview shows which value the variable `r1` takes on for the respective measurement chart:

Size	r1	Size	r1	Size	r1
36	8	036	10	536	12
38	10	038	10	538	14
40	12	040	10	540	17
42	16	042	10	542	19
44	18	044	10	544	21
46	20	046	10	546	23

For the figure type narrow hips (pre-fix "0"), no value was defined. Thus, the variable obtain the value 10 for all sizes of this figure type.

For individual measurement charts, the value of the respective reference size (column x value reference in the size table) is entered. If no reference is entered in this column, again, the value of the first value pair applies.

Dialogue functions

In basic blocks or construction components, information from the Grafis record are often required. This information can be process parameters (lengths, distances,...), but also objects (points, lines). For example, for the collar, information about the neckline is required; for a sleeve, information about the armhole. In the new programming language, a dialogue can be created which instructs the user of the program to click the required objects.

For the dialogue with the user, the functions

```
nIBox()
cPick()
```

are available.

nIBox()

Infobox builds a window with a note for the user or which the user can close with Yes/No. In this window, for example, the user can be told the reason why a construction cannot run under the particular conditions.

If an x value is assigned with an extreme value, the user can be warned. **The infobox appears also during grading! As a rule, use nIBox for error messages for extreme construction entries from your program.**

The infobox can appear in different display options. The display option is determined with the optional whole number parameter `nD`. The first digit of this 2-digit parameter controls which button is displayed. The second digit determines the icon in the window. Picture 20-4 contains an overview of the display options.

The function value of `nIBox` indicates the clicked button. The values of `nIBox` stand for the following buttons:





- 1 - Button "OK"
- 2 - Button "Yes"
- 3 - Button "Non"
- 4 - Button "Ignore"
- 5 - Button "Repeat"
- 6 - Button "Quit"

Clicking the button "Abort" always leads to immediate abort of the program. It is identical with `Exit Program`.

Example:

Before the construction steps for a mitred corner are carried out in the programming language, it is tested, whether the requested lines are suitable for creation of a corner and are not parallel.

```
'----- Lines parallel ?
rWi = rWiSS(s1,s2)
t1 = "Lines for corner are almost "+
& "parallel (angle<5°)!" + tC(13,10) +
& "The mitred corner cannot be "+
& "constructed."
t2 = "Error - Construction mitred "+
& "corner"
If (rAbs(rWi)<<5) Then
  nMsg= nIBox(t1,t2,21)
  Exit Program
Else If (rAbs((rAbs(rWi)-180))<<5) Then
  nMsg= nIBox(t1,t2,21)
  Exit Program
End If
```

	Icon:	No Icon	Exclamation mark	Info Icon	Question mark	Cross as Warning sign
						
Buttons:		+0	+1	+2	+3	+4
End/Repeat/Ignore	10+	10	11	12	13	14
OK	20+	20	21	22	23	24
OK/Abort	30+	30	31	32	33	34
Repeat/Abort	40+	40	41	42	43	44
Yes/No	50+	50	51	52	53	54
Yes/No/Abort	60+	60	61	62	63	64

Picture 20-4

If the angle between the lines s_1 and s_2 is almost 0° or almost 180° (between $-5^\circ/5^\circ$, $175^\circ/180^\circ$ or $-175^\circ/-180^\circ$), the message according to Picture 20-5 appears and the program is aborted.

The parameters for calling

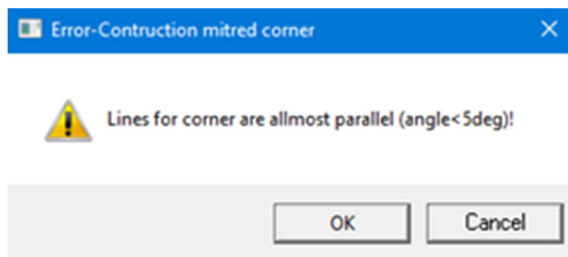
```
nMsg= nIBox(t1,t2,21)
```

are:

- t1 message text; here: "Lines for corner are almost parallel ..."
- t2 title of the infobox; here: "Error – Construction mitred corner"
- 21 the number for the display option; here: 21 for the icon exclamation mark and the button "OK".

cPick()

With `cPick()`, analogous to `nIBox`, a message appears on the screen which asks the user to click a point or a line. All information about the clicked object are gathered in a container and can be taken out of the container as required.



Picture 20-5

For collar and sleeve programs, dialogues can be developed with `cPick()` in which the user is guided through clicking the required lines. The use of z values for transfer of lengths and distances to the programming language program is not longer necessary.

Example:

For the calculation of the total length of the necklines in front and back, the following program lines are to be entered:

```
'----- allocate qF, qB
  qF = qKop(pXY(0,0)+pXY(100,0))
  qB = qKop(pXY(0,0)+pXY(50,0))
'----- click qF, qB
  tF="Click neckline FRONT !"
  cF = cPick(1,4,tF,"Collar",nT)
  qF = qCo(cF,"qq")
  tB="Click neckline BACK !"
  cB = cPick(2,4,tB,"Collar",nT)
  qB = qCo(cB,"qq")
'----- calculate target length
  rZl= rLngQ(qF)+rLngQ(qB)
```

Calling `cPick`, first fills a container; here: `cF` and `cB`. From this container, the required information is then, taken with the function `qCo`.

The parameters of the function `cPick()` have the following significance:

```
cPick(nI,nV,tC,tT,tP,nT)
```

nI unambiguous identifier; this identifier must be different for each call of `cPick()`. Thus, the different click instructions can be identified during test run and grading.

nV click variation

- 1 click point
- 2 click line/ curve fulcrum
- 4 click line/ curve
- 8 "freehand" click permitted

The individual variations can be combined by adding. Thus, $nV=3$ means clicking of points and line/ curve fulcrums.

tC comment text; With this text, the user is requested to click.

tT title text for the dialogue box

tP picture/ symbol text; permitted are, "!", "+", "i", "g" or the complete path to a bit-map.

nT during call: number of the part in which clicking is permitted. $nT=0$ permits clicking in all parts with a part number \leq the active part.

after call: number of the part which was clicked.

The following information can be called from the click container with the following functions. The first parameter is the variable name of the respective click container.

<code>nCo(c,"tl")</code>	Number of the piece which was clicked
<code>nCo(c,"nr")</code>	Pos-Number of the clicked object
<code>nCo(c,"ty")</code>	Type of the clicked object (-1: error, 0- digi point, 1- point, 2- line/curve)
<code>lCo(c,"rl")</code>	line/curve was clicked on the right (YES/NO)
<code>lCo(c,"st")</code>	click point is line/ curve fulcrum (YES/NO)
<code>lCo(c,"ri")</code>	curve direction in the click point in degrees
<code>rCo(c,"rln")</code>	relative length of the curve in the click point in %
<code>pCo(c,"pp")</code>	click point
<code>qCo(c,"qq")</code>	clicked line/curve

Proportion classes

The ease in a basic block can be adjusted via proportion classes or via x values. Which of the two options is used or whether both options are mixed, is decided by the programmer.

If proportion classes are used, the programmer defines the ease at waist, hip, bust, drop armhole... per proportion class in the program. If proportion classes are not used, the user adjusts the ease, later with x values.

The applicable proportion class is determined in the size table and transferred as a whole number value with the function `nZKlasse()`.

In a programming language program with the instruction `nZkl=nZKlasse()`, the variable `nZkl` has the following value for the respective measurement chart during processing:

Size table	value for nZKlasse()
> 01 e04 ____ 40_0	4
> 02 e04 ____ 42_0	4
> 03 e04 ____ 44_0	4
> 04 c02 ____ 40_0	2
> 05 g06 ____ 40_0	6
> 06 i08 ____ 40_0	8

The programmer determines the amount of ease to be added to bust, waist ... with the calculation of `nZKlasse`. With the instructions

```
'----- Bust width
rBu = rG(1)+10*nZKlasse()
'----- Waist width
rWa = rG(4)+13*nZKlasse()
'----- Hip width
rHi = rG(2)+15*nZKlasse()
'----- Drop armhole
rAh = 2*nZKlasse()
```

the bust width `rBu` for half of the garment is calculated as follows:

Size table	value of rBu	ease
> 01 e04 ____ 40_0	$920+10*4$	+40
> 02 e04 ____ 42_0	$960+10*4$	+40
> 03 e04 ____ 44_0	$1000+10*4$	+40
> 04 c02 ____ 40_0	$920+10*2$	+20
> 05 g06 ____ 40_0	$920+10*6$	+60
> 06 i08 ____ 40_0	$920+10*8$	+80

Per proportion class, 10mm ease are added to the bust, 13mm ease at the waist, 15mm ease at the hip. At the same time, the armhole is dropped by 2mm per proportion class. With the factors before `nZKlasse()`, the programmer determines the ease per proportion class. If the change of ease is to be irregular in the different proportion classes, the IF-ENDIF structure is to be used.

For tight-fitting garments, e.g. swimwear or sportswear, the calculation can also be $10*nZKlasse()-40$. Thus, the measurement in proportion class a00 is 4cm smaller than the body measurement.

Circle functions

Circles are treated like curves in the new programming language. All curve functions can also be applied to circles. A circle can be created with the functions

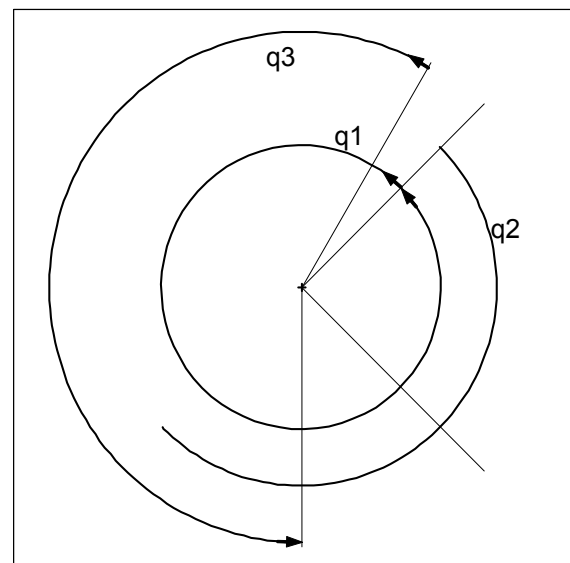
```
qTeilKr()
qHalbKr()
qVollKr()
```

As parameters, the centre point of the circle (point variable) and the radius of the circle (real variable) are to be entered. Depending on the circle type, direction assignments follow.

If the circle is required to create an intersection with a line or another curve, the function `qVollKr()` (full circle) should always be used. For creation of intersections, a direction point must be entered which points to the required intersection if more than one option are available. The circle centre is unsuitable as a direction point.

Example:

In the following example program, each circle variation is defined and then, output (Picture 20-6).



Picture 20-6

The parameter 45 in the instruction

```
q1 = qVollKr(p0, rRad1, 45)
```

determines that the symmetry axis of the full circle (start and end) is the 45° direction.

The parameter -45 in the instruction

```
q2 = qHalbKr(p0, rRad2, -45)
```

determines that the symmetry axis of the semicircle is the -45° direction.

The parameter 60 and -90 in the instruction

```
q3 = qTeilKr(p0, rRad3, 60, -90)
```

determine that the partial circle starts at 60° and ends at -90°. The circle is created in a mathematically positive direction.

```

' *****
  Program Main() ' Circle variations
' -----
  rVar rRad1,rRad2,rRad3
  qVar q1,q2,q3
  pVar p0
' ----- Centre point
  p0 = pXY(0,0)
' ----- Radius
  rRad1 = 100
  rRad2 = 140
  rRad3 = 180
' ----- define circles
  q1 = qVollKr(p0,rRad1,45)
  q2 = qHalbKr(p0,rRad2,-45)
  q3 = qTeilKr(p0,rRad3,60,-90)
' ----- Output
  AusP(p0)
  AusQ(q1,q2,q3)
  End Program
' *****

```

External functions

For more transparency, often required programming steps can be saved as external functions. An external function (here: type n) begins with

Function *nXxx*(*[parameter list]*)

and ends with

End Function

The function name is to be created analogous to a variable name and is to be assigned with a variable type. Within the function, the function name is a variable which can be assigned with a value. This value is returned after processing of the function. When calling the function, any number of variables of different types can be transferred to the function. The amount of parameters and the parameter type must be identical in the call of the function and the function definition. The parameters in the function call are also returned. External functions can be saved in their own modules. In the future, special modules for curves, corners etc. can be developed which will be made available to other Grafis programmers as libraries. The structures Program Main()/ End Program and Function *xXxx*()/ End Function must not be interlocked with one another.

Example:

```

' *****
  Program Main()
  [instructions]
  lIo=lEck(p20,p21,p27,p28,p31)
  [instructions]
  lIo=lEck(p31,p37,p56,p57,p57a)
  [instructions]
  End Program
' *****

```

```

' *****
  Function lEck(p1,p2,p3,p4,pEck)
  ' Calculation of the intersection
  ' of two lines
  ' The points p1 and p2 create the
  ' first line,
  ' the points p3 and p4 create the
  ' second line.
  ' The corner point pEck is returned
  ' as fifth parameter.
  ' If both lines are almost parallel
  ' the program is aborted with
  ' a warning.
  ' Generated: 10-09-2000 KF
' *****
  pVar
  sVar s1,s2
  rVar rWi
  tVar t1,t2
  nVar nMsg
' -----
  lEck= False
  s1 = sPP(p1,p2)
  s2 = sPP(p3,p4)
' ----- lines parallel ?
  rWi = rWiSS(s1,s2)
  t1 = "Lines for corner are almost "+
  & "parallel (angle<5deg) !" + tC(13,10) +
  & "The corner cannot be constructed."
  t2 = "Error - Construction corner"
  If (rAbs(rWi)<<5) Then
    nMsg= nIBox(t1,t2,21)
    Exit Function
  Else If (rAbs((rAbs(rWi)-180))<<5) Then
    nMsg= nIBox(t1,t2,21)
    Exit Function
  End If
  pEck= pSchnSS(s1,s2)
  lEck= True
  End Function
' *****

```

The external function `lEck()` constructs a corner point which is defined by four points. The four points are transferred in the parameter list. The first and second point and the third and fourth point create a line, respectively. If the angle between the two lines smaller than 5° , the program is aborted with a message. Otherwise, the corner point `pEck` is calculated and returned as fifth parameter of the parameter list of the function. The function can be called a number of times (here: twice) with different points each time.

Often, logical functions are programmed which only end with the value `True`, if the function has been processed, correctly. To relocate the shoulder seam by `x6` at the neck and `x7` at the armhole, the function `lTranslShoulder()` must have the following structure:

```

' *****
  Program Main()
  [instructions]
  lIs=lTranslShoulder(qNeckF,qNeckB,
& qArmF,qArmB,rX(6),rX(7))
  [instructions]
' *****

```

```

End Program
' *****
' *****
Function lTranslShoulder(q1,q2,
&          q3,q4,r1,r2)
' Transformation of q2 to q1 and
' q4 to q3
' relocate end point of q1 by r1
' relocate end point of q3 by r2
' create new curves
' reverse transform new q2 and new q4
' *****
lTranslShoulder=False
[instructions]
q1=...
q2=...
q3=...
q4=...
lTranslShoulder=True
End Function
' *****

```

The new curves of the neck and armhole are transferred in the parameter list. Before processing the instruction line

```

lIs=lTranslShoulder(qNeckF,qNeckB,
&          qArmF,qArmB,rX(6),rX(7))

```

in Main(), the shoulder seam of the curves qNeckF, qNeckB, qArmF, qArmB has not been relocated. After processing the line, the curves are re-allocated and the shoulder is relocated.

20.2 Automatic length adjustment

rNahInt(rA1,rIs1,rA2,rIs2,rTarg)

The approximation interpolation rNahInt() is required for automatic length adjustment, e.g. for collars and sleeves. The collar is to be adjusted to the neck, the sleeve to the armhole.

For application of length adjustments, the following procedure applies:

1. Formulate a new, unambiguous construction instruction with a target length depending on another construction parameter.
2. Determine a variable construction parameter rA , which can be altered for adjustment of the target length $rTarg$.
3. Allocate a zero approximation. Example: For $rA1=0$, the result would be $rIs1=0$.
4. First development of the construction with a suitable starting value $rA2$ for the variable construction parameter up to actual length $rIs2$ and calculation of actual length $rIs2$. Depending on the extent, the development steps can be programmed as a external function.
5. Calculate the new starting value rA with the function rNahInt().

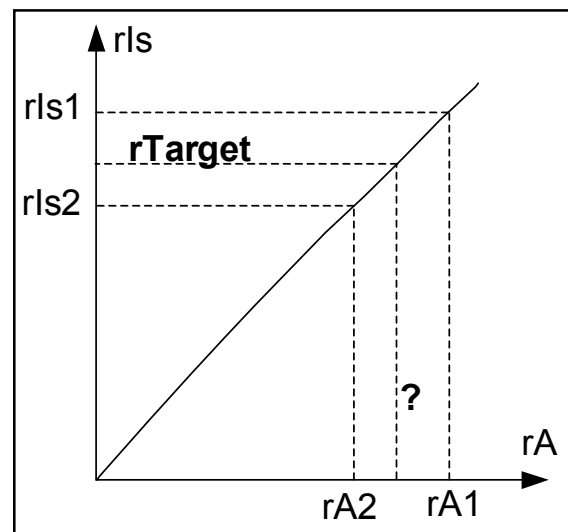
6. Repeated development of the construction with the new starting value rA and calculation of the actual length rIs .
7. Query, whether the target length has been achieved.
If yes, the construction is continued according to point 8.
If no, the values of $rA2$ and $rIs2$ are switched to the variables $rA1$ and $rIs1$. The variables $rA2$ and $rIs2$ then, obtain the values of rA and rIs which were last calculated. Then, a new value is calculated for rA according to point 5.
8. Finish the construction.

The function

rNahInt(rA1,rIs1,rA2,rIs2,rTarg)

The function rNahInt(rA1,rIs1,rA2,rIs2,rTarg) calculates the probable starting value from two starting values $rA1$ and $rA2$, and the corresponding result values $rIs1$ and $rIs2$, with the result $rTarg$.

A mainly linear interdependence between starting value and result value is assumed (Picture 20-7).



Picture 20-7

In the following collar band construction, the variable construction parameter is the distance between $p1$ and $p3$.

Example:

For a distance $p1 \leftrightarrow p3$ of 160mm, the collar neck is 165.8mm long and for 200mm the collar neck is 204.7mm long.

With the allocation

```

rA1 =160
rIs1 =165.8
rA2 =200
rIs2 =204.7

```

the required distance $p1 \leftrightarrow p3$ can be calculated for a target length of the collar neck of 183mm as follows:

```

rTarg=183

```

```

rA      =rNahInt (rA1,rIs1,rA2,
&                rIs2,rTarg)

```

This calculation results in a value of 177.6mm for the distance $p_1 \leftrightarrow p_3$. With this value, a collar neck of 182.9mm is obtained. A further calculation with the values

```
rA1    =200
rIs1   =204.7
rA2    =177.6
rIs2   =182.9
```

results in a value of 177.7mm for the distance $p1 \leftrightarrow p3$. With this value, the collar neck has the required length of 183.0mm.

