

## **1. General Information about SHEET CAD**

The program SHEET CAD offers more than 226 different pre-set sheet unfolding layouts.

SHEET CAD can read sheet unfolding layouts in DXF-format (CAD systems), and can save and transfer sheet unfolding layouts using DXF-format, HPME10-format (geometric data transfer to HPME10-program), CNC-format (data in CNC 920 macro file format).

The program SHEET CAD is executed on a PC, installed under Windows 3.x, Windows 95 and Windows NT operating system.

Hardware and software prerequisites:

Approx. 70 MB hard disc

SVGA card, 256 colors,

Windows 95, NT, 2000, XP

### **1.1 Copy Protection**

The program SHEET CAD can be supplied with hardware or software protection, as required. Normally the version is delivered with hardware protection.

The hardware protection consists of a hard lock, which must be connected to the parallel port (printer port). The hard lock must be connected to the printer port prior to starting the program. It must remain connected to the printer port and should not be removed before ending the program.

The following operation systems are supported by hard lock (hardware) protection: Windows 3.1, Windows for Workgroups, Windows 9x and Windows NT/2000.

The printer cable must be connected to the hard lock if the same interface is required for the printer.

The software protection needs no additional hardware. Please call your supplier to obtain the necessary installation code for installation.

The software-protected version also runs on all the above operating systems.

Note: We supply different modules for different operating systems.

The procedure for all software-protected versions is:

- Start the program
- Call KED (Tel. 06184-95090)
- Obtain a password and a number corresponding to your screen display.

It is not permitted to copy the program to another computer.

The installation is customized for your PC. You must re-install the program if any larger hardware changes are made.

## 2. Installation

A Windows- or a demo version of the SHEET CAD program which has already been installed must be deleted using either our de-installation program or in the conventional manner.

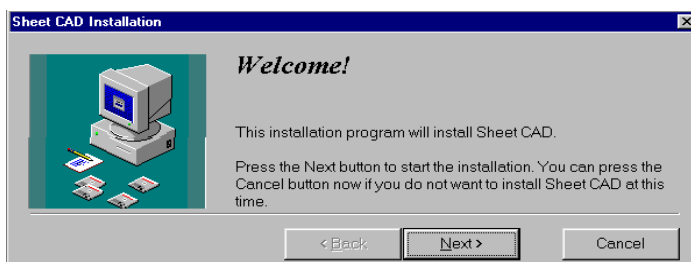
If you require hardware protection, please obtain a CD-ROM and a Marx hard lock from KED.

### To install the program:

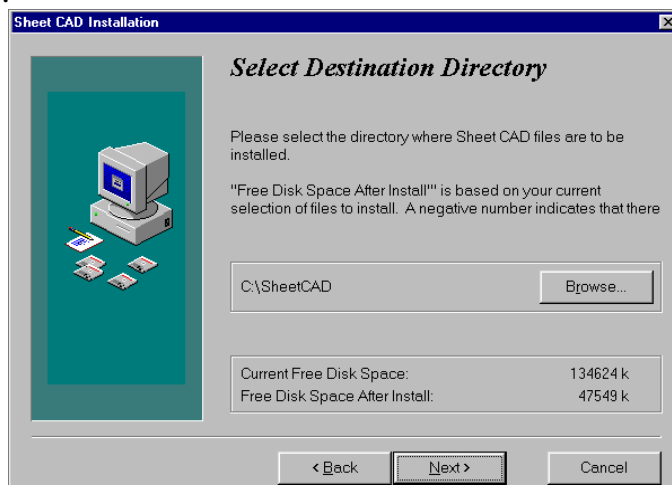
Check whether one or more of the following files are in your Windows directory: **3dg32.dll, 3dr.dll, 3dr32.dll, 3dreng.dll, 3dreng32.dll, 3drsys.dll, Gen32.3dr, 3dr.ini, 3drut.exe**, please delete all these files. These files will be re-created during installation.

Insert the "**CD ROM**" in your disc drive and start **setup.exe** using Windows.

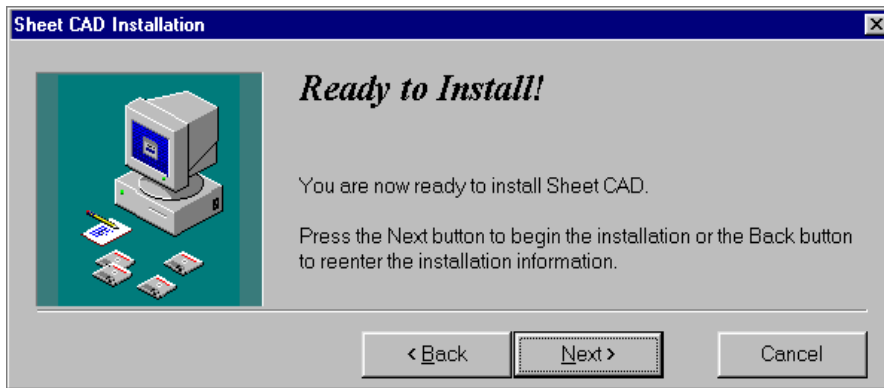
Installation will start. The following mask is displayed on the screen:



Before continuing, please close all running applications and select "**Next**". Installation will continue automatically. A window is displayed in which you must enter the **SHEET CAD** directory.



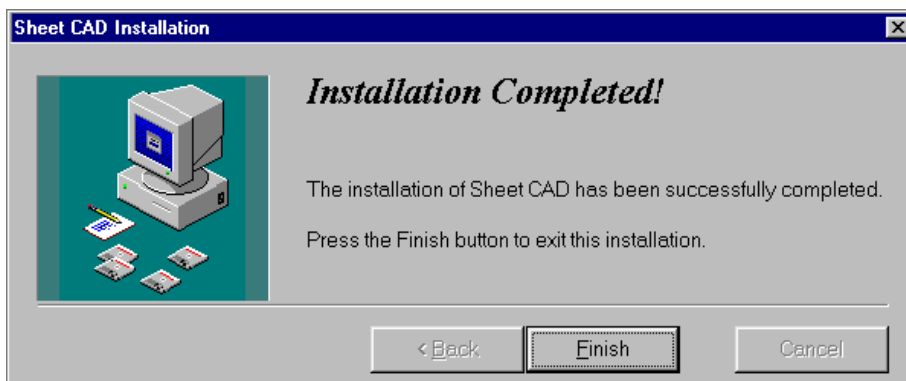
Enter the directory and confirm with "Next". The following dialog is displayed on the screen:



Data entries may be changed here again with "Back". Click the "Next" to install the program.

Installation continues automatically.

The following dialog is displayed when installation has been completed:

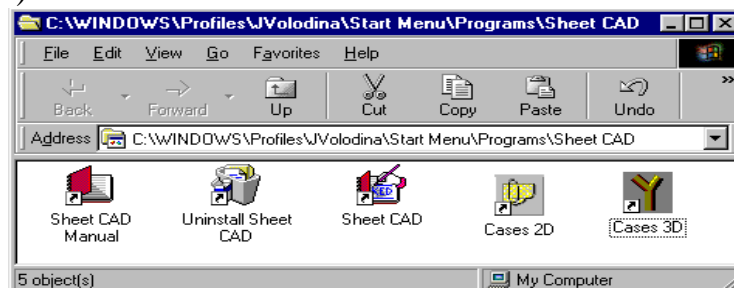


Installation has now been successfully completed. Confirm with "**Finish**". Restart Windows to activate the hard lock drivers.

### 3. To Start the Program SHEET CAD

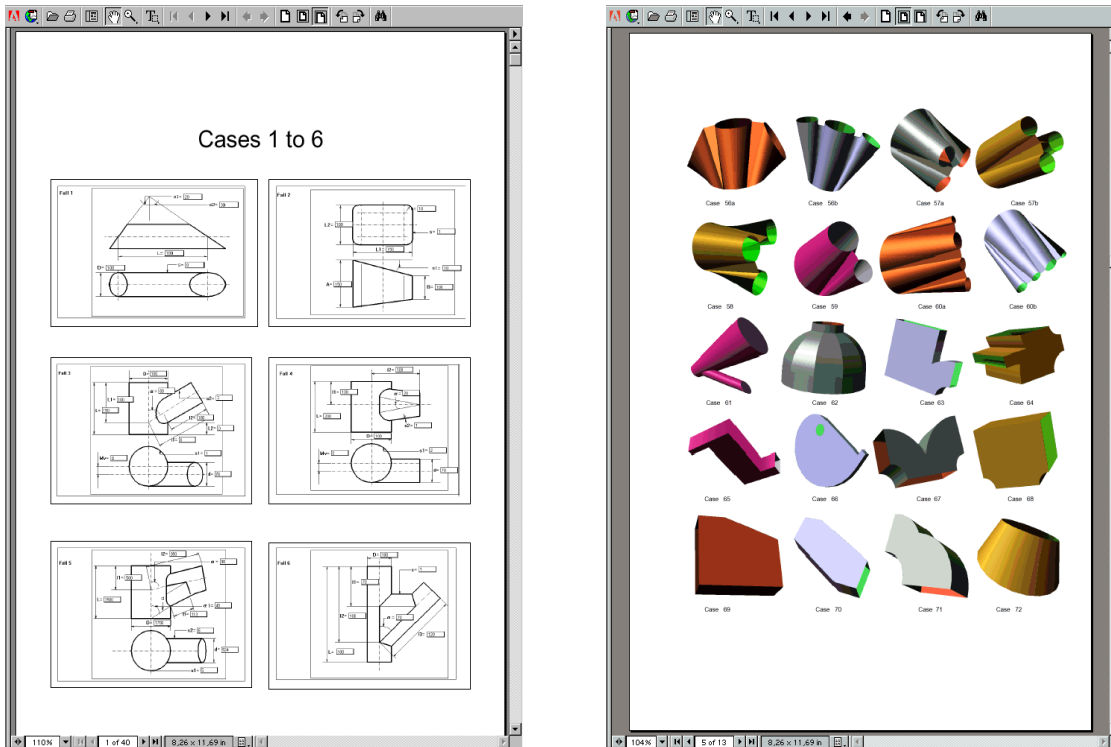
After installation the program group „**SHEET CAD**“ will be created.

Start the program by clicking on to "Start" – "Programs" – "**SHEET CAD**" (for Windows95, NT)



With “Sheet CAD Manual ” you can see the Sheet CAD- User Guide. Click that icon, the Manual will be shown in Adobe Acrobat.

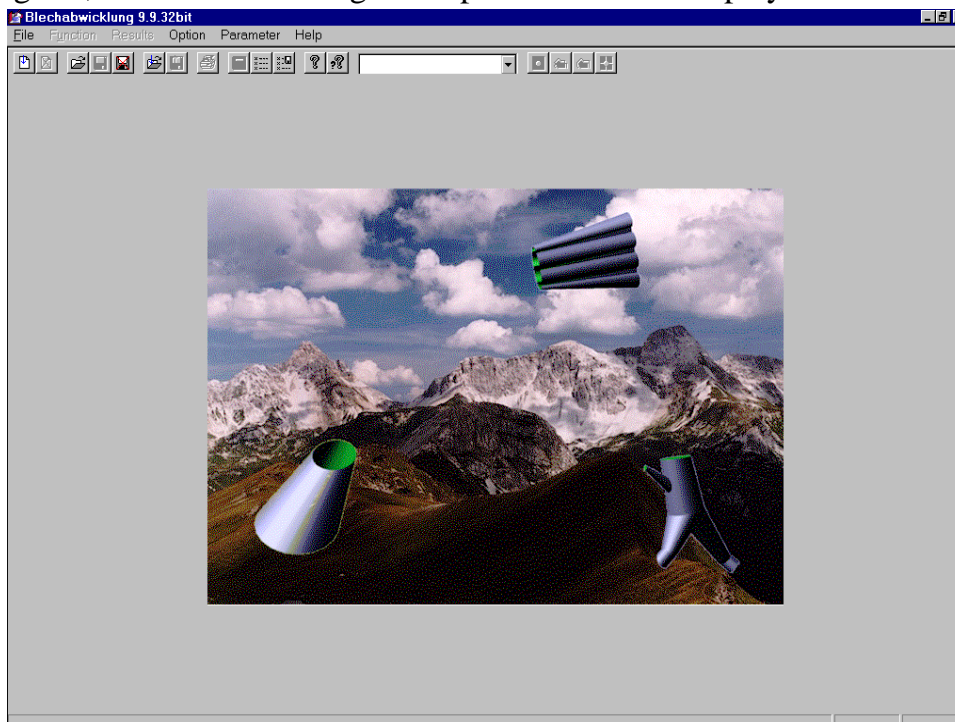
With “Cases 2D” you can see the Input-Mask for each case, with “Cases 3D” – 3-Dimensional picture for each case:



Start the program with “Sheet CAD”.

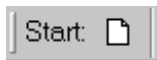
You can also start the Program under "Start" - "Programme" - "SheetCAD" (for Windows 95, NT, 2000).

Start the Program, the sheet unfolding workspace window is displayed on the screen:



### 3.1 Start the Programm

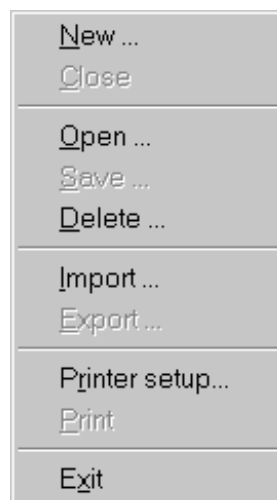
Click on the button “**Start**” or the Button



on Toolbar to start working with the Programm “**Sheet CAD**”

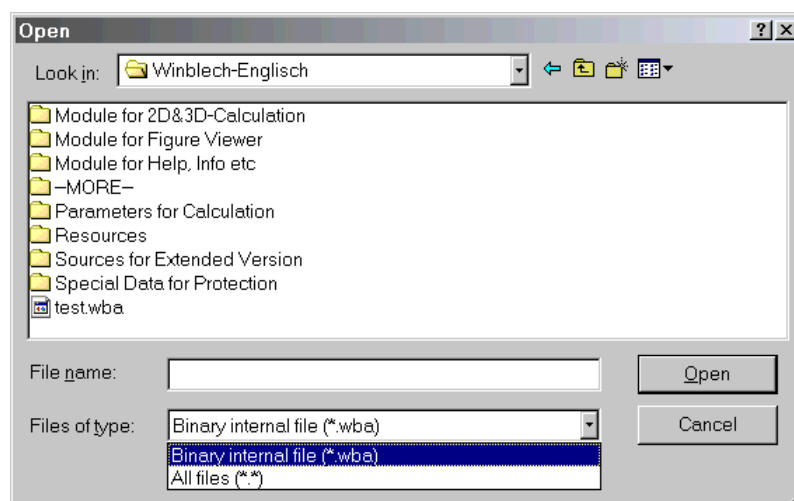
### 3.2 Loading existing sheet unfolding layouts

Select “**File**” in the menu and the following sub-menu is displayed:



The program allows you to load existing sheet unfolding layouts in Windows-format (“wba”) or in DXF-format.

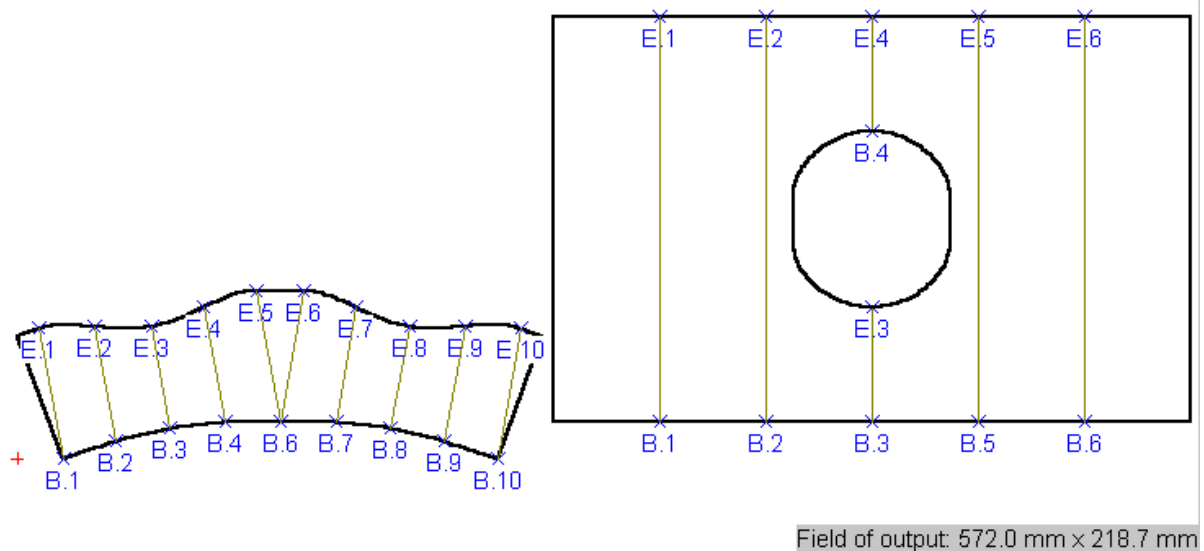
Select the option “**Open**” in the menu “**File**” . The following Dialog-Window is displayed on the screen:



You can select **"Binary internal File"** in the window "List of File Type" for your previously saved **"SHEET CAD"** files.

You can select the unfolding layout you require in the window "File name". Confirm with **"OK"**.

An image of the unfolding layout is displayed on the screen.



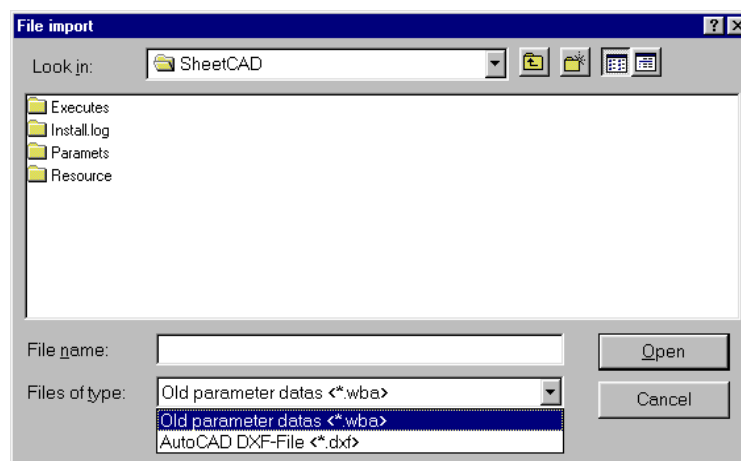
### 3.3 To import an unfolding layout

If you require more information about the unfolding layout, please select the option **"Import"**.

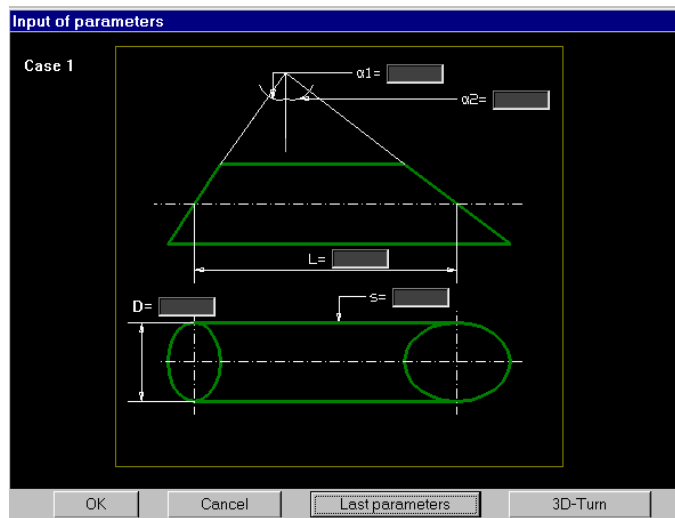
There are 3 options:

- to load the input parameter of one of the saved unfolding layouts:
- to load 2D-DXF- contours in the "SHEET CAD" workspace.

Click the option **"Import"** and the following window is displayed on the screen:

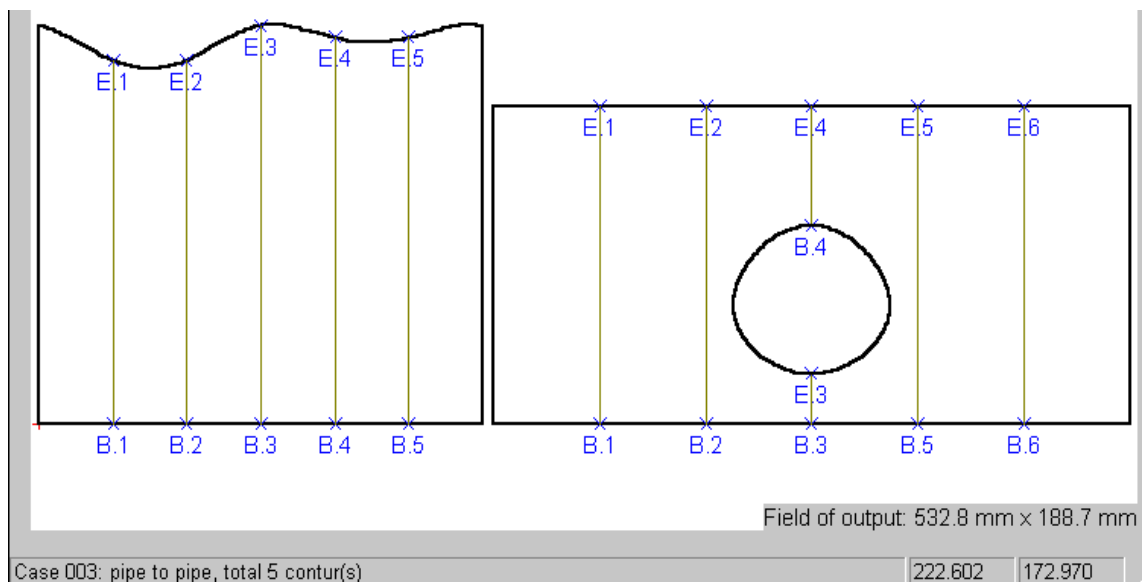


Select the option **"WBA-Format"** in the combo box **"Format of import file"** and select **"Binary WBA File"** in the window **"List of files types"**. Enter the name in the window **"file name"** and then click on **"OK"**. The unfolding mask selected is displayed on the screen:



Select the option **"AutoCAD DXF File"** in the window **"list of files type"**. Enter the name in the window **"file name"** and then click on **"OK"**.

The sheet unfolding layout selected is displayed on the screen:



#### 4. Create a new sheet unfolding layout

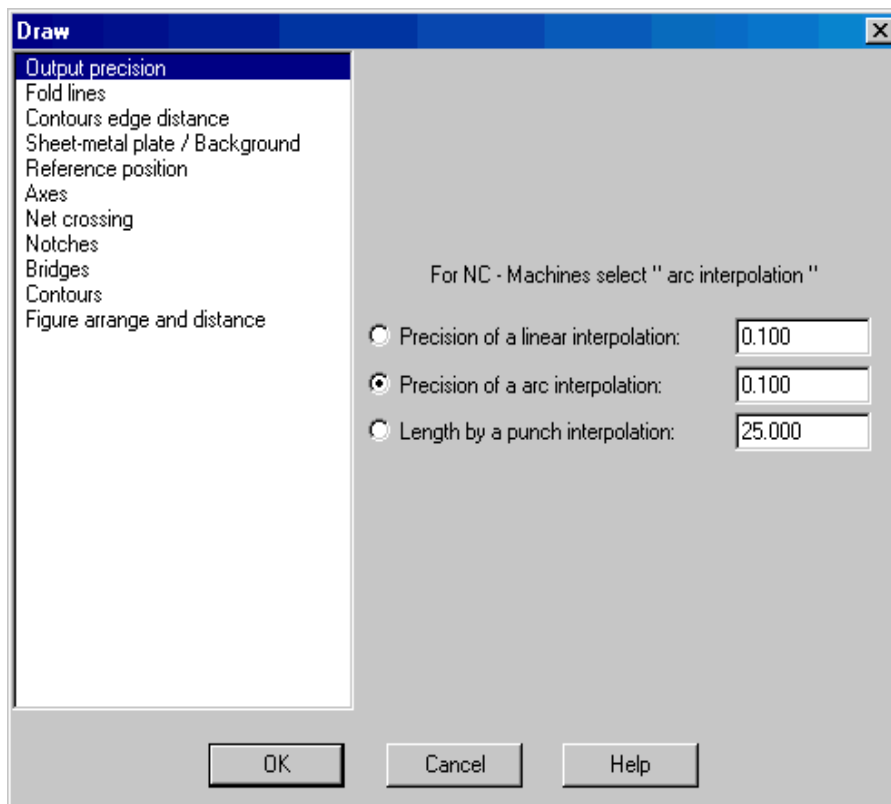
Under **"Draw"** you can input different parameters for calculation and output off sheet unfolding.

## Options input

The following options are available in the **SHEET CAD** program:

- Position options (for the origin of coordinates);
- Viewing options (for coordinate axis, rectangular division of screen, beginning of contours, etc.)
- Protocol option (to record all edited options).

Select the menu option "**Draw**", the following window is displayed from which you can select all options:

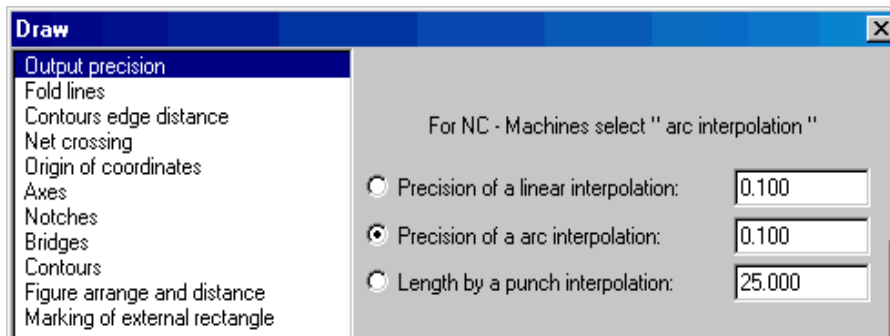


### 4.1.1 "Output Precision"

Select here, which Interpolation will be used by calculation off the contour. Input the necessary tolerance and click "OK"-Button. The calculation with choused interpolation and tolerance will be automatically repeated.

**Interpolation precision:** Enter arc interpolation accuracy in mm in the window "**Precision of arc interpolation**", line interpolation accuracy in the window "**Precision of line interpolation**", and punch interpolation accuracy in the window "**Precision of punch interpolation**".



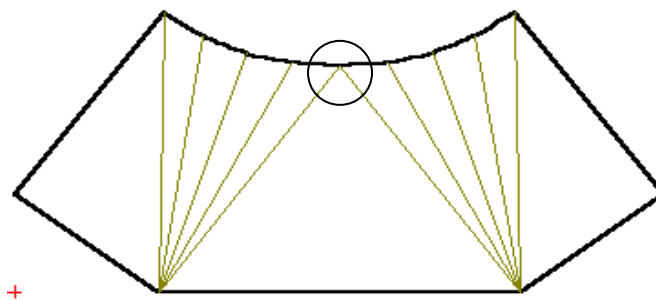


### 4.1.2 Marking / Fold Lines

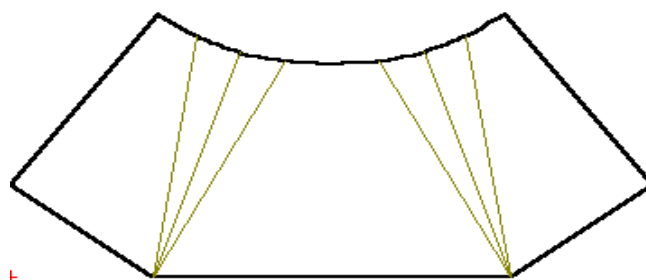
Here you can enter:

- ◆ **the number of fold lines** Here the required number of lines of a bend in regular intervals on calculated figure is placed;
- ◆ **step in Grad between fold lines:** Here are placed fold lines with the declared step in degrees, beginning from the left contour of the layout.
- ◆ **Distance between fold lines in millimeters along an x-axis.** Here are placed fold lines with the declared step in millimeters (along an x-axis), beginning from the left contour of layout.
- ◆ To make the markers for the beginning and end points of the fold lines: The checkbox ✓ next to "**Point markers are visible**" shows the option which is currently activated. Click accordingly to activate this option.
- ◆ The color and shape of the markers can be altered as required. Select the "**Change**" option.

