

# Chapter 16 "Layplanning"

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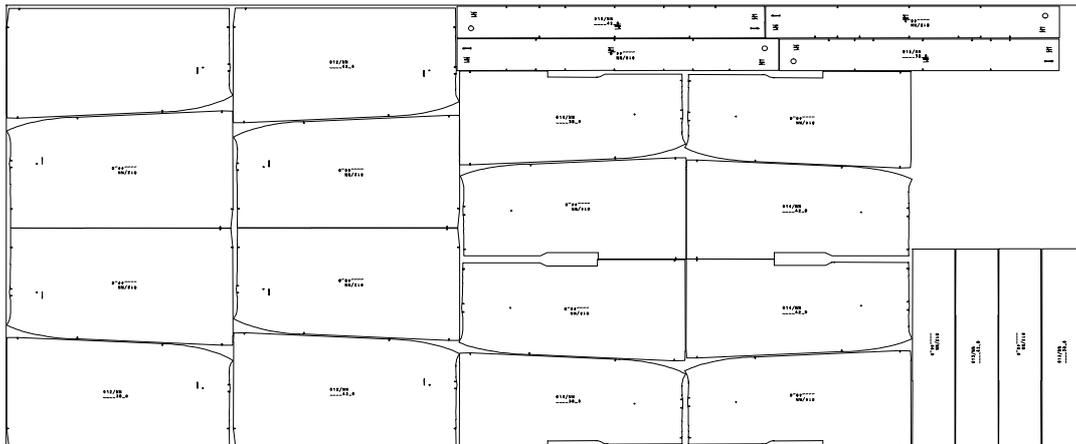
From version 6 GRAFIS contains a simple layplanning function suitable for craft, costing and education.

This function allows for layout of all production pattern pieces of the current style. Technical parameters such as material type, grain, number of pieces per style and repeat markings are considered. The pattern pieces can be moved without restriction on the fabric and –if permitted – can be rotated or flipped about the symmetry axis. During

layout it is indicated whether the piece can be placed at the current position or whether it overlaps. Simple automatic layplanning supports re-laying of small pieces, especially. A minimum distance between pieces (buffer) can be pre-set, also.

The following functions required for industrial layplanning are not yet implemented in the GRAFIS layplan:

- combining pieces from different styles in a layplan,
- use of variable buffer during layplanning,
- application of optimised layplans onto new layplans to be generated,
- generation of step lays,
- grouping pieces.



## 16.1 Preparations

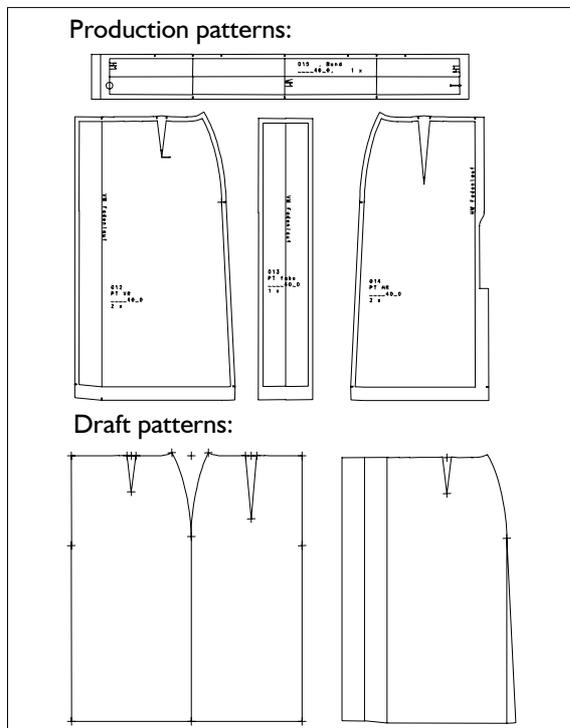
### Step-by-step guide

- ⇒ Generate production pattern pieces with closed perimeter
- ⇒ Set grain and repeat markings
- ⇒ Set „piece parameters“ in the part list (attribute „production piece“, material type, pieces per style)
- ⇒ Enter all sizes to be planned into the size table
- ⇒ Grade all parts.

### Construct production patterns with closed perimeter

During style development draft patterns are generated, first from which the actual production patterns can be derived (see Chapters 13 and 14). Pieces can be laid out, only if they have a closed perimeter. The pattern perimeter corresponds with the cutting line on the fabric.