Construction: collar band with automatic length adjustment

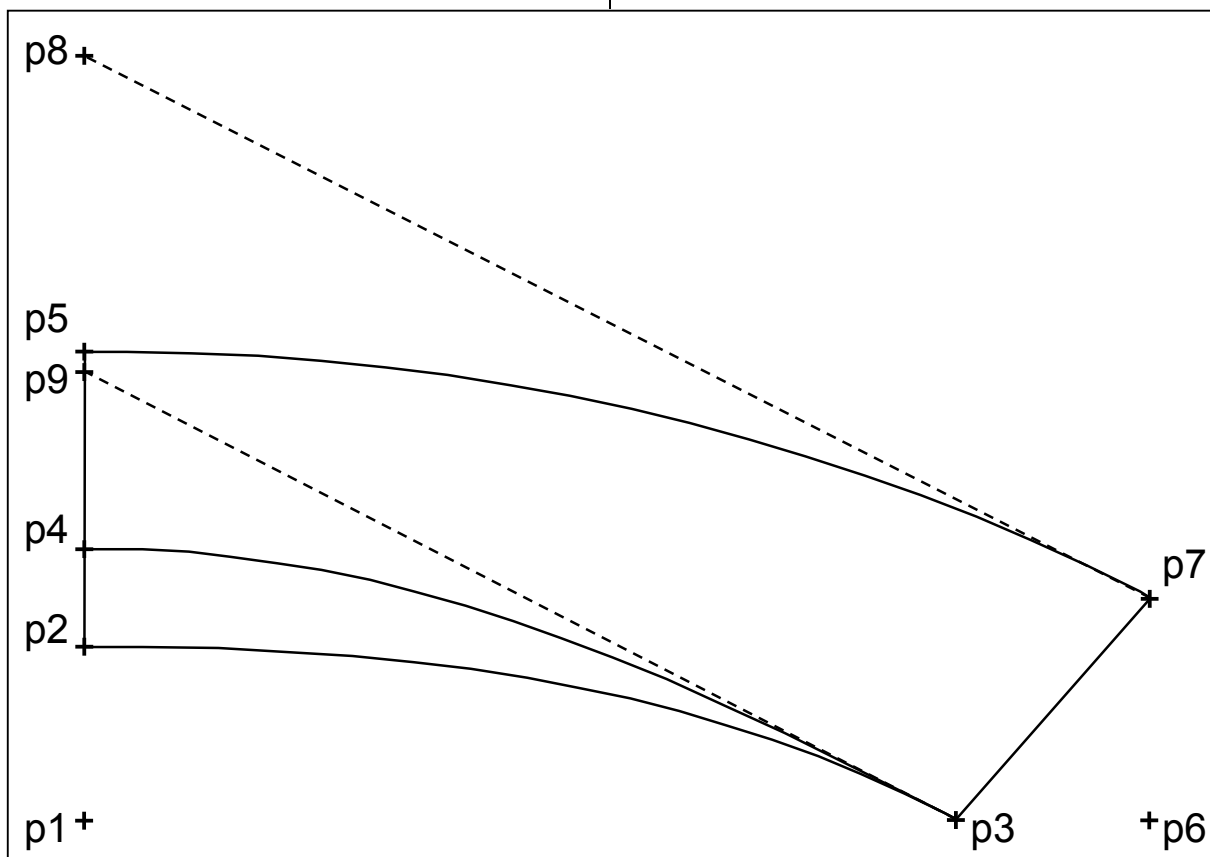
A collar band according to Picture 20-8 is to be programmed with application of the following x values:

X	Definition	Step	Value
1	addition collar length		0mm
2	raise CB	$p1 \Rightarrow p2$	35mm
3	collar fall width	$p2 \Rightarrow p4$	20mm
4	collar width CB	$p4 \Rightarrow p5$	40mm
5	collar point (x) to p3	$p3 \Rightarrow p6$	40mm
6	collar point (y) to p3	$p6 \Rightarrow p7$	45mm
7	factor for the direction p. collar neck dep. on x2	$p1 \Rightarrow p9$	2.6
8	direction p. f. collar edge	$p1 \Rightarrow p8$	155mm

Construction steps:

from	to	direction	distance
1	2	$\uparrow\uparrow$	x2 (raise CB)
2	4	$\uparrow\uparrow$	x3 (collar fall width)
4	5	$\uparrow\uparrow$	x4 (collar width)
1	8	$\uparrow\uparrow$	x8 (dir. p. collar edge)
1	9	$\uparrow\uparrow$	x2*x7
1	3	\Rightarrow	variable distance , so that «collar neck» = «neck meas. +x1»
			construct and optimise collar neck
3	6	\Rightarrow	x5
6	7	$\uparrow\uparrow$	x6
			construct collar fold and collar edge

All curves are to run into the CB at right angle. The collar fold and the collar neck have the direction $p3 \Rightarrow p9$ in $p3$. The collar edge has the direction $p7 \Rightarrow p8$ in $p7$.



Picture 20-8

The program: collar band with automatic length adjustment

```

*****
Program Main()
' Construction of a collar band after instructions by
' Mrs. Prof. H.Brückner, Berlin
' The user has to click the necklines in the front and back
' The collar is automatically constructed, so that the length of the collar
' neck equals the length of both necklines plus addition x1.
'-----

lVar
nVar n
rVar rWi3,rWi7,rA,rA1,rA2,rIs,rIs1,rIs2,rClLng,rTarg
pVar p1,p2,p3,p4,p5,p6,p7,p8,p9
sVar
qVar q1,q2,q3,qF,qB
tVar
cVar cF,cB
'-----

lCon
nCon
rCon rRi=0,rLe=180,rUp=90,rDo=270
rCon
tCon
'----- x value definitions
XTitel("collar band")
Defx(1,"addition collar length",0)
Defx(2,"raise CB",35)
Defx(3,"collar fold width",20)
Defx(4,"collar width CB",40)
Defx(5,"collar point (x) in relation to p3",40)
Defx(6,"collar point (y) in relation to p3",45)
Defx(7,"factor for direction point neck relating to x2",2.6)
Defx(8,"direction point for collar edge",155)
'----- query length of necklines
cF = cPick(1,4,"Click neckline FRONT !","collar","!",nT)
If (not lCo(cF, "iO")) Then
    FEnd(0)
    Exit Program
Endif
qF = qCo(cF,"qq")
cB = cPick(2,4,"Click neckline BACK !","collar","!",nT)
If (not lCo(cB, "iO")) Then
    FEnd(0)
    Exit Program
Endif
qB = qCo(cB,"qq")
rClLng = rLngQ(qF)+rLngQ(qB)
If(rClLng<<rX(2)) Then
    n = nIBox("The necklines are too short !")
    Exit Program
End If
'----- points at CB
p1 = pXY(0,0)
p2 = pXY(0,rX(2))
p4 = pPRiLng(p2,rUp,rX(3))
p5 = pPRiLng(p4,rUp,rX(4))
p8 = pPRiLng(p1,rUp,rX(8))
p9 = pPRiLng(p1,rUp,rX(2)*rX(7))
'----- collar neck 0 approximation
rTarg = rClLng+rX(1)
rA = rClLng
p3 = pXY(rA,0)
rWi3= rRiPP(p3,p9)
q1 = qSpline(p3,rWi3,p2,rLe)
rIs= rLngQ(q1)
'----- values for 1st approx.
rA1 = 0
rIs1 = 0
rA2 = rA

```



```

rIs2 = rIs
'----- autom.approx.
For n = 1,10,1
  rA = rNahInt(rA1,rIs1,rA2,rIs2,rTarg)
  p3 = pXY(rA,0)
  rWi3= rRiPP(p3,p9)
  q1 = qSpline(p3,rWi3,p2,rLe)
  rIs= rLngQ(q1)
  If(rAbs(rIs-rTarg)<<0.01) Then
    Exit For
  End If
  rA1 = rA2
  rIs1 = rIs2
  rA2 = rA
  rIs2 = rIs
End For
'----- collar point
p6 = pPRiLng(p3,rRi,rX(5))
p7 = pPRiLng(p6,rUp,rX(6))
'----- collar fold line
q2 = qSpline(p3,rWi3,p4,rLe)
'----- collar edge
rWi7= rRiPP(p7,p8)
q3 = qSpline(p7,rWi7,p5,rLe)
'----- output points + lines
AusP(p1,p2,p3,p4,p5,p6,p7)
AusQ(p2+p5)
AusQ(p3+p7)
AusQ(q1,q2,q3)
'-----
End Program
'*****

```

20.3 Collar neck with minimum as external function

As basis for various collar developments, a external function `qClNeck1()` is to be programmed which delivers a collar neck (Picture 20-9) of a given length, considering the following parameters:

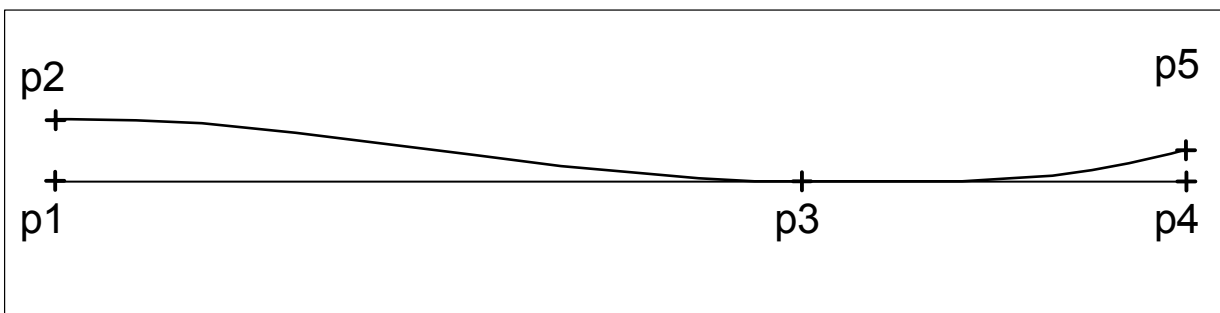
- raise centre back
- raise centre front
- additional direction at the CF
- position of minimum in % (from CB)

The next page shows a test environment for the function `qClNeck1()`. The actual function `qClNeck1()` is shown on the following page. The function `qClNeck1()` can also be saved in a new module, together with further functions for collar necks of different shapes.

Construction steps function `qClNeck1()`:

from	to	direction	distance
1	2	↑	rCb (raise CB)
1	4	⇒	variable distance , This distance is optimised so that the collar neck equals the length of rTarg.
1	3	⇒	rMin /100* variable distance
4	5	↑	rCf (raise CF)
			construct and optimise collar neck

The collar neck is to run into the centre back at right angle. In point p5 the curve is to have the direction $p3 \Rightarrow p5$ plus the correction `rRi5z`.



Picture 20-9

```

' *****
Program Main()
' Test environment for development of the function qClNeck1()
' -----
  nVar n
  rVar rClLng,rTarg
  pVar p1,p2,p3,p4,p5
  qVar qF,qB,q1
  cVar cF,cB
  rCon rRi=0,rLe=180,rUp=90,rDo=270
' ----- x values
  XTitel("collar neck for shirt collars")
  Defx(1,"addition to collar neck line",0)
  Defx(2,"raise CB",10)
  Defx(3,"raise CF",5)
  Defx(4,"additional direction collar stand in p5",10)
  Defx(5,"position p3 between p1-p4 in %",66)
' ----- query length of necklines
  cF = cPick(1,4,"Click neckline FRONT !","collar","!",nT)
  If (not lCo(cF, "iO")) Then
    FEnd(0)
    Exit Program
  Endif
  qF = qCo(cF,"qq")
  cB = cPick(2,4,"Click neckline BACK !","collar","!",nT)
  If (not lCo(cB, "iO")) Then
    FEnd(0)
    Exit Program
  Endif
  qB = qCo(cB,"qq")
  rClLng = rLngQ(qF)+rLngQ(qB)
  If(rClLng<<rX(2)) Then
    n = nIBox("The necklines are too short !")
    Exit Program
  End If
  rTarg= rClLng+rX(1)
' ----- collar neck line
  q1 = qClNeck1(rX(2),rX(3),rX(4),rX(5),rTarg,p1,p2,p3,p4,p5)
' ----- output
  AusP(p1,p2,p3,p4,p5)
  AusQ(q1)
  End Program
' *****
' *****
Function qClNeck1(rCb,rCf,rRi5z,rMin,rTarg,p1,p2,p3,p4,p5)
' ... calculates the collar neck line which has a minimum at rRi5 %
' between CB and CF. The parameters to be given:
' rCb - raise CB
' rCf - raise CF
' rRi5 - additional direction in p5 (at CF)
' rMin - position of minimum in percent (from CB)
' rTarg- target length of the collar neck (incl. add) from CB to CF
' returned are the curve qClNeck1, which starts at CB,
' and the points p1 to p5.
' -----
  nVar n
  rVar rA,rRi5,rIs,rA1,rIs1,rA2,rIs2
' -----
  rCon rRi=0,rLe=180,rUp=90,rDo=270
' ----- points at CB
  p1 = pXY(0,0)
  p2 = pPRiLng(p1,rUp,rCb)
' ----- 0.approximation
  rA = rTarg
  p3 = pPRiLng(p1,rRi,rMin/100*rA)
  p4 = pPRiLng(p1,rRi,rA)
  p5 = pPRiLng(p4,rUp,rCf)
  rRi5 = rRiPP(p3,p5)+rRi5z
  qClNeck1 = qSpline(p2,rRi,p3,rRi,p5,rRi5)

```

```

    rIs = rLngQ(qClNeck1)
'----- values for 1st approx.
    rA1 = 0
    rIs1 = 0
    rA2 = rA
    rIs2 = rIs
'----- autom. approx.
    For n = 1,10,1
        rA = rNahInt(rA1,rIs1,rA2,rIs2,rTarg)
        p3 = pPRiLng(p1,rRi,rMin/100*rA)
        p4 = pPRiLng(p1,rRi,rA)
        p5 = pPRiLng(p4,rUp,rCf)
        rRi5 = rRiPP(p3,p5)+rRi5z
        qClNeck1 = qSpline(p2,rRi,p3,rRi,p5,rRi5)
        rIs = rLngQ(qClNeck1)
        If(rAbs(rIs-rTarg)<<0.01) Then
            Exit For
        End If
        rA1 = rA2
        rIs1 = rIs2
        rA2 = rA
        rIs2 = rIs
    End For
End Function
'*****

```


Content of Module collarnecks.gpr:

```

*****
Function qClNeck1(rCb,rCf,rRi5z,rMin,rTarg,p1,p2,p3,p4,p5)
' ... calculates the collar neck line, which has a minimum at rRi5 %
' between CB and CF. The parameters to be given:
'   rCb - raise CB
'   rCf - raise CF
'   rRi5 - additional direction in p5 (at CF)
'   rMin - position of minimum in percent (from CB)
'   rTarg- target length for collar neck (incl. add) from CB to CF
' returned are the curve qClNeck1, which starts at CB,
' and the points p1 to p5.
-----
nVar n
rVar rA,rRi5,rIs,rA1,rIs1,rA2,rIs2
-----
rCon rRi=0,rLe=180,rUp=90,rDo=270
----- points at CB
p1   = pXY(0,0)
p2   = pPRiLng(p1,rUp,rCb)
----- 0.approximation
rA   = rTarg
p3   = pPRiLng(p1,rRi,rMin/100*rA)
p4   = pPRiLng(p1,rRi,rA)
p5   = pPRiLng(p4,rUp,rCf)
rRi5 = rRiPP(p3,p5)+rRi5z
qClNeck1 = qSpline(p2,rRi,p3,rRi,p5,rRi5)
rIs   = rLngQ(qClNeck1)
----- values for 1st approx.
rA1   = 0
rIs1   = 0
rA2   = rA
rIs2   = rIs
----- autom.approx.
For n = 1,10,1
  rA   = rNahInt(rA1,rIs1,rA2,rIs2,rTarg)
  p3   = pPRiLng(p1,rRi,rMin/100*rA)
  p4   = pPRiLng(p1,rRi,rA)
  p5   = pPRiLng(p4,rUp,rCf)
  rRi5 = rRiPP(p3,p5)+rRi5z
  qClNeck1 = qSpline(p2,rRi,p3,rRi,p5,rRi5)
  rIs   = rLngQ(qClNeck1)
  If(rAbs(rIs-rTarg)<<0.01) Then
    Exit For
  End If
  rA1   = rA2
  rIs1   = rIs2
  rA2   = rA
  rIs2   = rIs
End For
End Function
*****

```

Content of Module Main.gpr:

```

*****
Program Main()
' Shirt collar construction with automatic length adjustment
' of the collar neck line to the length of the measured neck
' after instructions by Mrs. Prof. H.Brückner, Berlin
-----
nVar n
rVar rClLng,rTarg,rRi5,rRi8,rRi11
pVar p1,p2,p3,p4,p5,p6,p9,p7,p8,p10,p11
qVar qF,qB,q1,q2,q3
cVar cF,cB
-----
rCon rRi=0,rLe=180,rUp=90,rDo=270

```

```

'----- x values
  XTitel("shirt collar")
  Defx(1,"addition to collar neck line",0)
  Defx(2,"raise CB",10)
  Defx(3,"raise CF",5)
  Defx(4,"additional direction collar stand in p5",10)
  Defx(5,"collar stand width CB",25)
  Defx(6,"collar width CB",65)
  Defx(7,"overlap collar stand",20)
  Defx(8,"reduce stand width at overlap",5)
  Defx(9,"collar point overlap in x direction",15)
  Defx(10,"collar point overlap in y direction",10)
  Defx(11,"direction collar point",10)
  Defx(12,"position p3 between p1-p4 in %",66)
'----- query length of necklines
  cF = cPick(1,4,"Click neckline FRONT !","collar","!",nT)
  If (not lCo(cF, "iO")) Then
    FEnd(0)
    Exit Program
  Endif
  qF = qCo(cF,"qq")
  cB = cPick(2,4,"Click neckline BACK !","collar","!",nT)
  If (not lCo(cB, "iO")) Then
    FEnd(0)
    Exit Program
  Endif
  qB = qCo(cB,"qq")
  rClLng = rLngQ(qF)+rLngQ(qB)
  If(rClLng<<rX(2)) Then
    n = nIBox("The necklines are too short !")
    Exit Program
  End If
  rTarg = rClLng+rX(1)
'----- collar neck line
  q1 = qClNeck1(rX(2),rX(3),rX(4),rX(12),rTarg,p1,p2,p3,p4,p5)
'----- points p6 to p11
  p6 = pPRiLng(p2,rUp,rX(5))
  Paral(-rX(5):q2=q1)
  p9 = pQend(q2)
  p7 = pPRiLng(p6,rUp,rX(6))
  rRi5= rRiQend(q1)
  p8 = pPRiLng(p5,rRi5,rX(7))
  rRi8= rRi5+90
  p10 = pPRiLng(p8,rRi8,rX(5)-rX(8))
  p11 = pPRiLng(p4,rUp,rX(2)+rX(5)+rX(6)+rX(10))
  p11 = pPRiLng(p11,rRi,rX(9))
'----- collar edge
  rRi11 = rX(11)
  q3 = qSpline(p7,rRi,p11,rRi11)
'----- output
  AusP(p1,p2,p3,p4,p5,p6,p7,p8,p9,p10,p11)
  AusQ(p2+p7,p9+p11,p5+p8,p8+p10,p10+p9,p9+p5)
  AusQ(q1,q2,q3)
  End Program
'*****

```

20.5 Construction component shoulder seam relocation with replacing Pos-objects

So far, only new objects were transferred to the Grafis record. For construction components which are to be applied to existing objects, it must be possible to access objects of the Grafis record. This is possible with the so-called Pos-numbers.

Each object (point, line) of the Grafis record has an unambiguous Pos-number for identification.

The Pos-number applies within one part and is automatically entered for each new object. All construction steps of the Grafis record point to the respective object via the Pos-number.

The application of Pos-numbers

Existing objects which are to be processed with a construction component, are identified with the function `cPick()`. The Pos-numbers can be extracted from the click container as whole number parameters. Example:

```
cXx=cPick(1,1,tC,tT,tP,nT)
```

The significance of the parameters is explained on page 20-5.

The Pos-number of the clicked point is extracted from this container as follows:

```
nXx=nCo(cXx,"nr")
```

A point or a line of the Grafis record is replaced by entering also the Pos-number of the object to be replaced for output from the programming language program. In output instructions with Pos-numbers, only one object can be output, respectively. The Pos-numbers can be entered for points, lines and curves. The Grafis record does not differentiate between lines and curves; both are regarded as lines.

```
AusP(nXx,pXx)
```

nXx Pos-number of the point

pXx point to be output

```
AusQ(nXx,qXx) or AusQ(nXx,sXx)
```

nXx Pos-number of the line

qXx line/curve to be output

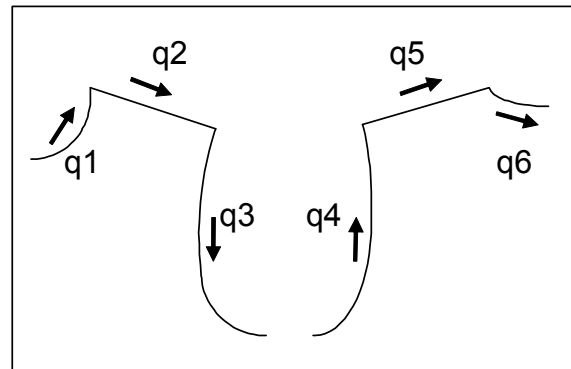
Application of Pos-numbers in the construction component "shoulder relocation"

Apart from the application of Pos-numbers, this example should also clarify:

- The creation of a meaningful dialogue with the user. First, the user is given the information and then, is requested to click the required objects.
- The safety of the program has great significance. The program must later "react", safely to the different cases of applications. For the shoulder relocation, the length of the shoulders is compared and each corner is checked for gaps and protruding lines.
- Each construction component should alter the original objects as little as possible, even though at first, no negative effects may be recognised. Therefore, the original orientation of

the lines is reproduced at the end of the construction component.

- A sufficient comment is necessary. This is irrespective of the fact, whether subsequent alterations/corrections are carried out by the original programmer or another person. When working with the construction component shoulder relocation, decide whether the comment is sufficient for you.
- A picture with point and line annotations according to Picture 20-11 is also part of each project. This also applies to a short description of the procedure.



Picture 20-11

For the shoulder relocation, objects according to Picture 20-11 are assumed or prepared.

