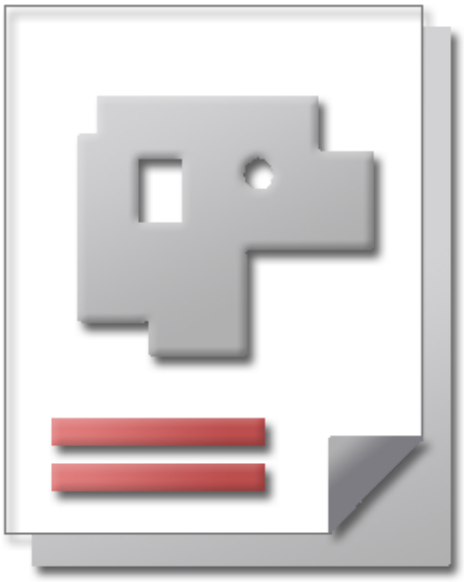
# *cncCUT*



# Online help SHEET METAL CENTER Plus

Technologies AV32

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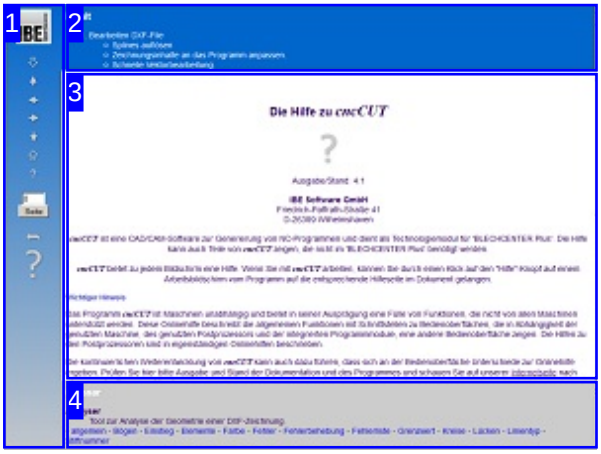
# Welcome to cncCUT's help files

## General Tips for Navigation of the Program




Choosing the Control Method:

There are two ways to navigate the help pages for *cncCUT* .

1. Interactive Navigation
   This allows you to decide for yourself which texts you need to read. Place the mouse cursor over the rectangles drawn onto the screenshots to get a more detailed description.

2. Continuous Navigation
   This mode leads through the document sequentially. All details will be shown one after the other, simply press the 'Next' button (right arrow in the Navigation Panel [1]) to move through the document one step at a time.

The screen is split into four frames: The menu to the left [1] with the navigation arrows for navigating the whole help document, and a box for entering a page number.

The top shows the Contents List [2] divided into chapters. The Glossary [4] of the most important technical terms is shown at the bottom. You can switch between the glossary and an gndex in this frame. Whichever you choose, clicking the catchwords will link you directly to the most relevant part of the corresponding help page.

The middle frame shows you the current help page [3].

Choose your favorite method controling the document

**interactive**

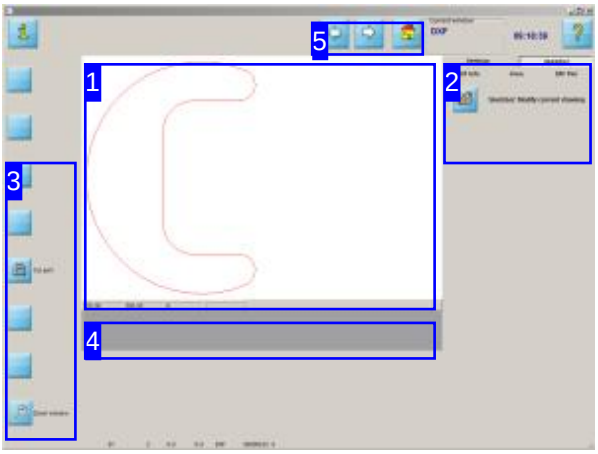
or

**contiguous**

Important Note
The *cncCUT* program is not machine dependant. It offers an abundance of features, some of which will not be supported by your machine. This online help document describes the general functions based upon GUIs which, dependant on your machine, the modules you have installed and your post-processor(s) may appear differently on your copy. The post-processors have their own independent help files.
The continuous development of *cncCUT* can also lead to differences between the program's actual GUI and the GUI shown in the online help documents. If this occurs, please check the version and date of the help file against that of the program. If necessary, check our homepage for a newer version, or contact us.

# Editing a DXF File

## Editing a Drawing.

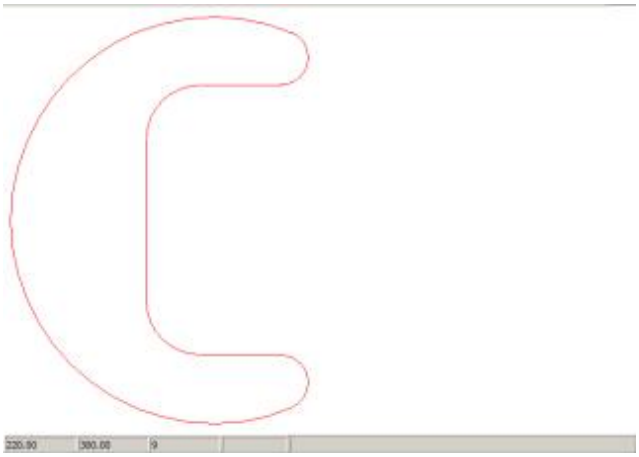



This screen allows you to edit a part in the Sketcher or create a new part from a macro, and switch to the next steps to add technology data to a part.