When opening the marker making application, GRAFIS checks whether the perimeter of the pieces to be laid out is closed. If GRAFIS finds gaps in the perimeter (>0.4mm) or protruding lines an error message appears and a report stating which piece contains the error in which size. The report can be saved or printed. Experience shows that gaps are mostly found at corners, line transitions or symbols.



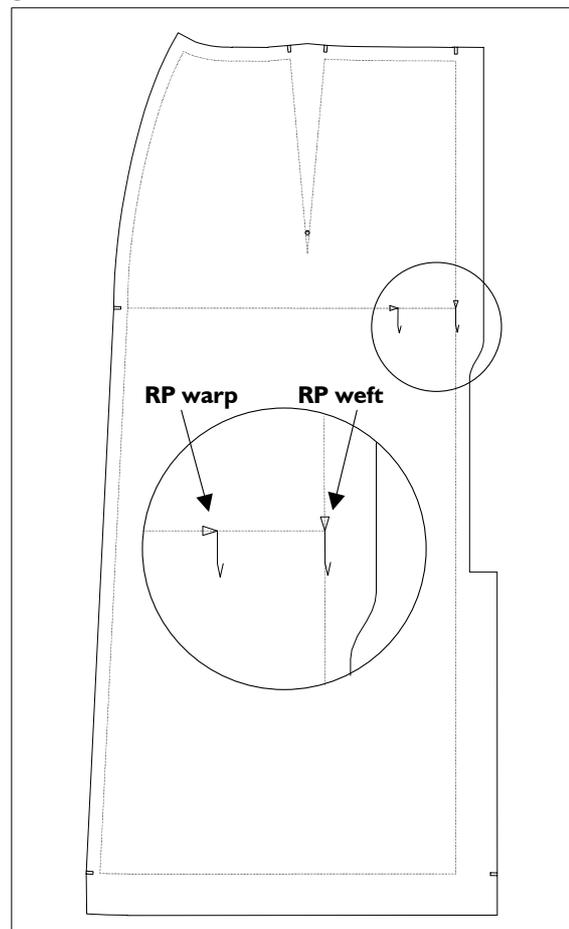
Picture 16-1

Construct a „straight skirt with separate box pleat“ in the centre front (1<sup>st</sup> Exercise from Chapter 14). The skirt is to consist of the following production patterns

- skirt front with pleat (left/right symmetrical)
- skirt back (left/right symmetrical)
- underlay and
- waistband (see Picture 16-1).

### Set grain line and repeat markings

Set the GRAFIS symbol „grain line“ in the production pieces. It is considered during layout in the marker. If no grain line symbol is set the negative y axis (direction downwards) is used as the grain.



Picture 16-2

If a production pattern is to be matched in weft and/or warp repeat the symbols „RP weft“ (for repeat point weft) and „RP warp“ (for repeat point warp) are to be set (Picture 16-2). The long line of both symbols indicates the grain/weft direction in which the symbols are to be aligned. The peak of the triangle points in the direction of the repeat: for „RP weft“ in direction grain, for „RP warp“ vertical to the grain. The significance of the symbols can, thus, be seen in their shape.

### Set piece parameters

After completion of the production patterns and before starting the marker maker function the piece parameters have to be set. In the *partorganis* menu the „Piece Parameter“ window (Picture 16-3) opens by switching to *+techn.par.* For all pieces to be layplanned the following is to be set:

⇒ All pieces to be layplanned have to have the attribute „production piece“. Only pattern pieces with this attribute are considered for the layplan.

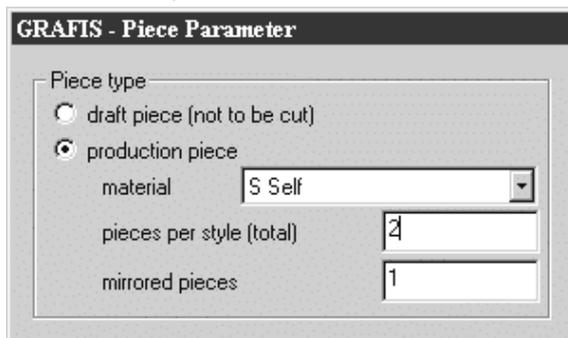
⇒ Determine the material type for pieces with the „production piece“ attribute.

If the required material type is not listed, it must be added in the file **\GRAFIS\MATERIAL.DAT**. This file contains the label for the material type in the first column. Each label can be assigned once, only. Capital letters or numbers can be used as labels but no special characters or umlaut. The material name follows from the third column onwards.

If the material list is to apply to one construction system, only it is to be saved as **\GRAFIS\ML&SO\_D\MATERIAL.DAT** (here: for the construction system Müller & Sohn Damen).