The programming language program for the shoulder seam is organised as follows:

- create and display info mask for the user. The user is informed about the pre-requisites and the application options.
- The curves are suitably allocated, so that the program can be tested in the development environment.
- Request the user to click the front neckline. The Pos-number of the ft neck is saved to nPos1 in the process.
- Request the user to click the front shoulder. The Pos-number of the ft shoulder is saved to nPos2 in the process.
- With the external function `lcurve_orient_all()`, orientate the neckline and shoulder according to Picture 20-11 check the corner. If no clear corner is found, abort with a message. Whether a curve was re-orientated or not, is saved under the variables lRota1 etc.
- Request the user to click the front armhole. The Pos-number of the ft armhole is saved under nPos3.
- With the external function `lcurve2_orient()`, orientate the armhole line according to Picture 20-11 and check the corner. If no clear corner is found, abort with a message.

- Request the user to click the back armhole. The Pos-number of the bk armhole is saved as nPos4.
- Request the user to click the back shoulder. The Pos-number of the bk shoulder is saved as nPos5.
- With the external function `lcurve_orient_all()`, orientate the armhole and shoulder according to Picture 20-11 and check the corner. If no clear corner is found, abort with a message.
- Compare the front and back shoulder and abort with a message, if necessary.
- Request the user to click the back neckline. The Pos-number of the bk shoulder is saved as nPos6.
- With the external function `lKurve2_orient()`, orientate the neckline according to Picture 20-11 and check the corner. If no clear corner is found, abort with a message.

Now, the actual transformation steps follow:

- Transform back armhole and shoulder to the front and then link.
- Relocate shoulder point at the neck by x1 and at the armhole by x2.
- Allocate the curves, again and reverse the transformation.
- If a curve has been rotated, return it to its original orientation.
- Replace the curves of the construction record with the new curves. The curves are output onto the original Pos-numbers.

The complete program `Main()` with the external functions `lcurve_orient_all` and `lcurve2_orient` in the Module "addition" follows.

Content of Module `Main.gpr`:

```

' *****
' Program Main()
' -----
' Construction component relocate shoulder
' ----- Information for the user
' The relocate amount are controlled via x values.
' The construction component requires:
' - shoulder lengths identical in ft and bk
' - straight shoulder lines (no curves) and
' - no gaps between the curves and the shoulder lines.
' ----- Internal information of the program
' q1: neckline ft, q2: shoulder ft, q3: armhole ft
' q4: armhole bk, q5: shoulder bk, q6: neckline bk
' lRota1 to lRota6 show, whether the curve has be re-orientated.
' At the end of the program, the curves are output in their
' original orientation.
' -----
' lVar l, lRota1, lRota2, lRota3, lRota4, lRota5, lRota6
' nVar n, nPos1, nPos2, nPos3, nPos4, nPos5, nPos6, nT
' rVar r1, r2
' pVar pSneck, pSarmh
' sVar s1, s2
' qVar q1, q2, q3, q4, q5, q6, q1t, q3t
' tVar tInfo, t, tGen, tTop, t1
' cVar c1, c2, c3, c4, c5, c6
' -----
' lCon
' nCon
' rCon
' tCon
' ----- x values
' XTitel("Relocate shoulder")
' Defx(1,"relocate amount at neckline to ft",10)
' Defx(2,"relocate amount at armhole to ft",10)
' ----- allocate the curves
' q1 = qKop(pXY(0,0)+pXY(0,20))
' q2 = qKop(pXY(0,20)+pXY(20,20))
' q3 = qKop(pXY(20,20)+pXY(20,-20))
' q4 = qKop(pXY(30,-20)+pXY(30,20))
' q5 = qKop(pXY(30,20)+pXY(50,20))
' q6 = qKop(pXY(50,20)+pXY(50,0))
' ----- query and check objects
' tGen = "create no clear corner."+tC(13,10)+

```



```

&      "Correct the corner and relocate"+tC(13,10)+
&      "the shoulder again !"
tTop = "Relocate shoulder"
'----- neckline ft
tInfo= "Click front neckline !"
nT    = 0
c1    = cPick(1,4,tInfo,tTop,"i",nT)
q1    = qCo(c1,"qq")
'----- shoulder ft
tInfo= "Click front shoulder !"
c2    = cPick(2,4,tInfo,tTop,"i",nT)
q2    = qCo(c2,"qq")
l     = lcurve_orient_all(q1,q2,lRota1,lRota2)
If(Not l) Then
t     = "The ft neckline curve and the ft shoulder"+tC(13,10)+tGen
n     = nIBox(t,"Relocate shoulder",24)
Exit Program
End If
'----- shoulder line straight line?
If(rAbs(rLngQ(q2)-rAbstPP(pQanf(q2),pQend(q2)))>>0.05) Then
t     = "The shoulder line is curved."+tC(13,10)
&    + "This case is not prepared."
n     = nIBox(t,"Relocate shoulder",24)
Exit Program
End If
'----- armhole ft
tInfo= "Click ft armhole !"
c3    = cPick(3,4,tInfo,tTop,"i",nT)
q3    = qCo(c3,"qq")
l     = lcurve2_orient(q2,q3,lRota3)
If(Not l) Then
t     = "The curves ft shoulder and ft armhole"+tC(13,10)+tGen
n     = nIBox(t,"Relocate shoulder",24)
Exit Program
End If
'----- armhole bk
tInfo= "Click back armhole !"
c4    = cPick(4,4,tInfo,tTop,"i",nT)
q4    = qCo(c4,"qq")
'----- shoulder bk
tInfo= "Click back shoulder !"
c5    = cPick(5,4,tInfo,tTop,"i",nT)
q5    = qCo(c5,"qq")
l     = lcurve_orient_all(q4,q5,lRota4,lRota5)
If(Not l) Then
t     = "The curves bk armhole and back shoulder"+tC(13,10)+tGen
n     = nIBox(t,"Relocate shoulder",24)
Exit Program
End If
'----- shoulder straight line?
If(rAbs(rLngQ(q5)-rAbstPP(pQanf(q5),pQend(q5)))>>0.05) Then
t     = "The shoulder line is curved."+tC(13,10)
&    + "This case is not prepared."
n     = nIBox(t,"Relocate shoulder",24)
Exit Program
End If
'----- compare shoulder lines
If(rAbs(rLngQ(q2)-rLngQ(q5))>>0.5) Then
t     = "The shoulder lines in ft and bk"+tC(13,10)
&    + "have different lengths !"
n     = nIBox(t,"Relocate shoulder",24)
Exit Program
End If
'----- neckline bk
tInfo= "Click back neckline !"
c6    = cPick(6,4,tInfo,tTop,"i",nT)
q6    = qCo(c6,"qq")
l     = lcurve2_orient(q5,q6,lRota6)
If(Not l) Then

```

```

t      = "The curves bk shoulder and bk neckline"+tC(13,10)+tGen
n      = nIBox(t,"Relocate shoulder",24)
Exit Program
End If
'----- transform back neckline and armhole curves
s1     = sPP(pQanf(q5),pQend(q5))
s2     = sPP(pQend(q2),pQanf(q2))
DrehTr(s1,s2:q4,q6)
'----- link curves
q1t    = qKop(q1+q6)
q3t    = qKop(q4+q3)
'----- relocate shoulder point
pSneck = pQend(q1)
pSarmh  = pQanf(q3)
pSneck  = pQPlng(q1t,pSneck,-rX(1))
pSarmh  = pQPlng(q3t,pSarmh,rX(2))
'----- create all curves again
q1      = qQbisP(q1t,pSneck)
q2      = qKop(pSneck+pSarmh)
q3      = qQabP(q3t,pSarmh)
q4      = qQbisP(q3t,pSarmh)
q5      = qKop(pSarmh+pSneck)
q6      = qQabP(q1t,pSneck)
'----- reset curves in the bk
DrehTr(s2,s1:q4,q5,q6)
'----- rotate curves in original direction
If(lRota1) Then
  q1    = -q1
End If
If(lRota2) Then
  q2    = -q2
End If
If(lRota3) Then
  q3    = -q3
End If
If(lRota4) Then
  q4    = -q4
End If
If(lRota5) Then
  q5    = -q5
End If
If(lRota6) Then
  q6    = -q6
End If
'----- output
AusQ(nCo(c1,"nr"),q1)
AusQ(nCo(c2,"nr"),q2)
AusQ(nCo(c3,"nr"),q3)
AusQ(nCo(c4,"nr"),q4)
AusQ(nCo(c5,"nr"),q5)
AusQ(nCo(c6,"nr"),q6)
'-----
End Program
'*****

```

Content of **Module addition.gpr**

```

'*****
Function lcurve_orient_all(q1,q2,lRota1,lRota2)
'-----
' The curves are orientated so that the end point of the first curve
' is positioned, directly at the beginning of the second. If the
' curves were oriented, correctly the function has the value True,
' other wise the value False.
'-----
nVar n
qVar q1t,q2t
pVar pEndq1,pAnfq2

```

```

'----- query variations, re-orientate curve
lcurve_orient_all= False
For n = 1,4,1
  If(n==1) Then
    q1t = q1
    q2t = q2
    lRota1 = False
    lRota2 = False
  Else If(n==2) Then
    q1t = -q1
    q2t = q2
    lRota1 = True
    lRota2 = False
  Else If(n==3) Then
    q1t = q1
    q2t = -q2
    lRota1 = False
    lRota2 = True
  Else If(n==4) Then
    q1t = -q1
    q2t = -q2
    lRota1 = True
    lRota2 = True
  End If
  pEndq1 = pQend(q1t)
  pAnfq2 = pQanf(q2t)
  If(rAbs(rAbstPP(pEndq1,pAnfq2))<<0.5) Then
    lcurve_orient_all= True
    q1 = q1t
    q2 = q2t
  Exit For
End If
End For
End Function
'*****

'*****
Function lcurve2_orient(q1,q2,lRota2)
'-----
' The SECOND curve is orientated so that the end point of the first curve
' is positioned, directly at the beginning of the second. If the two
' curves were orientated, correctly the function has the value True,
' other wise it has the value False.
' lRota2 is True, if q2 was rotated.
' q1 is not rotated.
'-----
nVar n
qVar q1t,q2t
pVar pEndq1,pAnfq2
'----- query variation, re-orientate curves
lcurve2_orient = False
For n = 1,2,1
  If(n==1) Then
    q1t = q1
    q2t = q2
    lRota2 = False
  Else If(n==2) Then
    q1t = q1
    q2t = -q2
    lRota2 = True
  End If
  pEndq1 = pQend(q1t)
  pAnfq2 = pQanf(q2t)
  If(rAbs(rAbstPP(pEndq1,pAnfq2))<<0.5) Then
    lcurve2_orient = True
    q1 = q1t
    q2 = q2t
  Exit For
End If

```

```
End For
'-----
End Function
'*****
```

Appendix A News in Version 12

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A.1 New in Grafis Patternmaking

New measurement system Basis_A

The new Optimass measurement system contains revised measurements for women, men and children and also new figure types for underwear.

Part organisation

The content and the appearance of the part organisation have been revised. In addition to the part organisation, a part rack has been added to the left of the workspace. The part organisation can be docked to this rack or displayed in a separate window. In the part organisation, it is possible to mark a number of parts and then, to delete them, to remove them or to save them as a part module, see Section 14.2.

Part Assistant

The new part assistant speeds up derivation of production pattern pieces. The existing Grafis functions from different Grafis menus have been compiled into individual dialogues in the part assistant and optimised exactly for these processes, see Section 9.3.

Z-values

The z values and corresponding dialogues have been improved. The new entry assistant for z values simplifies the creation of z values and allows for case differentiation with up to three conditions. Furthermore, new operands for creating z values have been made available, such as the partial length. Inserting z values into a previous record step enables adding z values subsequently. The z values are now easier to comprehend as the clicked operands are highlighted in colour and the values are displayed graded in an overview, see Section 12.2.

Size sorting in tables

In various tables, individual sizes such as S, M, L, XL, and XXL are sorted according to their reference size. This applies to the finished measurement table, editing measurement charts, editing z values and editing identification measurements in the Grafis notes of the interactive constructions.

Pixel images

There are various new functions for scaling and positioning and for image editing in the new *Manage pixel images* menu. Loaded pixel images can be stored as background images or as logos in the style, see Section 15.8.

Quick measure

In addition to the normal measure, quick measure has been introduced, started via the key combination Ctrl+Shift+M. The user can measure point co-ordinates, line lengths and distances. These measurements are displayed in a list, one below the other.

Last opened files

In the pull-down menu *Files*, the most recently opened files are displayed under *Recent files*.

Zoom on active part

With the key combination Ctrl+F6, the active part is zoomed.

Move/ zoom with space bar

Move/ zoom of the screen is started via the space bar. Once *move/ zoom* is activated, the active part can be moved separately on the screen with Ctrl. This is particularly important in the new part assistant.

Edit symbols

In the pull-down menu *Extras*, a new dialogue can be opened via *Edit symbols....* Here, set symbols can be lengthened or shortened.

Symbol colour

All symbols of the active part are displayed in orange – red and thus, highlighted in colour.

Symmetry line

A line can be defined as a symmetry line. The part is automatically mirrored along this line in the marker.


Xgz values

X, g and z values can be assigned to selected drag points of the interactive constructions or tools, see Section 13.3. Styles generated in Version 11 are updated and also obtain these adjustment possibilities. Linking interactive tools with x, g and z values enables hiding some existing functions. The affected menus are now clearer and easier to learn.

Starting interactive constructions and tools via right click

Interactive constructions and tools can be started by right clicking the corresponding line. If more than one interactive tool has been used at a line, the required one can be selected.

Autostart tools

Via a new button in the menu  the user can decide whether the tool is started automatically after call or not.

Updating click images

When calling any tool or interactive construction, click images are automatically generated and saved. They are updated during 'reset click'. This applies also to constructions and tools used for style development in Version 11. Saved images can now be viewed as a click preview in the <F12> list.

New corner tools

- *Corner 90 bevel*: free slanting of corners
- *Corner 100 bevel co-ordinated*: free slanting at two positions simultaneously
- *Corner 110 u-shape*: corner treatment with three lines
- *Corner 120 u-shape co-ordinated*: corner treatment with three lines at two positions simultaneously

Corner 130 step corner: corner treatment of a seam with different seam allowancesNew fashioning tools

- *Fastening 10*: Velcro closure and straps
- *Notch 10*: notch round or pointed
- *Notch 20*: notch as incision
- *Notch 30*: notch as incision at two positions simultaneously
- *Perforation 10*: free perforation
- *Perforation 20*: perforation along a line

- *Perforation 30*: perforation along three lines with cutting line
- *Marking line 10*: template generation

New construction tools

- *Parallel 20*: parallel co-ordinated to a number of lines
- *Raster 20*: raster along a line with start and end distance, replacing *Raster 10*
- *Link 20*: free or constructive linking, replacing *Link 10*
- *Link 30*: free or constructive linking at two positions simultaneously

Revised tools

- *Curve 10*: this tool now also has options which can be selected from the menu for adjusting interactive constructions.
- Tools with shape points, such as *Curve 10*, *Link 10*, *20 and 30*, *Corners 40*, *50 and 110*, *Notch 20 and 30* now have more shape points if the base points of the curve are placed close together.
- Many tools such as *Line 10 and 20*, *Rectangle 10 and 20*, *Circle 10 and 20*, *Curve 10 and 20* and *Link 10*, *20 and 30* contain a new option *Move base point in mm or %*.
- *Corner 60*: new option *Apply length from top or bottom*, see Section 4.6.
- *Corner 70*: option for cut corner, apply length from top or bottom, see Section 4.6
- *Corner 80*: additional notches
- *Dart hood 10*: arrow representation of fold direction
- *Raster 10*: number of points increased to 50
- *Pinch 20*: option *Permit release from base point (Y/N)* complemented by one entry allowing for release of base points in direction of symmetry axis.
- *Pantograph 10*: symbols are also graded
- *Ruffle 10*: error correction and revision of frill beginning and end.
- *Trouser fly 10*: output of double topstitch. New drag area *Stitch adjustment*.
- *Front edge 10* can be called into a separate part from Version 12 onwards and therefore, has an additional click for the shoulder.

Preallocation for tools during call

A new preallocation file is available where options and different parameters of the tools can be preallocated. Further information can be obtained from the Grafis Team.

A.2 New in Grafis Marker making

Part organisation

Content and appearance of the part organisation have been revised. A part rack has been added to the part organisation in the left area of the workspace. The part organisation can be docked to this rack or displayed in a separate window. In the part organisation, it is possible to select a number of parts and then to delete or remove them, see 14.2.

Edit symbols

In the pull-down menu *Extras*, a new dialogue can be opened via *Edit symbols...* Here, set symbols can be lengthened or shortened.

Place symmetrical pieces at the fold

For parts with a symmetry line, the user can determine that they can only be placed at the fold and not open.

Pattern pieces which have been constructed as half pieces and have been assigned the line attribute *symmetry line* are automatically mirrored in the marker and recognised as symmetrical pieces.

Pixel images

There are various new functions for scaling and positioning and for image editing in the new *Manage pixel images* menu. Loaded pixel images can be stored as background images, fills or as logos in the marker, see Section 15.10.

Quick measure

In addition to the normal measure, quick measure has been introduced, started via the key combination Ctrl+Shift+M. You can measure point co-ordinates, line lengths and distances. These measurements are displayed in a list, one below the other.

Last opened files

In the pull-down menus *Production style*, *Marker information* and *Marker*, the most recently opened files are displayed under *Recent files*.

Zoom on active part

With the key combination Ctrl+F6, the active part is zoomed.

Move/ zoom with space bar

Move/zoom of the screen is started via the space bar. Once *move/zoom* is active, the active part can be moved separately on the screen with Ctrl.

Export/ import

Data in cut-data DXF format can now be imported into or exported from Grafis marker.

A.3 New in the interactive constructions

Auto zoom

Auto zoom during drag area change can be switched on or off in the context menu.

New constructions

Corsage 10

Corsage 10 is a strapless body measurement bodice with up to three panel seams in the front and up to two panel seams in the back.

Characteristics of *Corsage 10*:

- Suitable for evening or bridal wear as well as lingerie
- Selection of hem or leg opening construction
- Stretch reduction adjustable lengthwise and crosswise
- With *Click bodice* in the context menu, the corsage is bound to a bodice. Thus, the positions of the two constructions are aligned.

Swimsuit 10

Swimsuit 10 is a finished measurement bodice with different neck and armhole variations. In the front, the user can choose between bust dart or cup finishing.

Bra 10

Bra 10 is a body measurement – finished measurement construction.

Characteristics of *Bra 10*:

- The cup can be made-to-measure or constructed with an underwire as basis. The underwire shape is incorporated in the cup construction.
- As an option, the waistline can be displayed. In this way, the bra can be constructively linked to a bodice or a bottom part.
- With *Click bodice* in the context menu, the bra is displayed inside a bodice.

Wire 10

Wire 10 is a tool for tracing underwires imported as DXF files and loaded as a background image.

Cup 10

Cup 10 is a tool for construction of upper and lower cup pieces.

Sleeve 90

Sleeve 90 is a two-seam sleeve construction with new construction logic for the sleevehead: from inside to outside. The objects of *Sleeve 90* are compatible with *Sleeve 30*.

Sleeve 100

Sleeve 100 is a single-seam sleeve construction with new construction logic for the sleevehead: from inside to outside. Objects of *Sleeve 100* are compatible with *Sleeve 40*.

Revised constructions

Many of the new possibilities below are available either after calling the basic block or after test run of styles from Version 11. In some cases, new functionalities are activated via a menu entry in the context menu.

Furthermore, new and improved echoes and increased drag limits facilitate the adjustment of interactive constructions. New auxiliary lines for clicking the armhole diameter are available at the combined armhole in all bodices. These auxiliary lines are required for calling *Sleeve 90* and *Sleeve 100*.

Many of the new features listed below are also described in the help for constructions.

Bodice 10, 50, 60

New construction logic for flaring the centre front. For styles from Version 11, the new logic is activated via the context menu. The belly ease can be specifically adjusted. The bodice can be utilised for menswear and maternity wear.

Tailored jacket 20

- New option *Position side panel to centre back or to side seam*
- New option *Adjust front length interactively or as body measurement*

Jacket 10

- New option *Stack point at front armhole or at centre front*
- New option *Adjust style length based on body height or as finished measurement*
- New option *Basic direction of side seam back*
- New option *Variations of belly grading*
- New option *First segment (mm / %)*
- New option *Adjust front length interactively or as body measurement*
- Relocation of bust level is possible
- New construction logic for shoulder seam relocation as in *Bodice 50*. Activation via context menu.

Waistcoat 10

- New option *Variations of belly grading*
- New option *Variations side seam – waist accentuation*
- New option *Stack point at armhole or at centre front*
- New option *Style length from...*
- New option *Adjust front length interactively or as body measurement*
- Relocation of bust level is possible
- The waistcoat can be adjusted for bodices with sleeve
- An alternative hem construction is activated if the front point is located in a corner position.