Sometimes it is worthwhile to delete the first and last fold line when two fold lines cross or touch each other (e.g. in designs 33 and 34 and other components):

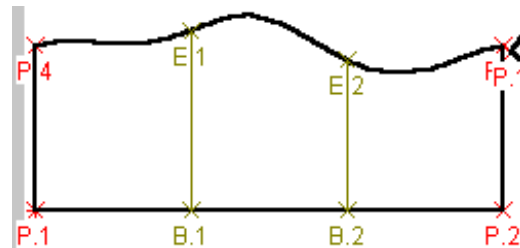
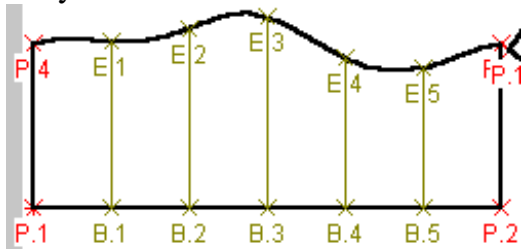


If command "**empty drawing for start and end fold lines**" is active, fold lines will be shown as follows:

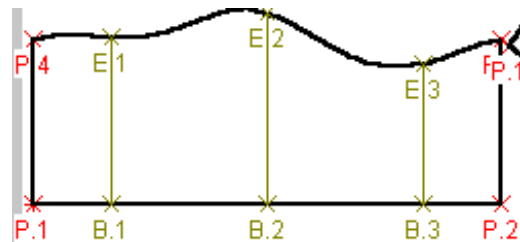
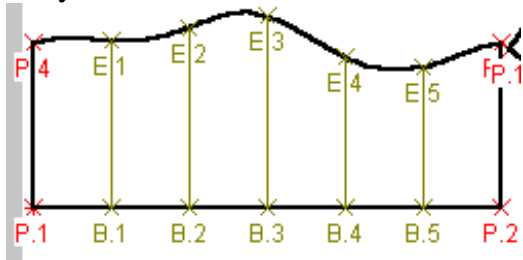


Here you also have an opportunity to represent on the screen only fold lines with odd number (control mark in a window " **empty drawing for even fold lines** ") or only fold lines with even number (control mark in a window " **empty drawing for odd fold lines** "). To activate one of these items, activate the appropriate command (control mark) and press "OK"-Button. Fold lines will be represented accordingly to a choice and renumbered anew. The appropriate representations then look as follows:

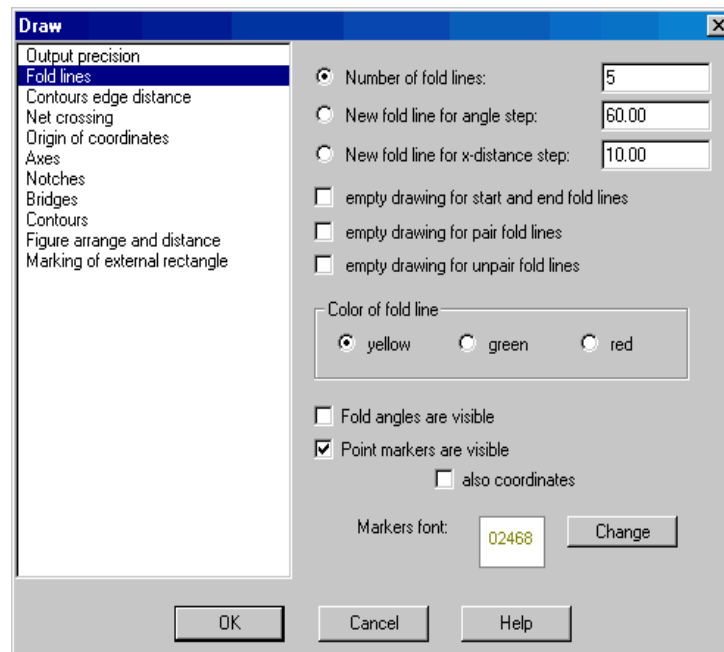
Only fold lines with odd number:



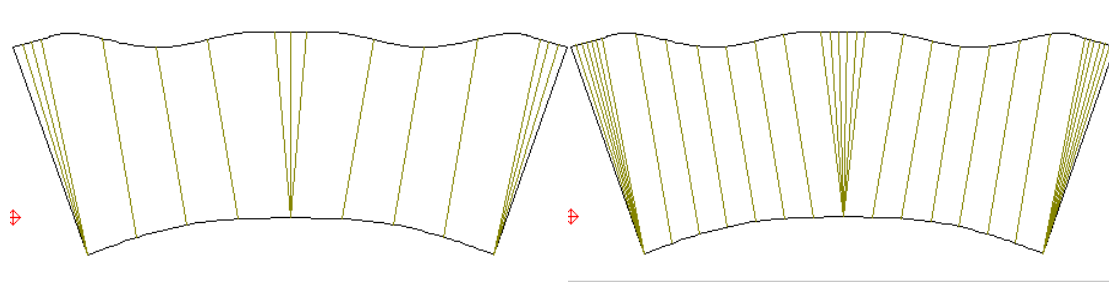
Only fold lines with even number:



Here you can change also color of fold lines. Choose between "yellow", "green", "red". The control mark specifies what case is active.

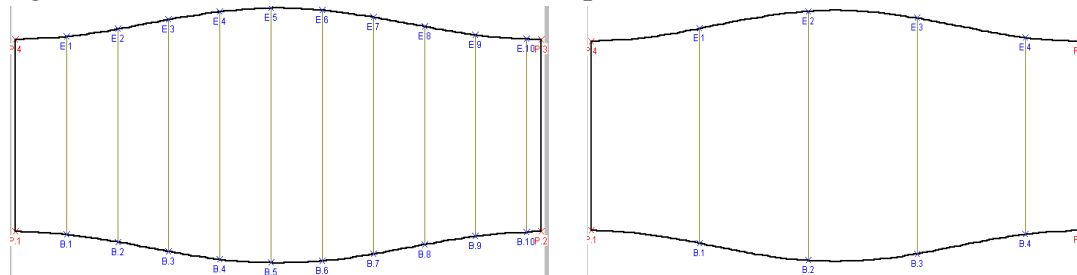


See example: Sheet folding layouts with "Number of fold lines" = 3 and 6.

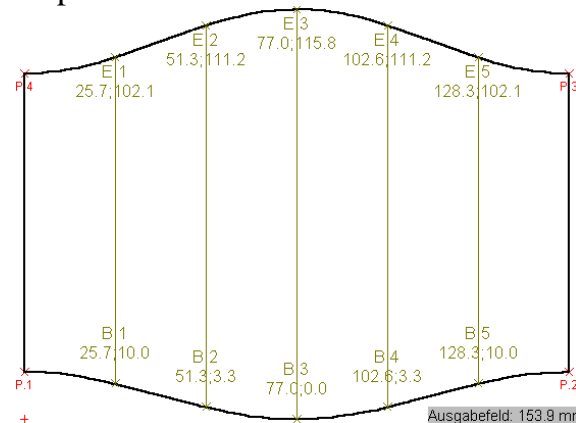


See example: Sheet folding layouts with „Angle step“ = 35 und 80

To change the number of fold lines, enter the required number and click on "OK".

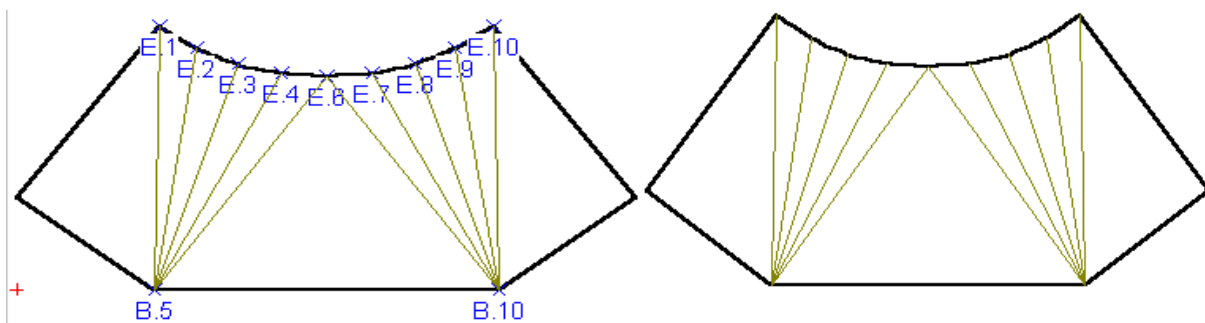


The coordinates off marked points can be also showed on the screen.:



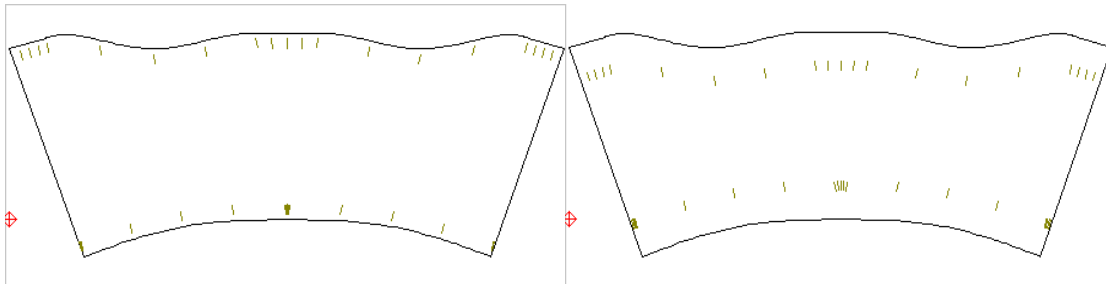
- The checkbox ☒ next to **"also coordinates"** shows the option that is currently activated.

Markers are displayed as shown in the example (an unmarked sheet unfolding layout is shown on the right for comparison):

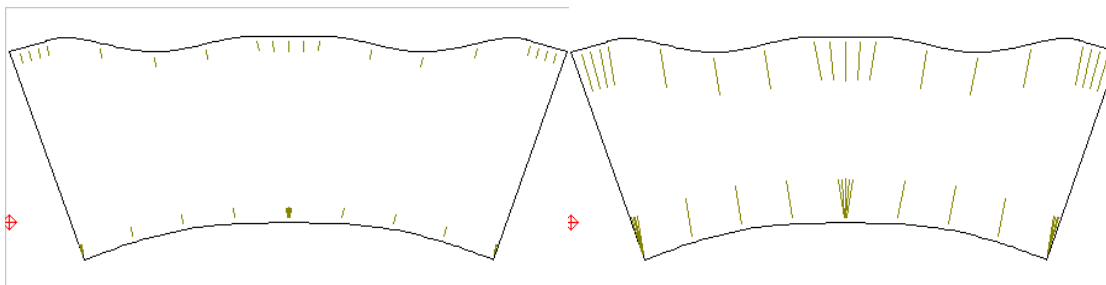


The bending angles can be shown along the bend lines:



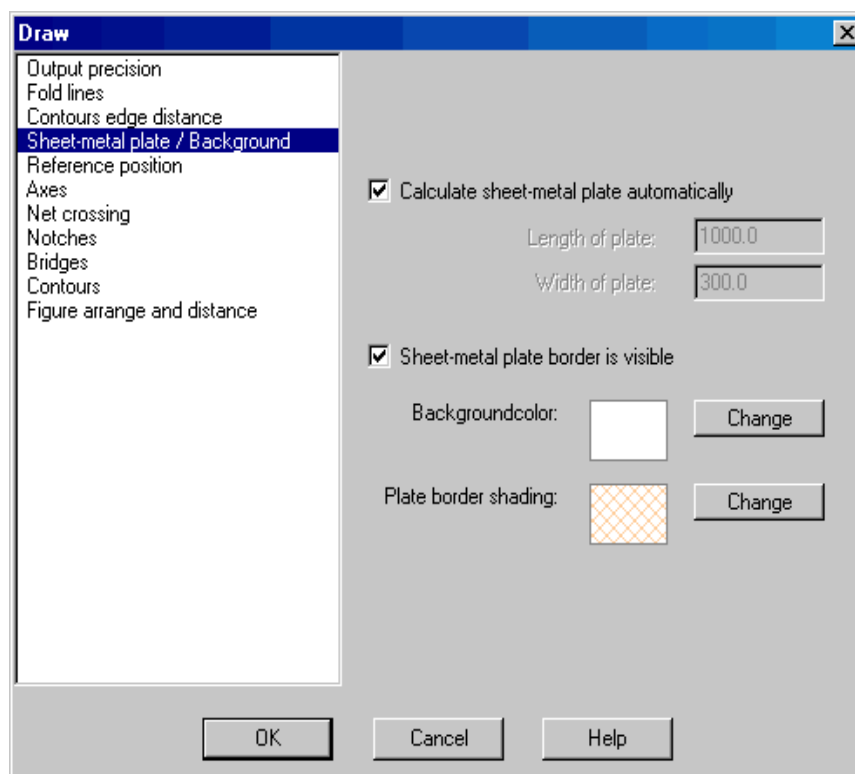


Enter the segment length. See the example of the sheet unfolding layouts with segment length = 2 mm and 13 mm:



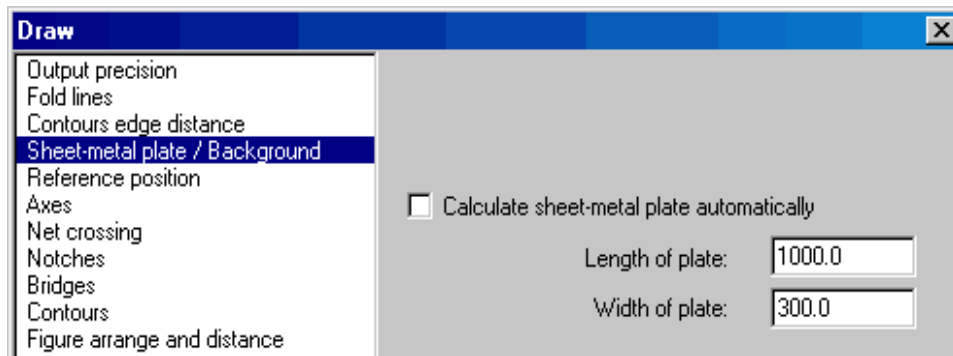
#### 4.1.4 Sheet-metal plate / Background

This option gives you the possibility of giving and/or of changing the size of the sheet-steel plate and background color.



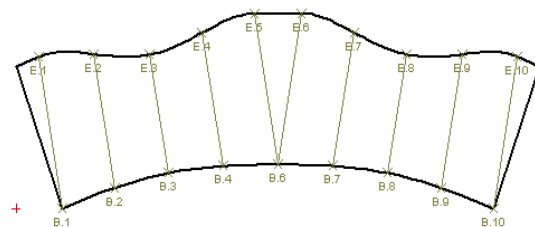
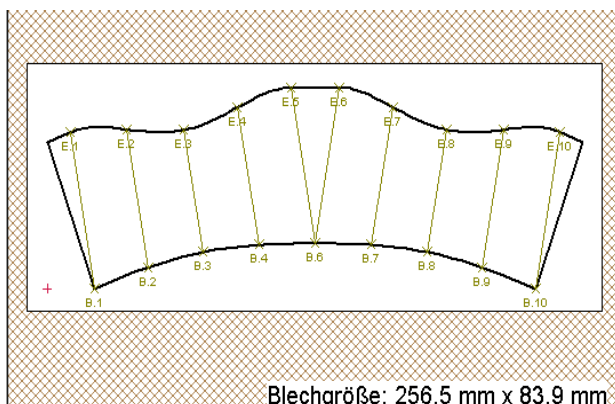
Here you have the following possibilities:

- ◆ determine the size of the expenditure sheet-metal plate. As default value it is accepted that the size is computed automatically (control mark ✓ in small box beside the field "**Calculate sheet-metal plate automatically**"). If you like to determine the size, click the checkbox on, the control mark disappear and the input fields for board length and board width become active. Enter the desired sizes here:



- ◆ Make the sheet-metal plate border visible and invisible: Control mark ✓ in small box beside the field "**Sheet-metal plate is visible**" shows, which case is active. In order to activate the instruction, click on the appropriate instruction.

The sheet-metal borders are represented as in the example (to the comparison on the right of a unmarked unfolding is shown):



Blechgröße: 256.5 mm x 83.9 mm

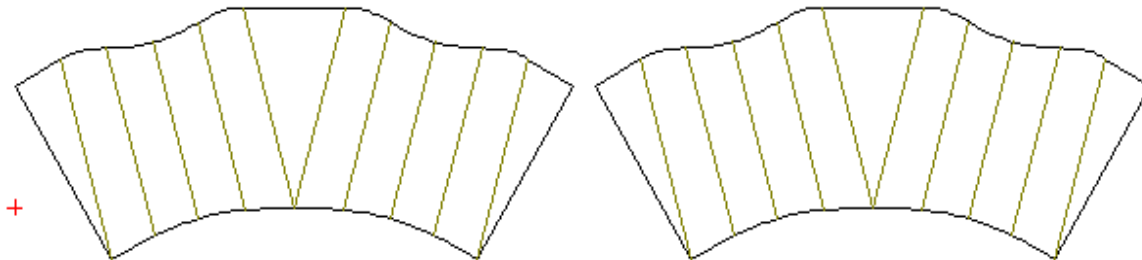
#### 4.1.5 Reference position

If under the point "**Sheet-metal plate / Background**" automatic computation of the sheet-metal plate sizes were selected, the origin will be placed automatically in the lowest left corner of the sheet-steel plate. If however the board sizes are entered manually, origin can be moved as follows:

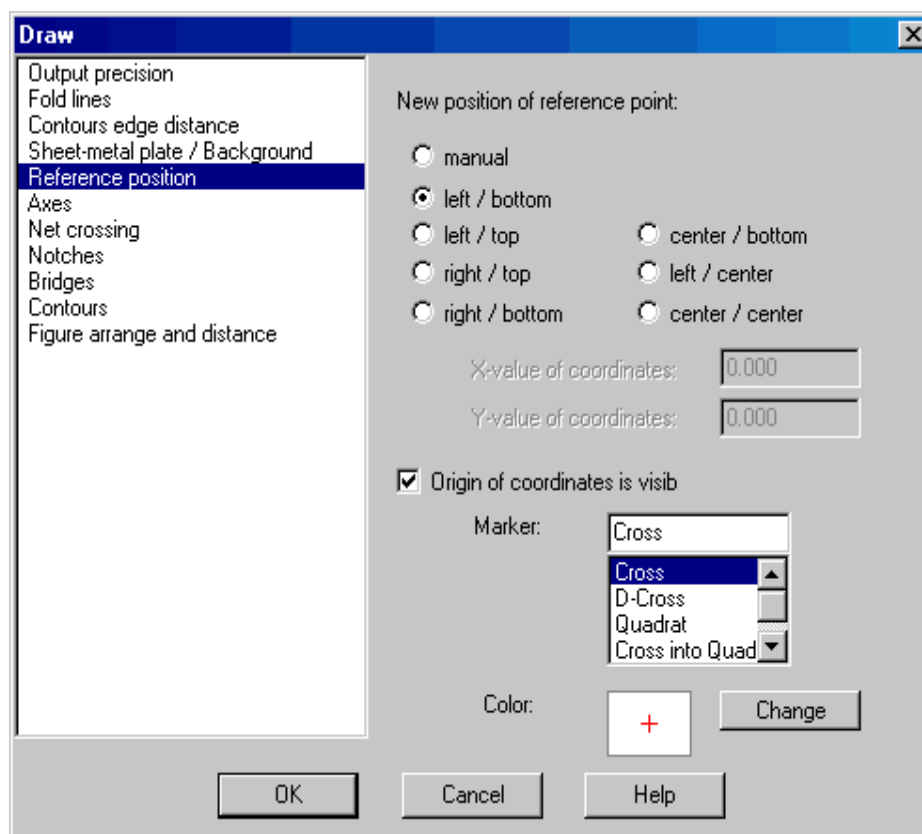
- To make the Origin of coordinates visible or invisible on the screen: The checkbox next to "**Origin of coordinates is visible**" shows the option which is currently activated. Click accordingly to activate this option.

- The color and shape of the zero point can be changed, as required. Select the "**Change**" option.

Markers are displayed as shown in the example (an unmarked sheet unfolding layout is shown on the right for comparison).



- **manual:** The position of the origin of coordinates can be set using this option. Activate option "Manual", enter the X- and Y-coordinate values of the new position of the origin of coordinates and click on "OK".

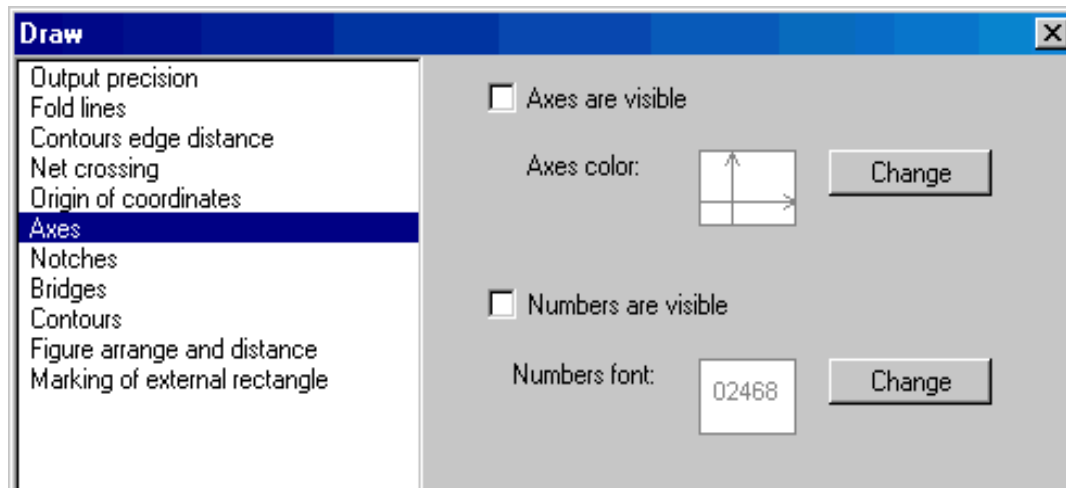


- **automatic:** The origin of coordinates is usually placed in the lower left-hand corner. Select this option if the origin of the coordinate axes should be moved (for example if a plot is required). If you click on "**Options**" the above window is displayed on the screen and the radio button ☒ will show the position of the origin of coordinates. Select the required position and click on "**OK**" to move the origin of coordinates.

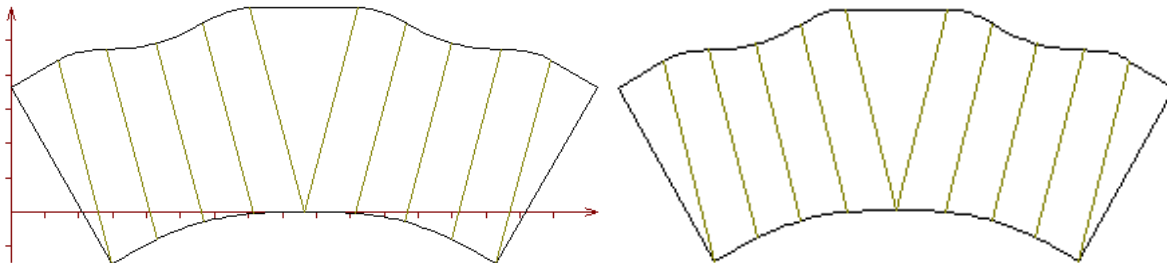
#### 4.1.6 Axes

The following options are available:

- To make the coordinate axes visible or invisible on the screen: The checkbox ☒ next to **"Axes are visible"** shows the option that is currently activated. Click accordingly to activate this option.
- The color of the coordinate axes can be altered as required. Select the **"Change"** option.



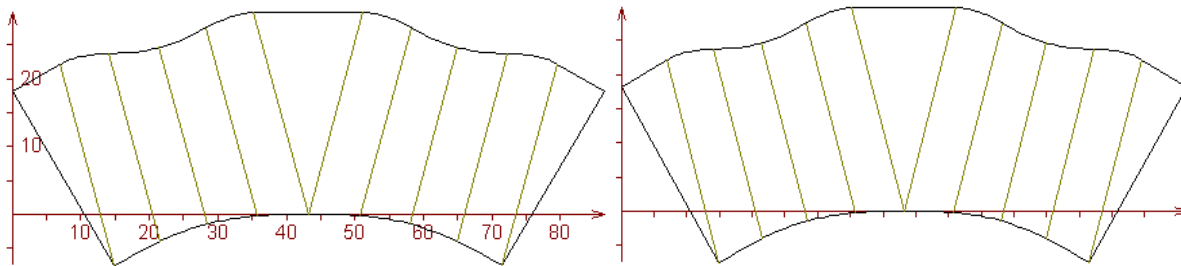
Markers are displayed as shown in the example (an unmarked sheet unfolding layout is shown on the right for comparison).



- To make the numbers on the coordinate axes visible or invisible on the screen: The checkbox ☒ next to **"Numbers are visible"** shows the option that is currently activated. Click accordingly to activate this option.
- The color and writing of the numbers can be altered as required. Select the **"Change"** option.

Markers are displayed as shown in the example (an unmarked sheet unfolding layout is shown on the right for comparison). This option will only work when the axes display is switched on.



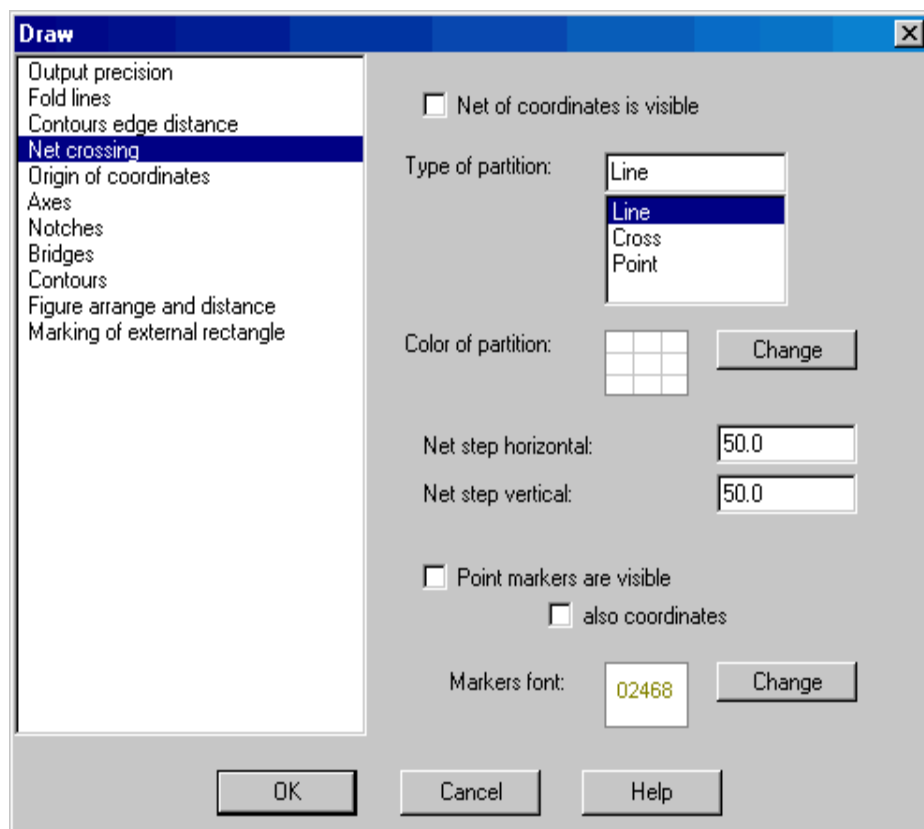


#### 4.1.7 Net crossing

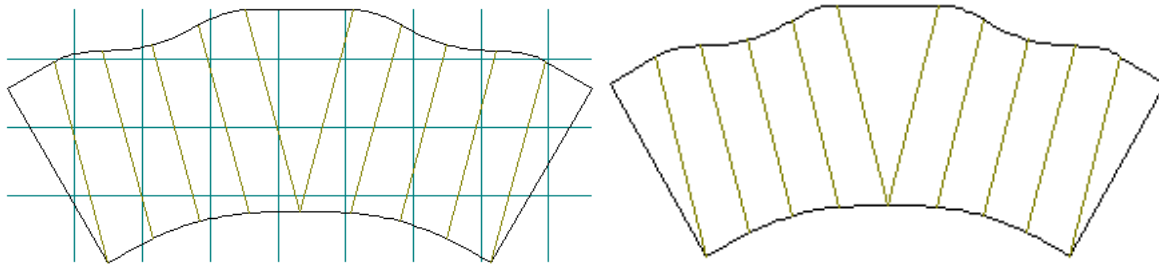
This option enables you to mark on the screen of crossing of a contour and a coordinate grid with the given width and height of cells.