⇒ Enter the amount of this piece required per style.

For right/left symmetrical backs „two pieces per style“ are required „of which one piece is mirrored“. Please note that here, the number of this piece per style is to be entered not the total number of pieces for the marker.



Picture 16-3

In the prepared style „skirt with separate box pleat“ open the *partorganis* menu and the „Piece Parameter“ window with the *+techn.par.* switch (Picture 16-3). Select the skirt front, set to „production piece“ and select the material type and the amount according to Picture 16-3. The skirt front is left/right symmetrical (paired) and, therefore, is required twice per style of which one piece is mirrored. The same applies to the skirt back. The production patterns underlay and waistband are required once each (mirrored: 0).

### Grade production patterns

All sizes to be layplanned are to be entered into the size table. One entry per size is sufficient. Grade all production patterns with *Grade All Parts*. The prepared style „skirt with separate box pleat“ is to be graded in sizes 38, 40, 42 and 44.

## 16.2 Open and prepare layplan

### Step-by-step guide

- ⇒ Prepare the style according to section 16.1
- ⇒ *File | Marker Maker*
- ⇒ Open new layplan with *<New>* or select an existing marker and load with *<Open>*

For a new layplan the following index cards have to be processed in order. To switch to the next card click on the next index-tab. **Click the *<OK>* button, only after having filled in all cards.**

### Step-by-step guide

- ⇒ Determine the number of styles per size to be laid out in the *Size Table* card
- ⇒ Determine the pieces to be layplanned in the *Contents* card
- ⇒ On the *Marker Maker Parameter* card the width of fabric and - if required - repeat information, minimum distance and vertical guide lines are to be set
- ⇒ Allow for rotation and/or mirroring individual or all pieces on the *Piece Parameter* card
- ⇒ possibly: set display and/or output options on the *Options* card
- ⇒ Click the *<OK>* button.

After having selected an existing layplan or having filled in the cards the marker maker application is launched and layout can begin (section 16.3).

### Start layplanning function

The menu function *File | Marker Maker* starts the GRAFIS layplanner. First, the window for selection of an existing layplan or opening a new marker (*<New>* button) is opened. The name for a new layplan is to be entered when depositing, only. Existing, saved layplans can be loaded with double-click or after selection and *<Open>*. Clicking *<Delete>* deletes the selected layplan.

## Enter marker options into the index cards

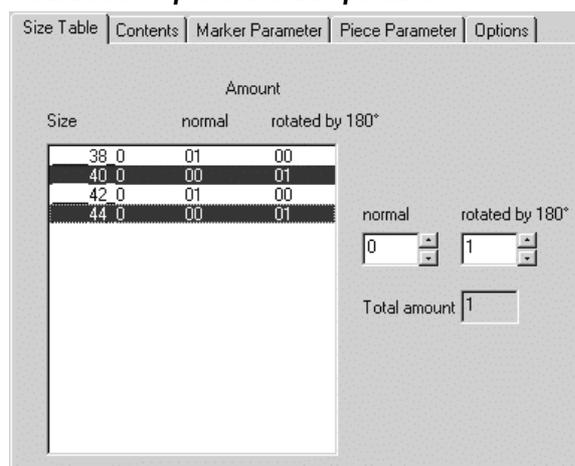
### Size Table card

On this card you determine **how many** garments in **which size** are to be laid out.

The first column in the size table card contains all sizes entered and activated in the size table. The second column determines how often the style is to be laid out in the direction of the grain in this size; the third column indicates how often it is to be laid out rotated through 180°.

Select a size. The entries in the second and third column of the size list can be changed with the dialogue fields „normal“ and „rotated through 180°“ to the right of the list. The sum out of „normal“ and „rotated through 180°“ is shown in the „total“ field.

If a number of sizes are to be layplanned in the same amount select all respective sizes. To select an area click on the first size and then on the last size with pressed down <Shift> key. Individual sizes can be selected together by pressing the <Strg> (<Ctrl>) key when clicking. Changes to the „normal“ and „rotated through 180°“ fields automatically apply to all selected sizes. **Transfer by dragging with left mouse button pressed is also possible.**



Picture 16-4

Open a new marker in the prepared style by opening the layplanning function via *File | Marker Maker* and clicking on <New>. Fill in the *Size Table* index card according to Picture 16-4.