Front and back part tools 20, 30, 40

- The direction drag cursor at the straight point of the panel seam is flipped about 180° from 25mm distance, allowing for finer direction adjustment.
- The dressage and the dressage area are displayed in mm.
- The notch position bottom is displayed in % if the value display is switched off.

Sleeve 30 and 40

New visualisation of sleeve position of the combined sleeve.

Pocket 10 and 60

New logic for styling curved corners in the *Basic shape adjustment* drag area. Curve with direction drag cursors and fine curves for tight curve radiuses.

Collar 40, 50 and 60

The facing can be moved in x and y direction.

Trouser 10, 30, 40, 60 and 70

New option *Adjust calf width via curve shaping or as finished measurement*.

Bodice 80

New option *Apply length in mm or %*. If the bodice is to be reduced or increased in percentage it is advisable to select the option *Apply length in %*.

Pant 10

The new option *Enter width* can be adjusted in the drag area *Leg opening*. If this option is selected, the width of the front panel seam is specified as finished measurement and the leg opening curve is constructed via three base points.

Appendix B Installing and Setting up Grafis

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B.1 Grafis Installation

Administrator rights and write permission

For a new installation of Grafis, normally the installation program must be performed with administrator rights. These rights are required for the creation of the desktop icon for all users, the link of Grafis file extensions with Grafis applications and the installation for the dongle driver.

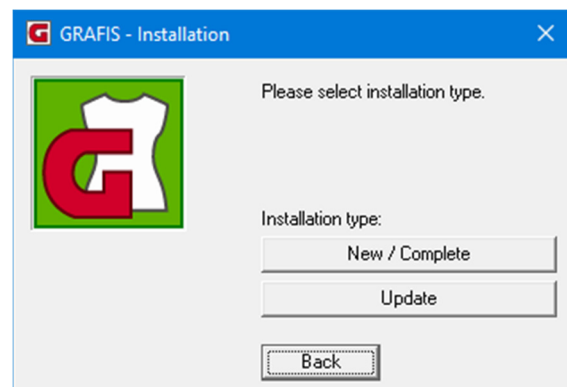
Under **Windows 10** the installation is usually started with the rights of the current user. If this user does not have administrator rights, the INSTALL.EXE should be executed as administrator with right click. Initially, the new folder C:\GRAFIS contains write permission for the current user only. All other users only have read permission. This is insufficient for using Grafis. Therefore, after installation, write permission may have to be added for the user group 'User'.

Under **Windows 7** the installation program automatically demands administrator rights. If the installation is to be carried out with simple user rights, for example for installation on a substituted drive or a network drive, the INSTUSR.EXE can be started instead of the INSTALL.EXE. This does not automatically demand administrator rights. However, creation of the desktop icon is permitted for the current user only. Dongle installation is normally not possible and must be started separately at a later time. For separate dongle installation start HASPU-serSetup.exe from C:\GRAFIS\HILFEN.

If Grafis is installed for the first time it may be required to give write permission to the installation directory (normally C:\GRAFIS) to normal 'Users' of the computer.

Start installation

As a rule, all open Grafis applications should be closed before installation. This includes Grafis Patternmaking, Grafis Marker making, Grafis Setup and Grafis Autonester. Grafis is usually delivered on CD or DVD. If the Autostart function of the drive is active, the installation program starts automatically after inserting the data carrier. If the installation does not start automatically, it can be initiated manually by starting the INSTALL.EXE on the data carrier. If



Picture B-1

Grafis has already been installed on the current computer, after the welcome window, you can choose between the installation variations *New/Complete* and *Update*, see Picture B-1.

Installation New/Complete or Update

The variation **New/Complete** installs Grafis completely and resets all existing settings and options to the delivery conditions. Style data, individual measurement charts and basic blocks will not be lost. Plotter and export/ import settings, path settings and window positions however, will be reset. Select this variation if Grafis is being installed for the first time or if an incomplete Grafis folder without functioning application exists. With the button **Installation in a network** Grafis can be configured for common use of a number of workstations within a network. For

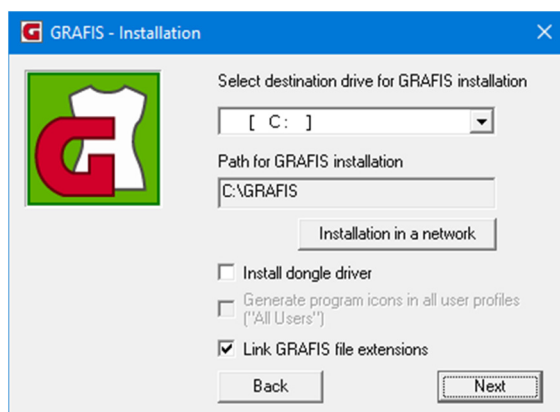
more information, please refer to details later in this section.

The variation **Update** should be selected if an existing version of Grafis is to be updated. All existing settings for paths, window positions, recently opened files, export/import settings, plotter setup etc. are carried over or a query appears before overwriting files.

Before updating an existing Grafis installation, a backup of all existing data should be carried out. It is sufficient to copy all Grafis directories in use from the local computer and from the network onto a separate medium or to save them as a copy on the local drive.

Select target drive and options

In the next step, the target drive is selected. Grafis is always installed in the folder \GRAFIS on the target drive. The following options can be selected, see Picture B-2 as an example for the installation variation **New**:



Picture B-2

Install dongle driver

This option should always be activated. The installation of the driver may only be omitted if the same or a later version of Grafis has already been installed on the computer. The driver installation itself checks if a dongle driver is already installed and proposes updating or skipping the installation.

Set up icons for all users

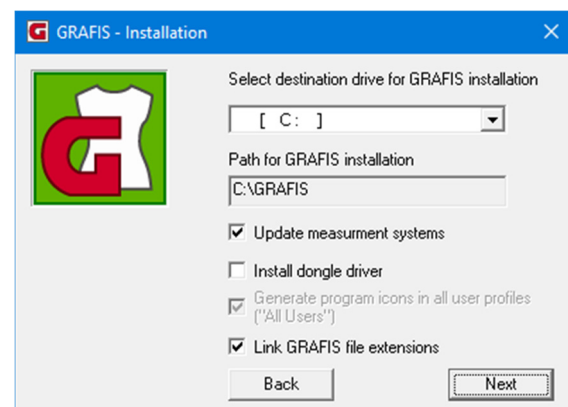
With this option you determine for which user profiles the Grafis icons are to be set up. If basically all users of this computer work with Grafis, this switch must be activated. If only the registered user is to work with Grafis, this switch can be deactivated. If the installation runs with simple user rights, i.e. without administrator rights, this option is inactive.

Link Grafis file extensions

This option activates the linking of the file extensions *.MDL, *.PMD, *.SCB and *.SBI with the respective Grafis program of the current installation. Files with these extension can then be opened with double-click in Explorer.

Update measurement systems

This option is only available for an **Update** installation, see Picture B-3. With this option, the installation of measurement systems can be specifically switched on or off. Use this option if the basic Grafis data is to be updated but the measurement systems are to remain unchanged.

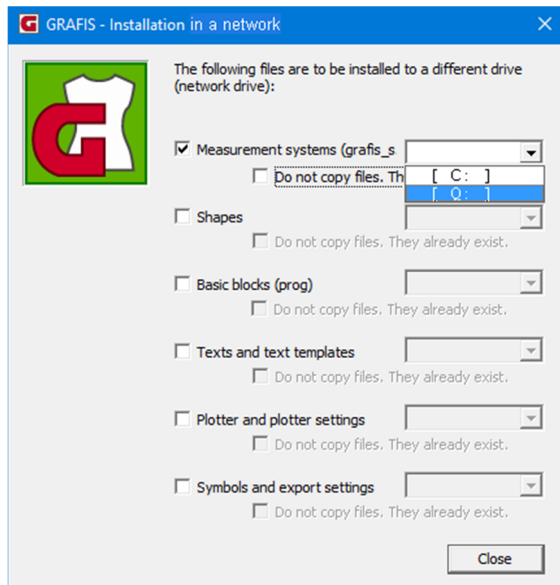


Picture B-3

Installation in a network

For an installation of the **New/Complete** variation, a further dialogue can be opened via the *Installation in a network* button, see Picture B-4. This dialogue permits moving six different folders or folder groups to other drives for shared use in the network. The folder or folder groups are:

- Measurement systems
- Forms
- Basic blocks
- Texts and text modules
- Plotter settings
- Symbols and export settings



Picture B-4

If only style files are to be exchanged, it is not necessary to move these folders to the network. It is sufficient to assign a common network drive for the Grafis users, activated in the Grafis Setup on the *Drives and Paths* file card. This drive should ideally be linked with the same drive letter on all Grafis user workstations. This variation is recommended if a number of independent users, such as service providers or students, wish to exchange styles or if styles to be provided for classes.

If measurement charts, forms and basic constructions are to be shared as well as the style data, these entries must be moved to a shared network drive. The drive letter for the network drive should be the same on all Grafis workstations. During installation on the first workstation, all data must be copied. For further workstations the option **Do not copy data. They already exist.** can be activated. This variation is recommended for companies with a number of workstations, in particular if data backup is carried out via this central drive.

If other information (text modules, plotter settings, symbols, export settings) are to be shared as well, the corresponding folders can also be activated.

It is not absolutely necessary for all these folders to be stored on the same network drive. Theoretically, each of these data groups may use its own drive. However, to ensure clarity, the data should only be spread over different drives in exceptional circumstances.

Over and above the already mentioned folders, other types of data can be migrated to network drives. For special configuration options right up to establishing a 'diskless workstation', please contact the Grafis Support.

Start installation

After having started the installation, all data is copied to the corresponding target folders. In the variation **Update**, targeted queries appear questioning whether specific data is to be overwritten. If applicable, at the end of the copy process, a list of files is displayed showing files which could not be copied as they were write-protected in the target drive or currently in use.

In the variation **New/Complete**, the setup program starts automatically after copying is completed. Here, fundamental setting for screen, available drives or system language can already be undertaken.

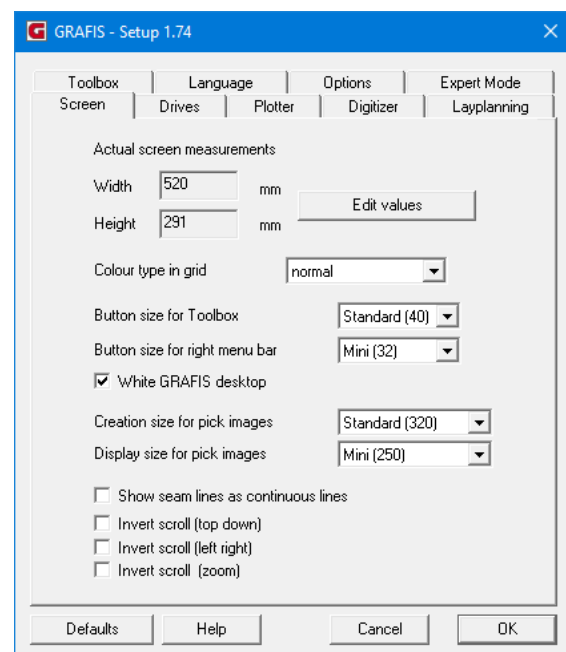
If the option **Install dongle driver** has been activated, the driver installation 'Safenet Sentinel Runtime' by Safenet follows.

B.2 System adjustment Grafis Setup

The system 'Setup' is started automatically during Grafis installation. It can be called at a later date from within Grafis via the pull-down menu Help → Grafis Setup or by starting the setup.exe in \grafis\hilfen\.

Changes to the Grafis Setup normally require a restart of the respective Grafis program to take effect.

Screen file card

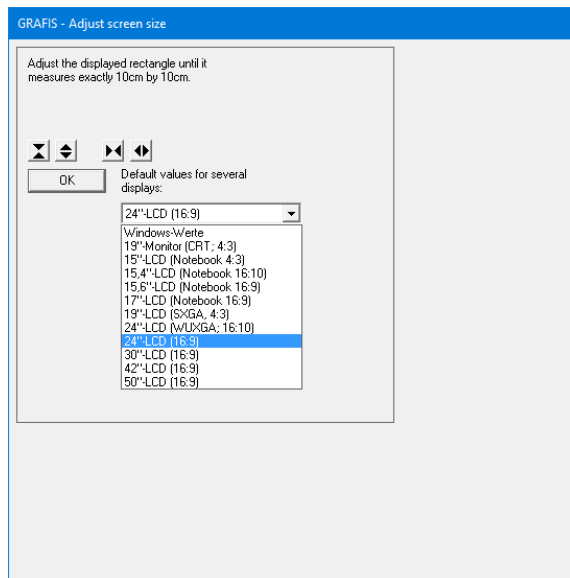


Picture B-5

On the *Screen* file card Picture B-6, the parameters for a distortion-free screen display can be adjusted.

After the Grafis installation and after each adjustment of the display size on the screen these settings should be checked and if necessary, adjusted.

To alter or check the settings click on *Edit values*. A square appears which has to be adjusted to 10cm length at the sides using the four buttons or by dragging the lines, see Picture B-6. This ensures that a circle is displayed as a circle and a square is shown as a square on screen. For simplification of the setup, a number of pre-defined settings for particular display types are available.



Picture B-6

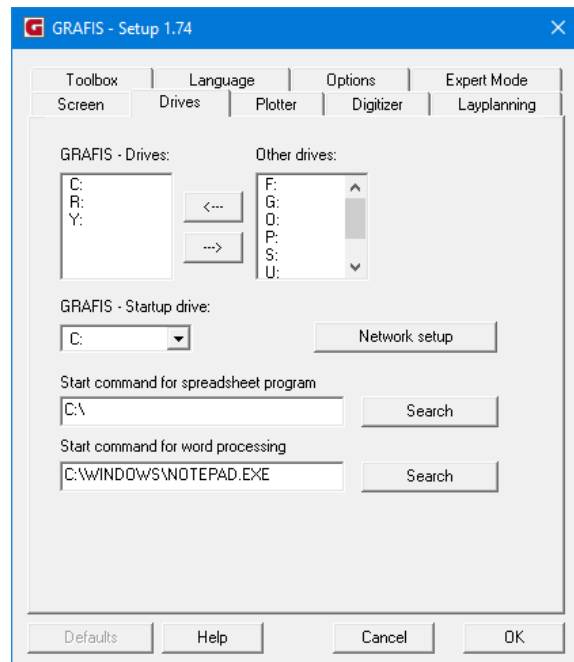
The *Screen* file card also offers a number of options for illustration and display in the Grafis window.

From version 11 onwards, the menu on the right is displayed with graphic symbols (buttons) as standard. The button size can be determined on this file card. A button size of 32 pixels is recommended for a screen resolution of up to 1024x768. For a higher resolution, 40 pixels are recommended.

Drives file card

The setting of drives is of fundamental importance. It ensues on the *Drives* file card, see Picture B-7. In the *Grafis drives* list on the left, all drives on which Grafis data is to be saved must be listed. One of the Grafis drives has to be selected as the Grafis start drive. This ensues in the field below the left window. The Grafis start drive should always be accessible. It is usually a local drive and ideally the original installation drive.

The selected drives can be moved from one side to the other with the arrow buttons.



Picture B-7

Drive letters for removable disks are only indicated if these data carriers are connected (e.g. USB sticks) or if media is inserted (e.g. for removable disk drives). CD/DVD or Blue-ray drives are never suggested or displayed.

The start commands for table calculation or text processing can be saved to permit a quick start directly from within Grafis.

Network setup

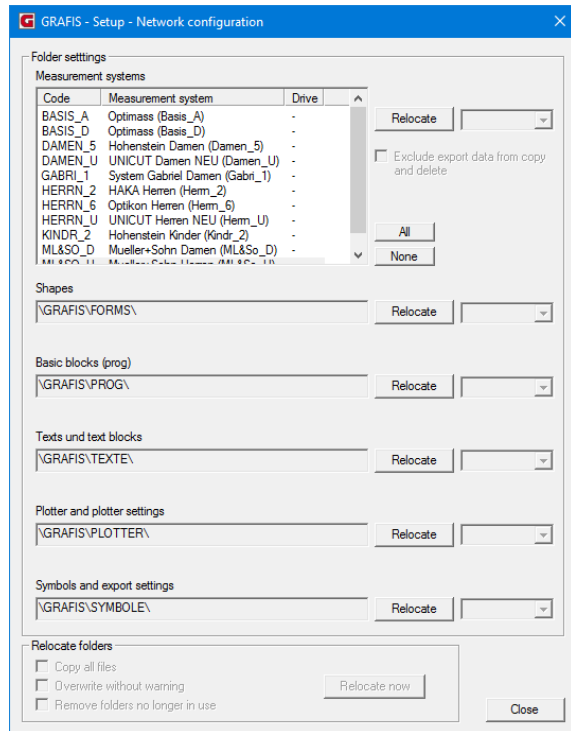
The button *Network setup* opens a separate dialogue window with the Grafis network configuration, see Picture B-8. Changes to these settings have fundamental impact on saving of files and should only be altered by a system administrator or experienced users.

During installation it is possible to install specific folders or folder groups on network drives. If this option has not been used, folders can be moved to different drives at a later date with the *Network setup* dialogue in the setup program.

Initially, the dialogue shows the current situation. If specific allocations have already been made, this will show here. As well as paths for the different folders, the button *Relocate* plus selection of a target drive enables new allocation. The selection *<basic drive>* resets previous relocation back to the original installation drive. This allocation can be carried out separately for each measurement system in the upper list area.

The actual move is initiated via the button **Relocate now** in the lower area of the window. Here, you can also determine if

- the existing files are copied,
- existing files are overwritten without warning or
- the files are removed from the original location and are to be relocated to a new location.



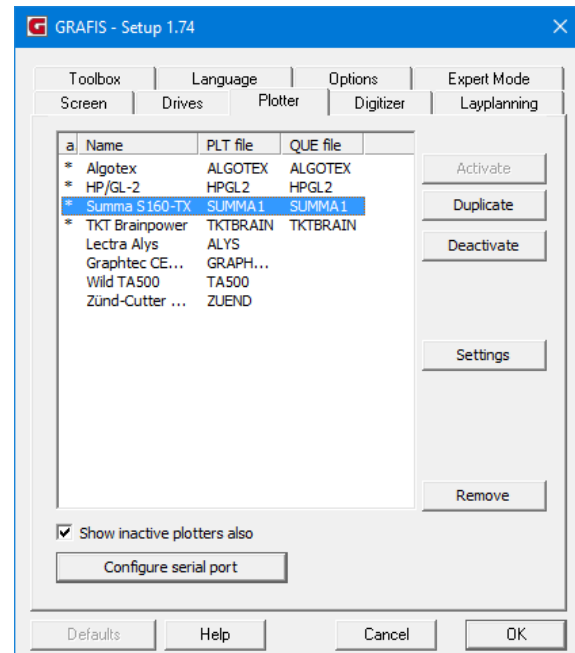
Picture B-8

If you waive copying the data, only the path entries are altered during the move. Use this option if the data has already been copied to the network drive from another workstation.

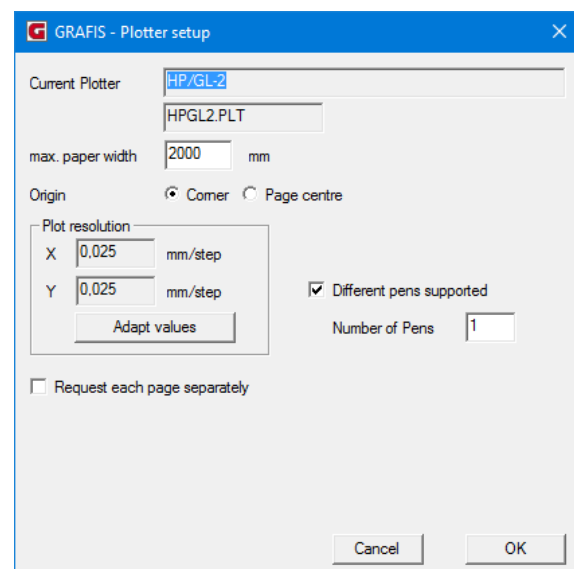
Plotter file card

The *Plotter* file card (Picture B-9) lists the plotters available in Grafis. Only plotters marked as active with '*' in the first column are offered in Grafis. Certain basic settings for the plotters can be adjusted via *Settings* (Picture B-10), such as the resolution or the maximum paper width.

Configure serial port adjusts the output parameter for direct output of plot data from Grafis to a COM port.