Here you have the following opportunities:

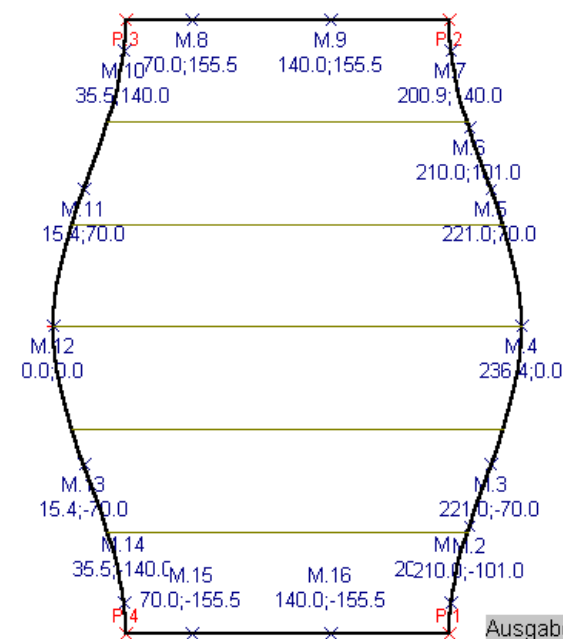
- To make the "Net crossing" (quadratic partition of the sheet unfolding layout) visible or invisible on the screen: The checkbox next to "**Net of coordinates is visible**" shows the option which is currently activated. Click accordingly to activate this option.
- The color and shape of the partition can be changed as required. Select the "Change" option.
- To make marks of points of crossing seen or invisible: the control label in a window near to "**marks of point are visible**" specifies, what case is active. To activate a command, press appropriate command.



Markers are displayed as shown in the example (an unmarked sheet unfolding layout is shown on the right for comparison).

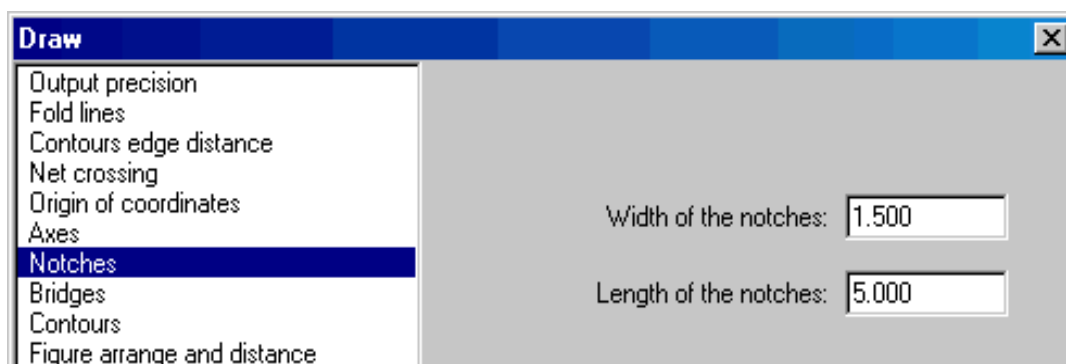


Coordinates of the marked points can be shown on the screen too. The control label in a window near to “also **coordinates** “specifies, what case is active.



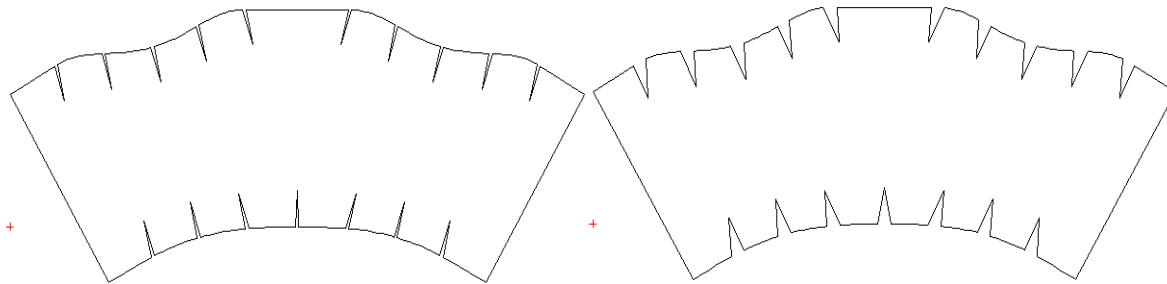
#### 4.1.8 Notches

Use this command to draw the fold lines as notches.

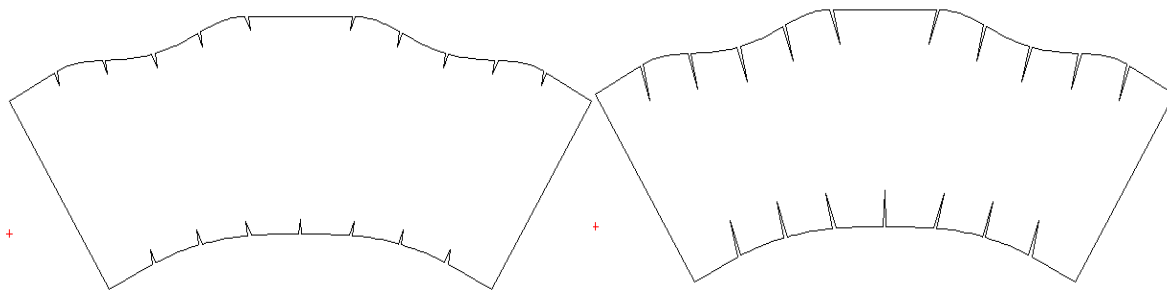


Enter the width and length of the notches and click “OK”-Button. The fold lines of the corresponding contour will be displayed using notches.

See example: Sheet unfolding layouts with "notch width" = 0.5 mm and 2 mm:

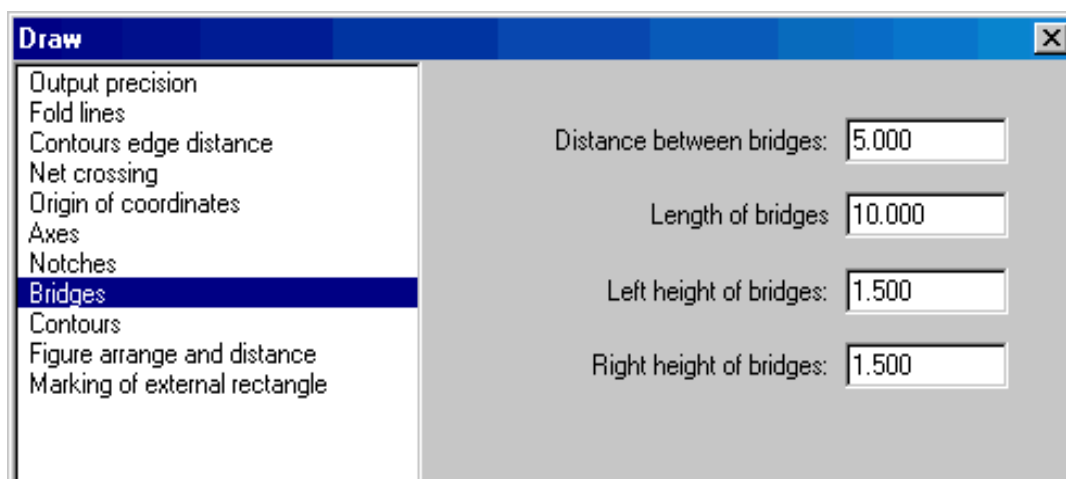


See example: Sheet unfolding layouts with "notch length" = 2 mm and 5 mm:

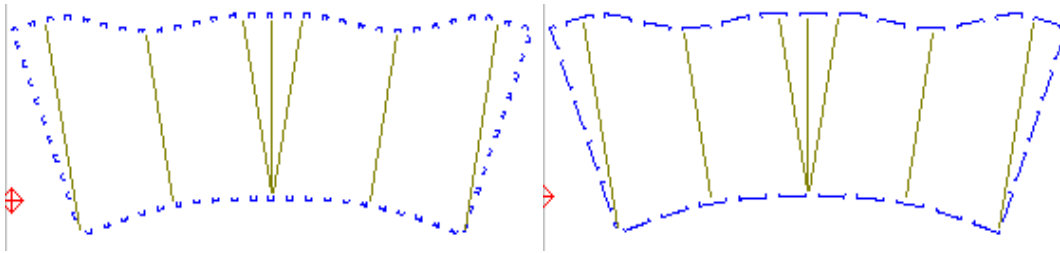


#### 4.1.9 Bridges

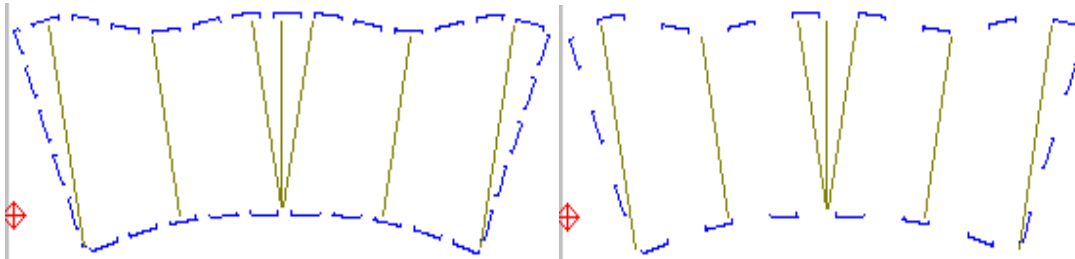
Enter the distance between the bridges, the length of the bridges and the height of the left and right-hand side of the bridges



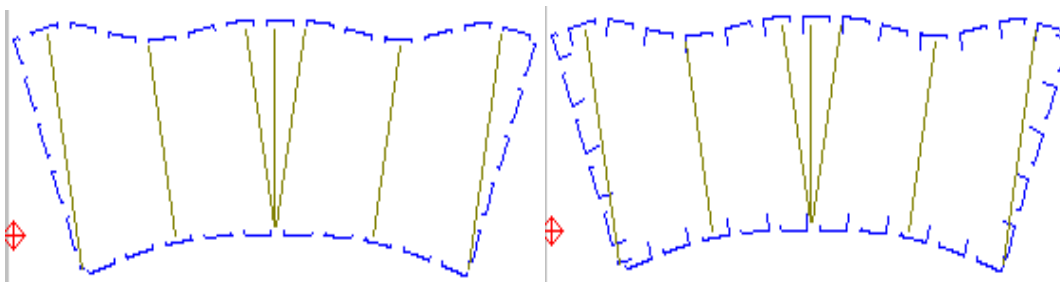
And the sheet unfolding layout is displayed as follows, with the length of the bridges = 2 mm and 10 mm., for example:



See example: Sheet unfolding layouts with bridge distance = 5 mm and 15 mm:



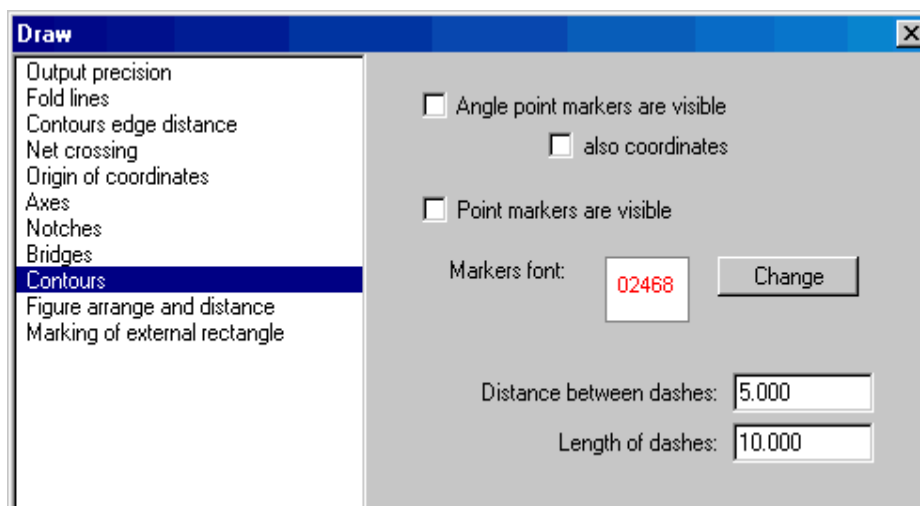
See example: Sheet unfolding layouts with "left-hand side height" = 1 mm and 5 mm:



#### 4.1.10 Contours

This option enables you to mark the most important points of the sheet unfolding layouts on the screen.

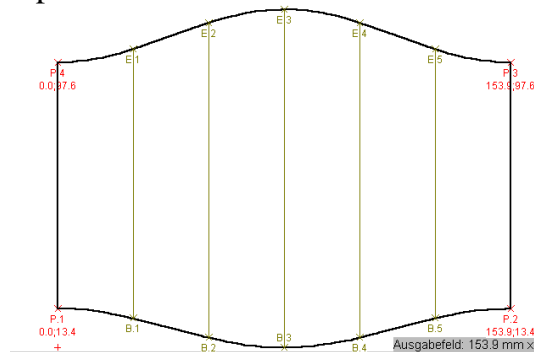
The following sub-menu is displayed if you click on this option:



The following options are available:

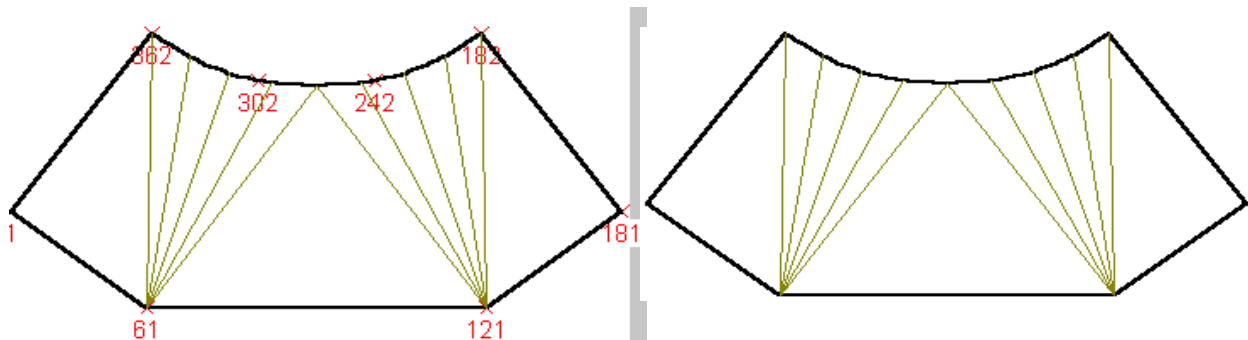
- To make the markers for the important points visible or invisible on the screen: The checkbox ☒ next to **"Point markers are visible"** shows the option that is currently activated. These markers can only be placed if the fold lines of the corresponding contour are not marked. Select accordingly to activate this option.
- To make markers for the corner points of each contour visible or invisible on the screen: The checkbox ☒ next to **"Angle points are visible"** shows the option that is currently activated. Click accordingly to activate this option.
- The color and shape of the markers can be altered as required. Select the **"Change"** option.

The coordinates of marked points can be also showed on the screen.:

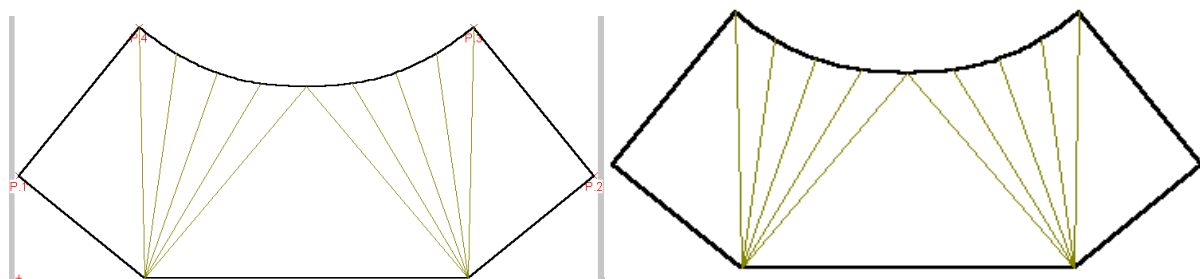


The checkbox ☒ next to **"also coordinates "** shows the option that is currently activated.

Markers are displayed as shown in the example (an unmarked sheet unfolding layout is shown on the right for comparison). For point markers:

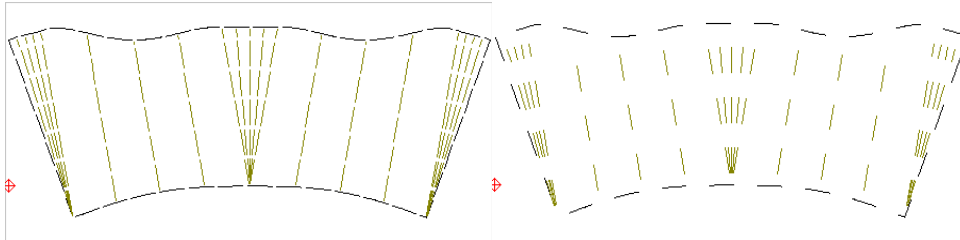


For angle point markers:

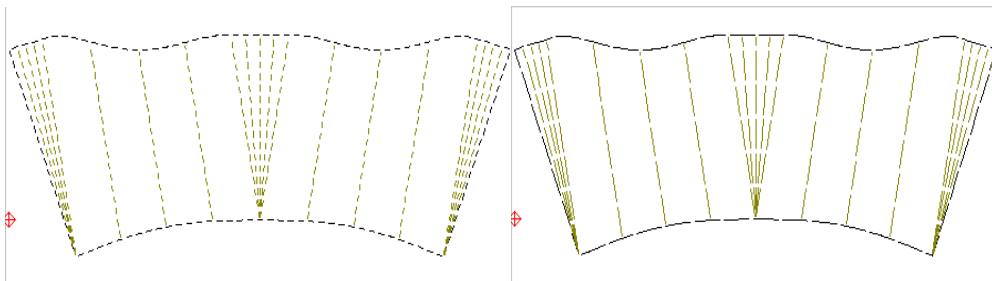


Enter here also the distance between the dashes and the length of the dashes for the sheet unfolding layout, using the dashes.

The distance between the dashes = 2 mm and 10 mm is displayed as follows:

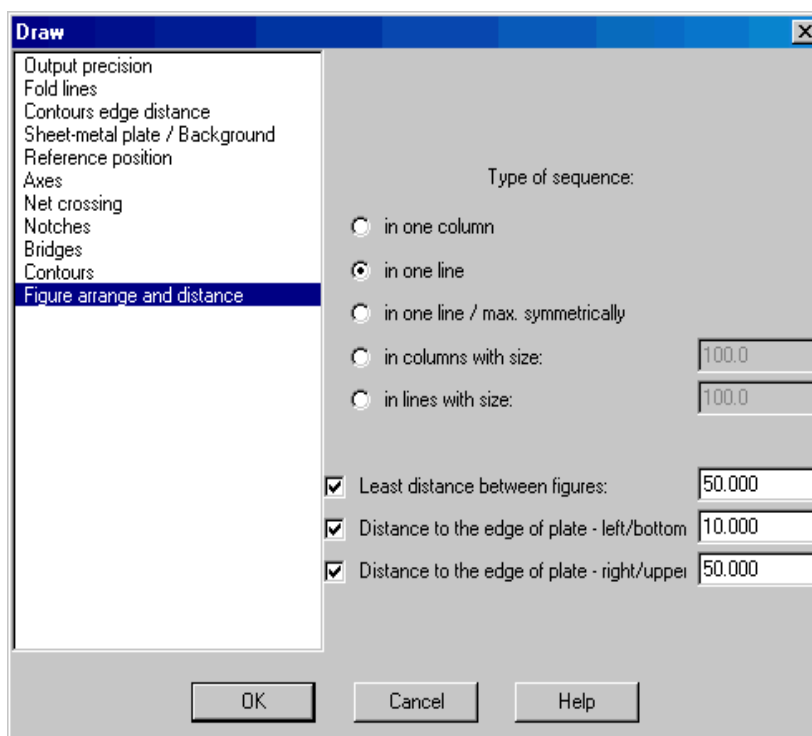


Example: Distance between the dashes = 2 mm and 10 mm.



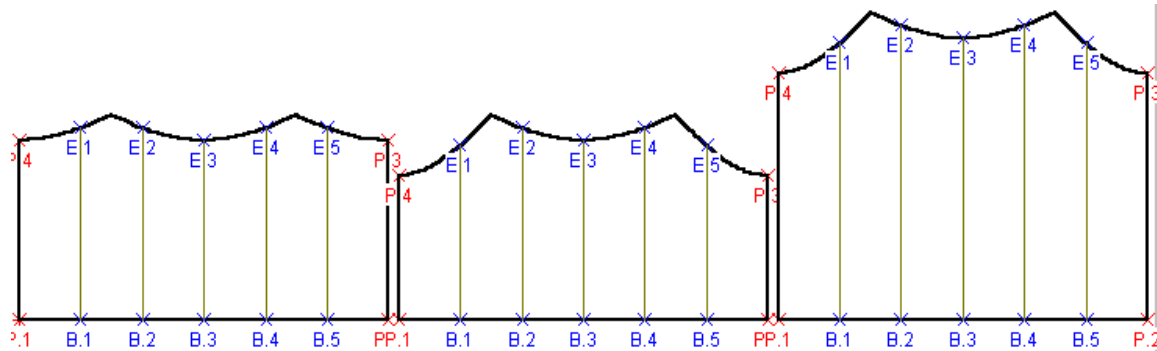
#### 4.1.10 Figure Arrange and distance

Here you can choose how and with which distance parts of sheet unfolding will be placed on the screen.

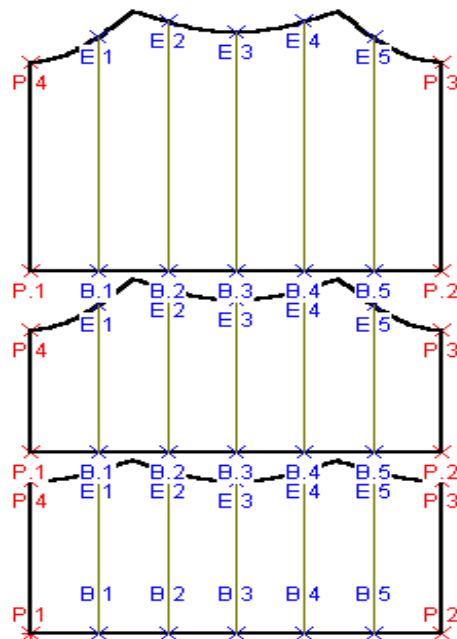


You have following possibilities:

- **“In one Row”**: if you choose this option, the parts of unfolding will be placed horizontal on the screen:



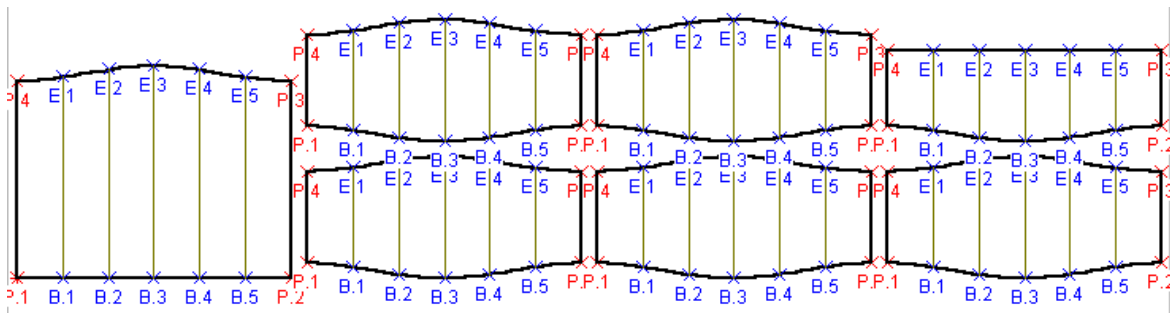
- **“In one Column”**: if you choose this option, the parts of unfolding will be vertical placed on the screen:



- **“in one line/max symmetrically”**: use this instruction to represent the parts as symmetrically as possible (concerning the x-axis) on the screen:



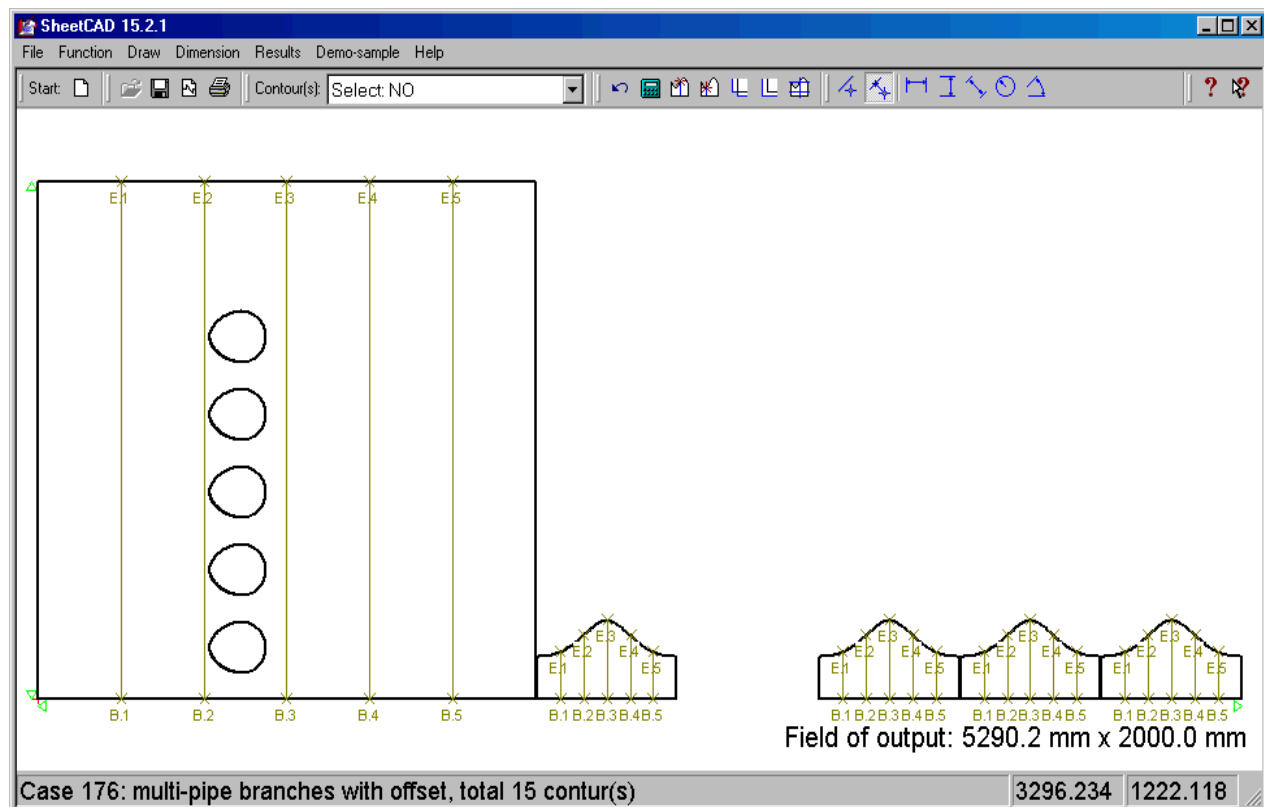




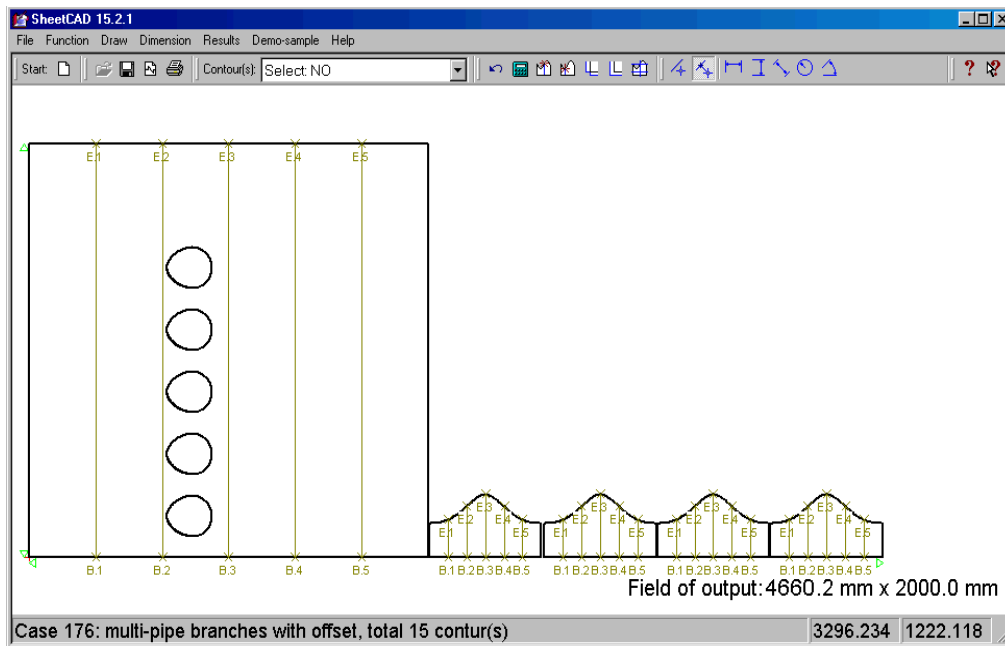
Under **“Least distance between figures”** enter the distance between sheet unfolding layouts in mm.