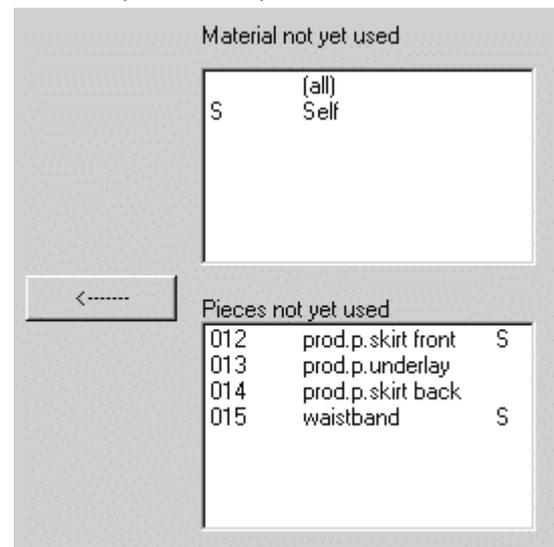
Click on size 38 and then size 42 while holding down the <Shift> key. All sizes from 38 to 42 are selected. Set the dialogue window „normal“ to „1“. Now, click on size 40 and then size 44 while holding the <Ctrl> key. Thus, only sizes 40 and 44 are selected. All settings for size 40 are automatically transferred to size 44. Set the dialogue window „normal“ to „0“ and the „rotated through 180°“ dialogue window to „1“ with the result shown in Picture 16-4.

### Contents card

This index card determines **which pieces** are to be planned in this marker. Layplans for fabric cutting usually contain pattern pieces of one material type (self, lining, interlining), only. Layplans for plot output or cutting templates often contain all pattern pieces.

The list „active pieces in marker“ contains all pattern pieces to be laid out in the current marker. At first, the list is empty and has to be assigned. The list „materials not yet used“ lists all types of material for which pattern pieces are available. The list „pieces not yet used“ shows all pieces with the „production pattern“ attribute.

For the style „skirt with separate box pleat“ only the material type „S“ (self) is shown (Picture 16-5) as the piece list contains no pieces for any other type of material. „pieces not yet used“ are the production patterns skirt front, underlay, skirt back and waistband (Picture 16-5).



Picture 16-5

To transfer all pieces of one material type double-click on the required material type. All pattern pieces of this material are transferred into the „active pieces in marker“ list. You can transfer a piece from the „pieces not yet used“ list by selecting the piece and clicking on „<-----“. A pattern piece can be excluded from the „active pieces in marker“ list by selecting the piece and then clicking the „Remove Piece“ button.

For the example „skirt with separate box pleat“ double-click on the material type „self“. All production patterns are automatically transferred to the „active pieces in marker“ list (Picture 16-5). Exclude individual pieces from the list by selecting a piece in this list and clicking <Remove Piece>. Transfer the removed pieces from the „pieces not yet used“ list by selecting them and clicking on „<-----“ with the result shown in Picture 16-6.

Active Pieces in marker		
012	prod.p.skirt front	S
013	prod.p.underlay	
014	prod.p.skirt back	
015	waistband	S

Picture 16-6

### Marker Parameter card

On the *Marker Parameter* card you determine:

- **width of the material**  
The required material width is to be entered in millimetres. You can select the standard width for A0-, A1- and A2 output devices. Entry of a different value, e.g. fabric width, is also possible. If the set material width is wider than the output device width use the wrap function for plotting. An A0 plotter (90 cm wide) requires two plot strips for material width of up to 1.80 m.
- **Minimum distance between pieces**  
The minimum distance applies to all pieces in the active marker; it is a minimum of 1 mm and can be increased at your discretion. It is considered during layout, automatically.
- **Material with pattern repeat**  
Enter the information about the material repeat „Weft“ (repeat lines in direction of the grain) and in „Warp“ (repeat lines vertical to the grain). The fields for „distance“ and „Offset“ of the repeat lines is active, only after having ticked „Weft“ and/or „Warp“. „distance“ determines the distance between repeat lines. „Offset“ defines the distance of the first repeat line from the edge of the material (left or bottom). Pieces to be matched on the repeat have to contain repeat symbols (see section 16.1).
- **Vertical guide lines**  
Default setting is „no“ vertical guide lines. Vertical guide lines are interesting for plotting with single sheet feed if pattern pieces are not to protrude the edge of the page. If „active plotter“ is selected the guide lines represent the individual sheets. With „every..... mm“ the distance between the guide lines can be defined. Guide lines act as material limits. Pattern pieces can be butted from left and right. Placing pattern pieces on top of a guide line is not permitted.

For the example „skirt with separate box pleat“ set the material width on the *Marker Parameter* card to 1.40 m and the minimum distance to 1 mm. The skirt pieces are not to be matched to a repeat. Guide lines are not required either (Picture 16-7).