Picture B-9



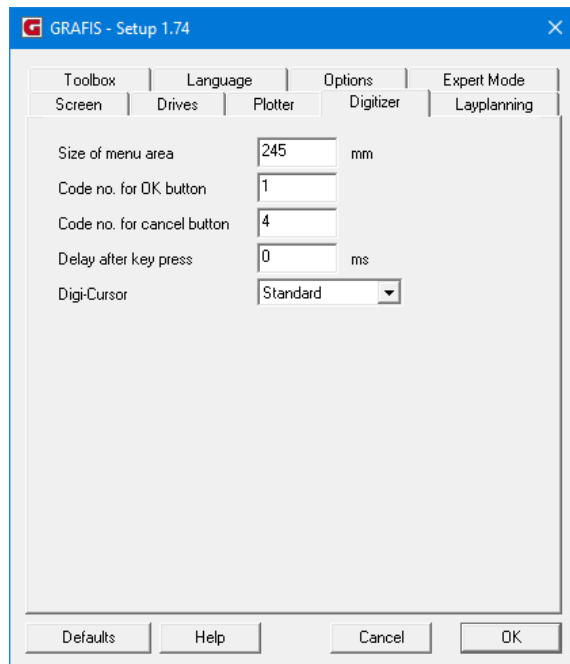
Picture B-10

Digitizer file card

Digitizing with Grafis is possible under the following circumstances:

- The digitizer is connected to the Grafis computer.
- The WinTab driver for the digitizer is available and installed.
- A 16 button cursor is connected.

To test the WinTab driver the Tabtest.exe in the \Grafis\Hilfen directory can be used. If Tabtest reports 'No Info (Keine Info)' the WinTab driver is not installed correctly.



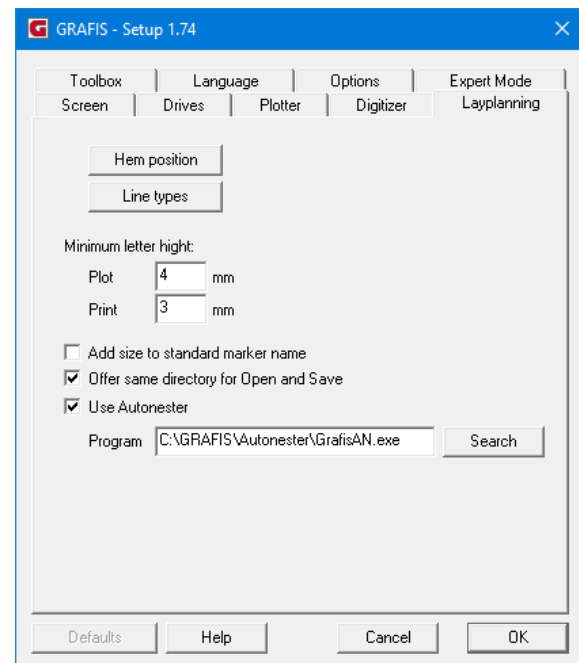
Picture B-11

If the WinTab driver has been installed successfully, the following variables can be adjusted on the *Digitizer* file card (Picture B-11):

Size of menu area	The distance p1=>p2 is 245mm on the menu pads supplied. As the pads can also be used enlarged or reduced proportionally, the current distance p1=>p2 is to be entered in millimetres.
No. for OK button	cursor key for <OK>
No. for Cancel button	cursor key for <Cancel>
Delay after key press	Delay after key press in milliseconds
Digi-Cursor	Standard... for normal digitizer mouse key assignment Numeric1... for numeric digitizer mouse, can be recognised at numbers in left three columns and letters in the right column Numeric2... analogue Numeric1 with different key numbering

Marker file card

The *Marker* file card (Picture B-12) offers some basic settings and options for the Marker making pro-



Picture B-12

gramme. *Hem position* defines the alignment for the automatically selected grain line direction in the Patternmaking and the Marker making, see section 18.10. *Line types* offers assignment of specific line significance to line attributes, see section 18.11. These parameters are fundamental and should be determined once during installation of the programme and then maintained.

Furthermore, the following can be adjusted:

Minimum letter size ... Minimum size for automatically set annotation for plot and print

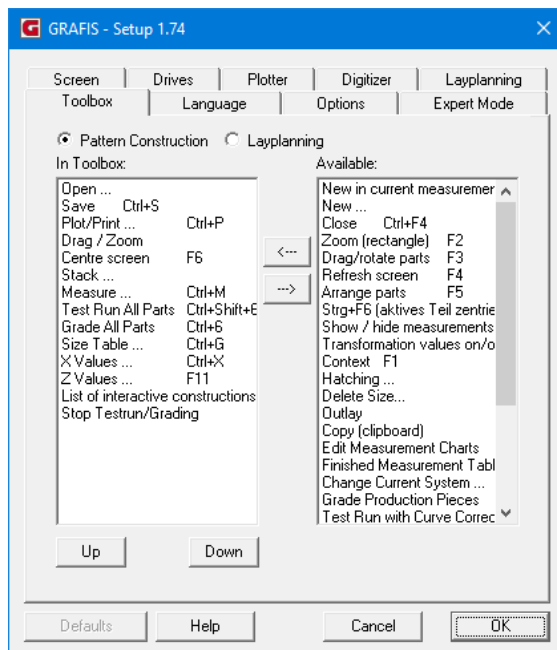
Add size designation to Marker name... During *Save as...* of a new marker, the placed sizes are named in the suggested marker name.

Offer same directory for open and save... For open and save only one common path is saved.

Use Autonester... If the Autonester programme was purchased it can be activated here.

Toolbox file card

On the *Toolbox* file card (Picture B-13), the combination and organisation of the buttons in the toolbox of Patternmaking and Marker making can be altered.



Picture B-13

The arrow buttons move the activated entries from one side to the other. *Up* and *down* alters the order.

Language file card

As well as German and English, Grafis is available in various other languages. The installed language packages are offered for selection in this dialogue.



Picture B-14

The basic language is the language in which the main data is available. It is marked with '*'.
For use of Grafis in areas with non-Latin letters, such as Russian, Mandarin (Chinese) or Thai, extended language options can be selected:

Use Window fonts for plot output

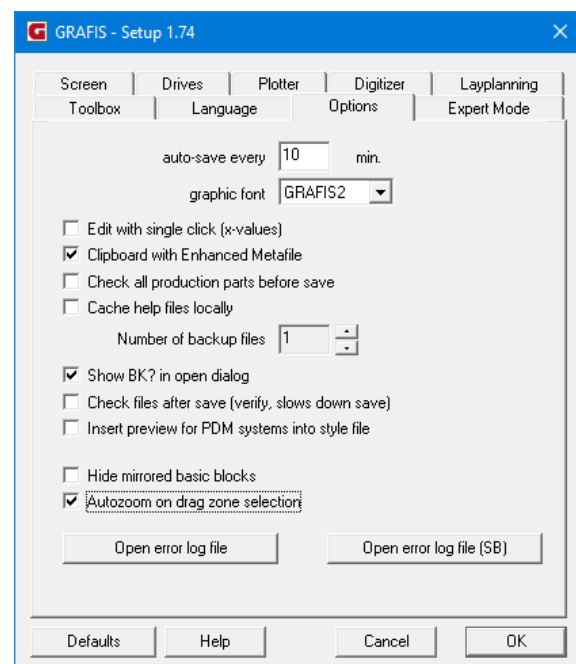
Here, Grafis switches to Windows fonts for display of Grafis text in picture and plot/ printer output. Windows fonts tend to have double lines and therefore, take significantly longer to plot with pen plotters. Furthermore, they are more difficult to recognise on the screen. However, the complete character set of the selected language is available. This is important for example in Mandarin.

Activate multi-byte characters in Grafis texts

This option is connected to the previously described option and must be used if the characters of the selected language are always coded with more than one byte per character 'multi-byte', such as for Mandarin.

Options file card

The *Options* file card (Picture B-15) contains a number of additional options.



Picture B-15

With the option **auto-save** regular automatic saving of the current style can be pre-set. Save ensues in the background *every* minutes. Entering 0 into this field switches off the automatic save.

With the function **graphic font** you can choose between different typefaces. The setting applies to output of text in drawings. The typeface GRAFIS2 is the default setting. In case of Cyrillic or Thai characters the selection of graphic fonts is limited. If the use of

Windows fonts for plot output is activated under *Extended language options* on the *Language* file card, this setting has no effect.

Furthermore, you can choose to start **text editing of the x value list** via simple click or double click.

If the patterns are not transferred correctly during transfer via clipboard, the switch **Clipboard with enhanced metafile** can be changed.

Check all production parts during save is useful for companies where style development and marker is carried out by different departments. Should an error occur during creation of a style, with this option the error is flagged up directly during saving of the style before the style is opened in the Marker making.

Cache help files locally is only required if the Grafis auxiliary files are loaded from networks and are not displayed correctly.

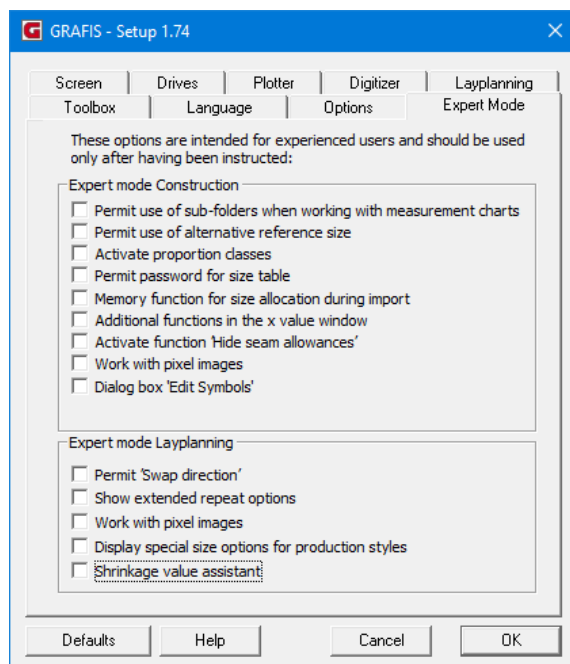
Number of backup files determines how many backup copies per style are saved. The backup copies are saved in the same directory in which the original style is saved and carry the extension *.bk0 for the first backup, *.bk1 for the second backup etc.

With **show BK? during open** you can determine that the backup files can also be opened directly through switching of the data type.

Check MDL files on save activates a control after writing of the data. Activate this option only if files which can no longer be opened appear frequently.

Store preview for PDM systems in the style activates saving of a screen shot in the style which can be used by PDM programmes for file preview.

Hide mirrored basic blocks hides the mirrored basic blocks in the call list.



Picture B-16

Auto zoom during drag area change switches the automatic zoom function during changing between different drag areas within an interactive construction on or off.

Open error log displays the record files created by Grafis for patternmaking or marker making (SB). This information may be required for Hotline support by the Grafis Team.

Expert mode file card

A number of complex or rarely used functions can be activated via this file card (Picture B-16).

B.3 Grafis directory structure

Folders/Subfolders and their significance

\GRAFIS

Grafis.exe, GrafisSB.exe, *.INI files and help files

\GRAFIS\Forms

shapes of the interactive constructions

\GRAFIS\Hilfen

Setup.exe and various help tools

\GRAFIS\Masken

mask files

\GRAFIS\Menues

menu files

\GRAFIS\Module

projects of Grafis Programming language and help files for the functions of the programming language

\GRAFIS\Plotter

*.PLT control files of Grafis plotters

*.QUE plotter link files

\GRAFIS\Prog

constructions which can be called in all measurement systems

\GRAFIS\SB

markers and marker information

\GRAFIS\SB\Mas

size list for marker

\GRAFIS\Symbole

system files symbole.sys and interfac.sys, export configurations

\GRAFIS\Texte

files of the typefaces and own standard texts

\GRAFIS\0440

files for the display of Grafis as partial translation in English

\GRAFIS\0860

files for the display of Grafis as partial translation in Mandarin

\GRAFIS\Damen_U

measurement system Womenswear UNICUT

\GRAFIS\Basis_A

measurement system Optimass

Each measurement system is structured as follows (Basis_A measurement system as example):

```
\GRAFIS\Basis_A\Interfac
    export data
\GRAFIS\Basis_A\Kollekt
    folders and subfolders with style files
\GRAFIS\Basis_A\Mas
    folders and subfolders with measurement charts
\GRAFIS\Basis_A\Mask
    program mask files for old Grafis programming
    language
\GRAFIS\Basis_A\Prog
    program files
\GRAFIS\Basis_A\Swert
    grade rule patterns
\GRAFIS\Basis_A\ST
    part modules
\GRAFIS\Basis_A\Xwert
    X value tables for old Grafis programming lan-
    guage programs
```

B.4 Grafis.ini parameter

Area, Name and Description

[SCREEN]

```
WIDTHMM=300
    Screen width in mm (visible image)
HEIGHTMM=225
    Screen height in mm (visible image)
BACKGROUND=0
    Background colour (0-black, 15-white)
MENUFONTHIGHT=14
    Type size in right menu
CONTINUOUS_SEAM=0
    Show seam line as continuous (charcoal grey) line
```

[PATH]

```
DRIVES=AC
    Letters for available Grafis drives
STARTUPDRIVE=2
    Consecutive no. of Grafis start drive
TABCALCRUN=
    Path for table calculation
TEXTPROC RUN=
    Path for text processing
WPADRUN=zzz
    Path for text program WordPad (C:\Program
    Files\Accessories\wordpad.exe);
    set during installation by the install program ac-
    cording to the windows version
```

```
PATHMASK=
    Path for masks \Grafis\MASKEN
PATHMENU=
    Path for menus \Grafis\MENUES
PATHPLOT=
    Path for plotter driver \Grafis\PLOTTER
PATHSYMB=
    Path for symbol file \Grafis\SYMBOLE
PATHTEXT=
    Path for text files \Grafis\TEXTE
PATHPROG=
    Path for measurement system independent pro-
    gramming language programs \Grafis\PROG
PATHFORM=
    Path for shapes \Grafis\FORMS
PATHMODULE=
    Path for module developments (programming)
    \Grafis\Module
PATHTEMP=
    Path for temporary working files \Grafis\Temp
PATHDAT=
    Path for *.DAT and Material.DBA
RUN01M=zzz
RUN02M=zzz ...
    Additional menu entry (menu text) for user defined
    programs (e.g. management programs, design pro-
    grams, data converters)
RUN01L=zzz
RUN02L=zzz ...
    Start command for respective entry
```

[OPTIONS]

```
SAVEMINUTES=0
    Time elapsed between automatic save in minutes
GRAFISFONT=Grafis2
    Name of Grafis font used (default = Grafis2)
EDITONCLICK=1
    Edit (x values) with single click
ENHMETAFI LE=0
    Copy to clipboard as Enhanced Metafile (0=no,
    1=yes)
FIXTOOLBUTTONS=32
    Size of buttons in toolbox (32 or 40)
FIXMENUBUTTONS=40
    Size of buttons in the right menu (32 or 40)
USEMBRAM=xx
    Use xx % of installed RAM
```

SHOWAVICURSOR=0

Special cursor for recording of screen sequences:
1=active, 0=inactive

CYCLESTATUSBAR=1

Continuous messages in the status line (0=no, 1=yes)

SAUMNR=0

Hem number menu usable (0=no, 1=yes)

CATHELP=0102

Entry help for category; how many digits are to be found from which place

MATHELP=

Entry help for material; In which position can the code letter be found.

XEDITINLINE=0

Edit entry in x value box analogous to part organisation (0=no, 1=yes)

CHECKFDTONLY=0

Checking method for connections:
0=standard option, connected style file is originally check to the file date. If there is a difference the file is opened and the content is checked.
1=only date/time are checked; Alteration here means alteration in any part irrespective of content.
2=extended mode; As 0 but alteration date is automatically entered for certain actions within the style.

NOPARAMUPDT=0

Update WITH part parameter not permitted (0=no, 1=yes)

EXTERRMSGLINK=0

Extended error message for unsoluble connection (0=no, 1=yes)

TITLECMAX=45

Length of path displayed in the title bar

PIECENN=NN

Standard entry for empty/new pattern pieces

ZOOMFAKT=2.0

Zoom factor for zoom function

NODK4003MEM=0

Switch off sticky function for separate menu (0=no, 1=yes)

NODK4004MEM=0

Switch off sticky function for parallel menu (0=no, 1=yes)

NODK4005MEM=0

Switch off sticky function for corners menu (0=no, 1=yes)

NODK4017MEM=0

Switch off sticky function for attribute menu (0=no, 1=yes)

MENUFONT=Courier

Menu font (True-type font)

MENUCHARHIGHTCORR=0

Height correction value for character height at right menu

MENUCHARSET=0

Character set for menu font (right menu)

DELEXPLISTONSAVE=0

Delete export record list 'Last output' when save style with 'Save as...'

DK5012EH=0

Show function 'hook in' at insert menu

REBUILD_ON_MDLCALL=1

Automatic test run after calling a construction

SYSTEMBEEP=2

system sound

0 = no sound

1 = beep over integrated PC loudspeaker

2 = Windows standard signal (pling)

CHECK_GRD_PTS=0

Extended grade point check

PRESET_DRAG_ARROW=1

Preset of yellow drag arrow at dragging

0 - like until Jan/2006 (during a Grafis session the orientation remains unchanged) <standard until 1/2006>

1 - One preset 'right' per drag session <standard from 2/2006>

CHECKMDLONSAVE=0

Automatic check of perimeter of production pieces when saving the style

HIDE_MIRFOLD=0

Hide all PROG sub-folders with mirrored constructions

ALLOW_CPRMDL=0

Allow module combinations in measurements
PROG folders

ALLOW_PRG_FOLDER=0

Allow sub-folders with PRG programs (compatibility to V8)

USE_TTF=0

Use Windows True-type fonts as printing font

PTTFCHARSET=0

Character set for plot font

PTTF_SUPP_UNICODE=0

Recognize unicode characters in plot texts automatically

PTTF_FACE=Courier New

Plot font Courier New

PTTF_PITCH=48

'pitch' and 'family' values for plot font

CACHE_CHM

Cache CHM files of net drives locally

BAKMAX=1
Maximum number of style backup copies (x=number)

LANGUAGE=0000
Language or country code for masks and menu texts (four digits)

LANGNAME=
Name of selected language

TXDIRAUTOM
Pre-set direction automatic in text menu

TXSIZEAUTOM
Pre-set scale automatic in text menu

MTABEXTRACT_MODE
Measurement chart extract method
0 - only extract if not available <default>
1 - only extract if different date or size, after query
2 - always extract without query

DRAGZONEMENUPOS=0
Position context menu in interactive environment:
0 - absolute (300,100) on current screen
1 - at mouse position <default>

NO_GRD_ZOOM=0
No zoom during start of grade rule pattern edit

GRD_GRP_ADD=0
Group grade rules additive

FORCE_PDM_COMPAT=0
Allow compatibility with old PDM Programme up to V9

MDL_PREVIEW_IMAGE=0
Store MDL style with preview image for Bizzoflex

MARKLINE_CUTLINE=0
Generate marking line directly with attribute *cut internal line*

DIALOGFONTHIGHT=8
Text size for system font (dialogue font)

STACKMOTHERPCS=0
Recorded stack also in mother parts

STACKBOUNDARY=1
Stack at part circumference

DISABLE_FIXED_LINTYPES=0
Generally disable old line type assignments

SHOW_BAKFILES=0
Offer opening BK? files

ENABLE_GRDTAB_SUBPATH=1
Managing measurement charts in subfolders (expert switch)

ENABLE_GRDTAB_ALTREF=1
Use of alternative reference size (expert switch)

SAVE_VERIFY=0
Plausibility check of write process. The file content is tested for structural logic. The file is not compared byte by byte.

SWITCH_SEAMADDITION=0
Function *remove seam allowance* (expert switch)

DELETE_SEAMADDITION=1
Delete allowance for function *remove seam allowance*, with =0 the old contour is changed to dashed attribute

ENABLE_EXTDXVAL=1
Additional functions in the x value window (expert switch)

ENABLE_GRDTAB_MEMMAP=1
Memorise import size assignment (expert switch)

[INTERFACE]

LINE51=>....<
Output for header GerberEPN: collection

LINE52=>....<
Output for header GerberEPN: style

LINE53=>....<
Output for header GerberEPN: part number

LINE54=>....<
Output for header GerberEPN: part name

LINE55=>....<
Output for header GerberEPN: line format

LINE56=>....<
Output for header GerberEPN: base size

LINE57=>....<
Format for size name

IMPNONLECTRA=1
0- when importing AAMA data Lectra-AAMA data is expected (Lectra does not supply notch points for graded contours)
1-when importing general AAMA data is expected

USEEPNCONV=0
EPN direct output using EPNCONV or EPNIN (0/1=normal);
Special option =2: Data is copied directly to the folder defined in EPNCONVPROG.

EPNCONVPROG=xx
Path for program file for EPN direct output

EPNSORT=0
Subsequent sorting of sizes in the EPN file (0=no, 1=yes)

EPNGRADGRAIN=0
Graded grain line in EPN file (0=no, 1=yes)

EPNCATEND=
End character or limit for category name (for part names with name elements of different lengths)

EPNNOSPACES=0
Remove spaces from part names and categories (0=no, 1=yes)

EPNUSELONGNAMES=0
EPN file: permit long file names (more than 8.3) (0=no, 1=yes)

EPNNUMBERONLY=0

EPN file: always reduce size designation to numbers (if possible) (0=no, 1=yes). This option can completely replace the entry LINE57 (see above).