You can set the distance between parts of the sheet unfolding layout or puzzles on the screen using this option.

Select this option to arrange sections of the sheet unfolding layout or single contours on the screen. The following is displayed on the screen after individual parts of a sheet unfolding layout have been removed, for example:

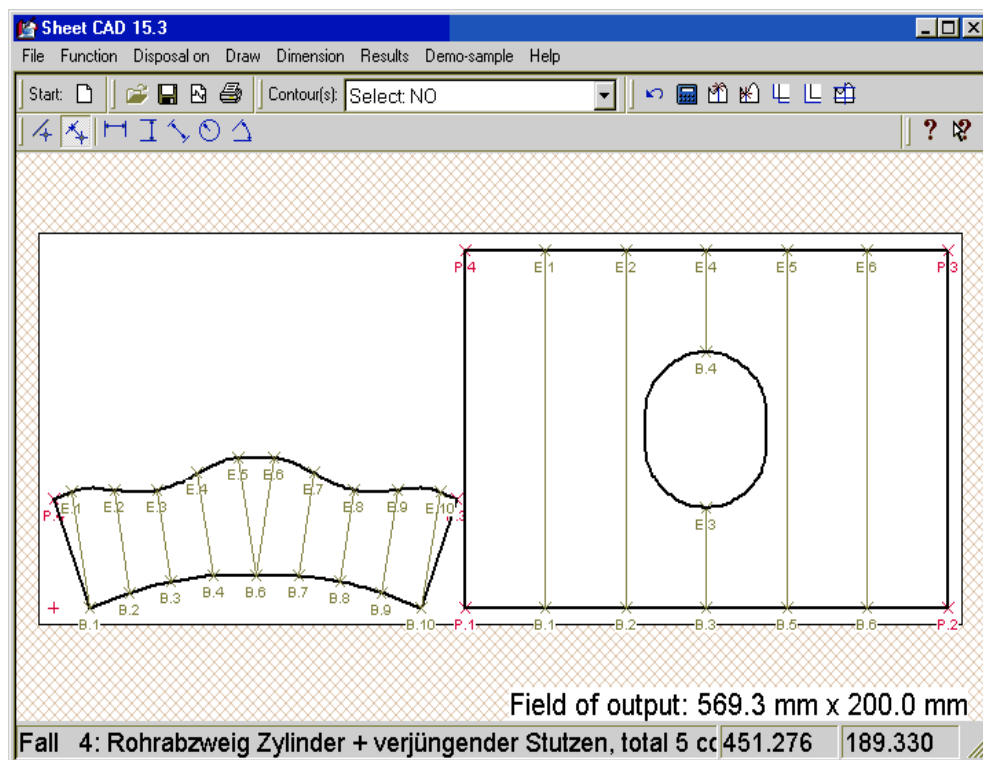


Click on this option to obtain the following layout:

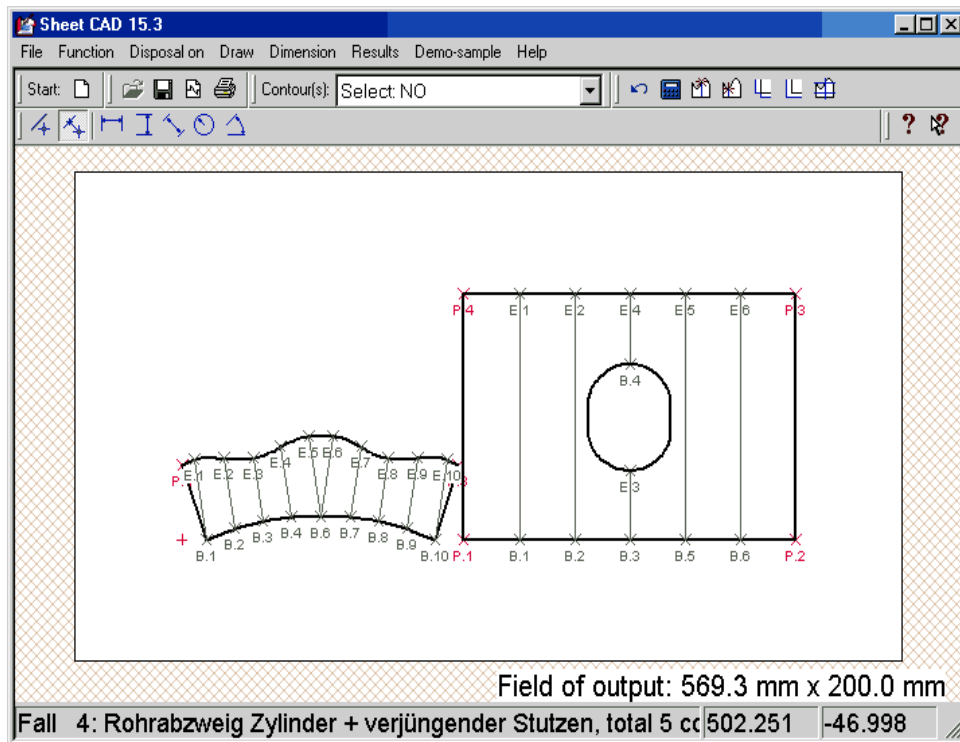


As "**Distance to the edge of plate - left/bottom**" and "**Distance to the edge of plate - right/upper**" enter here the distances between the edges to the outermost left and lower points (or outermost right and upper points of the contour) and the edges of sheet-metal plate in mm. Control mark ✓ shows, which case is active.

If you have e.g. the following picture on the screen after the calculation,

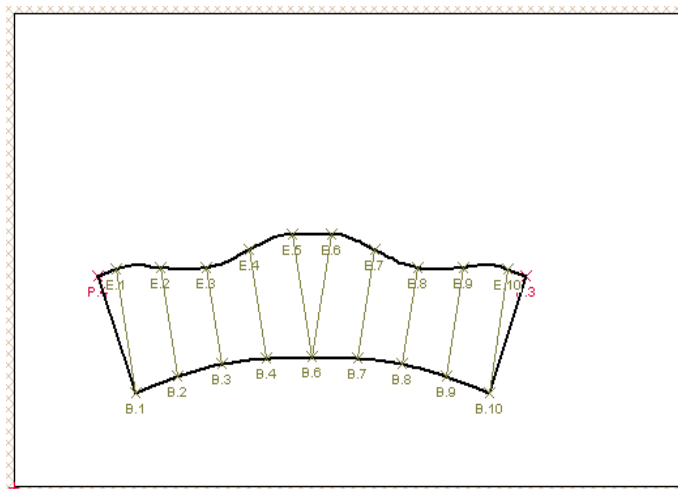


you can place the parts of unfolding further far away from the edge of sheet-metal plate. If you enter the desired distances and click the "**OK**"-button, then the parts of unfolding are moved:



### Consider please that:

- during the automatic sheet-metal plate size calculation only the distance from the left side of the board is considered ;
- the distances from the left/lower and of the right/upper edges are not considered at the same time, only one of the two cases must be selected ( Control mark ✓ shows, which case is active.) Otherwise the distance is considered only by the left side of the plate:

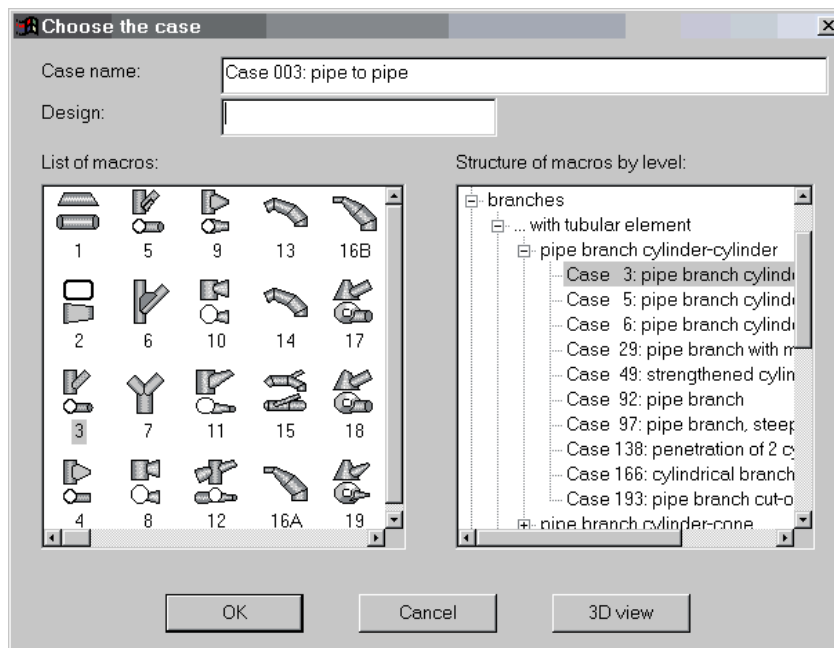


## 4.2 Create a new sheet unfolding layout from the menu

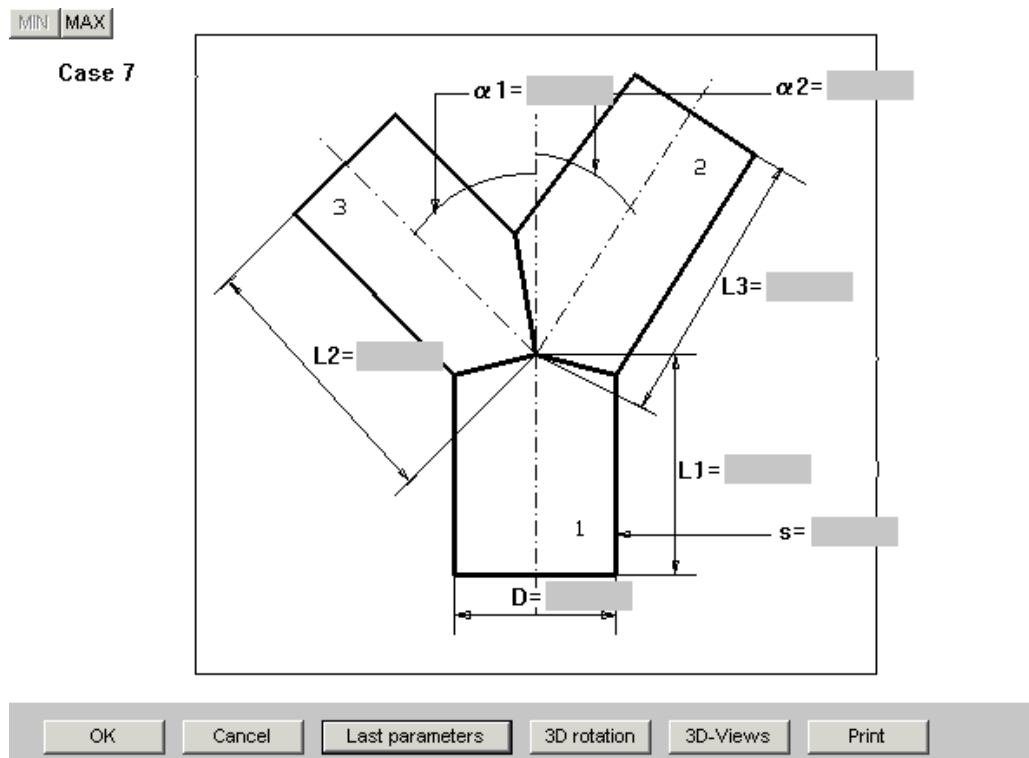
A new sheet unfolding layout can be created using the option "New..." in the menu option "File", or use the following icon:



The following window is displayed if you select the option "New...":



Select sheet unfolding layout using the cursor in the **"List of Designs"** or in the **"List of Names"** by clicking on the corresponding drawing. You can see the 3-dimensional picture of each case with last entered parameters by clicking the button **"3D-View"**. In window **"Design"** you can give the required name for your case. Confirm using **"OK"**. The following image is displayed on the screen:



The size of the input window can be changed with the help of the keys "MIN" and "MAX".

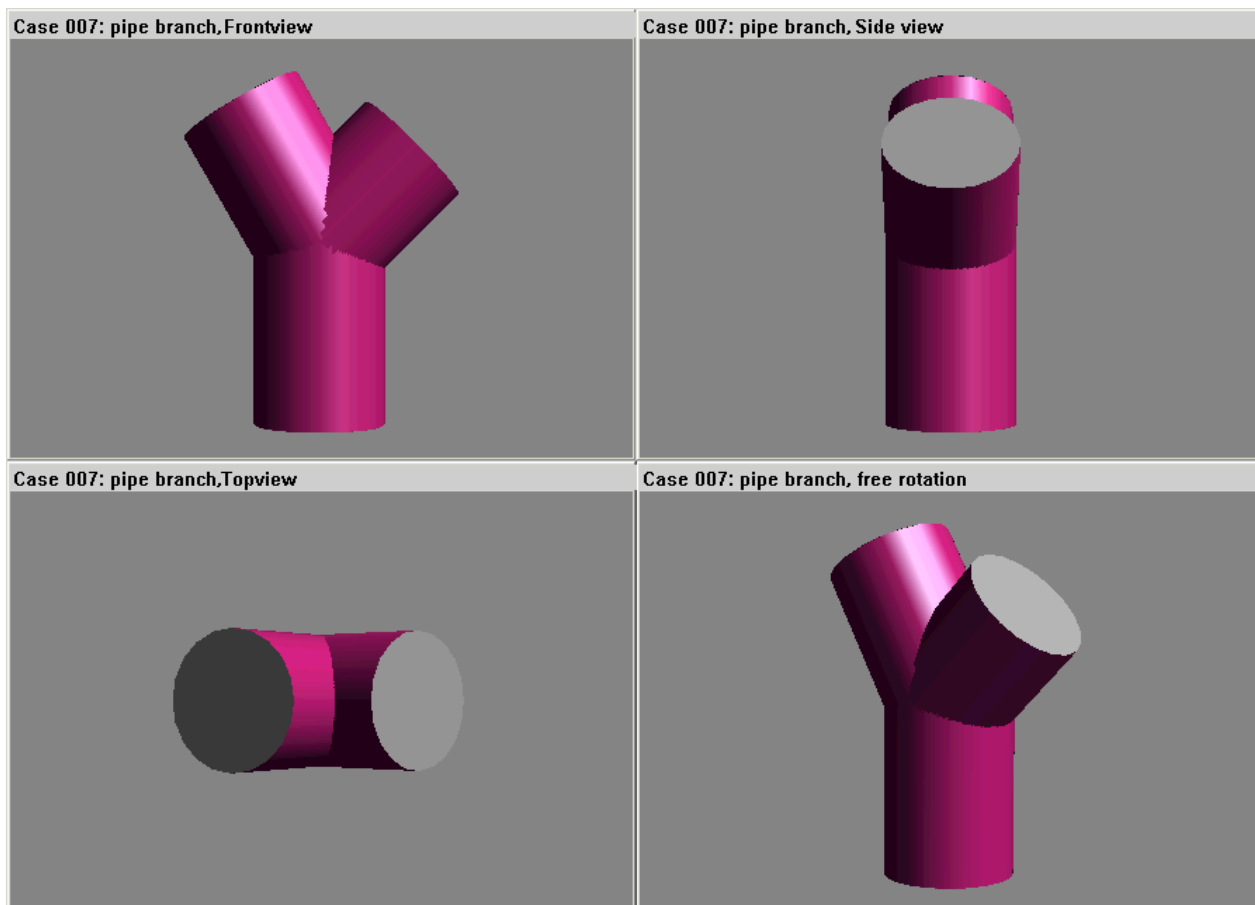
You can enter new parameters by clicking on the parameter window to be selected. Select the option **"last parameter"** if the parameters have not changed.

**Note:** All parameters are outside dimensions in all designs (apart from designs 34 and 35). Enter the inside radius (r1-r8) as inside dimension in designs 34 and 35. Enter all fold radii (e.g. designs 45, 107-a, 173-r) as inside dimensions. This will be shown separately on the screen if this is not the case.

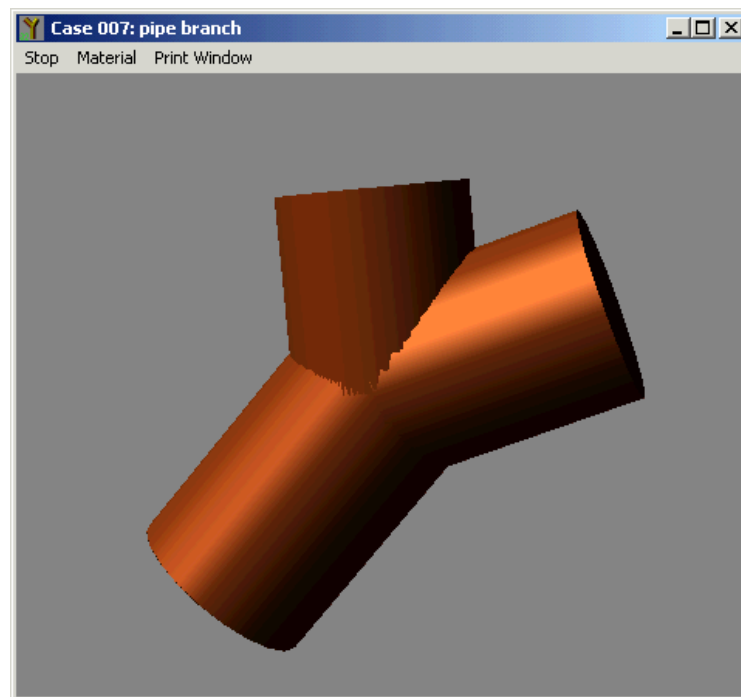
To the case 14 and 16b: Two contours lying next to each other are always parallel. The interval between the named contours corresponds the tool width „b“. If the tool width is =0, these contours are identical.

The sheet unfolding layout is displayed when you have entered all measurements.

You can take a look at the front, side and top view of the full-scale figures. Use the instruction **"3D-View"** for it. They get then the following representation on the screen:



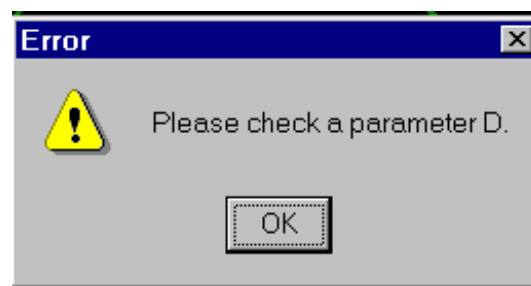
Select the option **"3D rotation"** and the following is displayed on the screen:



The rotating 3D structure is visible. Please select **"Stop"** or click on the cross in the right-hand corner of the screen. You will then return to the data entry window.

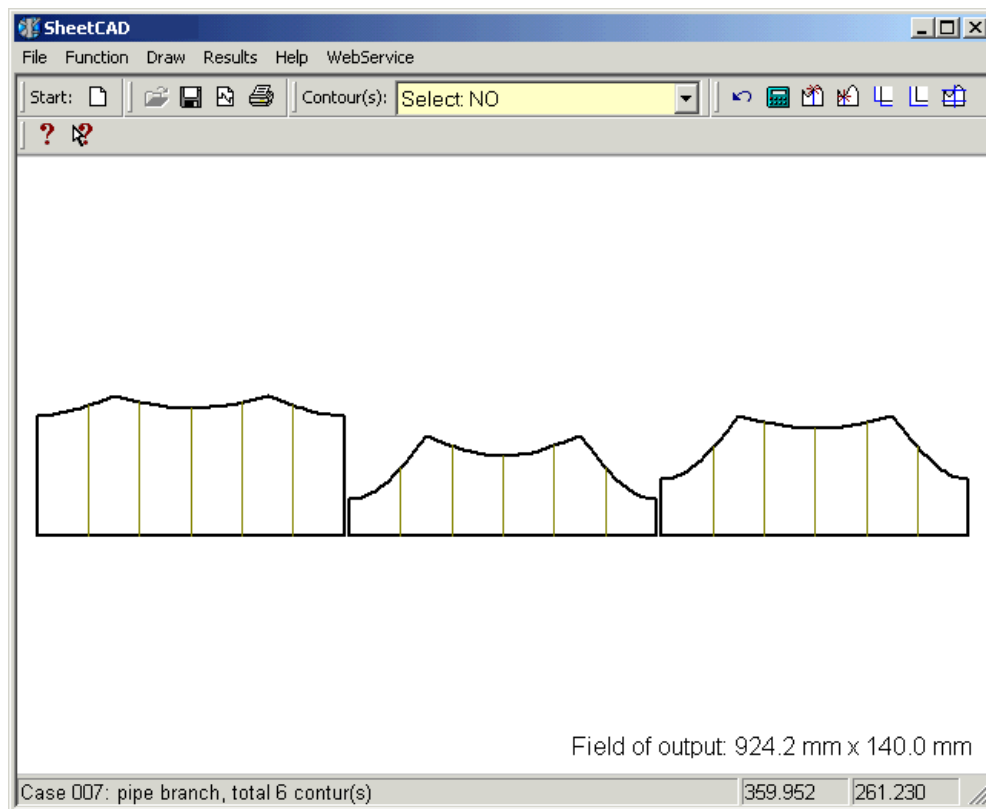
**Note:** clicking on the 3D rotation window with the left-hand mouse button can stop Rotation. If you then move the mouse - holding the left-hand mouse button - you can direct rotation.

Confirm with **"OK"** to start. An error message is displayed on the screen if some data is mathematically incorrect, e.g.:



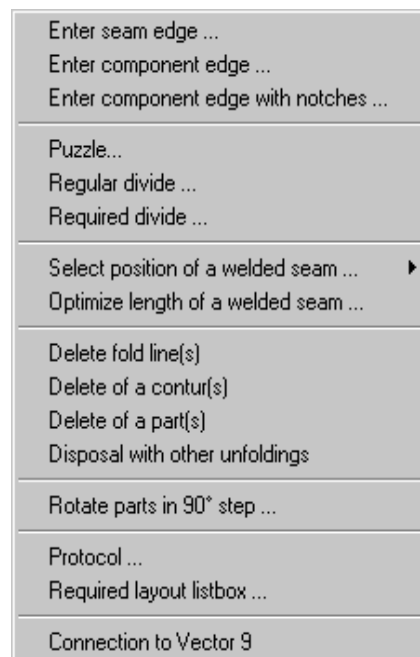
Please enter the corrected parameter value and confirm with **"OK"**.

The program will begin the calculation if all parameters are correct. The following can be seen on the screen:



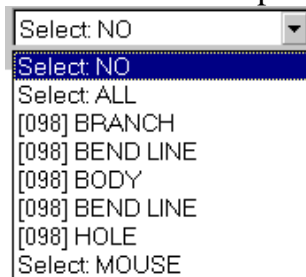
## 5. "Function"

Your sheet unfolding layouts can be edited using the menu option **"Edit"**. The following dialog is displayed on the screen if this option is selected:



## "Select contour"

The **"Select contour"** window is displayed when any option of this menu is selected. Click on the required contour or use the corresponding icon:



Select the required contour. You have three options of selecting the contour:

- By mouse click: Click on a contour or all contours on the screen. **"Selected: MOUSE"** is displayed in the information box.
- All contours on the screen: Click on the option **"Selected: All"**. All contours are selected.
- One of the contours: Click on one of the contours, e.g. "[004] points" for points in the information box and the selected contour will alter the color: It turns blue.

Different operations can be performed using the selected contour.

### 5.1 "Enter seam edge"

Select this option, if you want to add seam edge to your contour.

Click the option **"Enter seam edge"** in menu option **"Edit"** or this icon:

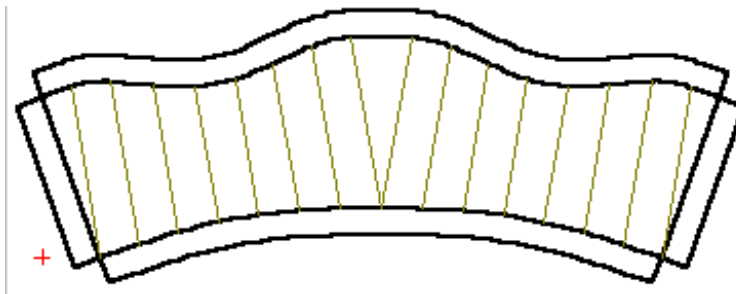


you become follow dialog-window on the screen:

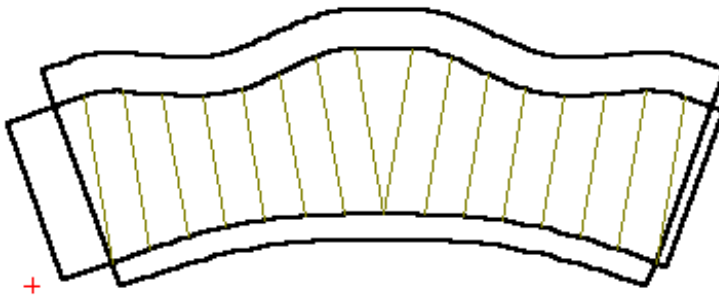


The seam edge for the selected contour is displayed on the screen.  
Enter the required size and click on “**OK**”. The selected contour with a seam edge is displayed on the screen.

Either a uniform seam edge will be appended, as selected in menu option “**Parameter**”:



or seam edges of various widths will be appended to different sides of the sheet unfolding layout



## 5.2 "Enter component edge"

Select this option, if you want to append a component edge to your contour.  
In contrast to the seam edge, the contour is unbroken - i.e. no open edges at the corners.