Picture 16-7

### Piece Parameter card

Settings for rotation and / or mirroring pieces in the layplan are determined on the *Piece Parameter* card (Picture 16-8).

Picture 16-8

For each pattern piece you can define:

- **fixed rotation angle**  
the piece is rotated about this angle prior to layplanning
- **tolerance angle**  
this is the maximum angle about which the piece is allowed to be rotated in the layplan

Additionally, the following rotation / mirror option can be allowed:

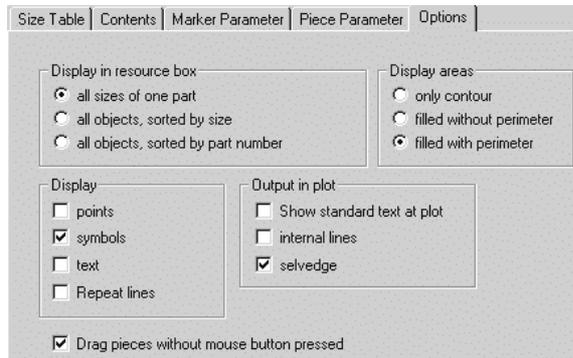
- mirror at grain line (x axis)
- mirror vertical to grain line
- rotate through 180°
- rotate through +/-90°
- rotate through +/-45°

Apart from the setting „fixed rotation angle“ this card defines what is allowed, only. The piece can be rotated / mirrored according to these settings in the layplan. The handling during layout is explained in section 16.3.

Analogous to the *Size Table* card a number of pieces can be selected together with <Ctrl> or <Shift>.

### Options card

The *Options* card contains all display and plot options.



Picture 16-9

Stocking the resource boxes is determined in „*Display in resource box*“. The following can be set:

- all sizes of a piece contained in one box,
- all objects sorted by size; each box contains one piece in one size, only
- all objects sorted by part number in a resource box

Under „*Display areas*“ you determine whether

- only contour,
  - filled contour without perimeter or
  - filled contour with perimeter
- of the pieces are displayed.

The switch setting for „*Display*“ of

- points
- symbols
- text
- repeat lines

applies during layout and plotting. Additional options for plotting can be set under „*output in plot*“. Display the bare minimum during layplanning. Displaying many objects is slower and depends on the power of your computer. Should the pattern pieces not hang steadily on the cursor text especially should not be displayed.

With the switch „*Drag pieces without mouse button pressed*“ you decide whether the pieces hang on the cursor

- after short click or
- with pressed left mouse button, only.

The first option is set to default.

The switch „*output in plot*“ applies for plot output, only. Here, you have to determine whether

- the automatic *standard text* (part number, part name, size, amount),
  - *internal lines* and
  - the *selvedge*
- appear in the plot.

Select all options according to Picture 16-9. After having filled in all index cards click on the <OK>

button. The layplanning application opens and layout can begin.

### 16.3 Layout of pattern pieces

First, prepare the style (section 16.1) and the marker options (section 16.2) and then, open the layplanning application with <OK> (Picture 16-10).

#### The layplanning application

The layplanning application is divided into three areas:

- the resource boxes,
- the pre-layout area and
- the material.

The resource boxes are situated at the upper edge of the screen. They contain all pieces to be laid out in all sizes. How the pieces and sizes are distributed in the resource boxes was determined in the *Options* card. The resource boxes can be scrolled to the right or left with the scroll bar. Below each resource box you can find the part number after **T:** and the size after **G:**.

If the *Options* card is set to „all sizes of one part“ the resource box contains all sizes and is marked with the part number, only. Move the cursor over such a box. Behind **G:** below the resource box the size of the piece taken out of the box with mouse click is indicated. With mouse click on the lower right corner of the box („all“ appears) all pieces in the box can be transferred to the pre-layout area.

The material is situated at the lower edge of the screen. The material width was determined on the *Marker Parameter* card.

The pre-layout area is the area between resource boxes and material. It can be increased by folding the resource boxes. To this end click the  button at the upper right end of the resource boxes. The boxes shrink to approx. twice the size of the button. The  button toggles to . Clicking on  unfolds the resource boxes again.

#### Laying out the pattern pieces

After the preparations in sections 16.1 and 16.2 you see the marker application according to Picture 16-10 with material and pre-layout area being empty.

#### Call pattern pieces from the resource box

Move the cursor over the resource box. The size of the piece attached to the cursor after left mouse click is indicated below the box. Click and move the cursor to the pre-layout area and the material. The pattern piece hangs on the cursor and is dropped after another left mouse click, only.