GRAINDOWN=0

Automatic grain line detection: select grain line in direction hem/bottom (1) or away from hem/top (0)

AAMASMOOTHPT=0

Consider smooth points (intermediate curve points) during AAMA file import (0=no, 1=yes)

ANNOTASPIECE

Use 'annotation' as piece name

DXFEXP_STARTLAYER

Standard DXF Export: first layer No. ...

DXFIMP_IGN_BLOCKS

Standard DXF Import: ignore 'blocks' entries

DXFEXP_NAMEMODE

Name modus for DXF file

0 = according to old standard (style_<part No.>.DXF)

1 = DXF file will be created with dialogue 'Save as'

2 = DXF file name will be created using the part name (style+<part name>.DXF)

Spaces and '.\/*:?' are changed into '_ '.

DXFIMP_CIRC2DRILLRAD

Radius of circle to drill hole conversion

IGN_GRADE_REF

Ignore AAMA/ASTM line type 'grade'

IGN_PLAID_REF

Ignore AAMA/ASTM line type 'plaid'

IGN_STRIPE_REF

Ignore AAMA/ASTM line type 'stripe'

MIN_SLITNOTCH_LEN

Preset minimum 'slit' notch length for import (general)

MIN_VNOTCH_LEN

Preset minimum 'v' notch length for import (general)

OPTNSALWY

Open options dialogue at every export

AAMASAVEAS

Save packed DXF files with 'Save as...' dialogue

DUPL_PCE_MODE=1

Treatment of double piece names:

0 = pack everything into one part

1 = create a second/ another part

AAMA_ACCEPT_FFPTS=0

Import or omit free function points as points

AAMA_CHK_DOUBLE_RULES=0

Check for double grade rules on a point

[PRINTER]**LEADINGBLANKS=xx**

Number of leading blanks for print output

MAXCHARPERLINE=x

Maximum number of characters per line for print output

MANAGER=zzz

Path for plot manager empty

NOEMPTYPAGES=

Do not print empty pages (only for Windows print) (0=no, 1=yes)

PORTNAMEMODE2K=

use alternative port name for direct output under Windows 2000 (0=no, 1=yes)

NOPOSRESET=x

Do not store position of parts in plot dialogue

[DIGITIZER]**DIGISTOP=0**

Waiting time after digitizer mouse click in milliseconds

SCHABLONEMM=205

Distance P1-P2 of digitizer template in mm

DIGIOK=1

Digitizer mouse key code for OK button

DIGIQUIT=4

Digitizer mouse key code for Quit-Button

LUPE=>.<

Digitizer mouse key assignment

ALLOW_KEYB_KEYS=1

Accept keyboard strokes as digitizer mouse clicks

[SYMBOL]**GRAINLINE=13**

Symbol number for grain line

DRILLHOLE=10

Symbol number for drill hole

AUXDRILLHOLE=14**NOTCH=1****VNOTCH=4****CASTLENOTCH=2****LABEL_SYM=18**

optional: Label symbol number

[SERIALPORT]**BAUDRATE=9600**

Baud rate for plot output to serial port

PARITY=0

Parity for plot output to serial port (0=none, 1=odd, 2=even)

DATABIT=8

Data bits for plot output to serial port

STOPBIT=1

Stop bits for plot output to serial port

FLOW=8

Serial communication, handshake settings, possible variations:

Hardware handshake (Pause) (CTS/RTS):
FLOW=8236

Grafis-Standard (Hardware/Spezial): FLOW=8

Hardware handshake 'mode com1:9600,n,8,1':
FLOW=4112Software handshake (XON/XOFF) 'mode
com1:9600,n,8,1,x': FLOW=4880**[TOOLBOX2]****B01=xx...B25=xx**

Assigning toolbox in Grafis Patternmaking; the possible parameter are listed in the Grafis.ini.

[TOOLBOXS]**B01=xx...B25=xx**

Assigning toolbox in Grafis Marker making; the possible parameter are listed in the Grafis.ini.

[MARKER] Pre-settings for marker making**BLGINIT=7000**

Standard value for material length in mm

MINPLOTLETTER=30

Minimum letter height for plot in tenth of mm (mm/10)

MINPRINTLETTER=20

Minimum letter height for printing via Windows in tenth of mm (mm/10)

PIECETEXTLETTER

Height of piece annotation (mm/10)

MARKERTEXTLETTER

Height of marker annotation (mm/10)

PIECETEXTLINLETTER

Height of text at annotation lines (mm/10)

TITLECMAX=50

Maximum length for path entry in Grafis title bar

ADDSIZETOFILENAME=0

Suggest size name for standard marker name (0=no, 1=yes)

BASEPATHSCB=x

Base directory for marker files \Grafis\SB

BASEPATHSBI=x

Base directory for marker information files

BASEPATHMDL=x

Base directory for production style files

RESETPPARAM=0

Reset layout parameter for rack pieces (0=no, 1=yes)

ONEPATHONLY=0

Remember only one path for open and save (0=no, 1=yes)

NOFLIP=0

Do not permit flip with click at crosshair during crosshair display (0=no, 1=yes)

NOTURN=0

Do not permit turn with click at crosshair during crosshair display (0=no, 1=yes)

CHECKCHAIN=0

Update prompt for chain plot (0=no, 1=yes)

ALLOW_SAVE_ON_CHECKCHAIN=1

Allow save after update

USESAVEFILE=1

Work with local copy (and write protection) (0=no, 1=yes)

BAKMAX=1

Number of backup copies

USE_MKX=1

Cut order planning interface on/off

MKXMODE=0

Mode for reading marker orders (0= Cut order planning (default), 1=Lago)

MKXSBEX=zzzz

Exchange directory for Grafis marker data in direction Cut order planning

MKXSBIM=zzzz

Exchange directory for Cut order planning marker request in direction Grafis

MKXMDX=zzzz

Exchange directory for Grafis style data in direction Cut order planning

MKXSB_ADD_FILE=0

Output to a file MKXSBEX is the complete path to the target file

ALWAYS_SMALLFILE=0

Always set option 'delete superfluous data' (0=no, 1=yes)

STRECHVALUEONGRAIN=0

Preset stretch value switch 'relate to grain line of pieces' (0=no, 1=yes)

AUTONESTERPATH=

Directory for Grafis Autonester

AUTONESTERKEY=

Release code for Autonester application

AUTONESTER_INCFOLDERNAME=0

Include path when determining name (n levels)

MDLACTMOD=0

Mode for updating styles

0 = discard piece properties (also for same style)

2 = transfer piece properties for identical ID or per category

3 = transfer piece properties (ID, piece text, material)

SCBOPENLIST

Structure of list view for 'Open marker...' dialogue (detail view)

- 0 = end list at this point
- 1 = file size
- 2 = date/time
- 3 = marker width
- 4 = marker length
- 5 = one letter for material code
- 6 = efficiency
- 7 = style name if available
- 8 = size list
- 9 = U/B (usage per bundle)
- 10 = total length of perimeters

STATUSWDTHF01..08

Arrangement of status line

- 1 = part number/ part name
- 2 = size
- 3 = length
- 4 = efficiency
- 5 = U/B (usage per bundle)
- 6 = width
- 7 = current rotation angle
- 8 = warning symbol

PLTSAVEAS_JOB=0

Create job file also when plot to 'FILE:' (Save As)

OLDMDLNOTIFY=0

Always display old warning message at non-existing production style.

MOVEUP_PIC

Create preview image at 'Complete marker upwards'

- 0 = no (standard)
- 1/2 = yes as bitmap
- 3 = yes as Metafile

SPLITCURVE_ENABLE=0

Split pieces with wavy line

SPLITCURVE_STRT=10

Starting distance for wavy line

SPLITCURVE_HGHT=10

Height of wavy line

SPLITFREEHAND_ENABLE=0

Allow splitting of pieces by freehand

ZOOMSIZEVAL=2.5

Size of material in proportion to screen at <F6> zoom (value in 1/X of screen size; standard = 2.5)

PLOT_RESTOREPOS=1

Restore original piece position after piece plotting (standard='yes')

SHOW_ALL_OPTPCS=0

Display also exchangeable pieces which are not in use

PMDLBASEPATH=

Basic path for production styles (for search)

OPTIPLAN_LOADSCB=0

Instead of styles markers are loaded as templates (0=no, 1=yes)

PSCBBASEPATH=

Basic path for marker templates (for search)

SCBBASEPATH=

Basic path for search of placed markers

MKCOLORMODE=0

Colour mode for piece display

0= normal (7 colours in 3 shades)

1= only one shade (7/1)

2= two shades (7/2)

3= continuous, one shade (7/c)

4= continuous, two shades (7x2/c)

5= continuous, three shades (7x3/c)

PCSWINLNS=2

Counter window pieces/placed line number

PATHSBMAS=r:\grafis\sb\mas

Path to SB\MAS folder

PLOT_NORESETDISTANCE=0

Do not reset distance value during plotter change

CUTPLOT_FOLLOW_THE_LINES=1

Plot-cut import with/without Follow Lines (expert switch)

DXFEXPMODE=1

Export mode for DXF markers (0-standard, 1-AAMA-like mode)

ENABLE_BDL_FLIP=1

Swap bundle direction (expert switch)

ENABLE_ENH_REPEAT=1

Further repeat options (expert mode)

ENABLE_BG_PIC=1

Background image (expert switch)

ENABLE_PMD_SZOPT=1

Special production style options (sizes)

ENABLE_SHRINK_ASST=1

Shrinkage assistant (expert switch)

B.5 Printer/Plotter Setup

The dialogue *Printer/Plotter Setup* opens via

- the pull-down menu File → Printer/Plotter Setup or
- in the plot menu with *change*.

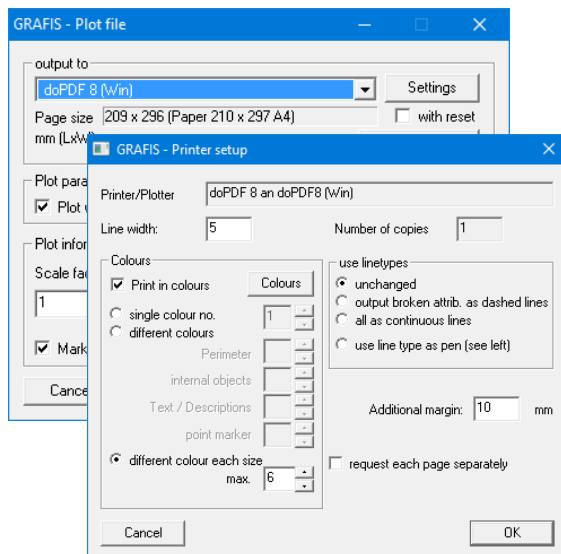
In this dialogue all settings for pattern output to plotters/ printers are carried out.

Fundamentally, the following output options are available:

1. Printer/ Plotter with installed Windows driver
2. Printer/ Plotter without Windows driver for direct output to LPT or COM interface
3. Plot to file.

Printer/ Plotter with installed Windows driver

These devices are marked with (Win) in *output to* field. The *printer setup* button opens a further dialogue, see Picture B-17.



Picture B-17

Printer/Plotter without Windows driver for direct output to LPT or COM interface

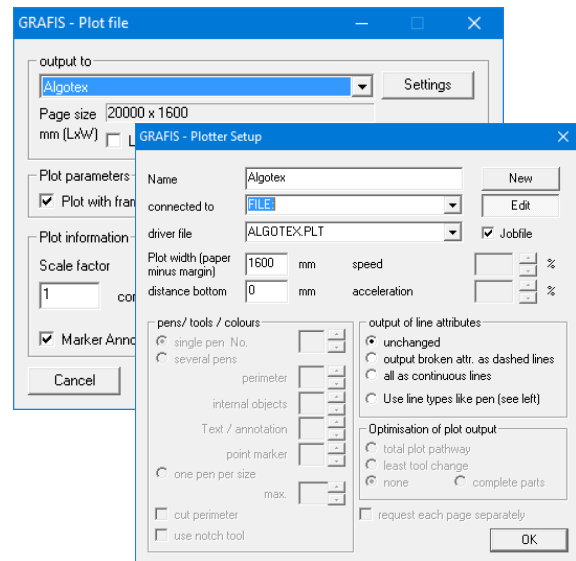
These devices have no particular indicator in the *output to* field. A further dialogue opens via the *Settings* button, see Picture B-17.

For directly connected devices, the corresponding interface must be selected in this dialogue. If the required device is not contained in the *output to* list, please read the explanations in section B.6.

Plot to file

Plot to file is only possible for printer/plotter without Windows driver. Select the prepared plotter in the *Plot file* dialogue. Pressing the *Settings* button opens the *Plotter Setup* dialogue where the option *connected to* must be set to 'FILE', see Picture B-18. Having accepted these settings, the next plot with this type of plotter will create a file. The file name choice is unrestricted, e.g. 'Trouser345.plt'.

Depending on the operating system, type of plotter and connection option, the output of plot files may vary. Some devices, in particular large format inkjet plotters (Algotex, TkT, Brainpower, Lectra Alys) are delivered with their own plot software which work directly with the plot files.



Picture B-18

If the plotter is connected directly to the computer via LPT or COM port (parallel or serial interface), you can also work with a COPY command. To send a plot file to a plotter click on *Start* → *Run....* on the windows desktop. Enter the following into the *Open* field:

```
copy e:\test.plt com2:
```

e:\test.plt must be the complete path to the plot file including its name.

com2: is the interface to which the plotter is connected.

Output to USB interfaces and plotter with direct network connection (printer port) with the COPY command is not possible. In this case, the Grafis plot manager, described in Appendix D can be deployed.

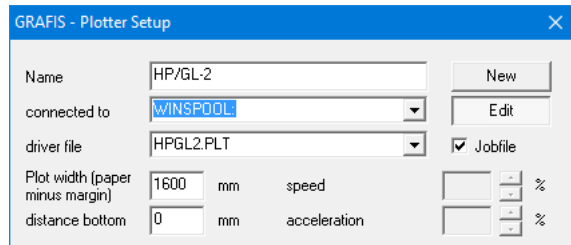
Controlling a plotter via 'WINSPOOL' for plotter connected via USB or network (printer port)

Plotter connected via USB or network (printer port) cannot be fed directly with data via an interface. In this case, Grafis offers the possibility to use a windows printer driver as a forwarding entity via the 'WINSPOOL' option. A windows driver matching the plotter, which allows forwarding plot data (PASSTHROUGH) must be installed. As a rule, drivers included in the Windows delivery content or HP drivers fulfil these requirements.

If the driver does not fulfil the requirement or no Windows driver is available for the plotter, the devices 'Generic/ Text only' or 'HP/ Hewlett Packard HPGL-2-Plotter', delivered with Windows, can be installed.

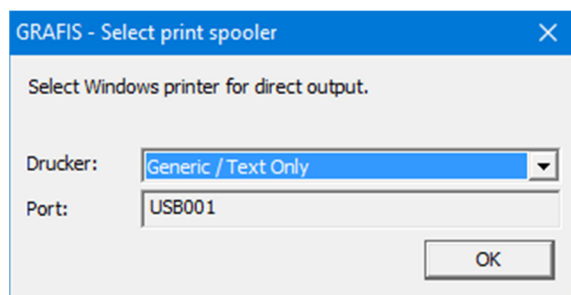
The following step-by-step process must be completed to activate plotting via 'WINSPool':

- File → Printer/Plotter Setup
- Click on *Edit* button
- Enter 'WINSPool:' (Picture B-19)



Picture B-19

- Click on *Edit* button again
- A window for selection of all printer drivers available on the PC appears. Select the driver for the plotter to be driven or the 'Text only' or 'Hewlett Packard HP-GL-2' plotter described above, see Picture B-20.



Picture B-20

- Confirm with *OK*.

If the driver does not support forwarding data, an error message appears during plotting. In this case, repeat the process with the printer driver 'Generic/Text only'.

Pens and line types

The settings for pens/colours and line types are of similar significance in the two dialogues.

Pens/Tools/Colours

From Version 11 onwards you can print in colour with Windows printers.

If the device is to use one colour/tool only, e.g. one pen or one knife, select *single pen no.* and enter the number for the colour/the tool. Select *several pens* if you want to use different tools. Select the corresponding number for colour/pen in the fields *perimeter*, *internal objects*, *texts/annotation* and *point markers*. Select *one pen per size* to output each size with a different tool.

Line types/Output of line attributes

The individual options have the following significance:

- *unchanged*
All line types are available.
- *output broken attribute lines as dashed lines*
The plotter differentiates only between continuous and dashed lines.
- *all as continuous lines*
The plotter draws everything as continuous lines.
- *use line types like pen*
The settings area for colours is active. The colour numbers are interpreted as line type numbers. In this case, the printout is single-coloured but with different line types. If *one pen per size* is active, every size is printed with a different line type like on a paper sewing pattern.

The available six colours are coded through colour numbers: 1- black, 2 – red, 3 – yellow, 4 – green, 5 – turquoise, 6 – blue.

Options in the dialogue Printer setup for Windows printers

Useful are values between 0 and 6 for the *line width*. If certain line types are no longer recognisable, reduce the line weight step-by-step.

Windows printers offer the option to add an *additional margin* around the plot image. This is particularly important when printing to PDF printer drivers. PDF printer drivers offer the full format (A4, A3 etc.) and it may be possible that the print image of a PDF file does not fit fully onto the connected printer. If the page is adjusted to the available page size, it loses its scale. If it is not adjusted, areas along the edge may be missing. When printing with PDF printer drivers it is recommended to set an additional margin of 10mm. Thus, PDF files can be output to a number of different printer models in original scale.

Options in the dialogue Plotter setup for devices without Windows driver

If *job file* is active, a job file is created during plot output. The job file is only useful when working with the plot manager. It contains information about the plot such as length, width, content, scale, bundle no.

Speed/Acceleration

Entering a value for *speed* can reduce the plot speed. A percentage value relating to the maximum speed is to be given. Analogous to the speed, the acceleration can also be reduced. Enter a percentage value relating to the maximum acceleration.

Optimisation of plot output

The individual options have the following significance:

- *complete parts*
The plotter optimises the plot path relating to the piece. This may mean frequent tool changes.
- *least tool change*
The plotter optimises the plot path with as little tool changes as possible.
- *none*
No plot path optimisation, e.g. for inkjet plotter.

B.6 Plotter adjustment and printer/plotter in a network

Grafis can support all plotters and printers with available Windows drivers. These devices are set up in Windows Control Panel. Further options are available in the *File* pull-down menu under *Printer/Plotter setup*. Setup and application of these devices is described in section B.5.

Plotter adjustment

The adjustment of plotters without Windows drivers ensues in Grafis with plot code files with the extension .PLT and plotter queue files with the extension .QUE. The files are stored in the directory \Grafis\Plotter. For some plotters PLT and QUE files are already prepared. Setup and application of these devices is described in section B.1.

The following basic options can be set in the Grafis setup on the *Plotter* file card for prepared plotters: maximum paper width, plotter resolution, number of pens or colours, zero point position, request for each page.

For output of patterns Grafis directly supports the following output devices:

- all Hewlett Packard plotters (e.g. DesignJet, Draftmaster), which process HPGL
- Encad Cadget 2, Encad T-200 and NovaJet
- Canon iPF-Serie (if HP/GL is supported)
- Summa plotter and cutter (e.g. S-Class)
- Graphtec plotter and cutter
- Wild plotter and cutter TA40, TA400, TA500, TA10
- Zünd plotter and cutter
- Mutoh plotters of iP, XP, XP-C and AC series
- Gerber plotter AP300 and AP700 (with special adjustment only!)
- all unlisted plotter which work directly with HP/GL or HP/GL-2
- DM/PL-compatible, i.e. Ioline devices (Summit series)

Furthermore, a range of inkjet plotter exists which can output HPGL data via a plot software included in the delivery:

- Algotex plotter
- Gamma Tech plotter
- Lectra Alys series
- Gerber Infinity series

The devices in the following list have already been prepared in the Grafis installation and can be activated in the setup on the *Plotter* file card:

Plotter driver file	Controllable plotter/printer
Algotex	Algotex Projet, ClassicJet, Streamjet, Windjet, Wavejet, Powerjet various widths (default set to 180cm)
HP/GL-2	all HP-GL/2-compatible plotter and printer, e.g. HP Designjet, Canon iPF, Encad T-200, and many more
Summa S160-TX	Summa cutter S-Class
Graphtec	e.g. Graphtec CE 3000-120 AP
Gerber Infinity	Gerber Infinity series and other Gerber plotter with plot manager
Lectra Alys	Lectra Alys series (ink jet plotter) with plot software
TKT Brain	TkT Brainpower plotter
Wild TA500	Wild plotter TA 500
Zünd	Zünd L800

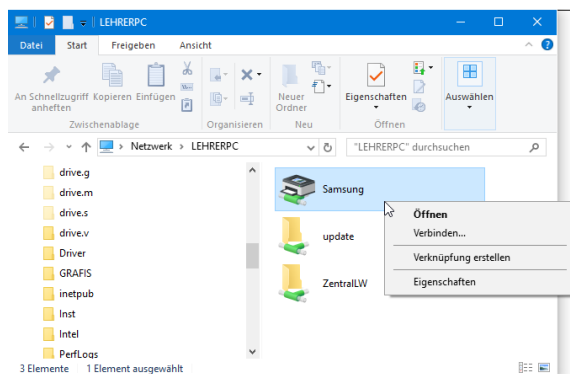
If your plotter is not contained in the above list, please obtain the following information:

1. Is a driver for the printer available for your operating system? If yes, it should be installed as a Windows printer.
2. Is the plotter HPGL-compatible (can it process HPGL-language)? If yes, it can be addressed as a HP-plotter.
3. Is the plotter compatible with one of the devices mentioned above? If yes, it can possibly be controlled with the respective control file.