Select the option “**Add component edge**” in menu option “**Edit**”, or click on the icon:



The window in which the size of the component edges you have entered in the menu option “**Parameter**” can be changed is displayed on the screen:

**Input of a parameter**

First component edge: 3.000  
( bottom component edge for unfoldings )

Second component edge: 3.000  
( right component edge for unfoldings )

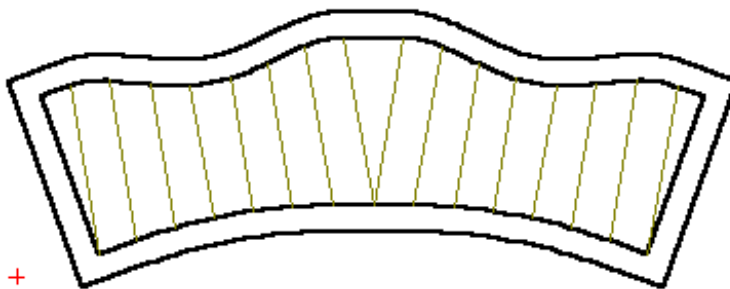
Third component edge: 3.000  
( top component edge for unfoldings )

Fourth component edge: 3.000  
( left component edge for unfoldings )

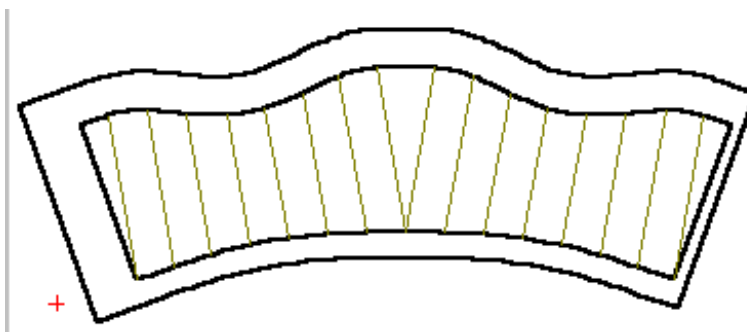
OK Cancel

Enter the required size and click on “**OK**”. The selected contour with a varied seam edge is displayed on the screen.

Either a uniform component edge will be appended, as selected in menu option “**Parameter**”:



or component edges of various widths will be appended to different sides of the sheet unfolding layout:

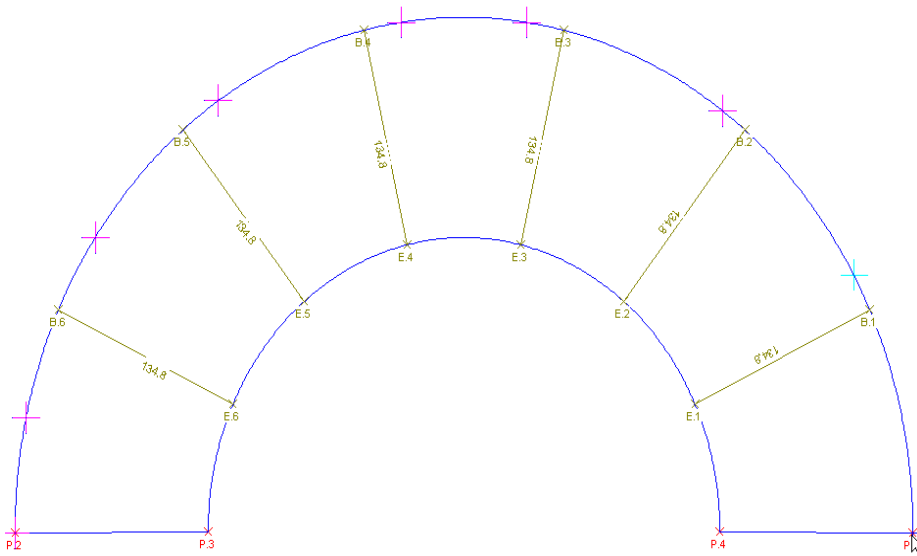


### 5.3 Enter component edge with notches

Select this option, if you want to append a component edge with notches on required location to your contour.

Select the outside contour (see “**Select contour**”), the contour will be blue, and click the command “**Enter component edge with notches**” under “**Edit**”, the blue cross appears by cursor – this is the location of one notches. Place this cross on the required place using the cursor (rights you can see the grad number).

When you placed the cutting line on the required place, click the link mouse-button. You can repeat this operation.



When all lines are placed on the required places, click the right mouse-button.

The window in which the size of the component edges you have entered in the menu option “**Parameter**” can be changed is displayed on the screen:

Input of a parameter

First component edge: 3.000  
(bottom component edge for unfoldings)

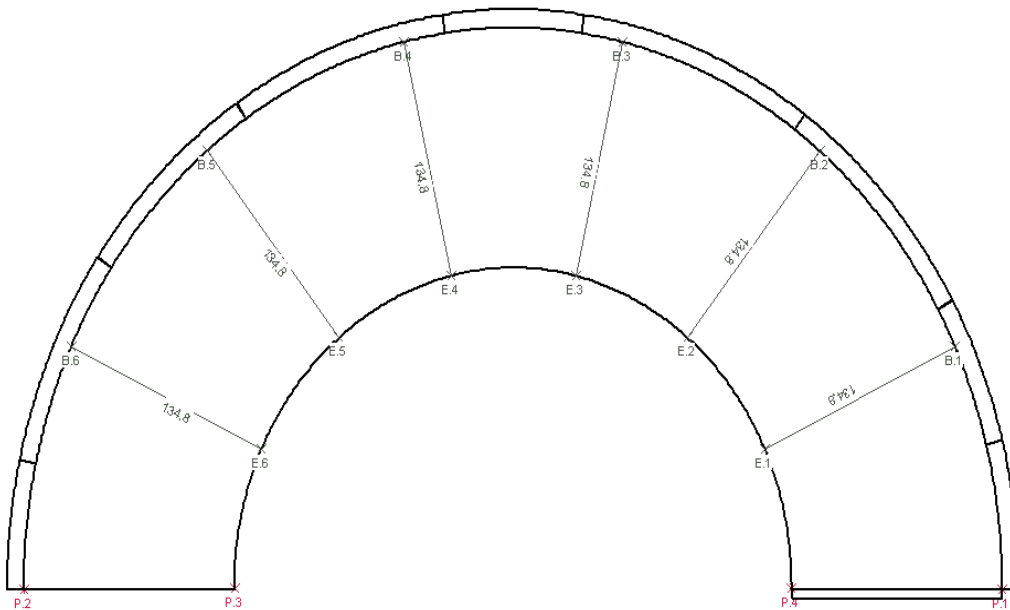
Second component edge: 3.000  
(right component edge for unfoldings)

Third component edge: 3.000  
(top component edge for unfoldings)

Fourth component edge: 3.000  
(left component edge for unfoldings)

OK Cancel

Enter the required size and click on “**OK**”. The selected contour with a component edge with notches is displayed on the screen:



## 5.4 "Puzzle"

Select this option or the icon:



if the sheet unfolding layout is larger than the sheet of metal. Click on the option. The window in which you can enter the size of the sheet of metal is displayed on the screen:

Puzzle

Length of grid cell:

200.0

Width of grid cell:

250.0

calculated amount of vertical grid cells:

3

calculated amount of horizontal grid cells:

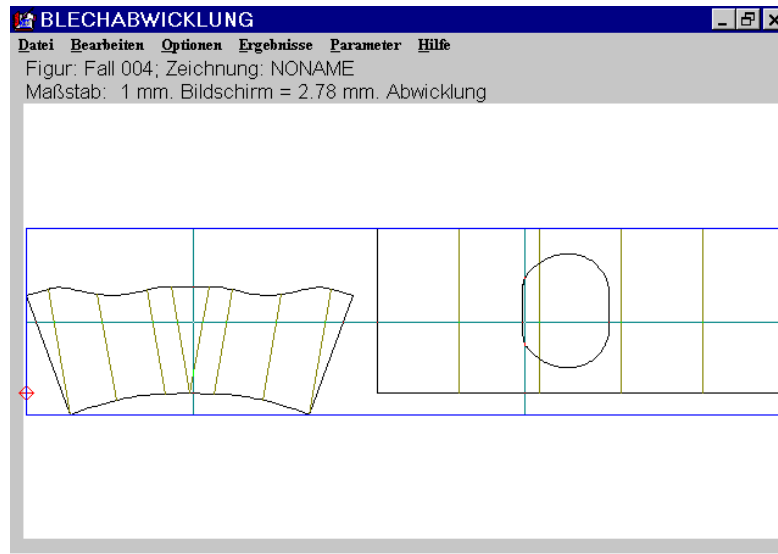
1

OK

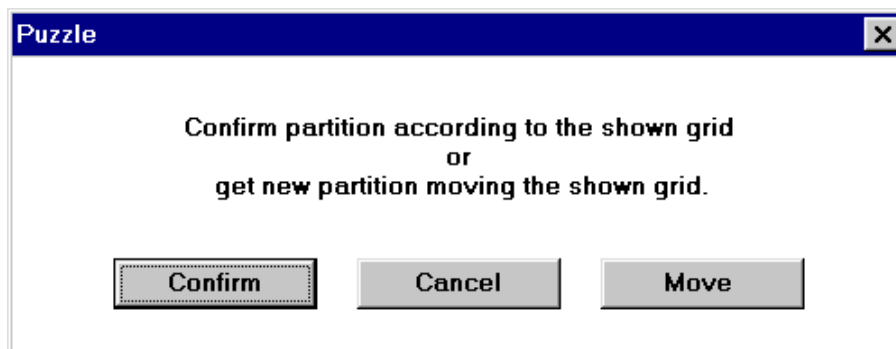
Cancel

Enter the length in the window **"length of grid cells"** and the width in the window **"width of grid cells"** and the program will calculate automatically the number of fields required for the sheet unfolding layout. Confirm with **"OK"**. The puzzle is displayed on

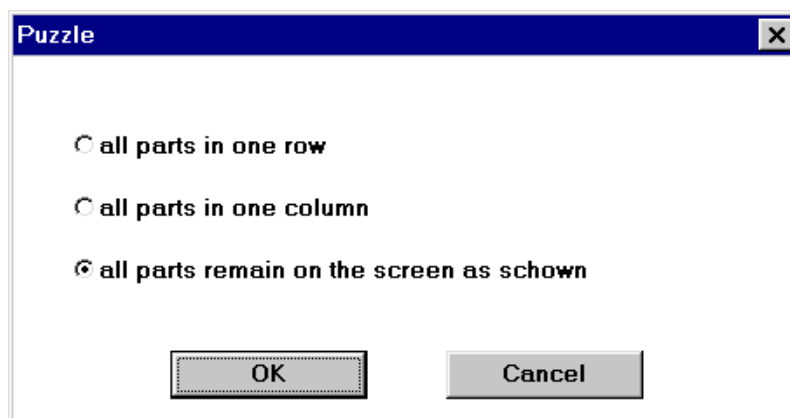
the screen. Now you can confirm the position of the puzzles or change the position using the mouse:



You can move the grid:



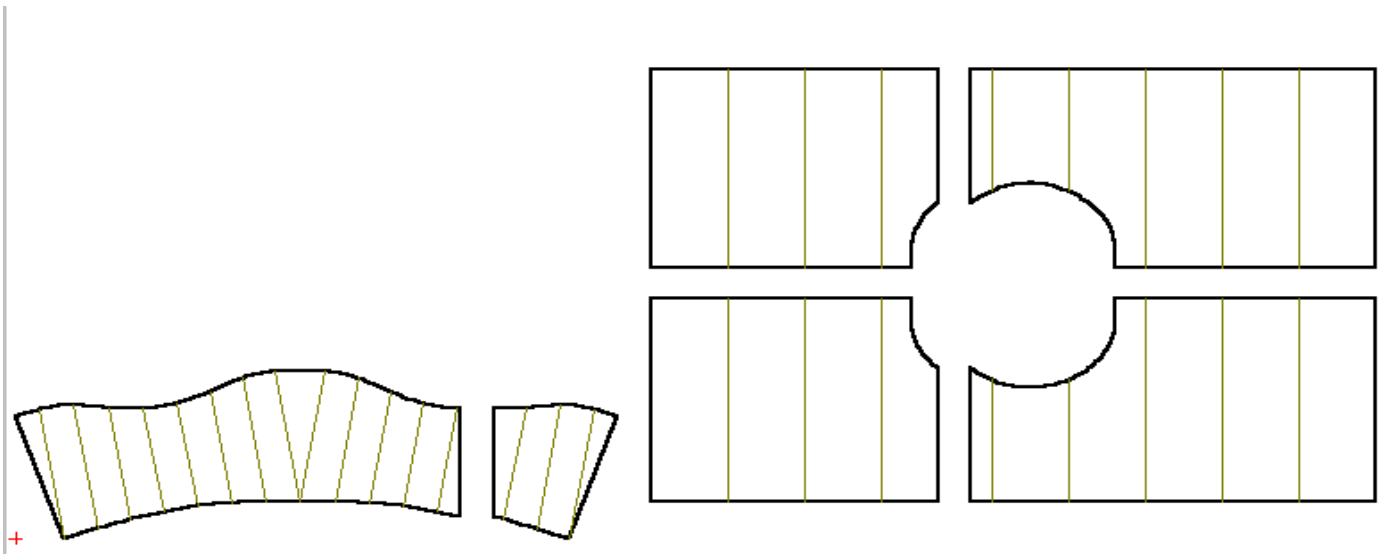
The following window is displayed when you have positioned the grid:



You can select the way in which the puzzle is displayed on the screen:

- all parts in one row;
- all parts in one column;

- all parts remain on the screen as shown at that moment. Only the distance between the parts is added. The third option has been selected in this example:

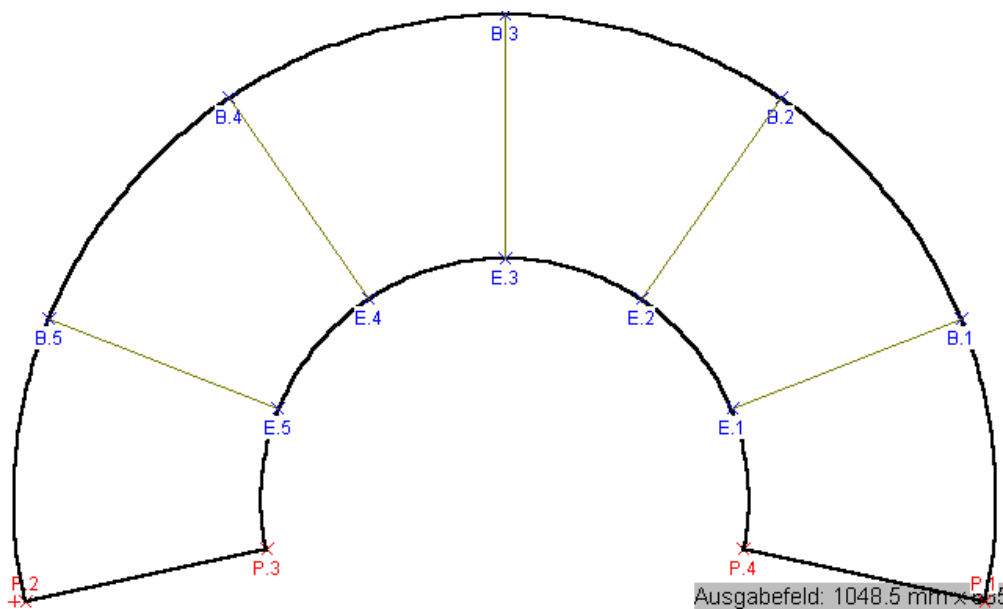


You can now select one of the puzzles and just work with one puzzle piece as usual.

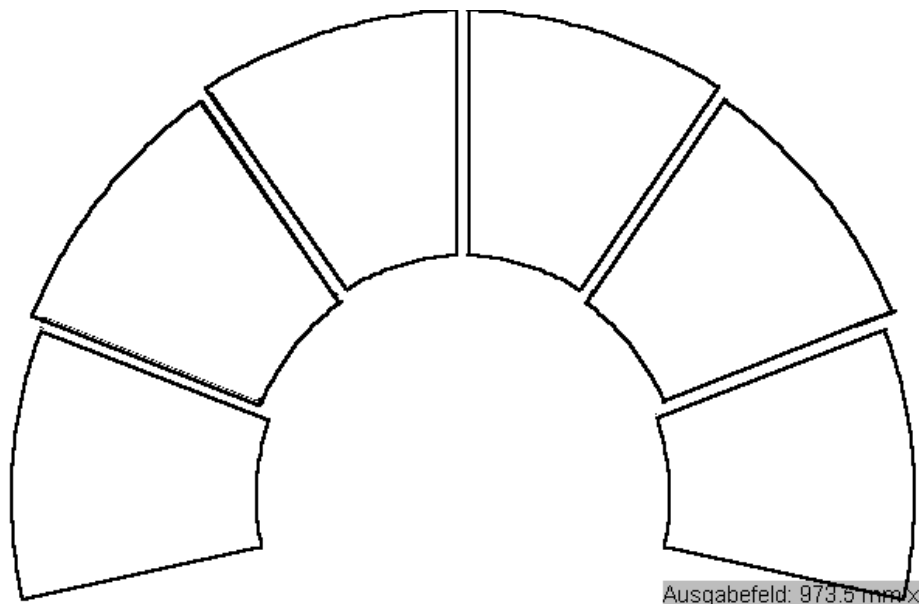
## 5.5 Regular divide

Use this command to cut the unfolding across the bending lines.

After calculation you get, for example, the unfolding with 5 bending lines:



You can cut this unfolding across the bending lines and get 6 parts. Select the outside contour (see “**Select contour**”), the contour will be blue, and click the command “**Regular divide**” under “**Edit**”, you get 6 parts on the screen:

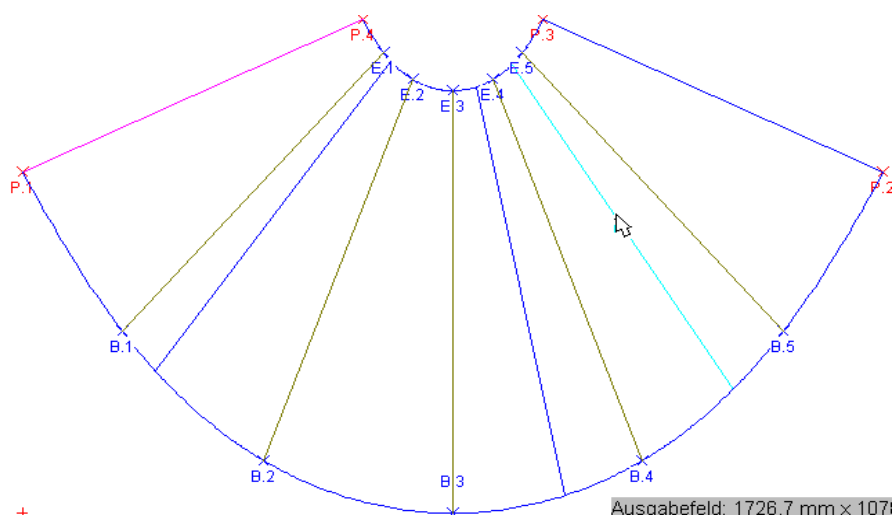


You can change the number of parts by changing the number of bending lines.

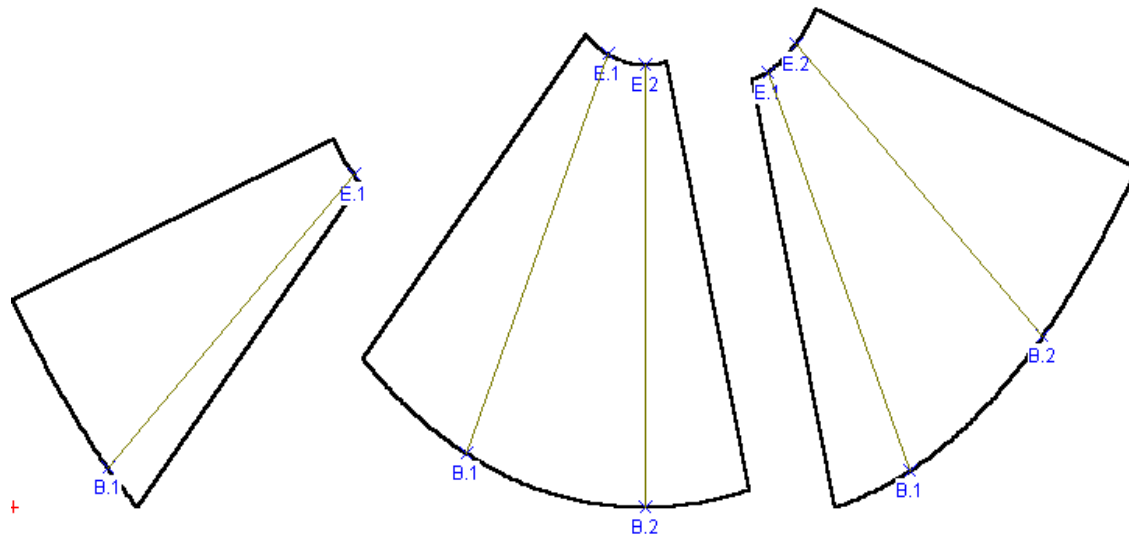
## 5.6 Required divide

Use this command to cut the unfolding.

Select the outside contour (see “**Select contour**”), the contour will be blue, and click the command “**Required divide**” under “**Edit**”, the blue line appears by cursor – this is the cut place. Place this line on the required place using the cursor (rights you can see the grad number). When you placed the cutting line on the required place, click the link mouse-button. You can repeat this operation:

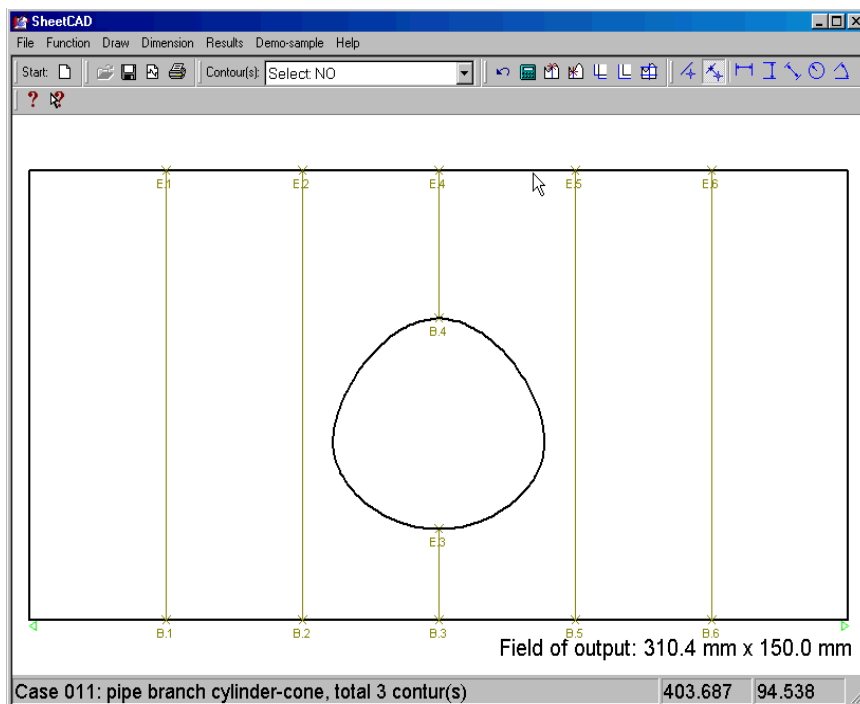


When all lines are placed on the required places, you can start the cutting by clicking the right mouse-button. The unfolding will be cut automatically:



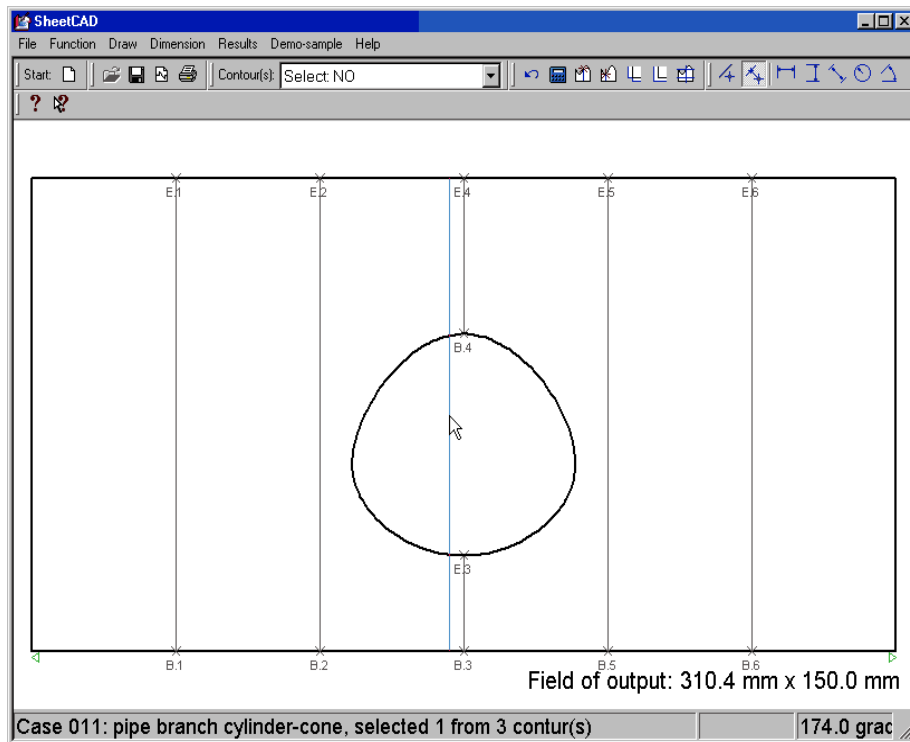
## 5.7 Select position of welded seam

You can select the position of the welding line after calculation using this option. The following sheet unfolding layout is displayed on the screen after calculation, for example:



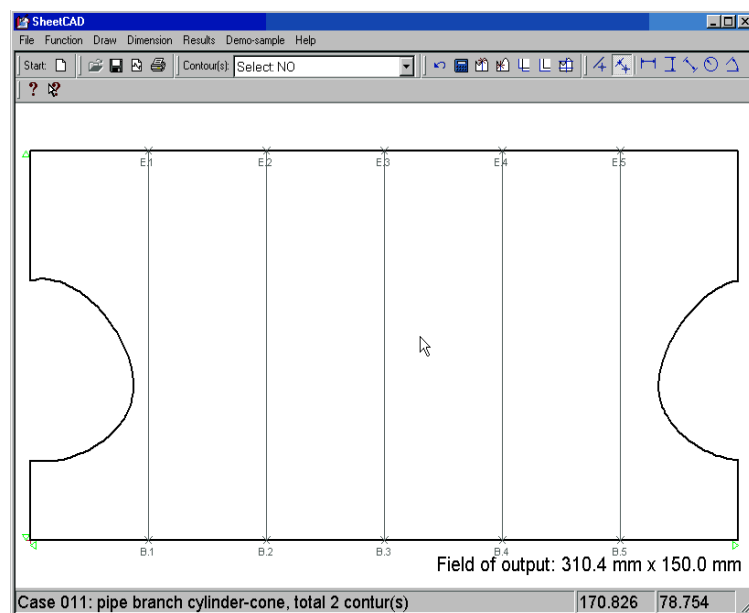
Select the desired contour (See Section 5.1). Click the option “**Select position of welded seam**” in the menu option “**Edit**”. A blue line is displayed at the cursor. This is the welding line. Position the welding line using the cursor:





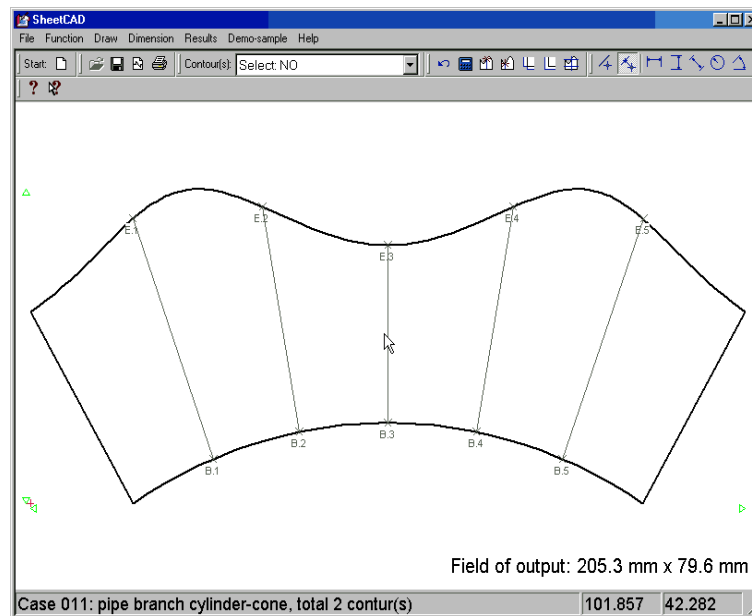
**Note:** The welding line angle of between  $0^\circ$  and  $360^\circ$  is displayed in the bottom left-hand corner of the screen to enable correct positioning.