**Only pattern pieces placed on the material according to current regulations are coloured in.**

Retrieve some pattern pieces from the resource boxes and position them on the material. The piece stops following the cursor when it touches another

piece or the edge of the material. At the same time a red thread appears between the piece and the cursor. As soon as this thread exceeds a certain length the piece follows the cursor, even across the edge of the material or placed pattern pieces.

**Re-position pattern pieces**

Move the free cursor (without pattern piece attached) across already placed, filled pattern pieces. In the status line at the lower edge of the GRAFIS screen the part number, part text and size of the pattern piece on which the cursor points is displayed. When the crosshair of the pattern piece appears it can be clicked and, thus, picked up again. Pick up a placed pattern piece, drag it away and re-position it at the original place. GRAFIS can re-insert pieces into a layplan provided they fit into the gap.

**mirror / rotate pattern pieces with the context menu**

Move the free cursor (without pattern piece attached) onto a pattern piece on the material or in the pre-layout area and open the context menu for the piece with the right mouse button (16-11). The individual menu functions apply to the piece with the cursor, only. They have the following

significance:

*re-lay*  
Automatic layout of the piece onto the first permitted position in the marker (from the left).

*mirror.../ rotate...*

Mirror the piece about x or y or rotate the piece about a fixed pre-set angle. Only rotate and mirror functions permitted for this piece on the „Piece Parameter“ card are active. If a function is to be permitted subsequently select *Properties* in the context menu.

*return*

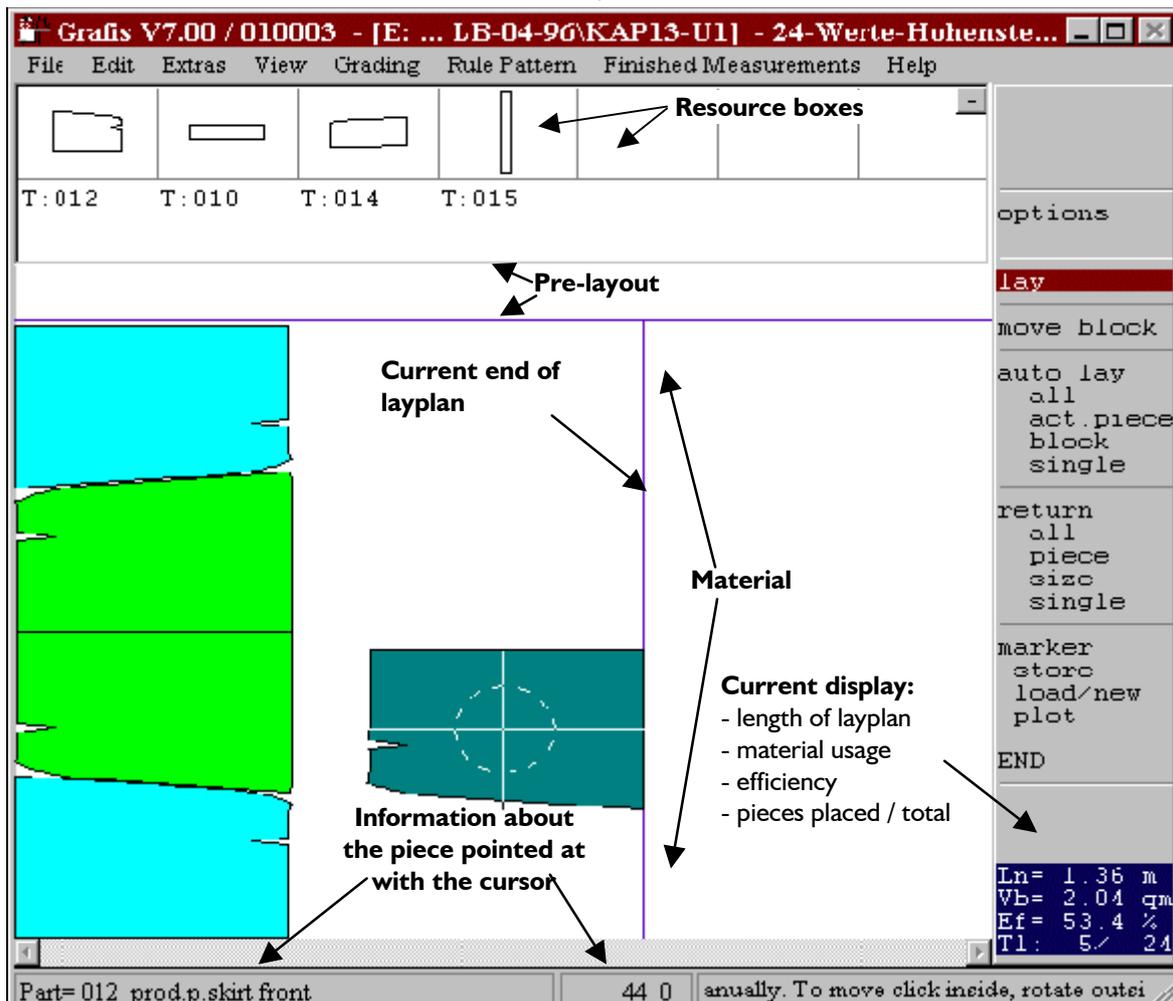
Returns the pattern piece to the resource box.