The 'Edit a DXF File' screen allows you to use the Sketcher to edit a part.

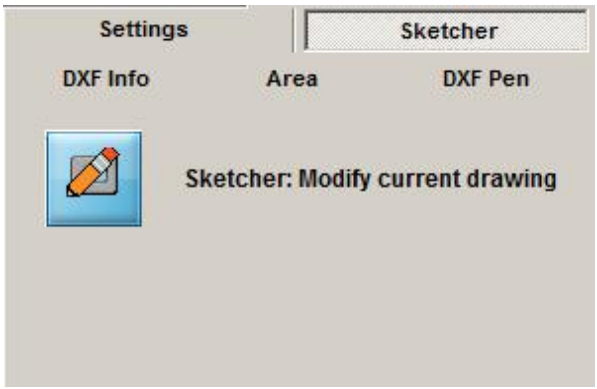
- The middle window [1] previews the selected component.
- If you would like a closer view of the part then press the 'Zoom' button in the navigation panel [4]. Take this chance to spot and repair flaws in the drawing file with the DXF checker.
- The grey field [5] is usually empty. If your component is flawed though, there will be two buttons offered with options for proceeding. Open contours are generally recognised and flagged as errors. If you wish to cut an open contour, then you can use the checker to allocate a specific line type to this contour and use the 'cut open contours' menu to cut these specific types of contour.
- The buttons in the navigation panel [3] take you to the sheet database or the macro selection screen. The lower button goes to the next work phase: the machine settings window.

1



This frame shows a preview of your component. If you left-click on the preview this will open the 'Zoom window' , allowing you to check the part over in detail.

2




For more detailed information aber the part, click on the 'DXF Info' tab.

The 'Settings' tab allows you to influence how your components are displayed.

If you wish to make modifications to the part shown, or create a new part, the 'Sketcher' module offers the functionality you require. To select it, open the 'Sketcher' tab. The 'Sketcher' module has its own Online help files in which all functions are described in detail.

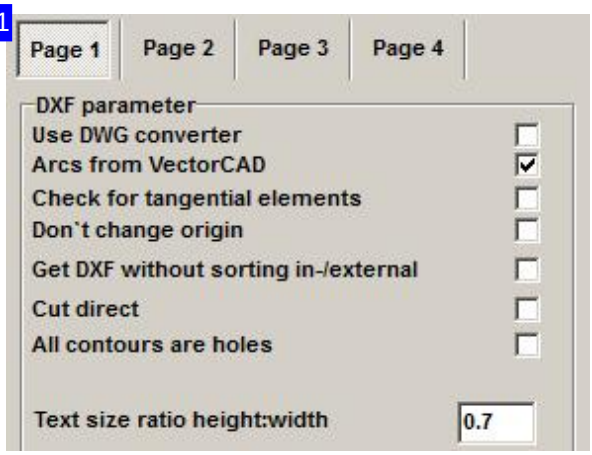
Switch to the 'Checker' for quick editing of the individual vectors.

20

The first tab allows you to influence the display of your components.

The second tab allows you to set the limits for joining points and vectors; the third tab allows you to scale DXF-drawings. To make single point visible use Tab 4.

21




This frame allows you to influence the display of your components.

- Using the DWG converter.
  You can convert drawings saved as DWG files automatically. Mark the check box to use the DWG converter, and all files will be imported through it (including DXF files!) You must have the DWG converter installed on your system for this.

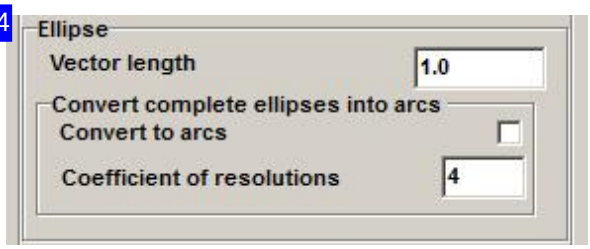
- Get DXF without sorting internal/external contours.
  If a DXF-File's elements are sorted by internal- and external contours, you can suppress sorting. Mark the corresponding checkbox.

- Apply sorting - cut directly.
  If this box is checked, the program will not sort for you. The parts will be cut directly, usually in the order they were drawn.

- Text line factor height/width.
  If text strings in markings are too long, you can compress them by entering a scaling factor in this text box. Enter a value less than 1 to compress, more than one to zoom.