Click the left-hand mouse button when you have positioned the welding line correctly. The new sheet unfolding layout is displayed on the screen within a few seconds:

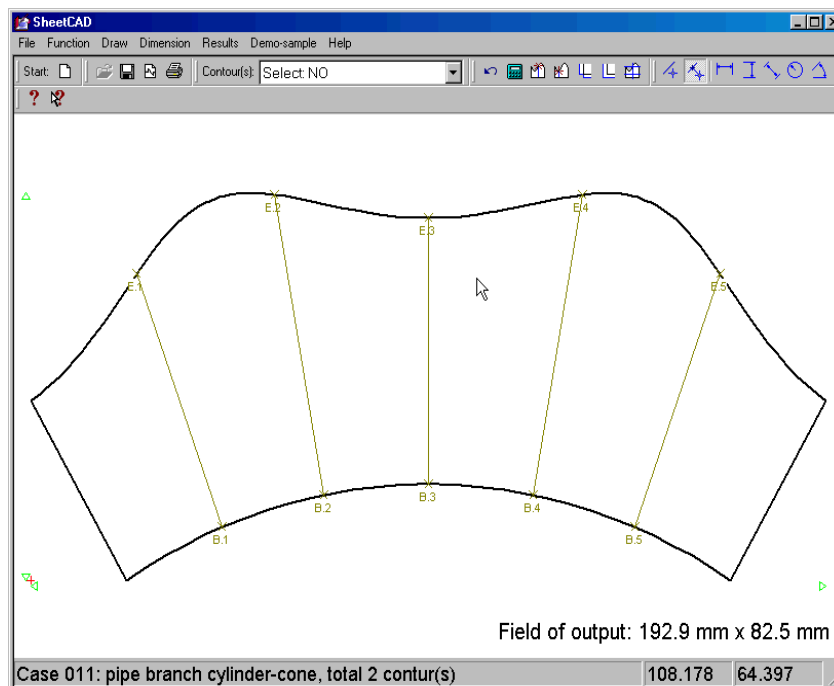


## 5.8 Optimize length of welded seam

If, after calculating, the following sheet unfolding layout is visible on the screen, you can automatically position the welding line on the shortest length. Select the option **"Optimization of welding line"** for this purpose:

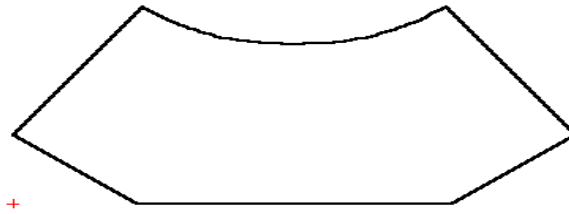


Select the required contour (see Section 5.1). Click on the option **"Optimize length of welded line"** in the menu option **"Edit"**. The new sheet unfolding layout is displayed on the screen within a few seconds:



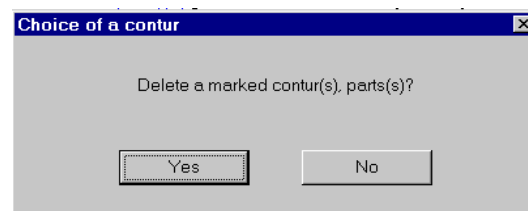
## 5.9 Delete fold lines

Select the option **"Delete fold lines"** if you do not require fold lines on your sheet unfolding layout, but fold lines is displayed as a default value (pre-selection). Select the required contour (not fold lines). This is displayed in blue, and click the option to automatically delete the fold lines.



## 5.10 "Delete contour(s)"

The following window is displayed on the screen when this option is activated:

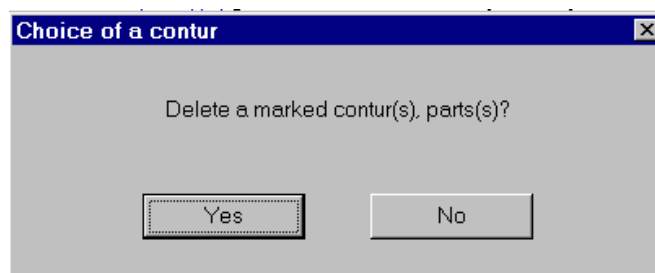


Click **"Yes"** to delete the selected contour:



## 5.11 "Delete part(s)"

The following window is displayed on the screen when this option is activated:

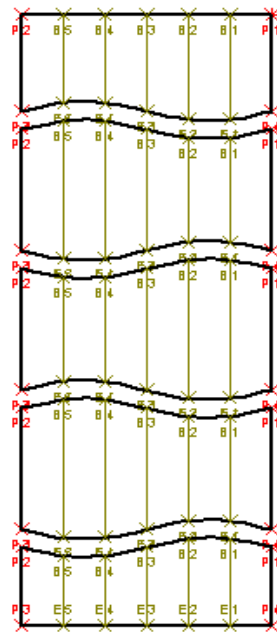


Click "Yes" to delete the entire selected contour, including its main lines and fold lines.

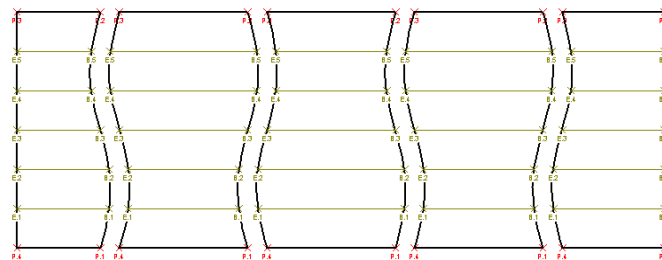
### 5.12 Rotate parts in 90 ° step

Use this instruction, to turn the left the completion on the screen around 90°.

If you have e.g. the following unfolding on the screen:



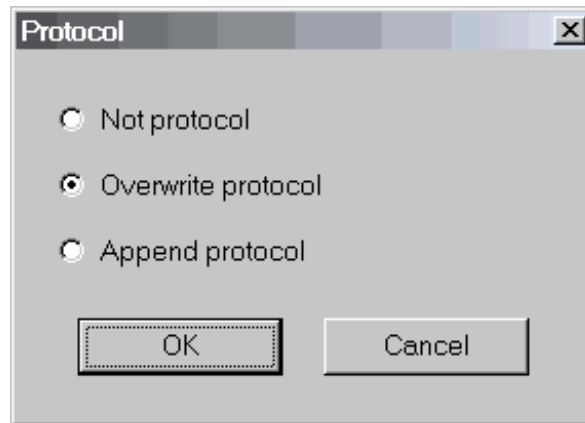
select under "Edit" this instruction; the unfolding is turned automatically to the left around 90°:



### 5.13 Protocol

This option enables you to protocol all the calculations you have made.

The following sub-menu is displayed if you click this option:



- The radio button ☒ shows the option has been activated. Click on the corresponding option to activate the option:
- **No Protocol:** No protocol will be made if this option is activated
- **Overwrite Protocol:** The last protocol will be deleted and a new protocol will be created if this option is activated;
- **Append Protocol:** The last protocol will be appended if this option is activated.

The protocol is Text-file "winblech.ptl". The file can be obtained in the menu option "**Results**" using the option "**Protocol**".

---

```

Blechabwicklung: Protocol file

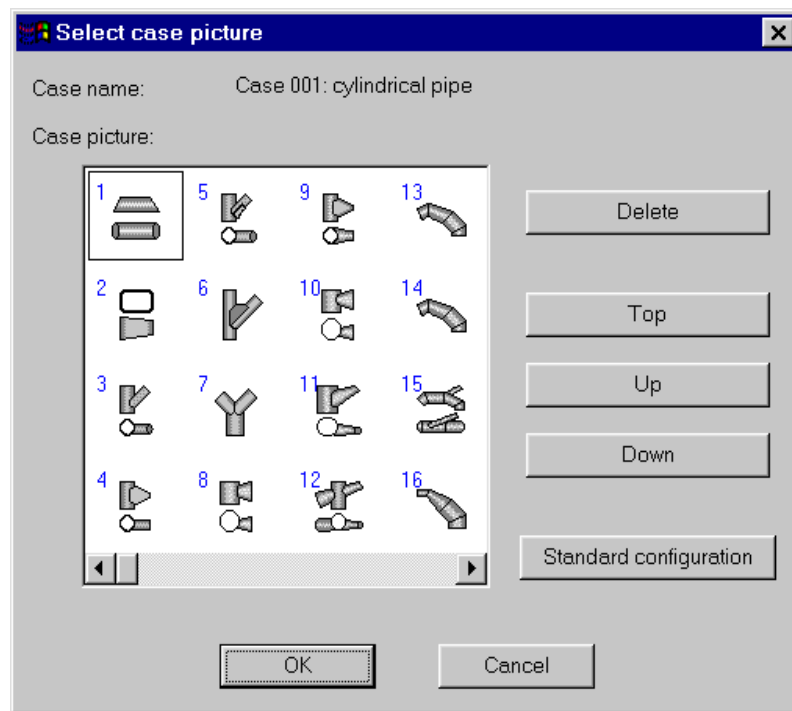
Day:   6. May 1999
Time: 12:17.30

Case: Case 016

Input parameter:
    Small pipe diameter           100.000 mm
    Thickness of wall             0.200 mm
    Angle of segment arc         130.000 grad
    Radius of arc                 1         140.000 grad
    Large pipe diameter          200.000 mm
    Number of interior segments   0.000 -
  
```

#### 5.14 Required Layout list box

Here you can arrange all sheet unfolding layouts as required. Select the option "**Required Layout list box**" and the following layout is displayed:



Here you can delete sheet unfolding layouts which are not required. Select the sheet unfolding layout, confirm using "**Delete**" and the sheet unfolding layout is deleted.

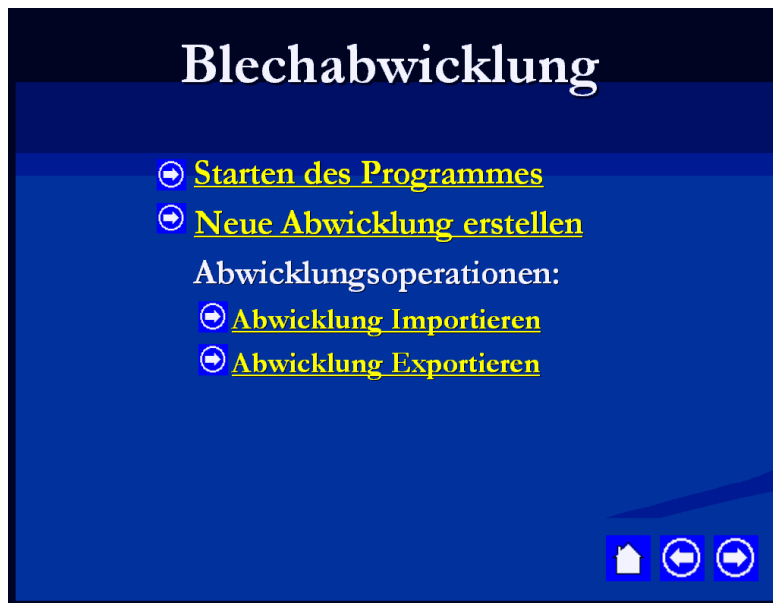
You can **alter the position** of the sheet unfolding layout. Select the sheet unfolding layout, then select the option "**Up**" or "**Down**" as often as required. The sheet unfolding layout is then positioned as required.

When the layout menu is configured as required, please confirm using "**OK**". The menu will be saved automatically.

If you want to call up the standard layout menu, select the option "**Standard configuration**" and the standard layout menu is displayed on the screen. Press "**OK**" to continue.

## 5.15 Start Demo-Example

Use this command for viewing an example of work with the program. Press this command, demonstration will be started in Power Point:



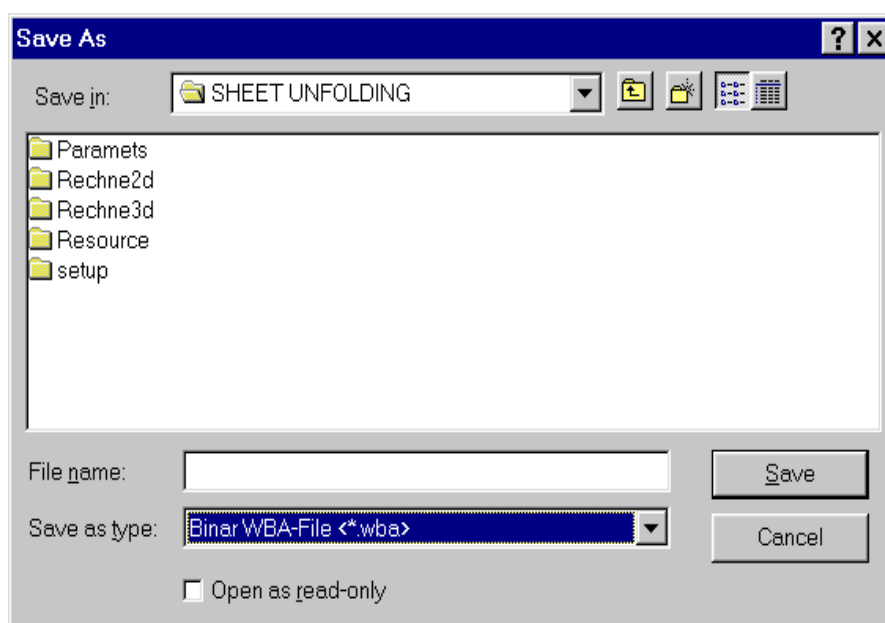
## 6. Save

Calculated data must be saved in the required format. Sheet unfolding layouts can be saved in SHEET UNFOLDING -Format-WBA or in AutoCAD - format - DXF.

Select the option "**Save**" in menu option "**File**" to save sheet unfolding layouts or click on the icon



The following window is displayed on the screen:



Enter the required name and confirm with **"OK"**. Files are then automatically saved.

## 7. Exporting a file: Saving sheet unfolding layouts in DXF-Format, HPME10-Format, CNC920-Format

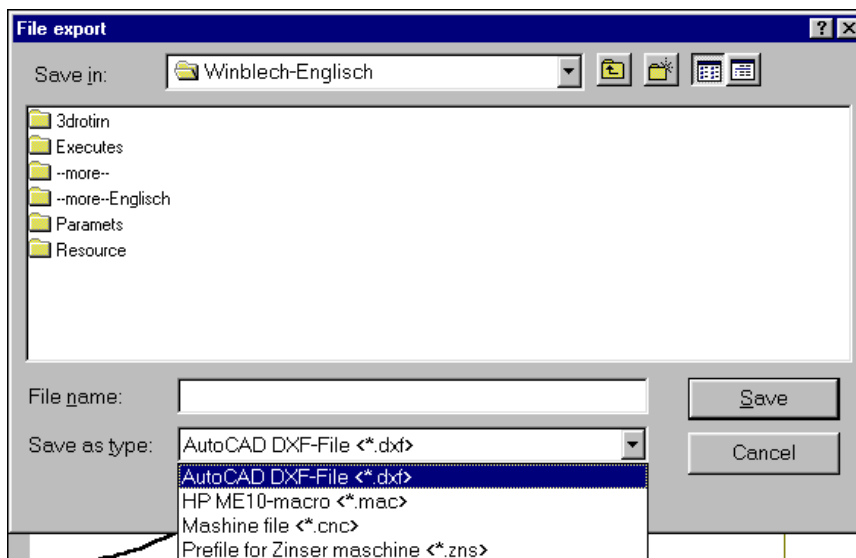
Select this menu option to save sheet unfolding layouts in DXF-Format (CAD-Format); HPME10-Format (HP-Format) or CNC920-Format.

All sheet unfolding parts can be saved in one or more files if the sheet unfolding layout consists of several parts.

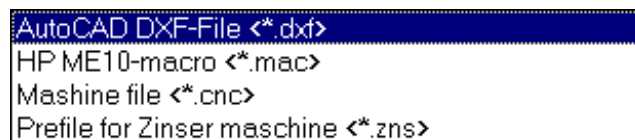
Select the **"Export"** option in **"File"** or click on the icon:



The following window is displayed on the screen:



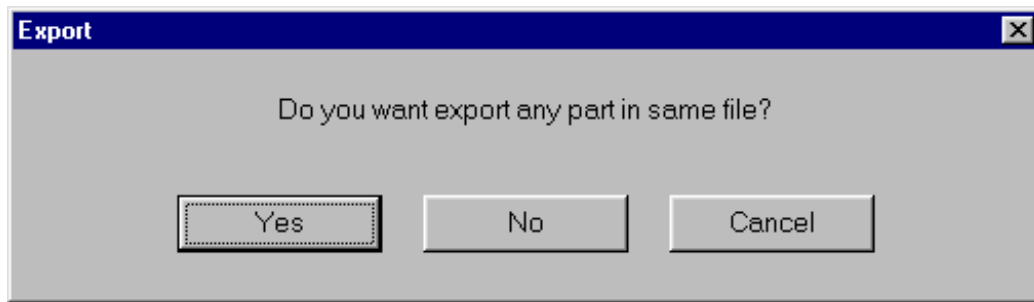
Select the corresponding file type from the list **"List of file types"**:



Enter the name of your sheet unfolding layouts in the corresponding DXF- (\*.dxf), HPME10- (\*.m10), CNC-Format (\*.cnc) window **"File Name"**. "Case4.dxf", "Case4.mac", "Case4.cnc" in this example.

Confirm with **"Save"**, you get follow message on the screen:





If you click **“Yes”**, your files will be saved automatically, and files will be created with names in the following format in your Winblech directory:

“<File Name>\_<Number of Part>.<Format>”.

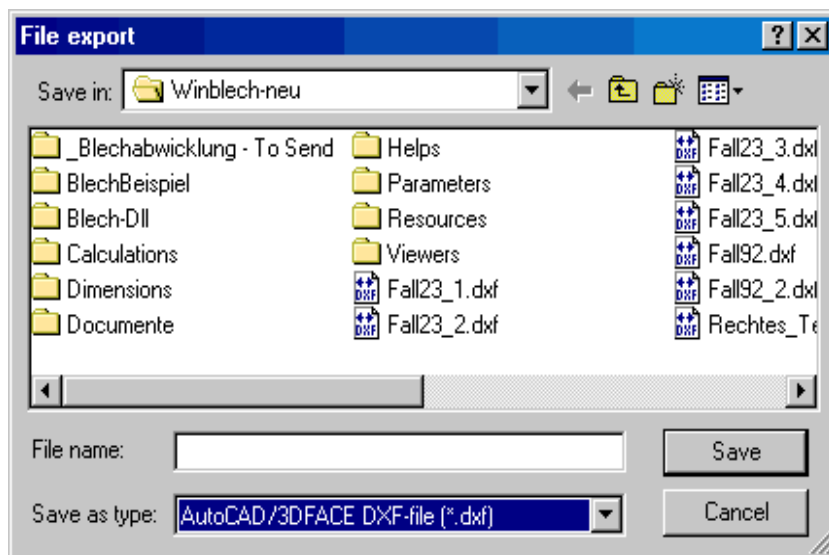
<Filename> is the name you have entered in the window **“File name”** in this case;

<Number of Parts> - is the number automatically given to the part by the program.

<Format> - is the format in which you want to save the sheet unfolding layout: DXF-, HPME10- or CNC- Format. The following files are created in our example: “fall4.dxf”, “fall4\_2.dxf” or “fall4.mac”, “fall4\_2.mac” or “fall4.cncf”, “fall4\_2.cnc”.

## 8. Export of 3D-Objects

Select the **“Export of 3D-Objects”** option in **"File"** . The following window is displayed on the screen:

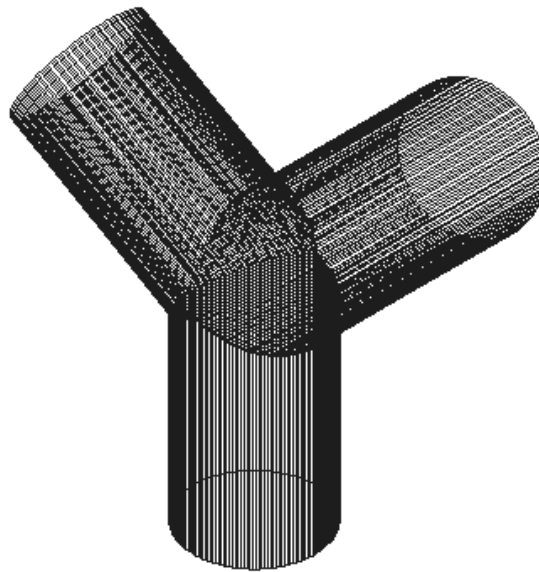


Select the corresponding file type from the **“List of file types”**

Enter the name of your sheet unfolding layouts in the corresponding DXF- Format in window **"File Name"**.

Confirm with **“Save”**, you get follow message on the screen:

Now you can open the 3D-sheet layout in CAD-Program:



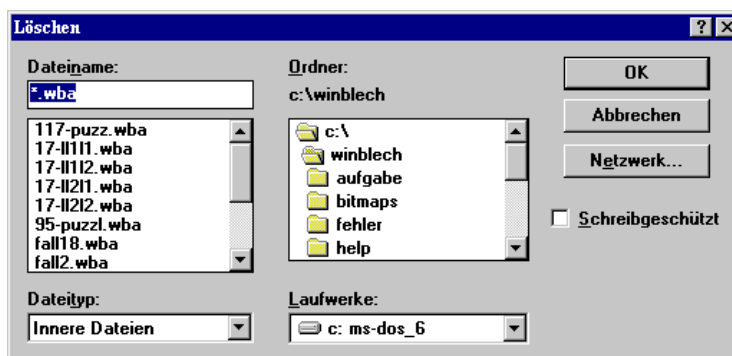
## 9. Delete file:

Different Windows SHEET CAD format files (\*.WBA, \*.CNC, \*.DXF, \*.MAC, \*.WTA) can be deleted using the program.

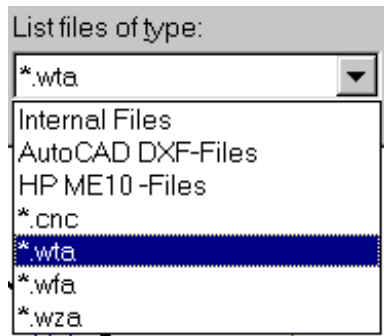
Select menu option **"Delete"** from the menu option **"File"** or the icon:



and the following window is displayed on the screen:



Select the required format using the cursor in the window "File type".

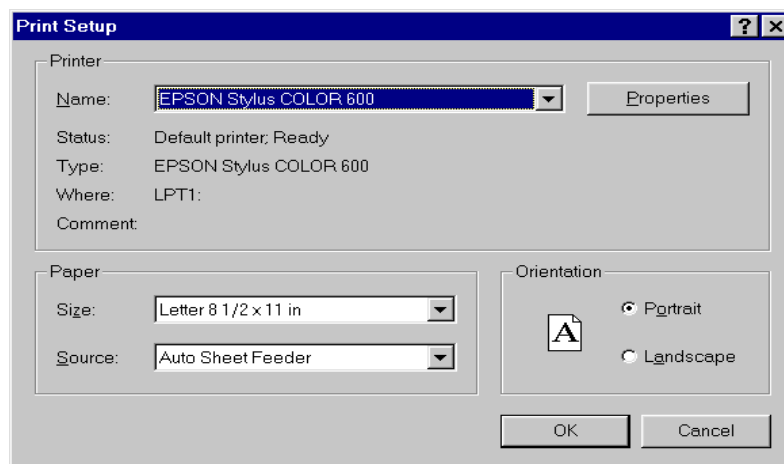


The corresponding file is displayed in the window **"File Name"** if you have selected this format.

Select the required file and click on **"OK"** to delete the file.

## 10. Print-Out Sheet Unfolding Layouts:

Select the option **"Printer setup"** in the menu **"File"**. The following window is displayed on the screen:



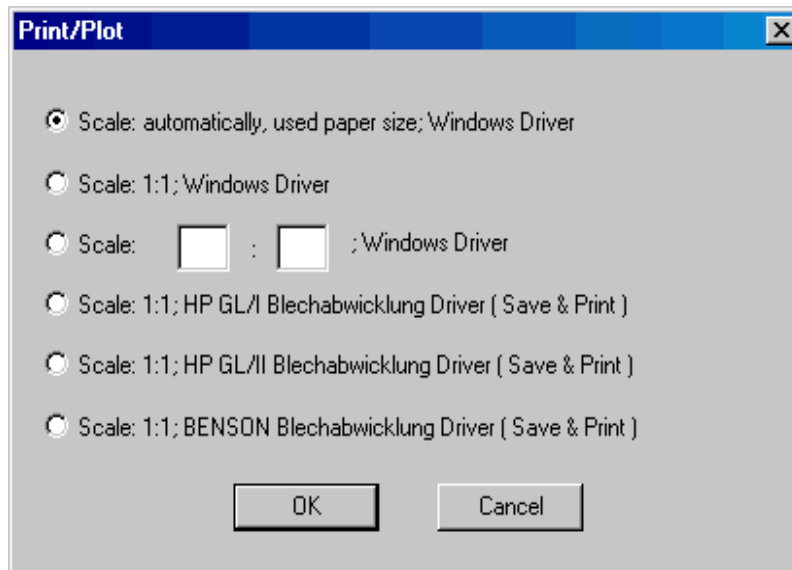
The printer, format, paper size etc can be selected. Confirm with **"OK"**.

Sheet unfolding layouts can now be printed.

Select menu option **"Print"** from the menu option **"File"** or click on the icon:



The following window is displayed on the screen:

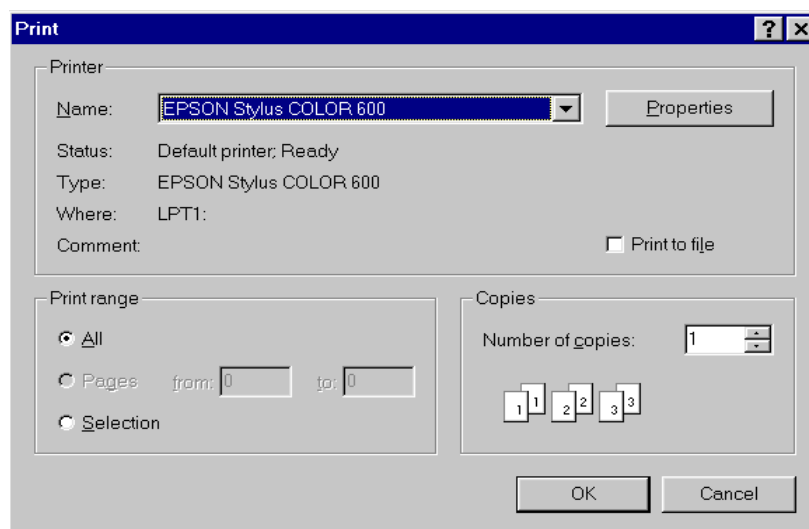


The following options are available:

- Print sheet unfolding layouts to scale: The program automatically selects the scale of the sheet unfolding layout so that it fits on the page;
- Print sheet unfolding layouts on a scale of 1:1;
- Print sheet unfolding layouts on a required scale ;
- Plot sheet unfolding layouts in HPGL I-format;
- Plot sheet unfolding layouts in HPGL II-format;
- Plot sheet unfolding layouts in BENSON-format.

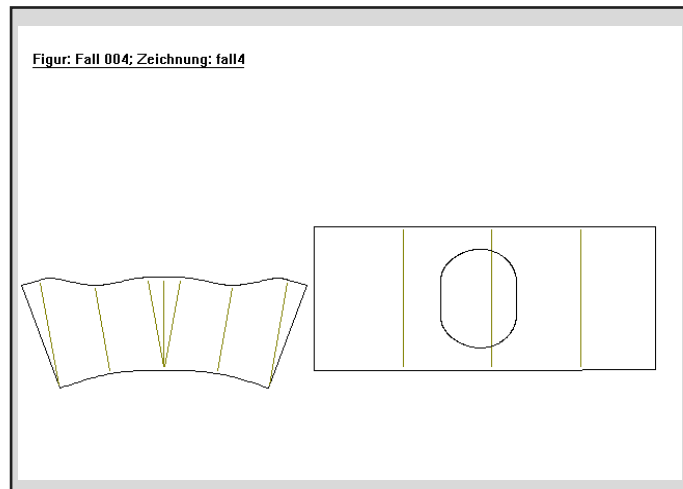
The radio button shows the activated option.