Is the answer NO to all the questions, a special plotter control file is required for the device. It can only be generated by experienced specialists. Basis for the generation of a plotter control file is a plotter manual which can be obtained from the supplier or manufacturer in most cases. Generating a new plot code file requires special knowledge about controlling plotters. It is realised by the Grafis team as part of a service agreement.

Shared use of printers/plotters with Windows drivers

As a rule, printer and plotter with Windows drivers can be used from various Grafis workstations within a network without special settings. It is merely required to enable the printer in the printer setup of the computer to which it is connected. Other workstations can also address and use the printer via this sharing. The simplest way to connect to the network printer is to search for the PC within the network environment. Here, all available network printers are listed. Select the required printer with a right-mouse click and select *Connect...* from the menu, see Picture B-21.



Picture B-21

For printer or plotter directly connected to the network via a so-called printer port, installation of the supplied driver on all computers to use the printer or plotter is required. Proceed as for a normal device installation under Windows.

Shared use of printer/plotter without Windows driver or direct output of plot data

If an older plotter is to be connected to Grafis via the network, verify that the plotter can process HPGL data. Only in this case can the plotter be supplied with plot data directly from Grafis.

To enable the plotter via the network, a Windows driver must be installed on the host PC. If no Windows driver is available for the device, use the 'Generic/ text only' driver supplied with Windows (or if still available the 'HP/Hewlett Packard HP-GL/2' driver). This driver must then be connected to the interface to which the plotter is connected and enabled in the network. The name used should be the actual name of the plotter. Please ensure that no test page is printed during setup of the printer driver. Enabling ensues as described in the previous section.

The printer driver must be connected on the client PCs also as described in the previous section. Use 'WINSPOOL' in Grafis as the output target, see section B.1. Alternatively, the plot manager may be used, the setup is explained in Appendix D.

B.7 Settings for EPN export to Gerber

Options in Grafis.ini

Experienced users can control the export with the following switches in the Grafis.ini, section [INTERFACE]:

DATAINTERFACE=x default output format (1=Grafis, 2=EPN, 4=AAMA/DXF, 0=menu selection) 0

EPNSORT=0 Subsequent sorting of sizes after export (1=on, 0=off)

EPNGRADGRAIN=0 Graded grain line (1=on, 0=off)

EPNCATEND=- End character or delimiter for category name (e.g. '-' or '_')

EPNNOSPACES=0 Remove spaces from part name and category (0=no, 1=yes)

EPNUSELONGNAMES=1 Permit long file names (more than 8.3) (0=no, 1=yes)

GRAINDOWN= Automatic grain line detection; Select grain line in direction hem/downwards (=1) or away from hem/upwards (=0)

EPNNUMBERONLY= always reduce size designation to numbers (if possible) (1=on, 0=off)

EPNCONVPROG=... external program file for EPN direct output (e.g. c:\grafis\hilfen\epnconv.exe)

The EPN file contains a header with three pre-set fields in which the information part name (1-20), category (A-40) and part description (41-60) is expected. These fields can be collated by the user from the Grafis designation for collection, style, part number and text. This is determined in the Grafis.INI file in the [INTERFACE] area via entries in LINE51 to LINE56. Here, it is specified from which position of the Grafis text how many characters are transferred to which position in the header. The following entries in the [INTERFACE] area are also relevant:

LINE51=>....<

Output for header GerberEPN: collection

LINE52=>....<

Output for header GerberEPN: style

LINE53=>....<

Output for header GerberEPN: part number

LINE54=>....<

Output for header GerberEPN: part name

LINE55=>....<

Output for header GerberEPN: line format

LINE56=>....<

Output for header GerberEPN: base size

LINE57=>....<

Format for size name

Options in Interfac.sys

The file `\GRAFIS\SYMBOLE\INTERFAC.SYS` defines the interpretation of the different Grafis symbols for output to an interface file. It applies especially to the output to Gerber systems.

Gerber Accumark systems have a code letter for each object (line, symbol). The assignment of these codes to the Grafis lines and symbols ensues in the INTERFAC.SYS file. This file contains only ASCII characters and can be edited in any editor. Symbols and line types not assigned in this file will not be exported. Furthermore, the file contains details about the minimum distance between two grade points (this is also the minimum distance between notches). This distance is checked during export. A warning message appears if the distance falls below the determined value. The piece is still exported.

The file contains the interpretation instruction for one Grafis symbol per line.

The **first digit** gives the symbol type. The following applies:

- 1 = line symbol. Symbols output only in connection with lines, e.g. notches.
- 2 = point symbol: These symbols can be positioned anywhere and do not have to be connected to a line, e.g. buttonholes or drillholes.
- 3 = point symbol. In general as 2, but they contain two points for output (for special Gerber systems)

The **second digit** states the number of the Grafis symbol to be defined for interpretation.

A field with up to 10 digits follows. Here, it has to be defined which letter or letter combination is to be used for the symbol in the file. For line symbols (type 1) two letters are significant, for point symbols (type 2 and 3) only one letter is significant.

Appendix C Installing and Setting up the Autonester

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The mode of operation for the Autonester was explained in chapter 18.17.

Preparation/System requirements

The Grafis Autonester functions independently from the Grafis Marker making program. It can run on a separate computer that has been setup for this purpose. Communication between the marker making software and the Autonester ensues via nesting job orders and nesting job solutions. These job orders are saved in the Grafis Autonester directory. If the Autonester runs on a separate computer, the Grafis Autonester directory must be enabled in the network. If Autonester and Grafis Marker making run on the same computer this is not necessary.

Please note that the Autonester puts demands on the system during nesting. Since it is the processor that is mostly affected, this may slow down the system if working with other software (such as Grafis) at the same time. Also please note that the processor generates more heat under full load than under normal conditions. For computers which do not have optimum ventilation this can lead to problems with the stability of the whole system. Laptops in particular are not suitable. We recommend the following minimum requirements for a computer that is to be configured especially for use with the Grafis Autonester:

- Intel Pentium i3/i5/i7 or AMD Athlon, Dual- or Quad-Core
- minimum 2 GB RAM
- The other components can be according to mass-market PC standards. There are no particular requirements for graphic cards or hard disk size.

Installation

The Grafis Autonester is installed from the Grafis CD via its own installation program. Connect the USB-Hardlock only after installing the Autonester. The file can be found on the CD in the folder \Tools\Autonester and is called "Autonstr.exe". After starting the installation program you are guided through the installation process.

Select a target network directory that can be enabled for other users (e.g. C:\Autonester) for the installation. If installing Autonester on a local workstation, install directly in the recommended directory C:\Grafis\AUTONESTER or on the appropriate Grafis drive.

After the Autonester installation is complete, the hardlock driver setup required for the program (Safenet Sentinel) starts automatically. The USB-

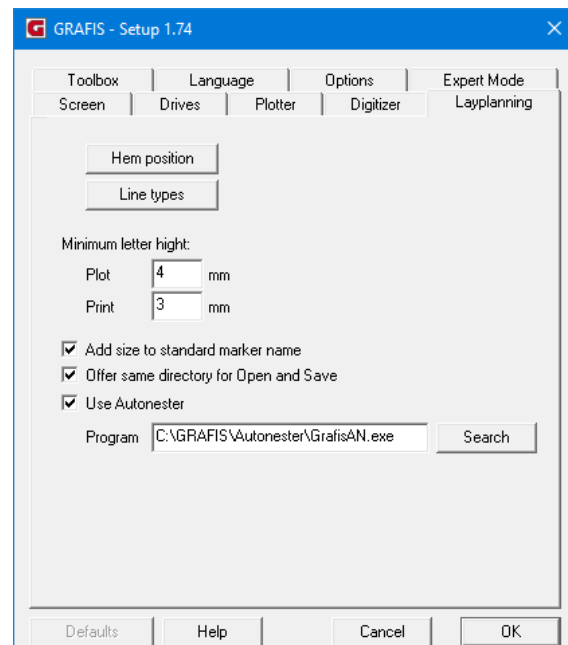
Hardlock is to be connected only after the driver installation. A system reboot may be required.

When using Grafis and Grafis Autonester on the same PC, it is necessary to connect both hardlocks. The hardlocks and their corresponding drivers are compatible.

The Grafis Autonester is entered into the Autostart folder of the start menu during installation. This will start the Grafis Autonester automatically and make it available for nesting jobs after each new start of the computer. The entry in the Autostart folder can be deleted if this is not required.

Setup of the Marker making software

After the successful installation of the Autonester, a link between Grafis Marker making and Grafis Autonester has to be established. All Grafis workstations



Picture C-1

must be able to save files to the Autonester directory.

The path for the Autonester directory is now entered in the setup of each Grafis workstation. To enter the path start Setup (e.g. via Start → Programs → Grafis → Setup) and select the *Marker making* tab. Check *Use Autonester* and enter the path for the Autonester application (GrafisAN.exe) with *Search*, see Picture C-1.

End Setup with *OK*. The Autonester is now set up on this Grafis workstation.

Prepare and send Autonester orders

Finished marker as well as unplaced marker job orders can be sent to the Autonester. A job order can be sent as soon as a marker file is open and the marker making mode is active. A nesting job order is created with *Marker* → *Send to Autonester*. All pattern pieces are returned to their original position (rotation and mirror) and unplaced is selected.

Grafis Marker making saves the job order file directly into the Grafis Autonester directory. The order file contains all the information (e.g. piece perimeters and laying parameters) required by the Autonester for the calculation. If the Autonester is active and set to automatic mode, calculation of the nesting job starts automatically after a few seconds.

The marker file can be closed during calculation. The user can also continue working on the marker. However, please note:

- The basic structure of the marker must not be altered. In particular the order and amount of sizes and pieces and the marker parameters of the pieces.
- The marker file must be saved before closing. This also saves the information about the sent job order file. Otherwise, opening the completed nesting job may no longer be possible.

Taking these two points into account, the user can

- prepare a number of markers,
- send them to Autonester and
- save them under a new names

in a short space of time. The Autonester processes the nesting job orders successively.

Loading Autonester solutions

When the Autonester has calculated a solution or an interim solution, a file is entered into the Autonester directory. To load this file the respective marker must be open and the marker making mode must be active. Load the solution via *Marker* → *Load Autonester file*. When opening a marker file with an available solution, a message box appears asking if the solution is to be accepted.

After accepting an Autonester solution, it is possible that individual pieces do not appear to be placed despite the correct calculation of the marker in the Grafis Marker making software. This is due to the different ways in which Grafis Marker making and Autonester operate. Should this happen, attempt to place the pieces in question by moving the surrounding pieces slightly. If this does not work a certain operation parameter in Autonester can be changed. This results in slightly reduced marker efficiency but the situation mentioned above occurs less often.

Options for marker making with Autonester

Grafis Autonester supports all fabric and laying parameters that can be entered in the Grafis Marker making. These are:

Material/ fabric:

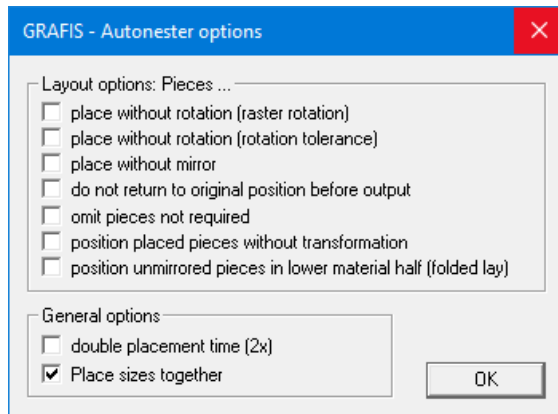
- fabric width
- spread type
- fabric faults
- repeat
- shrinkage values
- global buffer

Piece parameters:

- raster rotation (45/90/180°)
- free rotation angle
- fixed rotation angle
- flip allowance
- tolerance (buffer, block addition)
- symmetry switch for folded or tubular material

Use of shrinkage values that do not relate to the grain line in a piece is not possible. Otherwise, the shape of a piece would be altered during a rotation. The Autonester cannot automatically take this into account. The automatic splitting of pieces is also not possible with the Autonester - even if this option is enabled in the marker, e.g. automatic splitting of the crutch point from a trouser leg.

Check carefully that the correct piece parameters are set before sending the nesting job order. The Autonester will use all possible rotation options! It is often the case that more options are enabled for marker making than should be permitted. During manual marker making, the human operator can compensate for any exceptions. This procedure is not possible when using the Autonester.



Picture C-2

To change the enabled Autonester marker options, use the dialogue window *Marker* → *Autonester options*, see Picture C-2.

In this dialogue window the following can be disabled:

- use of raster rotation (45/90/180°),
- use of free rotation (rotation tolerance) and
- use of flip allowance.

Omit pieces not required

This option is valid only for pieces where the parameter *Piece can remain unplaced* has been checked on the file card *Pieces*. This Autonester option defines if a piece should or should not be placed.

Do not return pieces to original position before output

If the first three options have been enabled and the pieces in the marker have not been rotated or flipped, you do not have to select *return and switch to unplaced* when sending nesting orders.

Position placed pieces without transformation

This option allows you to define certain rotation or flip transformations for single pieces. The Autonester will not rotate or flip/mirror any pieces that have already been placed even if this has been enabled in the piece parameters.

Non-flipped pieces on the top ply (closed spread)/ Position unmirrored pieces in lower material half (folded lay)

When laying on tubular fabrics or folded face-to-face spreads, it is possible that all non-flipped pieces are to be cut from the top ply (lower half of the ply on the screen). The Autonester, however, places the flipped pieces for best efficiency. Therefore it can be expedient to lay all non-flipped pieces (those occurring only once in the spread) on the top ply i.e. lower half of the ply on the screen.

Double placement time (2x)

The time used by Autonester for nesting is doubled between the min-max limits. This option is useful when the Autonester has to calculate markers more efficiently i.e. better fabric utilization.

Place sizes together

Individual sizes are placed in blocks within the marker (interlocking multi-size markers).

Send to Autonester (active piece only)

Only active pieces (placed pieces or pieces on the laying field) will be sent to the Autonester when this option is enabled. Pieces still in reserve will be ignored. This option is useful when only certain groups of pieces are to be automatically placed.

Opening an Autonester file ...

If the link between a marker and an Autonester job order has been lost (e.g. a marker was not saved after the order was sent to the Autonester), this option can be used to import the corresponding Autonester file. It is important that the Autonester file matches the current marker. If not the pieces will be jumbled or not placed.

These options, when set, are saved and apply permanently.

Autonester user interface

Mode

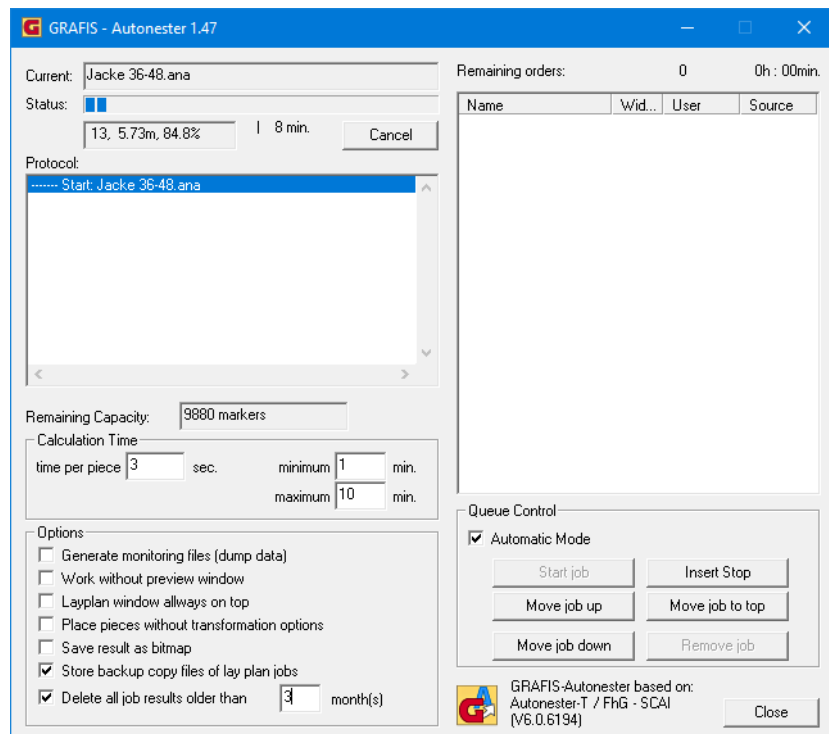
The Autonester operates automatically if the switch *Automatic mode* is set. In automatic mode the job order list is compiled automatically. Incoming Autonester jobs are registered every 10 seconds. The order of the job entries can be altered. As soon as an entry appears in the jobs list, calculation of the marker begins. Once a job order calculation is finished, calculation of the next job order begins automatically.

Calculation time

The quality of a nesting solution at constant placement time is dependent on the amount of pieces to be placed. More calculation time should be allowed for markers with a large number of pieces than for simple markers. The given placement time is calculated on the basis of the number of pieces and a time factor per pattern piece. The resulting amount is limited by a minimum and a maximum value. In the above screenshot, placement time is set to 3 seconds per piece with a minimum of 1 minute and a maximum of 10 minutes placement time. The most appropriate time values depend on computer processor speed and the requirements of the marker making department (quick response, high efficiency etc).

Status

As soon as a nesting job order is being processed, the name and current status of the job order can be found in a window in the top left corner. The progress bar displays the selected calculation time, the time elapsed, the number of interim solutions and the current length. If the option *without preview* is not selected an additional preview window displaying the current status of the calculation appears. Calculation of the current job order can be stopped by closing the preview window or with *Cancel* if required. Comments or error messages for the current order appear in the *Record* window. The entries in this list can be clicked individually. They appear in full in a separate dialogue box.



Picture C-3

Options

Generating monitoring files

Standardised monitoring files for the nesting job orders are generated. These files are important for error diagnostics. Activate this option only if you have been requested to do so - e.g. by the Grafis Hotline.

Work without preview window

The preview of the nesting solution in progress is not displayed. Select this option if the graphic display of the nesting solution is not required or not desired.

Marker window always on top

This option displays the marker preview window always on top of all other windows. This enables the user to simultaneously work with the Grafis Marker making program and follow the progress in the preview window. This option is only useful if Autonester and Grafis Marker making run on the same system.

Save result as a Bitmap file

If this option is activated and the preview window is open, a Bitmap file of the nesting job result can be generated. The Bitmap file will be saved under the same name as the nesting job in the Autonester folder.

Placing pieces without transformation options

This option disables any allowance for rotation and flipping of the pieces to be placed. All pattern pieces will be placed in their original orientation.

Retaining backup copy files of nesting job orders

When an Autonester nesting job order (*.ANA) has been fulfilled, the job order is deleted. When this option is active, backup copy files (*.ANB) can be generated. These are saved in the Autonester folder. This option is useful not only for error diagnostics but also for statistical evaluation of Autonester utilization.

Delete all job results older than...

All Autonester job results (*.ANL) are saved in the Autonester folder even if they have been transferred to Grafis Marker making. Thus it is always possible, at a later date, to reset the marker file to that of the Autonester status. To avoid an overflowing Autonester folder, this option can be activated to delete older no longer needed Autonester job results (*.ANL). The time span is given in 1 monthly intervals. All corresponding files such as bitmaps (*.BMP) and backup files (*.ANB) are also deleted.

Options in the Grafis.ini for the Autonester application

A series of entries for the Autonester are found in the text block [MARKER] in GRAFIS.INI. All entries begin with AUTONESTER, see section B.5.

The entries AUTONESTERPATH and AUTONESTERKEY can be regulated in the setup program. AUTONESTERPATH specifies the Autonester directory where nesting job orders and nesting job results are saved. If the Autonester is to be displayed in the marker menu, AUTONESTERKEY must not be set to "0".