*„nil“ piece*

Returns the pattern piece to its original position. Any rotation or mirror is reversed. The fixed



Picture 16-11



Picture 16-10

rotation angle determined in the „*Piece Parameter*“ card remains existent.

#### *Properties*

Opens the „*Piece Parameter*“ card. The properties / allowances for the selected pattern piece are indicated and can be edited. Changes apply to all pattern pieces with this part number, not just this piece.

#### *Abort*

Closes the context menu.

### **Mirror / rotate pattern pieces with the crosshair**

The crosshair of the layplanning function is basically identical with the drag function for pieces called via <F3>.

When the cursor points on a piece in the marker or in the pre-layout area the cursor appears in form of a crosshair with circle. The length of the crosshair axis corresponds with the dimensions of the piece. If the piece is too small for the cursor to be used adequately you have to zoom in with *Edit | Move/Zoom* or use the context menu. The crosshair cursor offers the following functions:

#### **drag**

Quick click inside the circle. If the „*Options*“ card is set to „*drag pieces without left mouse button pressed*“ the pattern piece is attached to the mouse. A second click drops the piece.

#### **rotate**

Click outside the circle and drag with pressed left mouse button. If the tolerance angle is set to „0“ in the „*Piece Parameter*“ card rotation is not permitted and clicking outside the circle works like clicking inside the circle (*drag*).

The rotation can be reset with „*nil*“ in the context menu.

#### **mirror**

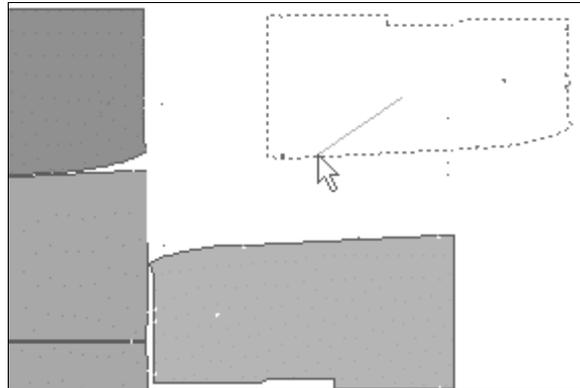
Point on the symmetry axis outside the circle with the cursor. As soon as the circle is hidden click the symmetry axis of the pattern piece. It is mirrored. If the circle is not hidden mirror about this symmetry axis is not permitted („*Piece Parameter*“ card).

Mirror, also is reset with „*nil*“ in the context menu.

### **Slide pattern pieces**

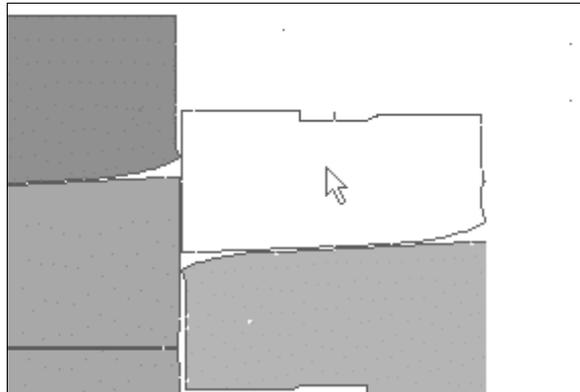
Sliding pattern pieces is possible, only if the „*Options*“ card is set to „*drag pieces without left mouse button pressed*“.

First, click the pattern piece so that it is attached to the cursor. Drag the piece with left mouse button pressed. A red thread appears indicating the slide direction (Picture 16-12).



Picture 16-12

When you release the mouse button the pattern piece slides to the already placed pieces (Picture 16-13).



Picture 16-13

Create the marker displayed for the style „*skirt with separate box pleat*“ with the described functions (Picture 16-14).