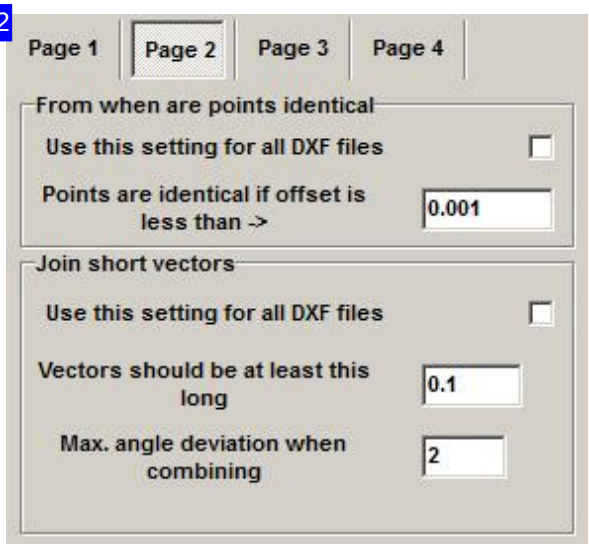
Use the next frame for editing ellipses.

24




Use this frame for editing ellipses and separating ellipses into vectors
The splitting value can be adjusted manually in the 'Vector length' cell. The smaller this value, the finer the ellipse's resolution remains. Smaller values increase processing time for ellipses in your drawing correspondingly. For this reason you should not set too small a value if your ellipse is physically large. Small ellipses will require a small resolution, else they will not appear round when cut.

22

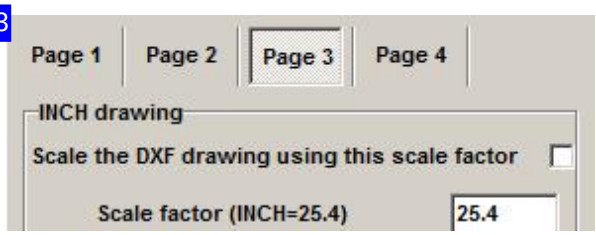



This frame allows you to set the limits for joining points and vectors.

- Point limits.
  Enter the limit up to which points are to be considered identical. Mark the check box if this limit should be applied to all DXF drawings.

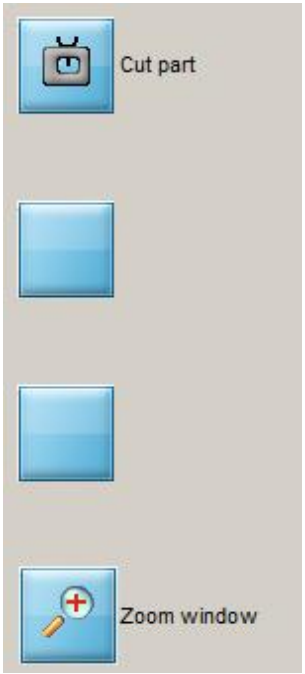
- Limits for vectors.
  Enter the limits of angles and lengths from which vectors should be joined. Mark the check-box if the limits should be applied to all DXF files.

23




You can set the scaling for DXF files individually.
Enter the value in the cell, and mark the check-box to confirm.
The setting applies for all further DXF drawings, and so should be reset after use.
Splines see next chapter.

3




These buttons are for navigating the program.

- The topmost button continues to the next step, 'Cutting technology'.

- Click the 'Zoom' button for a closer view of your part. This opens the 'Zoom window' with its various options to zoom and pan around your drawing, and Check your DXF files against errors.
  Hold the <ctrl> key to save your part.

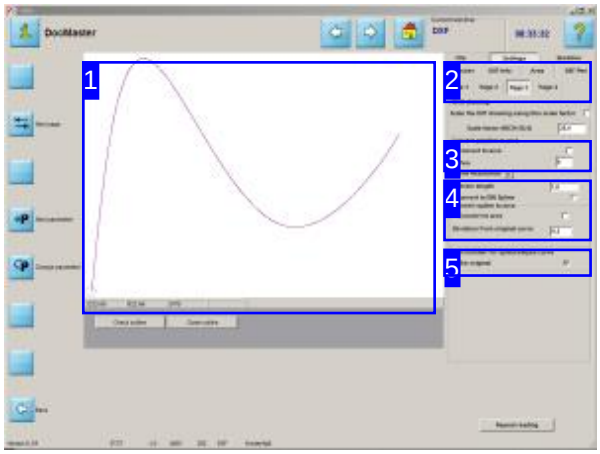
4

If your component is flawed then these two buttons will be offered to correct it. If you want to target open contours specifically then allocate the contour specific line types using the Checker . These can then be worked directly in the 'Cut pen contours' screen.
Click 'Close contour' to make the program attempt to repair all flaws in the contour automatically. This is however not always possible. If it is not, then you can use the 'Check contour' button to switch to the DXF checker and fix the part.

5

These buttons navigate continued editing. Use the left buttom to go back a step, and the middle button to go on a step within the technology module, or if at the last step, back to the main program.
The rightmost button returns to the homepage.

# Dissolving Splines




You can dissolve splines by entering new vector lengths and transforming into arcs. You can display the original curve with the new curve to check your settings are giving the right result. In this checking display, the new curve is shown in blue and the original curve in red. Control points can be displayed selectively; mark the corresponding checbox.

There must be a spline present which needs converting!