In addition, there are the options AUTONESTER_SOL and AUTONESTER_INCFOLDERNAME. After importing an Autonester nesting solution, AUTONESTER_SOL shifts the marker so that all pieces are shifted to the left i.e. as close to the beginning of the marker as possible. AUTONESTER_INCFOLDERNAME is to include the directory in the file name. This avoids ambiguity when assigning file names to Autonester nesting job orders. The number specifies how many directory levels are to be included in the file name - 1 to 3 levels are recommended. The options AUTONESTERTIME and AUTONESTEREXEC are not in use at this time

Appendix D Installing and Setting up the plot manager

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The plot manager is a stand-alone windows program. It can be used independently from any GRAFIS installation. This program runs on operating systems Windows XP/7/8 or 10. It can also be used on older PCs.

Installing the plot manager

The installation is started using the program PLOT-MGR!.EXE. This file is found either on the Grafis CD or on the local Grafis workstation in the folder \GRAFIS\HILFEN. Double clicking the *.EXE file will start the installation.

The plot manager requires an independent directory on the plotter server – e.g. C:\PLOTTER. The plot server is the computer to which the plotter is connected. If the plot server is to be controlled via a network, the directory must be enabled or it should be a directory on the net drive. A target directory is requested at the beginning of the installation.

After the installation is complete, the plot manager setup will start, see Picture D-1.

Setup the options in the following categories *Plot command*, *Plot.bat - Configuration* and *Options* according to the existing system.

If the plotter is connected to a serial interface COMx:, the following parameters must also be selected: baudrate, parity and protocol. These are found in *Use mode command*.

If the plotter is connected via USB or a network, select *Send via Windows Printer Driver* and activate *Show plot command*.

The scroll bar *Calculate plot time* specifies the criteria which the plot manager uses to calculate the estimated plotting time.

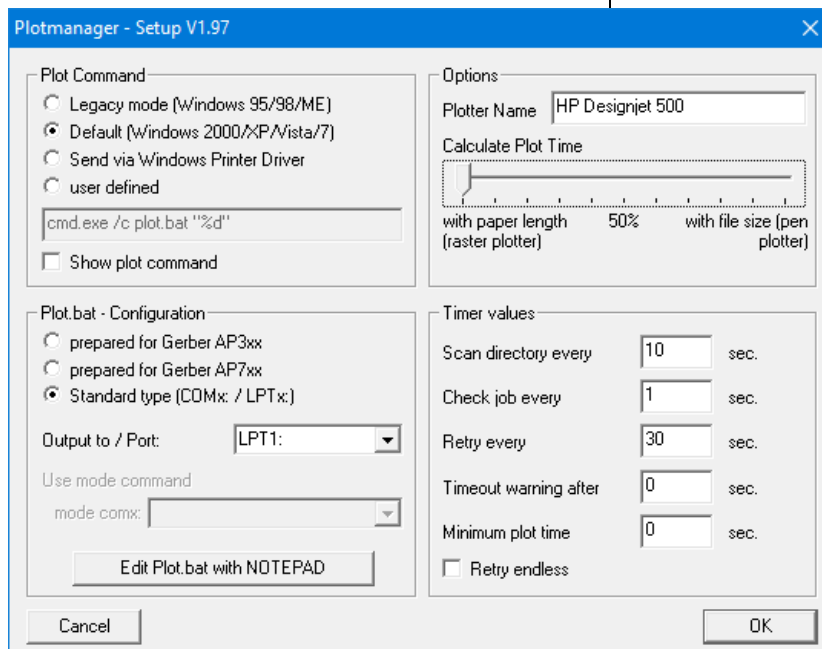
The remaining settings should be left unaltered.

All settings and options are saved in the PLOT-MGR.INI file in the current folder. An explanation of each option in this file is to be found at the end of this text.

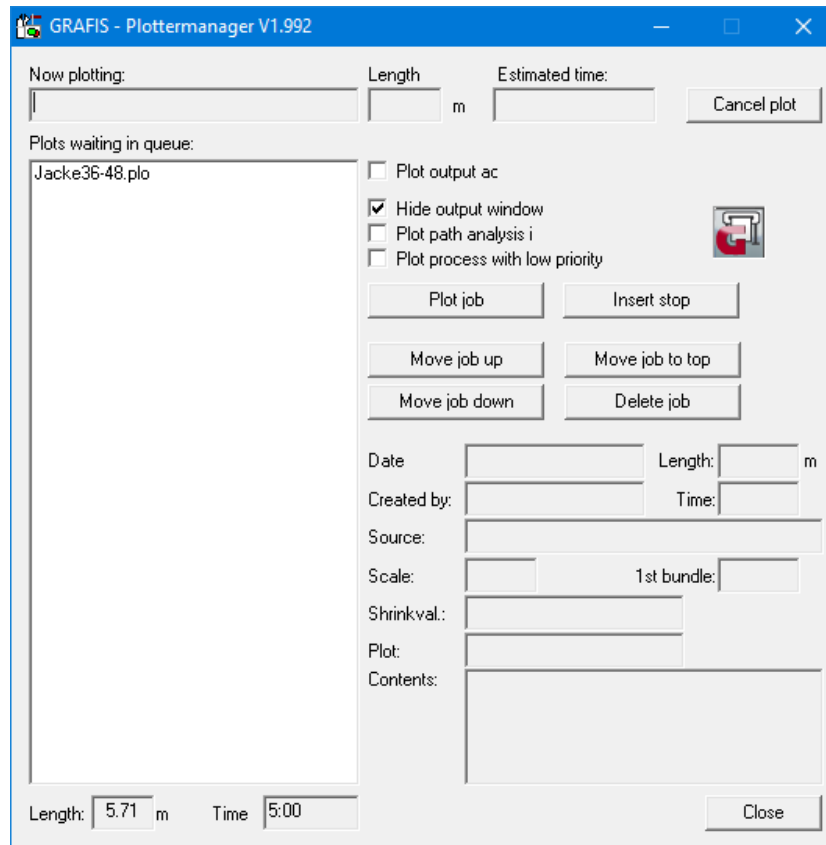
The installation program adds an icon to the Auto start folder so that the plot manager starts automatically after user login.

The following files are required for setup and use of the program if the plot manager should not or cannot be installed with the installation tool: PLOT-MGR.EXE (plot manager program), PLOTCTL.EXE (remote control program), SETUPMGR.EXE (plot manager setup program). These files

are copied to a folder for future use as the enabled target folder for plot files in the network. The PLOTMGR.EXE program file should be linked in the Auto start folder for automatic start up. Then, run SETUPMGR.EXE to complete PLOT.BAT setup and software configuration.



Picture D-1



Picture D-2

Plot manager options

The plot manager user interface is illustrated in Picture D-2. The options are as follows

Plotting active

The plot manager is set to stand-by mode. The current directory is scanned every 10 seconds for new plot jobs. If new plot jobs arrive they will be processed automatically.

Hide output window

All plot job commands are issued in a DOS window. At the beginning, it is possible to make this DOS window visible for control purposes by de-activating this option. An intermediate setting for this switch is available which always shows the DOS window without reduction. Thus, the plot process runs with total system load. This option is required if the data does not arrived sufficiently fast at the plotter (only for very slow PCs).

Plot path analysis in LOG file

For control purposes, the plot manager runs an automatic log file (PLOTMGR.LOG). This file captures every plot job processed with name, date, time and plot duration. Set this option if further information (total line length, pen up length, number of pen select commands, etc.) is required. This additional information can also be found in PLOTMGR.LOG

Plot process with low priority

If the computer is used for other applications as well, it is useful to run the plot process with low system load. For this purposed activate this option. An intermediate state of this switch is available which is reserved for special applications.

Cancel plot

The current plot job is aborted.

Plot picture

Sends the selected plot file to the plotter.

Insert pause

A pause command is inserted in the list before the selected plot job. The plot manager de-activates automatically and waits for user input.

Move up

Moves the selected plot job up one position.

Move to 1st position

Moves the selected plot job to the first position. It will be executed as the next job.

Move down

Moves the selected plot job down one position.

Delete picture

Deletes the selected plot job.

Further displayed information:

Now plotting

This plot is in process.

Length

Length of the plot in meters.

Estimated time

Estimated data transfer time - this is the time that the plot manager needs to transfer the data. It is not the actual plotting time. These two values are only the same when the plotter has a small memory i.e. is not able to store the plot file. If the plot manager is in non-stop use, the estimated data transfer time is very close to the plotting time.

The following information is always given for the plot selected on the left of the list.

Creation

Date and time of the plot job creation

Created by (*)

The user name of the plot jobs creator.

Length (*)

Plot length in meters

Time

Estimated output time

Source (*)

Source file from which the plot was issued

Scale (*)

Scale of the plot (e.g. 1:1 for original size or 1:5 for minis)

1st bundle (*)

If a marker is being plotted, the number of the first bundle in the marker is shown here.

Contents (*)

If a chain of markers is being plotted, the list of the markers is shown here.

(*) This readout appears only when the Grafis Layplan program generates the job file. These displays are empty if the Grafis Patternmaking program has generated the job files.

At the bottom of the list there are two additional readout displays. These are for the total plot length and the total plot time of the complete list of job files.

Starting the plot manager

To create plot jobs in the Grafis Patternmaking and Marker making programs, the plot manager does not need to be active. Only the plot manager directory must be available. If this directory is located on a separate PC, it must be running. The plot manager has to be started when plot jobs are to be plotted. The close button (upper right corner) minimizes the plot manager to prevent a shut down during plotting. To shut down the plot manager use the *Close* button in lower right corner. This button is only available when no current job is being processed.

If the plot manager should always be on standby, create a shortcut to the plot manager program in the auto start folder. The installation sets this up automatically.

Configuring the plot manager in Grafis

In the Grafis plot window, click on the *Settings* button to the right of the selected plotter. Click *Edit* in the new window and enter the target drive and directory in the display *connected to*. End the entry with '\ ' e.g. 'P:\ ' or 'C:\PLOTTER\ ' if the plotter is connected to the PC. If the option *job file* has been selected, job files are generated for the plot job. This displays more detailed information about the plot job in the plot manager. Click *Edit* again and close this box with *OK*. All plots generated with this plotter setting will be sent to the selected target directory. File names are generated automatically. As each plotter will have own plotter settings you can work with any number of plot managers and therefore any number of plotters. Alternatively, a single plotter with various settings (different tools, velocity, paper width etc.) can also be used.

Access to the plot manager in a network

A network plot server PC is recommended in companies with a large number of plots per hour. This can be a simple PC (minimum 133 MHz) with Windows operating system. More than one plotter can be connected to this PC depending on the number of serial and parallel ports available. Each plotter must have its own directory for its own plot manager. This directory can also be located on the network if the server is running around the clock. The advantage here is that plots can be generated even if the plot server PC is switched off. The PC can then be switched on when plotting should start. A remote check of the plot manager can be achieved using PLOTCTL.EXE. This program allows users to check the status (with a slight time delay) of the plot manager from any where on the network. PLOTCTL.EXE must be located in the same directory as PLOTMGR.EXE.

Please note: the plot manager may only be started once. It may only be started on the plot server. The remote check program, on the other hand, can be started as often as required.

Activating the plotting process using 'WINSPOOL' for USB plotters or through network (Printerport)

Plotters connected via USB or network (Printerport) do not have the ability for a direct data transfer interface. In this case, Grafis offers the possibility of using the option 'WINSPOOL:' to relay the plot files through a Windows printer driver. A Windows printer driver for the selected plotter must be installed which supports the PASSTHROUGH of the plot files. Generally the standard plotter drivers from Windows or driver from HP fulfil this requirement.

If the driver does not fulfill this requirement or there is no driver for the selected plotter, install the Windows device 'Generic/Text only' or 'HP/Hewlett Packard HPGL-2-Plotter', see Picture D-3.

To start the plotting process using 'WINSPOOL:' complete the following sequence:

- Start the plot manager
- Click the button right of the command line.
- Enter 'WINSPOOL:'.
- Click the button right of the command line to save entry.
- A popup window with all available printer drivers appears. Choose the driver for the selected plotter or alternatively 'Text only' or 'Hewlett Packard HP-GL-2 Plotter'.
- Confirm with OK.

If the driver does not support PASSTHROUGH, an error message appears. In this case, repeat the above sequence using the printer driver 'Generic/Text only'

The PLOTMGR.INI options in detail

Under certain circumstances, further options of the plot manager in PLOTMGR.INI can be adapted for the plotter or the local situation. Here is a short explanation of options that cannot be changed via the plot manager window.

COMMAND

Contains the plot command that will be executed with each plot job.

NAME

Contains the name of the plotter. This name will be shown in the title bar of the plot manager and can be used to differentiate between several plotters.

PLOTBYTES

The plot manager stores the number of plot bytes processed.

PLOTSECONDS

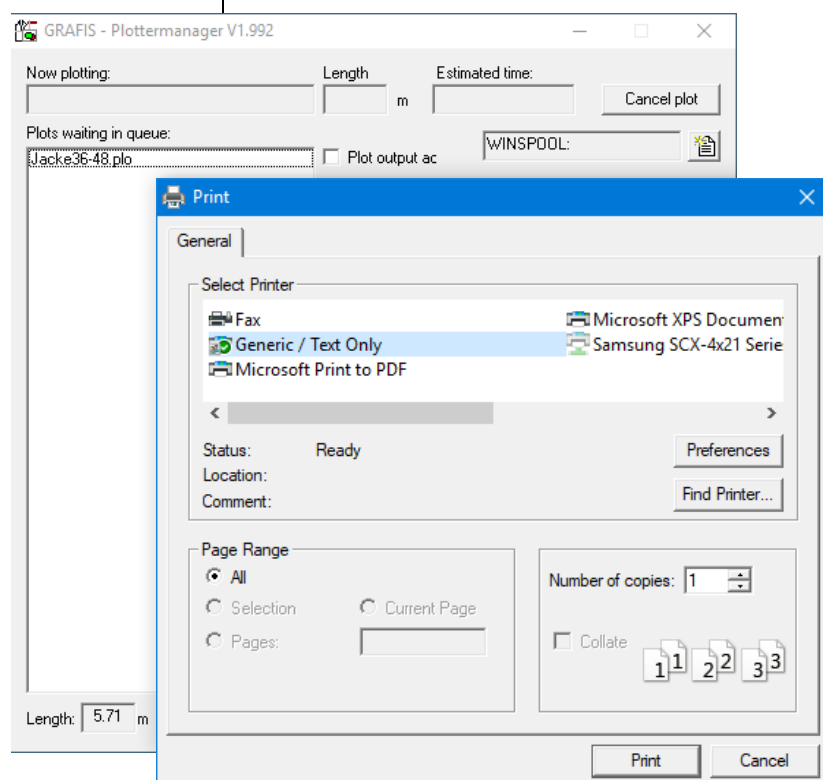
The plot manager stores the time in seconds of the plots processed. The two values PLOTBYTES and PLOTSECONDS are used to calculate the estimated plot time.

PLOTMMETER

The plot manager stores the length in millimetres that have been plotted. The two values PLOTMMETER and PLOTSECONDS are used to calculate the estimated plot time.

TIMECALCBYTES

Contains the weighting value for the calculation of the estimated plot time. The value range from 0 to 100. 100 calculates the time based on file size only (PLOTBYTES). 0 calculates the time based on plot length only (PLOTMMETER; advantageous for ink jet plotters). A value in between are a mixture of the two.



Picture D-3

PLOTTIMER

Contains the time interval in seconds for checking the plot directory for new jobs. It is also the maximum pause time between jobs.

RETRYTIMER

Contains the time interval in seconds for the start of a retry after an error message.

CHECKTIMER

Contains the time interval in seconds for checking the status of the current job.

SHOWCMD

When this is set to '1', the plot command line will be shown in the plot manager window. Then it can be changed from the user interface.

MINSECONDS

Contains the minimum amount of time that plot job needs. This command can be used to detect errors.

RETRYENDLESS

Raise the retry output to endless. Normally the plot manager stops after three attempts.

Configuration example: Encad Cadjet 2 is connected to a Grafis PC and additional Grafis workstation PCs in the network

The Encad Cadjet 2 is connected to the PC via a parallel port. If an additional printer is needed, the PC requires a second parallel port (LPT2:). The following configuration is recommended:

Create the folder C:\CADJET for the plot manager in the directory C:\. The folder 'Cadjet' is a shared folder and has read/write access that can be secured using a password. Copy the file PLOTMGR.EXE to this folder. The PLOTMGR.INI contains following command line:

```
COMMAND=c:\command.com
/c copy %d lpt2:
```

In the GRAFIS.INI at this PC add the entry MANAGER=C:\CADJET under the heading [PRINTER]. In the Grafis Layplan program under plotter setup, enter 'C:\CADJET\' in the display field *connected to*.

Now configure the additional Grafis workstation PCs. Search for the 'Cadjet' folder and connect to drive P: using a right mouse click. Do not forget the option 'restore connection'. Enter 'P:\' in the display field *connected to* of plotter setup in Grafis at these additional workstation PCs.

The estimated plot time averages a few seconds because the plotter has enough memory to store multiple plot files. It goes with the real plot time only if the plotter is under continuous operation.

Configuration example: Algotex plotter connected to a separate PC and additional Grafis workstation PCs in the network

Algotex plotters are supplied with a configured PC or are connected to an available PC (WaveJet and WindJet series). The plotter driven by a self-contained plotter control program that runs on Windows. This program is monitoring a folder for incoming HPGL plot files, e.g. c:\algotex\hpgl. This folder is entered in the setup of the plotter control program.

Create a directory C:\PLOTTER on the plotter PC. Enable this folder as shared folder 'Plotter' in the network. The additional Grafis workstation PCs have access to this folder as described above. Drive P: is connected. Copy the following files to C:\PLOTTER on the plotter PC: PLOTMGR.EXE, PLOTCTL.EXE, the additional help program FILEEXST.EXE (to be found under C:\GRAFIS\HILFEN) and a PLOT.BAT. The PLOT.BAT contains the following:

```
@echo off
copy '%1' c:\algotex\hpgl\plot.hpg
fileexst.exe c:\algotex\hpgl\plot.hpg
```

The program FILEEXST.EXE stops the execution of PLOT.BAT as long as the specified file exists. The Algotex plot program deletes the file as soon as the plot is finished.

Add the following command to PLOTMGR.INI:

```
COMMAND=plot.bat %d
```

Set the value TIMECALCBYTES=0. The estimated plotting time will be calculated based on the plot length in millimetres. This value is comparatively accurate.

Configure the additional Grafis workstation PCs as above. Additionally an icon to the program P:\PLOTCTL.EXE should be added to each desktop so that the workstation user has access to the plot queue to view and change the queue.

Configuration example: Gerber AP320 plotter connected to a separate plotter PC, additional Grafis workstation PCs in the network and a file server with plot files on drive H:

Create the folder H:\AP320 on drive H:. Copy the files PLOTMGR.EXE, PLOTCTL.EXE and APCHECK.EXE (to be found under C:\GRAFIS\HILFEN) to this folder. Install the Gerber plot program PLOTGBER to folder C:\GERBTEST on drive C:. Additionally copy the file GBSHIFT.EXE to C:\GERBTEST.

Add the following entries to the file PLOTMGR.INI:

```
COMMAND=plot.bat %d
TIMECALCBYTES=100
RETRYENDLESS=1
```

The PLOT.BAT contains the following:

```
@echo off
copy '%1' c:\gerbtest\plot.0$$
c:
cd \gerbtest
copy gbshift.ini gbshift.ret
gbshift.exe plot.0$$
plotgber.exe plot.0$$ 2
h:
cd \ap320
apcheck.exe
if exist error.log copy
    c:\gerbtest\gbshift.ret
    c:\gerbtest\gbshift.ini
del c:\gerbtest\plot.0$$
```

Set the value TIMECALCBYTES=100. The estimated plotting time will be calculated based on the size of the plot file. This value is comparatively accurate. Additionally, a special plot driver file (ap320.plt) is required for the Grafis workstations. It contains the exactly determined feed length. This file can be requested from the Grafis Hotline or the Grafis dealer. Configure the additional Grafis workstation PCs as above. The target directory should be 'H:\AP320\', where H: is connected automatically on login.

Configuration example: HP Designjet 510 using the HPGL-2 option connected to a network

The HP plotter is assigned an IP number automatically during installation. This is used by the PC printer driver to access the plotter. Install the driver included with the HP plotter. Send a test plot to plotter via the Windows driver.

Install the plot manager as described above. Select the option *Show plot command* during the setup (in the SETUPMGR program). After starting the plot manager activate the plot command prompt by clicking the adjacent button. Enter 'WINSPOOL:'. Save the entry by clicking the adjacent button again. A popup window with all available printer drivers appears. Choose the previously installed HP driver (HP Designjet) and confirm with OK.

If the HP driver does not support PASSTHROUGH, additionally install the standard Windows driver 'Generic/Text only' to the same network interface as the HP driver. Choose this from the popup window instead of the HP driver and confirm with OK.