### **Change display**

<F6> toggles between zooming the complete layplan and zooming the material width. This function is valid, only when a number of pattern pieces are placed and the layplan is no longer completely visible.

<F4> refreshes the screen.

The function *Edit | Move / Zoom* can be applied, also.

### 16.4 The marker maker menu

The following functions are available in the menu:

**options**

The index cards for the marker (section 16.2) can be edited. After return to the marker application changes are considered, immediately and the layplan is updated.

**lay**

This menu function must be active for manual (interactive) layout. The cursor takes on the shape .

**move block**

When *move block* is active the cursor shape is . Move all pieces to the right of the cursor to the right or left with pressed left mouse button. Only pattern pieces situated completely to the right of the cursor on a valid position in the marker will be moved.

**auto lay**

The simple automatic layplanning function integrated in GRAFIS works after the following principle: the pattern piece is placed on the first permitted position in the marker (from the left). Optimisation considering contour or efficiency does not ensue.

*all*

All pieces to be laid out are planned.

*active piece*

The pattern pieces on the material and the pre-layout area are planned.

*material pieces*

The pattern pieces on the material are planned.

options
<b>lay</b>
ove block
auto lay
all
act.piece
block
single
return
all
piece
size
single
marker
store
load/new
plot
D

*single*

If *single* is active the cursor takes on the shape . Click a pattern piece on the material or the pre-layout area. It is laid out, automatically.

**return**

With this function pattern pieces are returned from the material or the pre-layout area to the resource boxes

*all*

All pattern pieces are returned to the resource boxes.

If *return: part, size or single* is active the cursor has the shape .

*part*

All pattern pieces with the part number of the clicked part are returned.

*size*

All pattern pieces in the size of the clicked piece are returned.

*single*

The respective clicked pattern pieces is returned.

**store, load, plot marker**

This function stores, loads and plots the layplan.

*store*

The layplan is stored under a name to be given. It can be loaded with *load/new*.

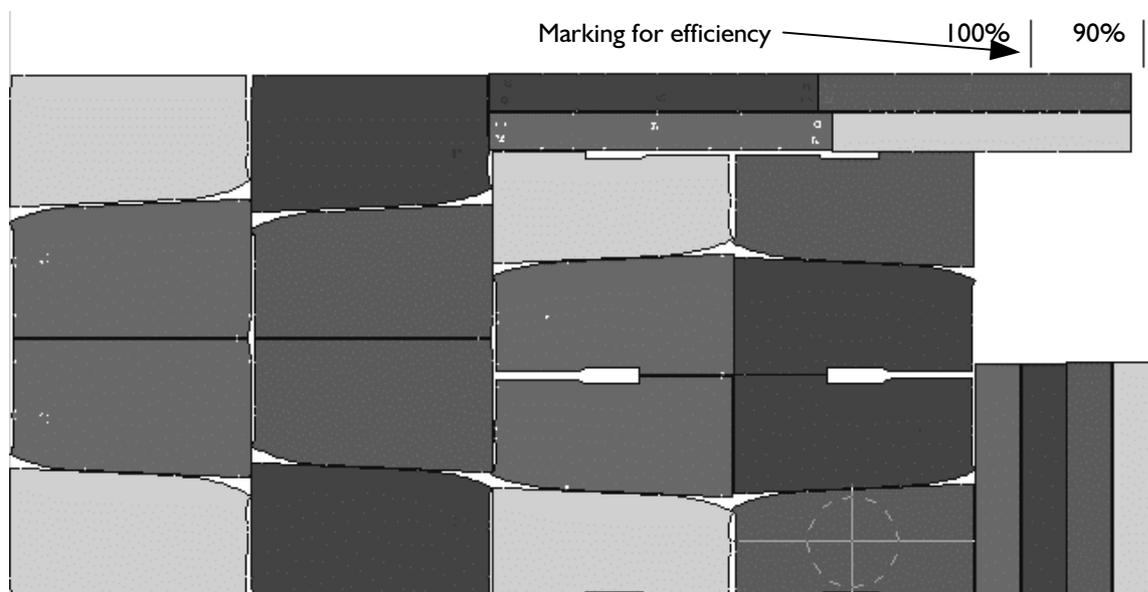
**The markers of this GRAFIS layplanning function are saved in the style. Only after having saved the style is the layplan saved.**

*load/new*

A stored layplan is loaded or a new marker is generated.

*plot*

starts the well-known menu for plot output (Chapter 3.3).



Picture 16-14

***Layplans for the actual fabric width can be output on a reasonably priced A0-plotter by plotting the marker in two plot strips.***