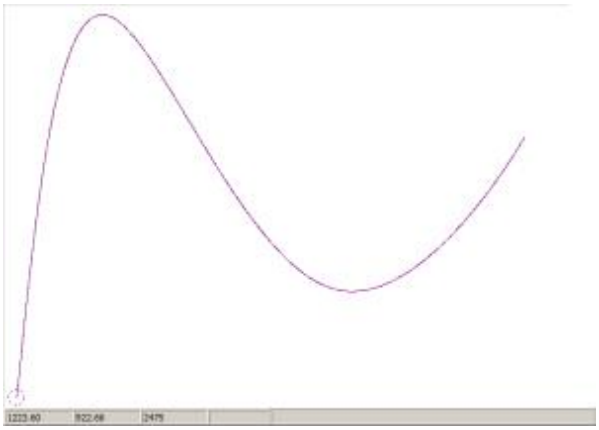
This screen allows you to replace an existing spline with an approximated spline.

Spline curves are often made up of large collections of tiny vectors, giving them the exact required form. The total number of elements can be drastically reduced using limiting values to create a simplified spline,thus enabling *cncCUT* to process your drawing quicker and easier.

2

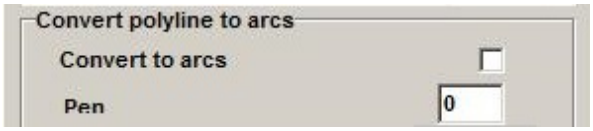
Once you have selected your drawing in the 'DXF selection' screen, switch to the 'Settings' tab and select the 'Page 3' sub-tab.

1



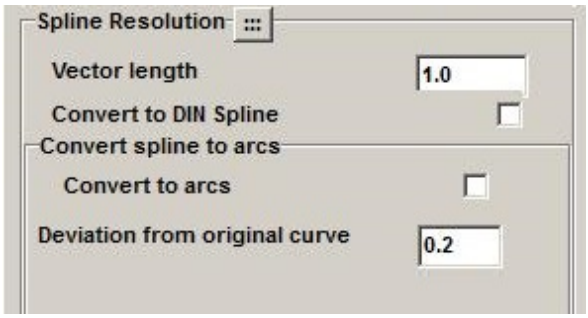
The preview shows you the new spline (blue) and when the corresponding checbox is marked, also the original spline (red). You can use the cursor to stretch a box to zoom in on and check in more detail.

3




If the drawing has polylines, you can reduce the number of elements by converting them to arcs here. Mark the checkbox and refresh the display.

4




Splines can be dissolved into vectors and arcs. To dissolve into vectors, enter the maximum length. The default value is 1.

The dissolution of splines into arcs requires entry of the maximum deviation of the new curve from the original curve. The default value is 0.2. Mark the corresponding checkbox to convert the spline to arcs.

The textboxes below show the number of elements after dissolution.

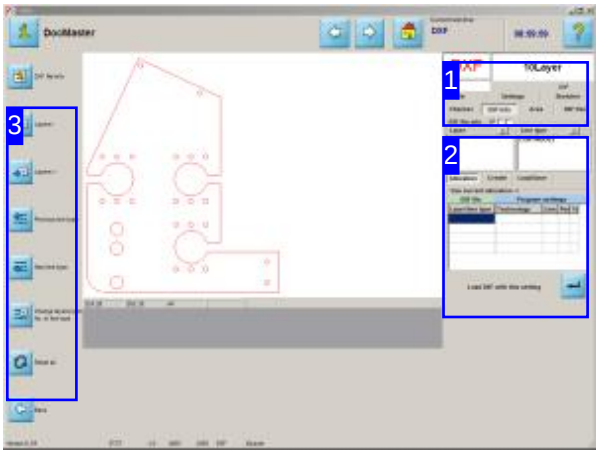
- V: Vectors
- A: Arcs
- C: Circles
- T: Texts

Click the top button to refresh the display.

5


This frame allows you to make settings for the preview display. Mark the corresponding checkbox to show the original curve or your control points. The size of the control points can be adjusted; enter the required radius.

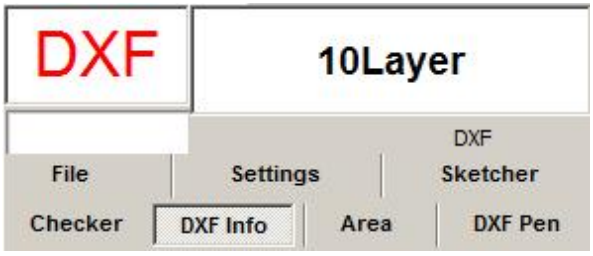
# Adjust drawing content to fit the program.




You can select individual components of your workpiece and allocate them technology types here. To activate this feature click on the 'DXF Info' selection box to allocation technology types to certain DXF layers or line types. To manage the drawing's colors click 'DXF Pens'.