- a) To print the sheet unfolding layout, either select the option "**Automatic scale**", "**Scale 1:1**" or set the scale manually.  
Confirm your selection with "**OK**" and the following window is displayed on the screen.

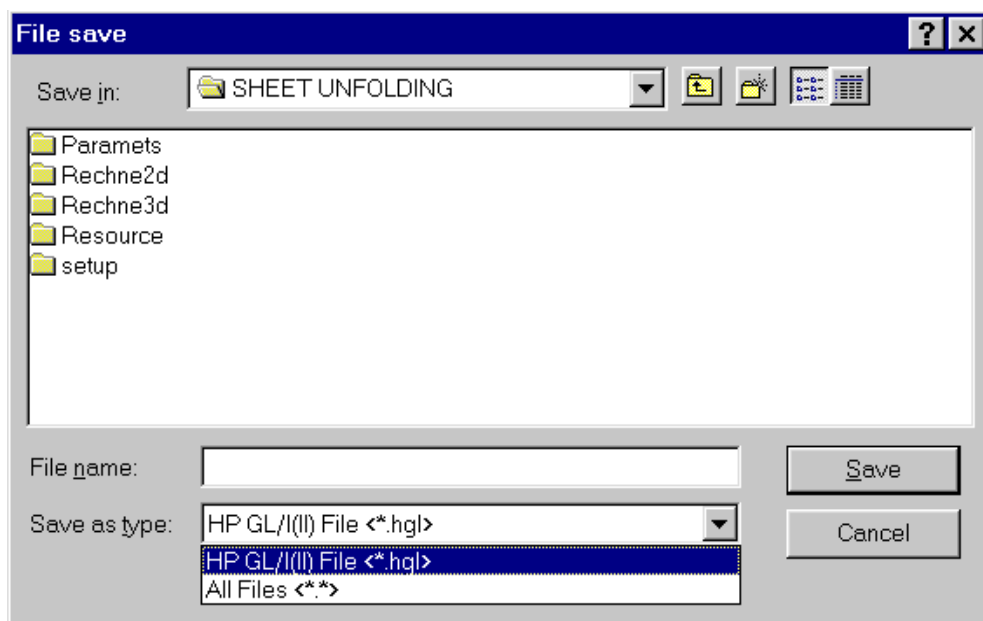


Select the required options and confirm with **"OK"** to start printing.

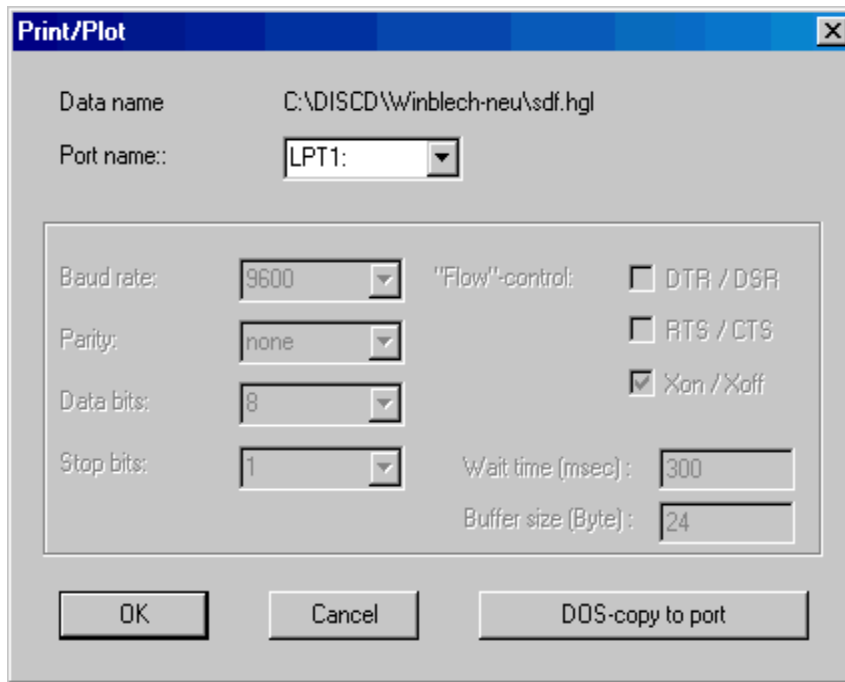
The following printout is obtained in auto format:



- b) Three other options are available if no 32-bit plotter is available (Windows NT, Windows 95). If this is the case, start a DOS-application to control your plotter. The **"Save As"** is displayed if one of these three options has been selected and confirmed.



Enter the name in corresponding format ("\*.hgl" in this case) in the option **"File name"** and confirm with **"OK"**. The following window is displayed on the screen:

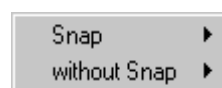



Select the "Interface"; enter the "Baud rate", "Parity", "Data Bits", "Stop Bits", "Flow Control", "Delay Time" and "Buffer Length" of your plotter.

Confirm with "**OK**" and the plotter starts printing automatically.

## 11. Dimension

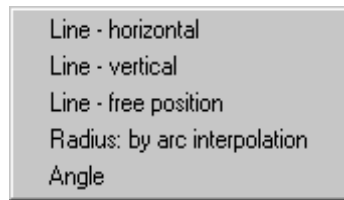
Dimensioning enables you to describe geometry by displaying measurements. All dimensioning functions can be found on the Dimensioning toolbar "**Dimension**" menu. Dimensioning tools have several options for additional formatting and settings. In the program SHEET UNFOLDING there are three fundamental kinds of the: Linear dimensioning, Radial dimensioning and Angle dimensioning. Linear dimensions cover horizontal, vertical and aligned dimensions, you can measure lines, multi-lines, arc, circles and line segments, by selecting the object with object catches, or draw free standing dimensions. To select the object with object catches, click the button in the Toolbar, or select the instruction "**Snap to next element**" under menu option "**Dimension**".



To draw free standing dimensions, click the button  in the Toolbar, or select the instruction "**without Snap to next element**" under "**Dimension**". In the Toolbar the following Toolbox is activated:



Under menu option "**Snap to next element**" or "**without Snap to next element**" a Popup menu will be activated:

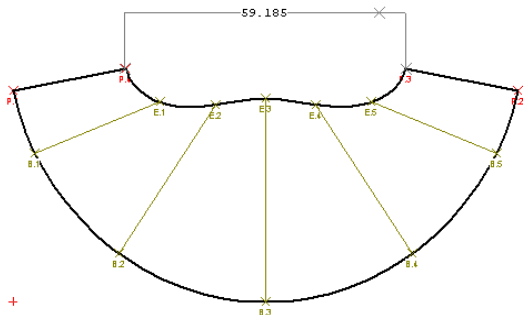


To draw the dimensions, you can use buttons in the Toolbar or instructions in the Popup menu.

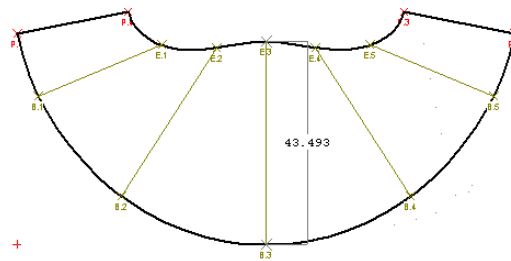
## 11.1 Linear dimensions

Linear dimensions can be horizontal, vertically or aligned. For aligned dimension the dimension line will be placed parallel to the line, on which the points of origin of the auxiliary line are.

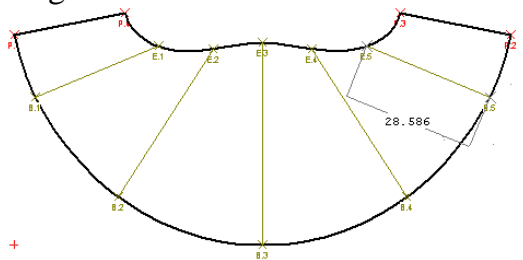
Horizontal:



Vertically:






Aligned:



To draw a linear dimension:

1. Select from the Popup menu "**Snap to next element**" under "**Dimension**" "line - horizontally" for horizontal dimensioning, "line-vertically" for vertical dimension or "line – free position" for aligned dimension. You can also use one of the following buttons:

- Horizontal: 
- Vertically : 
- Aligned : 

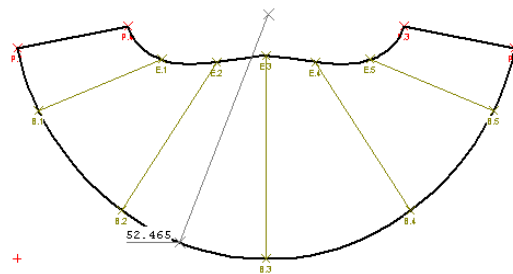
2. Linear dimensions are defined by selecting start and end points, then locating the dimension text. Click on the place, on those points of origin first and the second help lines should be placed (e.g. at the beginning and end point of one line or two points, between which an appropriate distance will be measured). A line will be drawn from first to the second points.

3. Specify the position of the dimension line, by placing this line with the mouse on the correct place. Click this place on, on the line appear the measured length.

## 11.2 Radial dimensions


With “**radial dimension**” you can measure radius of arc and circles. These dimensions are defined by selecting an arc or circle and locating the dimension text.

**Note:** You can use the “radial dimension” function only, if you select “**accuracy of the arc interpolation**” under “**drawing**” (“design accuracy”)!)



To draw a linear dimension:

1. Select “**Radius**” from the Popup menu “**Snap to next element**” under “**Dimension**”.

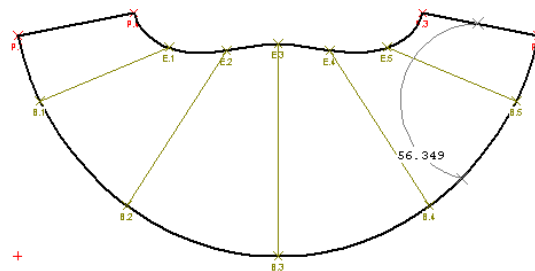
You can also use the following button: 

2. Click on the circle or arc, which you would like to measure, on the screen appear a line, which represents the radius of the selected arc. You can move this line to other arc or circles, according objects will be snapped automatically.

3. After you placed this dimension line on the desired arc or circle, click with the mouse, on the line appears the dimensioned radius.

## 11.3 Angular dimension

Angular dimensions define the angle between two lines. The dimension line forms an arc.






To measure an angle between two lines, mark first line, then a second line and afterwards the position of the dimension arc.

To draw the angular dimension:

1. Select "**Angle**" from the Popup menu "**Snap to next element**" under "**Dimension**".

You can also use the following button : 

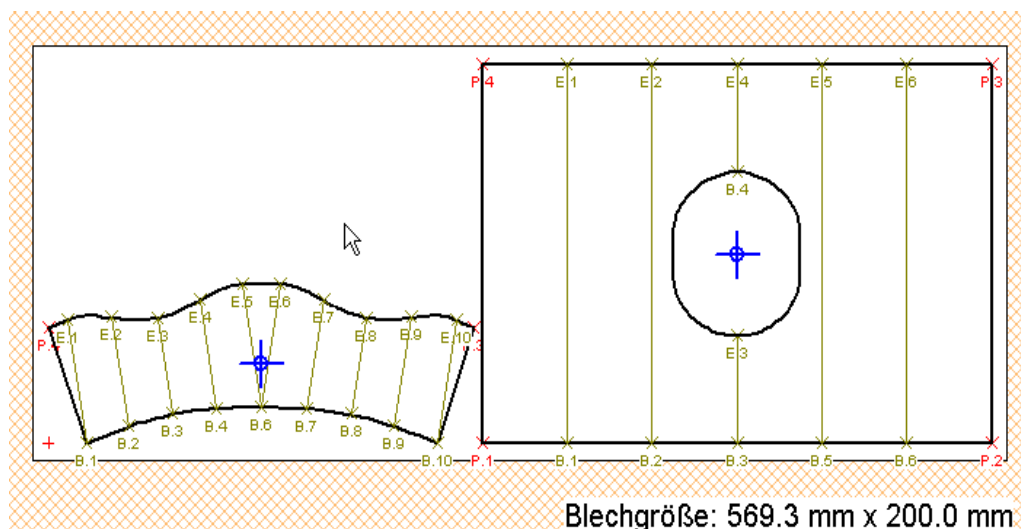
2. Click to two lines, between which you would like to measure the angle. A line from the first clicked point to second clicked point will be drawn. That is the dimension arc.
3. Specify the position of the dimension arc, by placing this arc with the mouse in the correct place. Click this place on, on the arc appear the measured angle.

## 12. Disposal

With the help of this instruction the parts of unfolding can be placed on the sheet-metal plate at will. They can be also turned and afterwards over the module "**Puzzle**" arbitrarily divided.

If you would like to place the parts of unfolding after the calculation differently than represented on the screen, use the instruction "**Disposal on**".

In order to activate Disposal-mode, click on this instruction. In the center of each completion part a cross-hair appears:



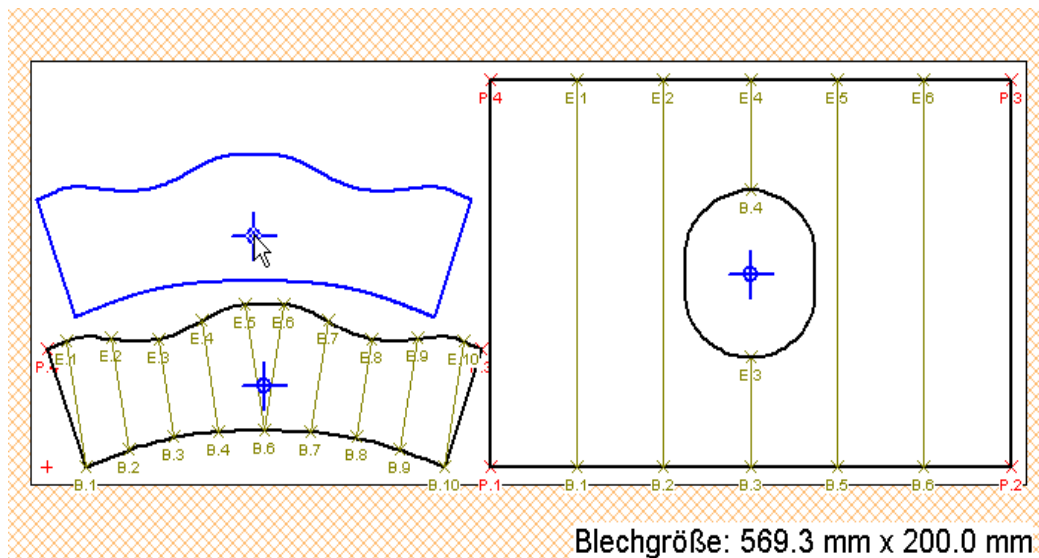
All parts have now a blue cross with circle. If you click with the mouse into the internal circle and keep the key pressed, then you can move this part within the sheet-metal plate at will.

If you click within the outside circle with the mouse, then you can turn this part around its own center.

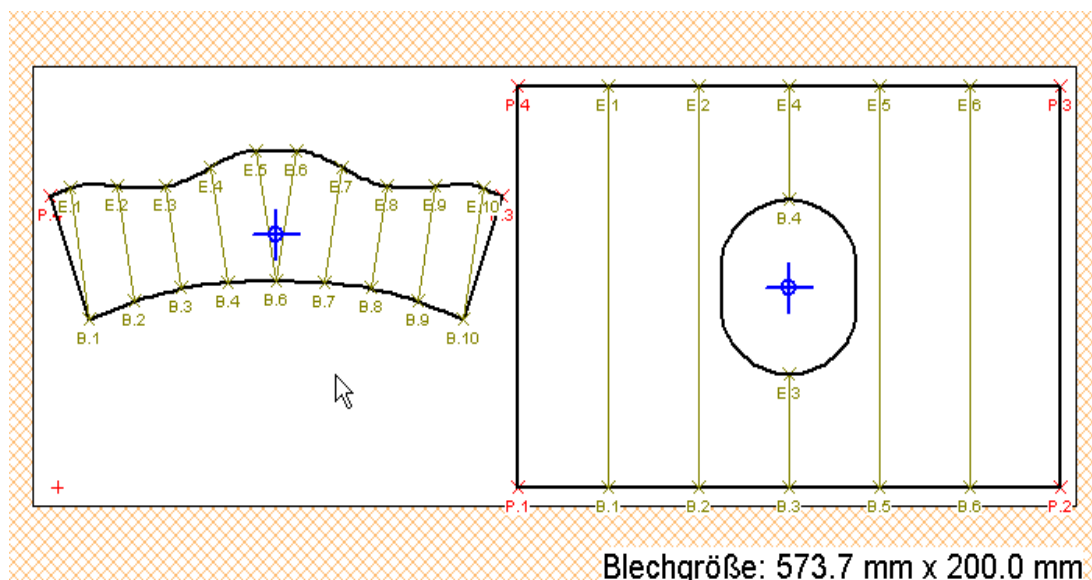
If you click within the outside circle with the mouse, then you can turn this part around its own center. It is examined whether the condition for the minimum distance up to the edge

of sheet-metal plate (see section "**Figure arrangement and minimum distance**") is fulfilled.

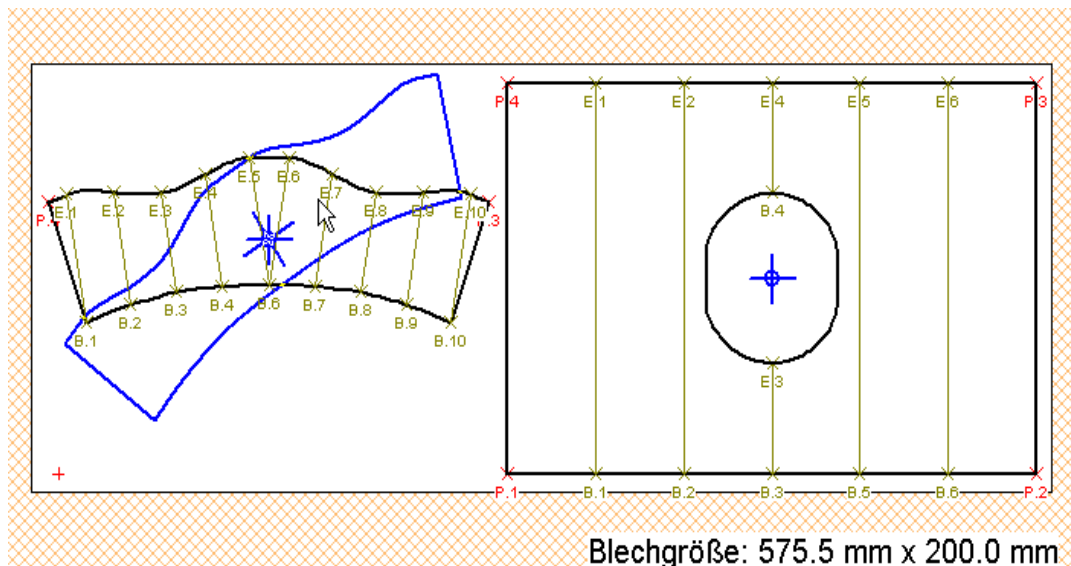
In order to shift a part, you place the cursor in the center of the cross-hair in the center of the desired part. Press the left mouse button; the contours are represented as strokes. Keep the left mouse button pressed and shift with the mouse the blue image of the part on the desired place:



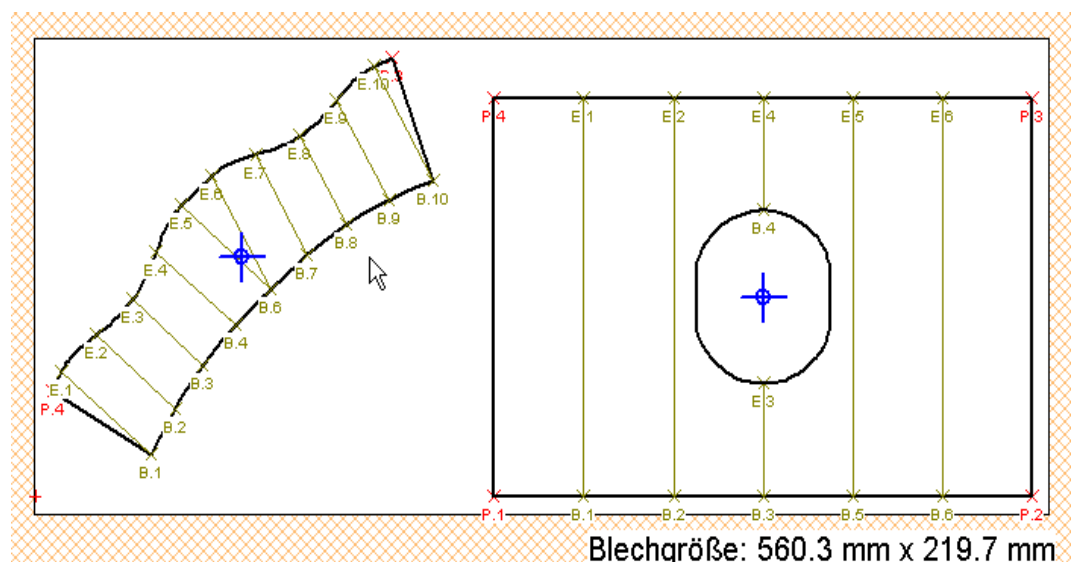
After the part is placed on the correct position, release the mouse button, then the part of unfolding is shown on the new place:



In order to rotate a part, place the cursor beside the cross-hair in the center of the desired part. Press the left mouse button; the contours are represented as strokes. Keep the left mouse button pressed and rotate you with the mouse the blue image of the part up to the desired position:



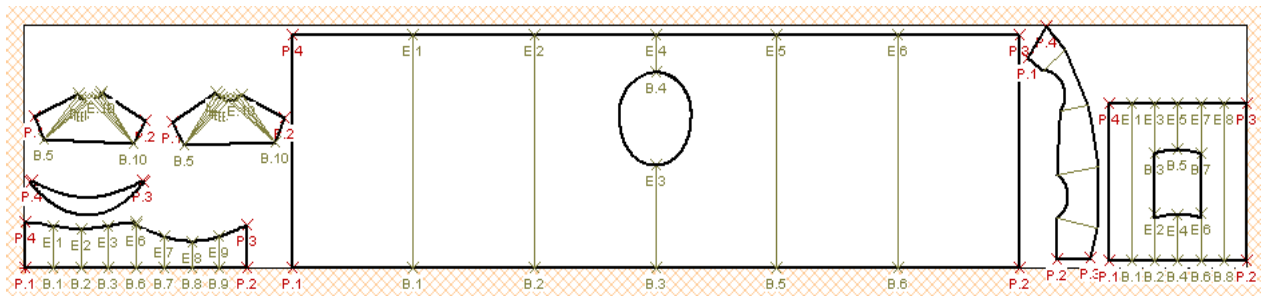
After the part is placed on the correct position, release the mouse button, then the completion part is shown on the new place:



Um Verschachtelungs-Modus zu deaktivieren, klicken Sie den Befehl „**Verschachteln aus**“, die Fadenkreuze verschwinden, das Verschachtelungsmodus ist deaktiviert.

## 12.2 Disposal with other unfoldings.

If you want disposal different construction units on a sheet-metal plate, then use the instruction "**Disposal with other unfoldings**" under the menu option "**Function**". If this instruction is active (control mark ✓) all parts, calculated after the activation, are placed on a board:

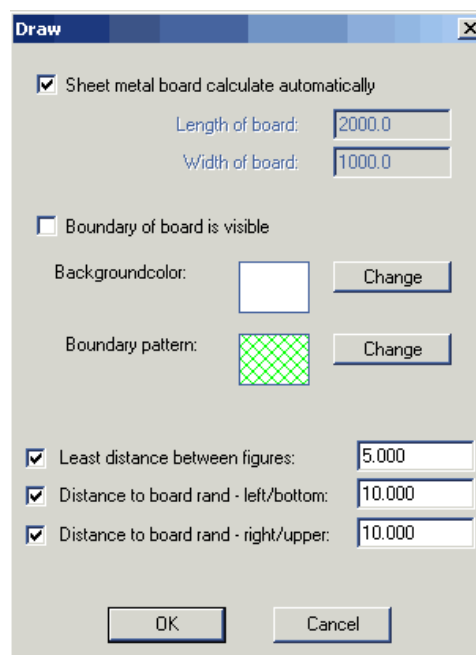


If you disposal no more, then leave the Disposal-mode with "Disposal off" at upper menu bar.

### 12.3 Disposal setup

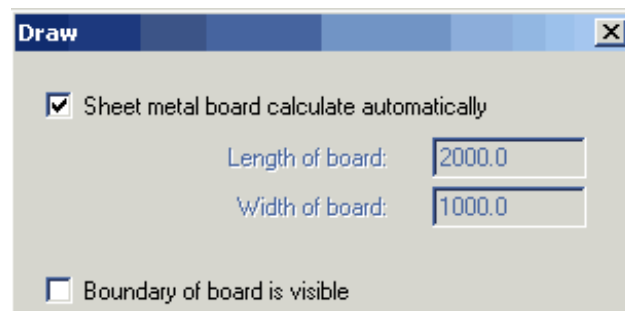
Here you can set up the options which concern disposal (or change corresponding values - see also chapter "**Draw**").

Choose the command "**Disposal setup**", and the following dialog window becomes visible:



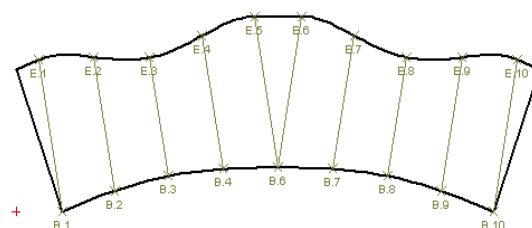
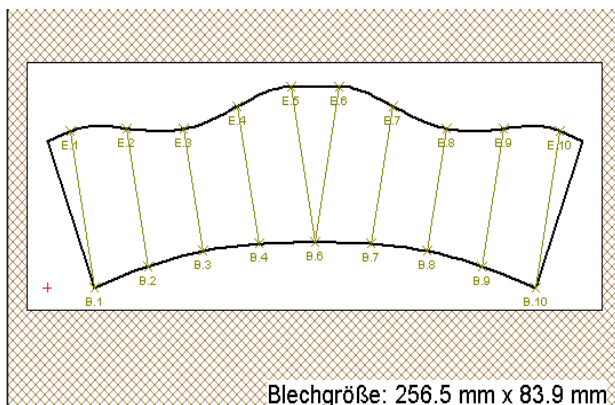
Here you have the following possibilities:

- ◆ determine the size of the expenditure sheet-metal plate. As default value it is accepted that the size is computed automatically (control mark ✓ in small box beside the field "**Calculate sheet-metal plate automatically**"). If you like to determine the size, click the checkbox on, the control mark disappear and the input fields for board length and board width become active. Enter the desired sizes here:

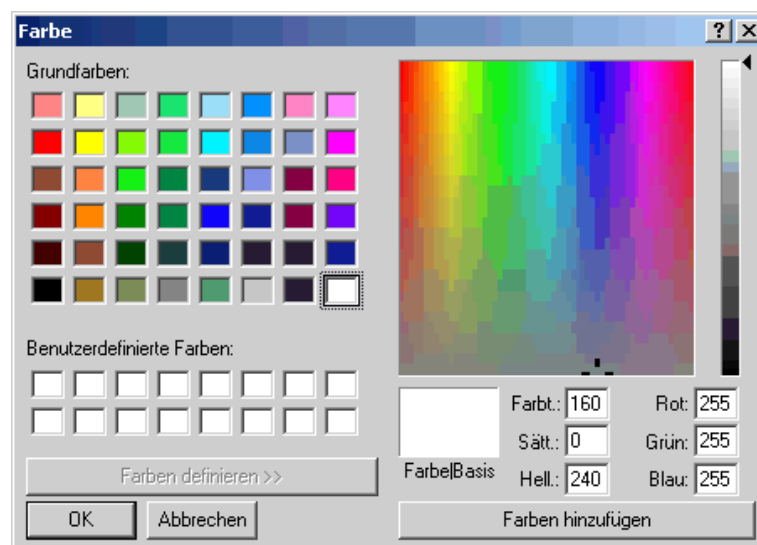


- ◆ Make the sheet-metal plate border visible and invisible: Control mark ☒ in small box beside the field "**Boundary of board is visible**" shows, which case is active. In order to activate the instruction, click on the appropriate instruction.