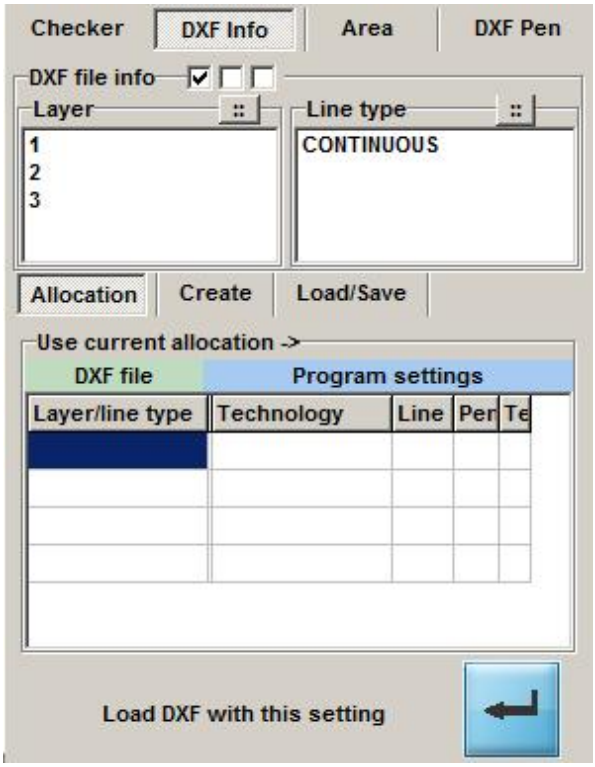
DXF drawings from various sources can contain multiple layers which *cncCUT* as a cutting program cannot separate. Despit this, this screen allows you to use the layers to set pen colors and line types which can be allocated different processing types. The available processes are set in the post-processor's technology table when 'TechCutTypes' is set.
The standard processes 'cut' and 'mark' are allowed by default.

1




The 'DXF Info' tab allows you to allocate technology types to the layers and line types of your drawing. The 'DXF Stifte', tab allows the same for DXF pens.

2

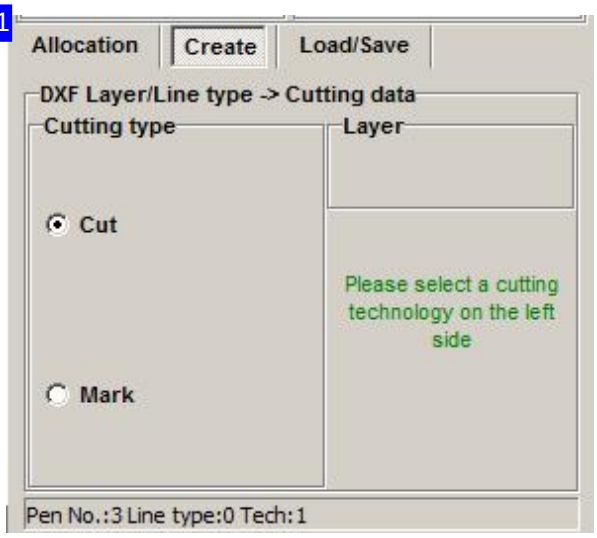



The 'DXF Info' tab allows you to allocate technology types to the layers and line types of your drawing. The 'Layer' frame lists all layers present in the drawing, the 'Line Type' frame lists all line types. The 'Allocation' tab lists all existing allocations in tabular form. The 'DXF File' column to the left shows the drawing's elements, and the columns under 'Program Settings' show how the elements will be processed according to the post-processor info or the default values.

Select one or more layers or line types to work with from the lists at the top. You will then see the 'Create' tab to make your alloations.

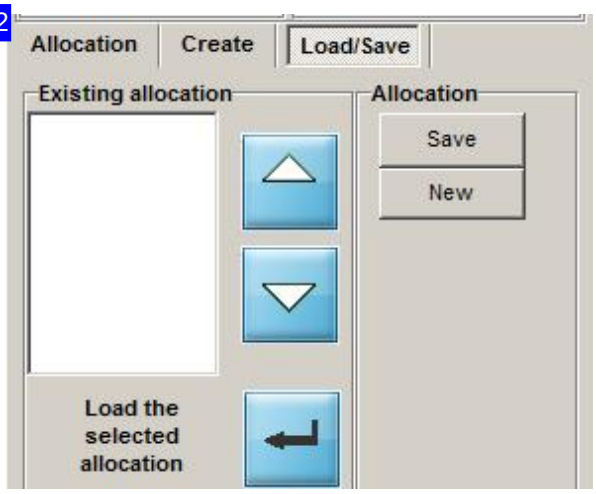
Allocations can be 'Load/Saved' ed for future use.

21



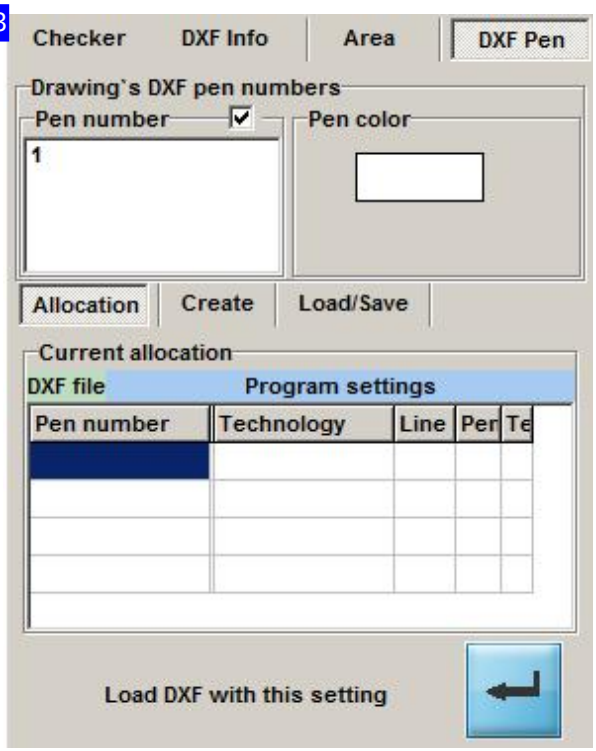

The 'Create' tab allows you to allocate a cuting type to the positions marked in the selection lists [2]. The cutting types available for selection are post-processor dependent and displayed only where relevant. The default settings are 'Cut' and 'Mark'. Select the cutting type using the radio button and click 'Apply'.

22



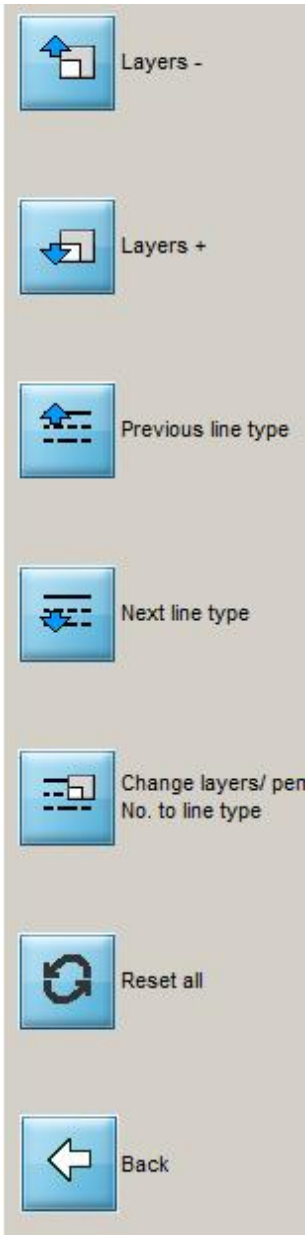

Technology allocations can be 'Load/Saved' ed to a file for future use. This allows you to use the settings you make for this drawing on another drawing.

23



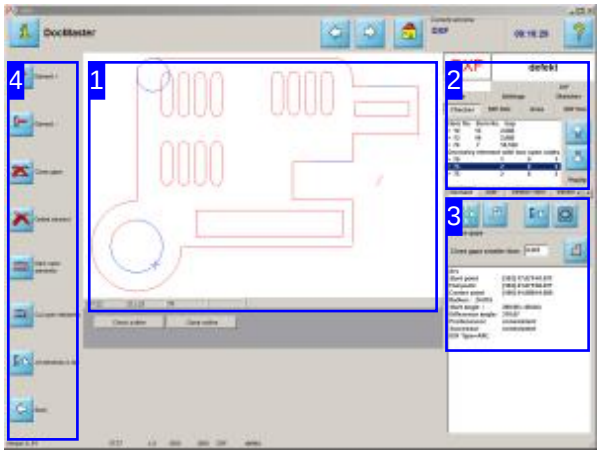

To allocate a pen and associated technology data to a drawing color, begin as with line types and layers. The 'DXF Pen' tab contains the relevant selections, with the 'Pen Number' frame showing all pen numbers currently in use.

3




There are context-sensitive buttons in the navigation panel for navigating the selection lists. In the 'DXF Info' tab these are split with the top two for navigating layers and the bottom two for navigating line types.

# Quick Vector Processing.



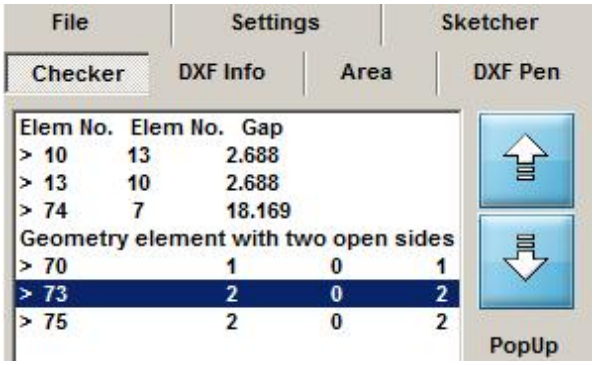

The 'Analysis' screen allows you to quickly check over your workpiece's elements, and individually fix faulty vectors. The functions are the same as the 'Analyser' but with reduced complexity to give optimum usability without a mouse.
For a wider-reaching functionality, switch to the Zoom window , from which you can access the full Analyser.

The first time you call this, conspicuous and potentially erroneous items will be shown in the list [2]. The most important steps in this field are:

- Closing gaps in a contour.
- Changing multpile smaller vectors into single joined vectors.
- Changing open contours into markings.
- Changing open contours into cutting lines.