The sheet-metal borders are represented as in the example (to the comparison on the right of a unmarked unfolding is shown):

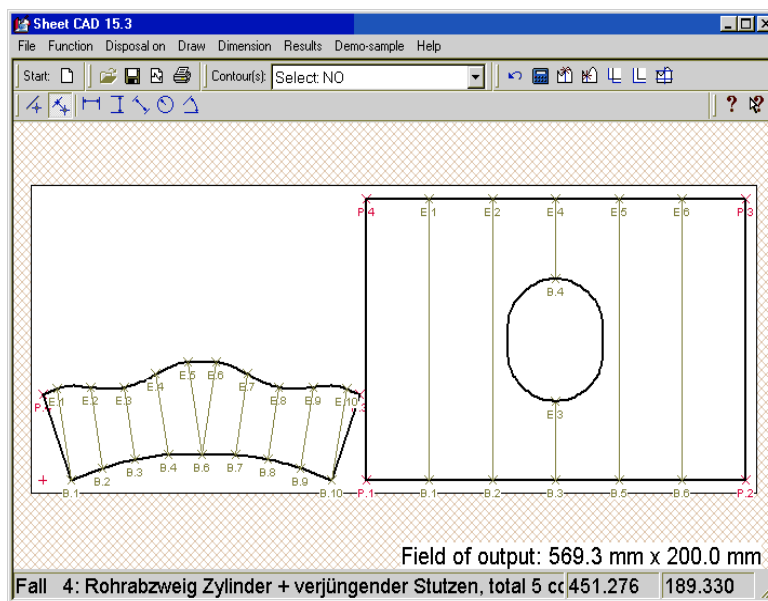


- ◆ Background colour (colour of the issue field) and board border shading (colour of the board borders) can be changed. Click the key "**changing**" beside the small box "**background colour**" (or "**board border shading**"), on the screen appears the standard colour choice window:

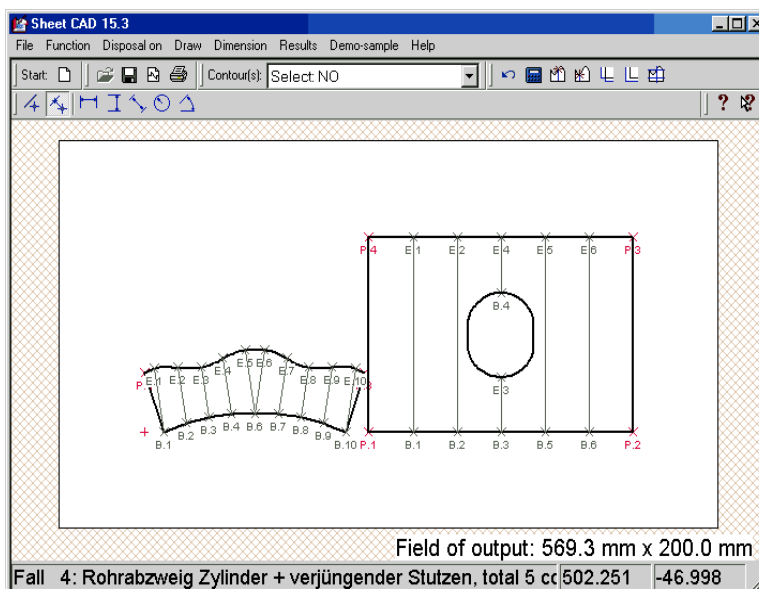


- ◆ Under **"Least distance between figures"** enter the distance between sheet unfolding layouts in mm.  
You can set the distance between parts of the sheet unfolding layout or puzzles on the screen using this option.
- ◆ As **"Distance to the edge of plate - left/bottom"** and **"Distance to the edge of plate - right/upper"** enter here the distances between the edges to the outermost left and lower points (or outermost right and upper points of the contour) and the edges of sheet-metal plate in mm. Control mark ✓ shows, which case is active.

If you have e.g. the following picture on the screen after the calculation,

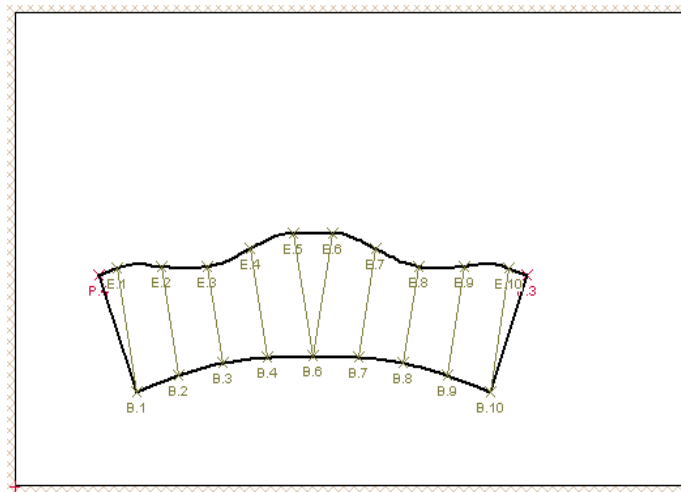


you can place the parts of unfolding further far away from the edge of sheet-metal plate. If you enter the desired distances and click the **"OK"**-button, then the parts of unfolding are moved:



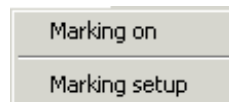
### Consider please that:


- during the automatic sheet-metal plate size calculation only the distance from the left side of the board is considered ;
- the distances from the left/lower and of the right/upper edges are not considered at the same time, only one of the two cases must be selected ( Control mark ✓ shows, which case is active.) Otherwise the distance is considered only by the left side of the plate:

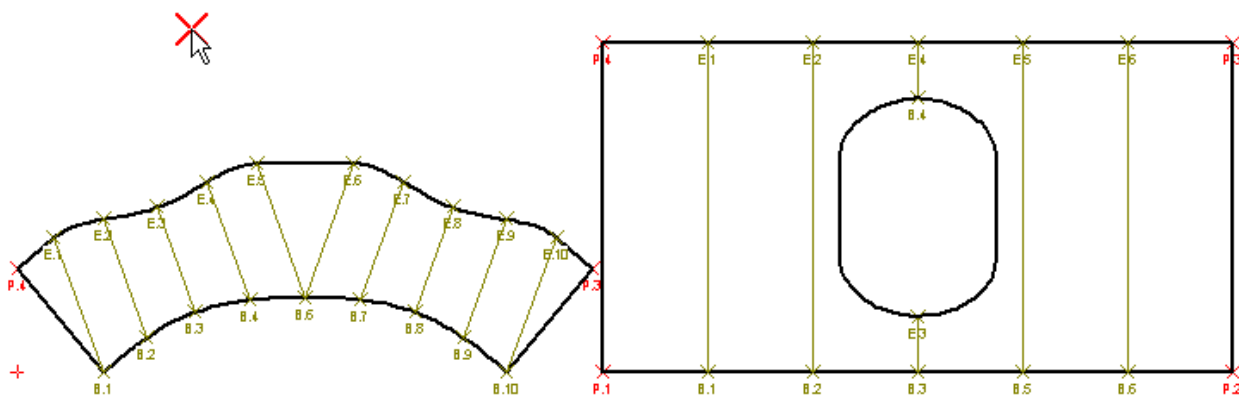


## 13 Marking

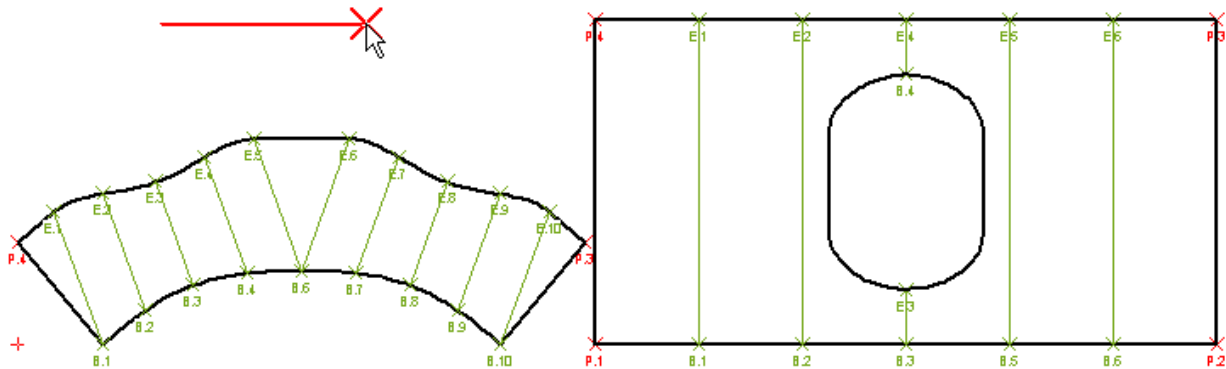
Use this command to mark the sheet metal board. Click the order, you get the following popup-rmenu:



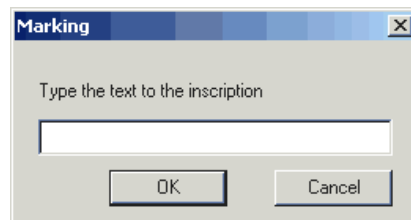
To activate the marking mode, click the following order: " **Marking** " or you use the button  on the toolbar. If this mode is active (controlmark ✓), a red cross appears by the cursor:



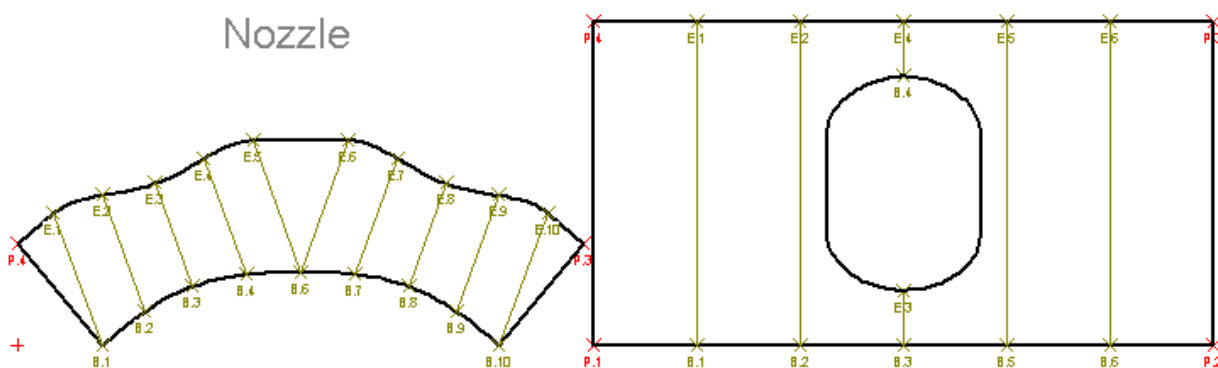
If you have placed the cross at the desired place, holding your left mouse button down, drag the a red line. At this line the text will be placed:



Release the mouse key and on the screen appears a dialog window in which you can enter the desired text:

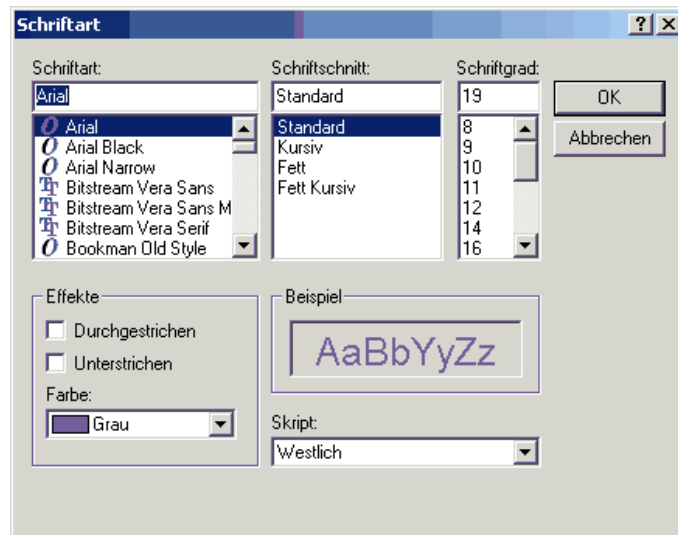


Enter the text and confirm with the "**OK**" button. The entered text appears on the screen:



Fontart and fontsize you can choose under the instruction „**Marking setup**“. Click this instruction on, you receive a standard window:

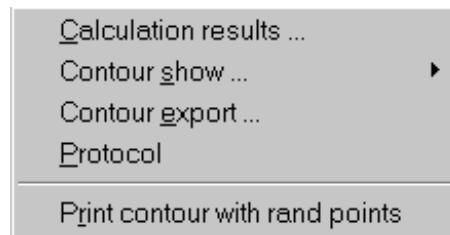




Choose the required Fontart, Fontsize and Fontcolor. Confirm with „**OK**“-button.

## 14 Results

Select the menu option "**Results**", the following sub-menu is displayed on the screen:



### 14.1 Calculation Results

When the calculation has been completed, the **size** and **weight** of the **sheet unfolding layout** and the **sheet** will be visible.

If you have clicked the option "**Calculation Results**", or the button



the window containing all calculation results can be seen on the screen.

**Calculation results**

Case name: Case 176: multi-pipe branches with offset

Design:

Unfolding / Contour: [176] BODY

Thickness [mm]: 4.000

Material: Steel C15

Weight [kg/dm?]: 7.850

Unfolding length [mm]:	2186.5		
Unfolding breadth [mm]:	2000.0		
Welded seams length [mm]:	2000.0		
Cut length [mm]:	8373.1	Sum:	18387.0
Square of board [mm?]:	4373097		
Square of unfolding [mm?]:	4373099	Sum:	4730192
Weight of board [kg]:	137.315		
Weight of unfolding [kg]:	137.315	Sum:	148.528

Close

Text form   Excel form   import from Excel

The material can be changed using the window **"Materials"**:

Brass Ms 60

Brass Ms 72

Iron (pure)

Pig-iron Rq 5

**Steel C15**

Steel C35

Steel 60

Steel 41 Cr4

Steel X10 Cr13

special material

Specific sheet unfolding layout parts can be selected in the window **"Sheet Unfolding / Contour"**:

**[036] BRANCH**

[036] BODY

[036] HOLE


The corresponding values change automatically.

You can load the table into Windows - Write - editor. Use for it the instruction "Text form". Click the instruction, to Windows Write editor will be loaded and you automatically receive output of the computation results for each part of the unfolding:

----- Case 176: multi-pipe branches with offset -----		
-----		
Body length		2000.000
Body diameter		700.000
Welded seam position		90.000
Wall thickness		4.000
Number of branches		5.000
Branch diameter		200.000
Length to branch		1800.000
Branch length		500.000
Vertical angle of branches		90.000
Horizontal angle of branches		-90.000
Average shift of axes		189.490
Wall thickness of branches		4.000
Method		0.000
Branch diameter		200.000
Length to branch		1500.000
Branch length		500.000
Vertical angle of branches		90.000
Horizontal angle of branches		-90.000
Average shift of axes		189.490
Wall thickness of branches		4.000
Method		0.000
Branch diameter		200.000
Length to branch		1200.000

The result table can be exported also to Excel. Use for it the instruction "Excel form". Select the instruction, the input data and computation results will be shown as Excel table:

A3	Case 176: multi-pipe branches with offset					
	A	B	C	D	E	F
1						
2						
3	Case 176:	multi-pipe branches with offset				
4						
5		Eingaben:	[176] BODY	[176] HOLE/1	[176] HOLE/2	[176] HOLE/3
6		Blechsorte	1	1	1	1
7		Eingabe: Abwicklungsfläche / Tafelfläche	0,75	0,75	0,75	0,75
8		Preis/m Schnittlänge	0,11	0,11	0,11	0,11
9		Preis/m Schweißlänge	7	7	7	7
10		Preis/m²	20	20	20	20
11		Preis der Tafel	87,462	0,964	0,964	0,964
12		Tafelgröße in m²	2	2	2	2
13		Aufschlag in %	20	20	20	20
14		Ergebnisse:				
15		Fläche der Abwicklung: m²	4,3732	9,79233E+16	9,79233E+16	9,79233E+16
16		Fläche der Tafel: m²	4,3732	0,0482	0,0482	0,0482
17		Schnittlänge: m	8,3732	0,693	0,693	0,693
18		Schweißlänge: m	8	9,79233E+16	9,79233E+16	9,79233E+16
19		Ergebnis: Abwicklungsfläche / Tafelfläche	2	2,0316E+18	2,0316E+18	2,0316E+18
20		Preis: Schnittlänge	0,921041	0,07623	0,07623	0,07623
21		Preis: Schweißnähte	14	6,85463E+17	6,85463E+17	6,85463E+17
22		Preis Abwicklungsblech	87,462	0,964	0,964	0,964
23		gesamter Preis	122,8596492	8,22556E+17	8,22556E+17	8,22556E+17
Berechnung der Kosten / Blechsorten und Preise /						

The input parameters can be changed in Excel. After several parameters are changed, click the button "import from Excel" in the sheet metal completion result window, close the window and go back to the input (instruction "**Undo**" ). On the screen you get the input mask with the new values of the changed parameters.

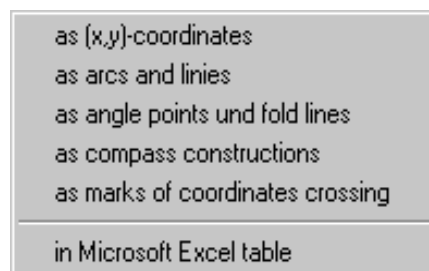
## 14.2 Contour Coordinates

The sheet unfolding layout can be edited as a drawing or as coordinates.

The following sub-menu is displayed if the option "**Contour Coordinates**" is selected in "**Results**":

Four different options are available:

- **Contour coordinates as (x, y) - Coordinates:** Coordinates are given as points in sequence;
- **Contour coordinates as arcs and lines:** Contours are displayed as lines between two points and arcs with beginning and end points and center.
- **Contour coordinates as angle points and fold lines:** Only the corner points of each contour and beginning and end points of fold lines.
- **Contour coordinates as compass construction.**
- **Coordinates in Microsoft Excel table.**



Click the corresponding option to view the sheet unfolding layout in one of these formats. The Windows Write Editor is loaded automatically and the corresponding text file is displayed on the screen: The following coordinate data will be shown:

**Contour Coordinates as (x, y) – File " Blechabwicklung.Points":**

-----			}
-----	Case 003: pipe to pipe	-----	
-----		-----	
-----			
Length to branch		100.000	
Branch length		180.000	
Branch angle		45.000	
Branch length		0.000	
Pipe length		150.000	
Length to branch		0.000	
Pipe diameter		100.000	
Average shift		20.000	
Branch diameter		50.000	
Thickness of wall		1.000	
Thickness of wall		3.000	
-----			
-----	[003] FOLD LINE	-----	
-----			

- **Contour Coordinates as Arcs and Lines. File "Blechabwicklung.Elements“:**

-----					}
Type	From point [x;y]		To point [x;y]	Middle point [x;y]	
-----					
LINE	0.0 ; 0.0		147.7 ; 0.0	---	
LINE	147.7 ; 0.0		147.7 ; 150.7	---	
LINE	147.7 ; 150.7		140.3 ; 157.9	---	
LINE	140.3 ; 157.9		134.5 ; 163.0	---	
LINE	134.5 ; 163.0		128.8 ; 167.6	---	
LINE	128.8 ; 167.6		122.2 ; 172.4	---	
LINE	122.2 ; 172.4		114.0 ; 177.9	---	
LINE	114.0 ; 177.9		105.0 ; 183.5	---	
LINE	105.0 ; 183.5		98.4 ; 187.2	---	
LINE	98.4 ; 187.2		94.3 ; 189.2	---	
LINE	94.3 ; 189.2		91.1 ; 190.5	---	
LINE	91.1 ; 190.5		88.6 ; 191.3	---	
LINE	88.6 ; 191.3		86.1 ; 191.7	---	
LINE	86.1 ; 191.7		83.7 ; 191.9	---	
LINE	83.7 ; 191.9		82.0 ; 191.7	---	
LINE	82.0 ; 191.7		80.4 ; 191.3	---	
-----					

- **Contour Coordinates as Angle Points and Fold Lines. File "Blechabwicklung.Rands“:**

From	Coordinates [x;y]	To	Coordinates [x;y]	Angle
B1	24.6 ; 0.0	E1	24.6 ; 131.2	--
B2	49.2 ; 0.0	E2	49.2 ; 146.5	--
B3	73.8 ; 0.0	E3	73.8 ; 187.1	--
B4	98.4 ; 0.0	E4	98.4 ; 187.2	--
B5	123.0 ; 0.0	E5	123.0 ; 171.9	--

[003] BRANCH	
Angle point	Coordinates [x;y]
P1	0.0 ; 0.0
P2	147.7 ; 0.0
P3	147.7 ; 150.7
P4	0.0 ; 150.7
P5	0.0 ; 0.0

- **Contour Coordinates as Compass Construction.** File Blechabwicklung.Circles“:

[003] BRANCH				
Punkt Nr.	Koordinate [x;y]	Radius		
		left	right	
Base 1	0.0 ; 0.0	--	--	
Base 2	147.7 ; 191.9	--	--	
1	0.0 ; 0.0	0.0	242.1	
2	147.7 ; 0.0	147.7	191.9	
3	147.7 ; 150.7	211.0	41.2	
4	140.3 ; 157.9	211.2	34.8	
5	134.5 ; 163.0	211.3	31.7	
6	128.8 ; 167.6	211.4	30.7	
7	122.2 ; 172.4	211.4	32.0	
8	114.0 ; 177.9	211.3	36.4	
9	105.0 ; 183.5	211.4	43.5	
10	98.4 ; 187.2	211.5	49.4	

All Windows-Write-Editor-Operations are available:

The file can be saved, edited, printed etc.

- **(x, y) coordinates in Excel table.** Select this instruction, Microsoft Excel will be automatically started:

C7		Wall thickness	
	A	B	C
1			
2	Case 176: multi-pipe branches with offset		
3			
4		Body length	2000
5		Body diameter	700
6		Welded seam position	90
7		Wall thickness	4
8		Number of branches	5
9		Branch diameter	200
10		Length to branch	1800
11		Branch length	500
12		Vertical angle of branches	90
13		Horizontal angle of branches	-90
14		Average shift of axes	189,49
15		Wall thickness of branches	4
16		Method	0
17		Branch diameter	200
18		Length to branch	1500
19		Branch length	500
20		Vertical angle of branches	90
21		Horizontal angle of branches	-90
22		Average shift of axes	189,49
23		Wall thickness of branches	4

### 14.3 Export

Select this menu option to save sheet unfolding layouts in DXF-Format (CAD-Format); HPME10-Format (HP-Format) or CNC920-Format.

All sheet unfolding parts can be saved in one or more files if the sheet unfolding layout consists of several parts.

### 14.4 Protocol

If the option "**Protocol**" has been selected, the Windows-Write-Editor is automatically loaded and the text file "winblech.ptl" is displayed on the screen:

```

Sheet CAD: Protocol file

Day: 15. July 2005
Time: 15: 8.25

Case 166: cylindrical branch with reinforcement

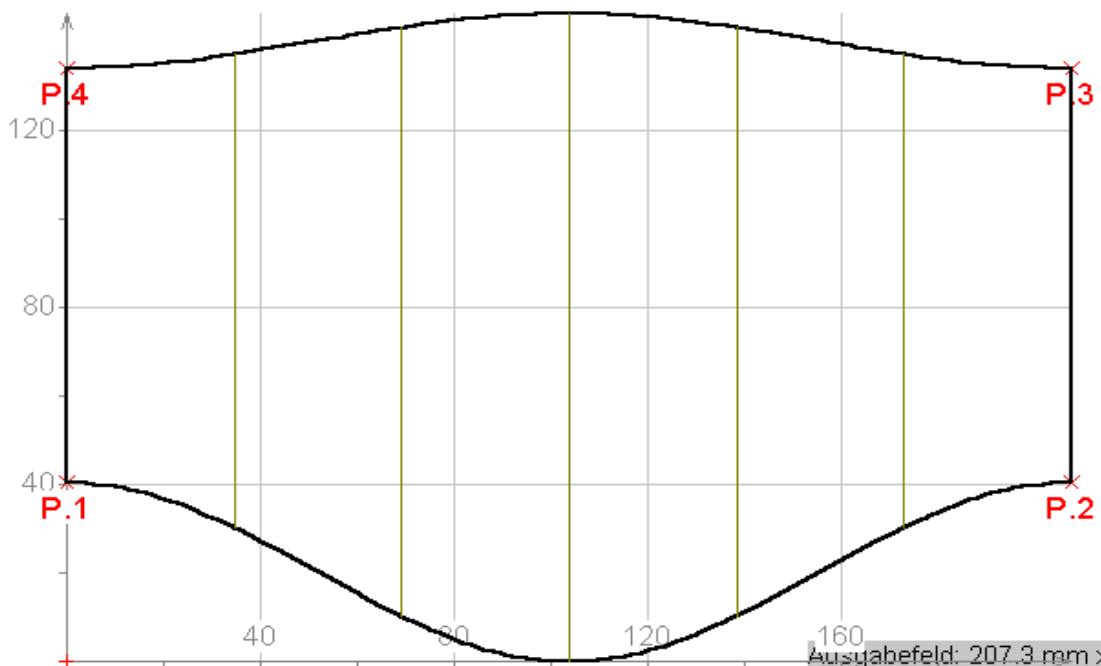
Input parameter:
Pipe diameter                102.000 mm
Branch angle                  45.000 grad
Branch length                 120.000 mm
Pipe length                   150.000 mm
Length to branch              30.000 mm
width of power sheet          20.000 mm
Wall thickness of branch      3.000 mm
Average shift                  20.000 mm
Wall thickness of pipe         1.000 mm
Branch diameter                46.000 mm

```

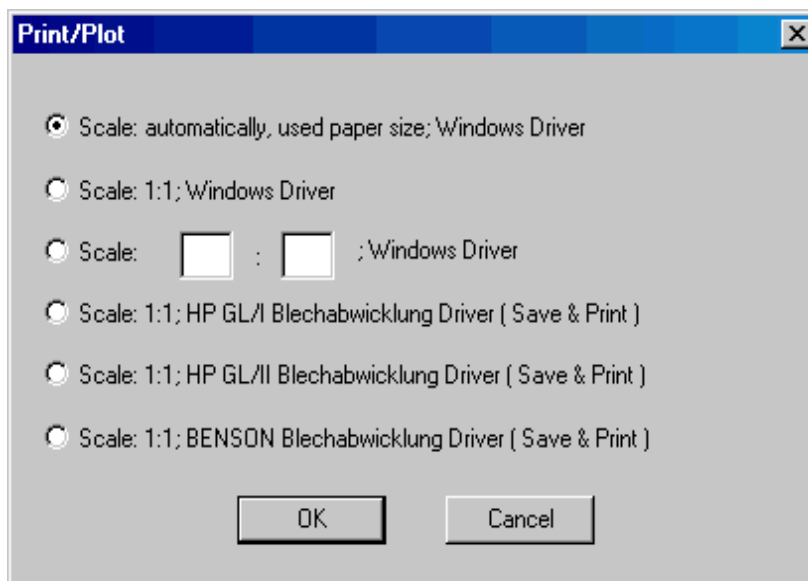
### 14.5 Print contour(s) with angle points

With this command you can print the sheet unfolding layout with Coordinate axes and Angle points of each contour.

Click this command, you get on the screen the sheet unfolding layout with coordinate axes, P-partition of the drawing and angle points:



And on the screen appears the “Print/Plot” window:



You can print the sheet unfolding layout as usually (See Capture 9 – “Print out the sheet unfolding layout”).



## 15 Undo

Click on the button



if you liked to go to back the input mask for this case.

## 16. Close

### 16.1 Closing a sheet unfolding layout

Select the option "**Close**" in the menu option "**File**" or click on the icon:



### 16.2 Exiting the Program

Select the option "**Exit**" in the menu option "**File**".