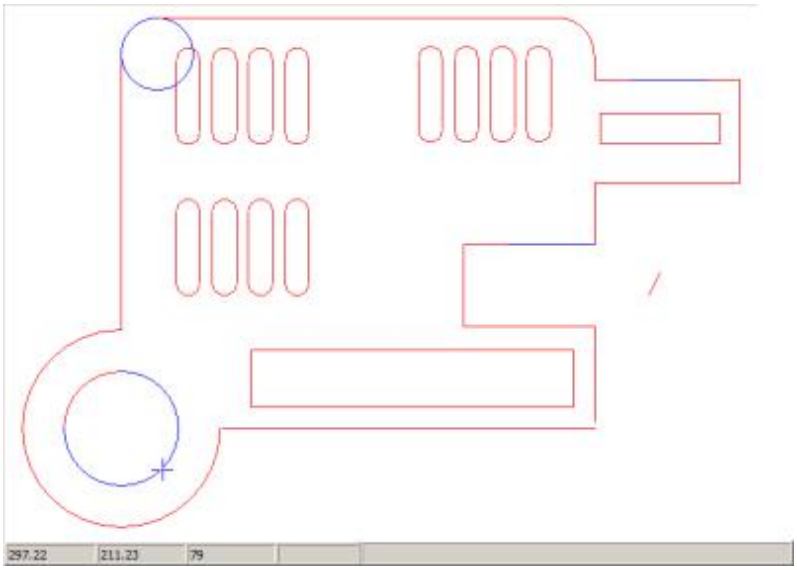
When changing lines, line type and colour will be adapted to suit, you can also change them explicitly.

2



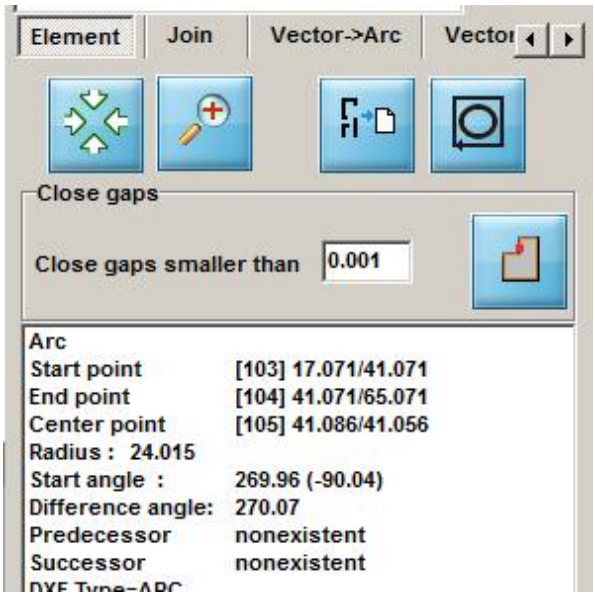

This list shows the contour's elements. You will be given tips about the elements' statuses to help you find and fix any faulty vectors.
The buttons to the right allow easy navigation of the list. These buttons are identical to the top two in the navigation panel [4].

1



The preview shows you the part in its entirety or, by highlighting in the list, individual detail views of each element. Use the buttons to the left of frame [3] to switch between these views.

3



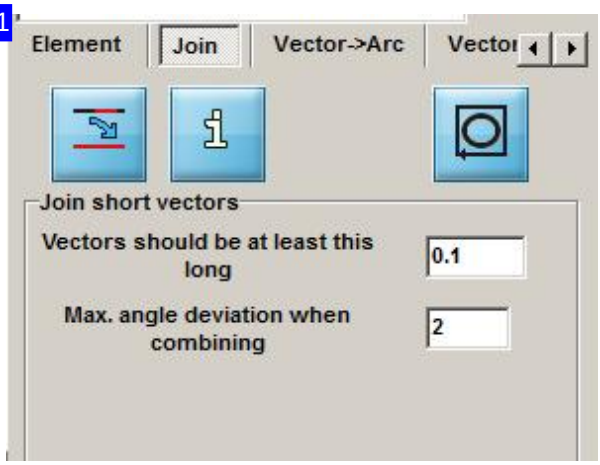

This frame gives detailed information about the element marked in the top list [2]. Use the two left buttons in the top row to switch between a Preview of the whole drawing or a detailed view of the highlighted element.

Click the third button to transfer all elements to the top list. Use the right button to check if your contour is closed-ended. A dialog box appears to report the result of your check.

You can enter a limiting value for gaps which should be automatically closed in the 'Close gaps' frame. Click the right button to automatically close all gaps up to the value you entered.

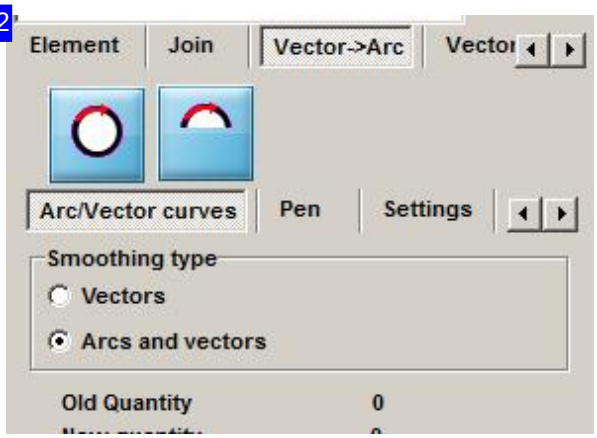
The 'Join' tab allows you to combine multiple small elements into one single larger one.

31



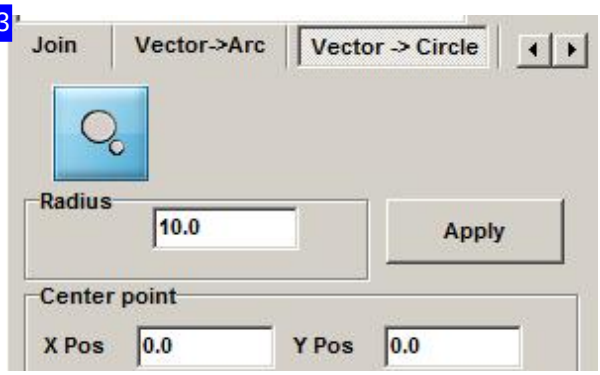

Contours which are made up of multiple small vectors can be joined into one larger vector in this tab. Enter the maximum permissible length and angle deviation here. Mark an element in the list or drawing and click the left button. This function allows ironing out of any irregularities in your contour.

32



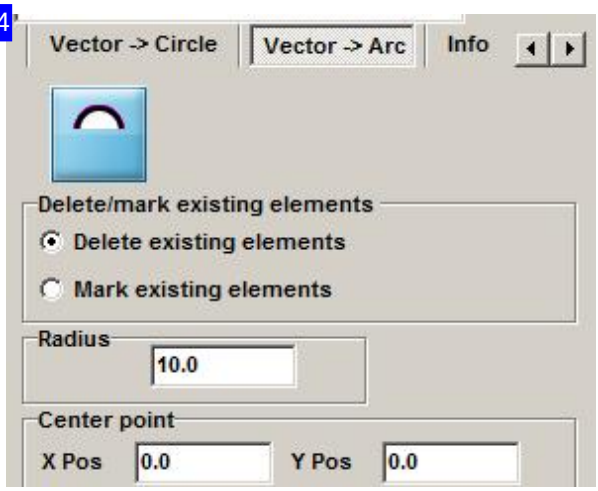

From this tab you can join selected or all contours together to form an arc. Enter the criteria for joining in the settings tabs and click to convert.

33



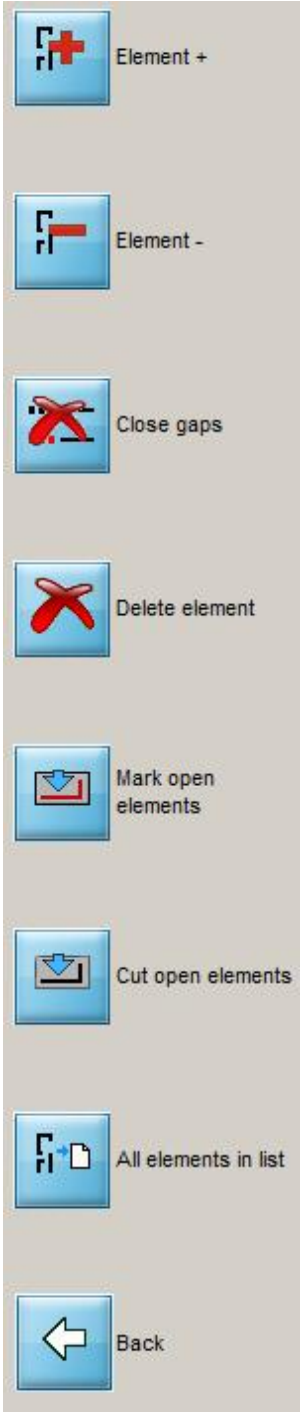

This tab allows you to convert a single element into a circle.

34




You can convert existing elements into arcs here, and either delete the existing element, or mark it.

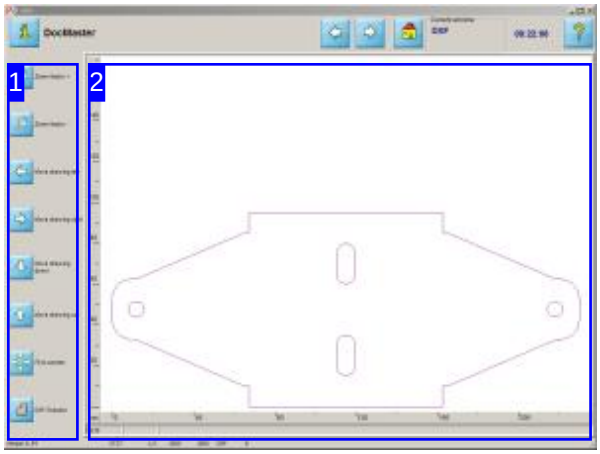
4




The most important functions in this screen can be accessed with one click using the navigation panel:

- Use the top buttons to navigate the Element list .
- Click the third button to close gaps in a contour according to your settings made in frame [4].
- To delete a specific element, mark it in the preview [1] or element list [2] and click the fourth button.
- The 'Mark open element' and 'Cut open element' buttons allow you to allocate an open contour the correct line type. This way you can easily allocate the right line types for eg. welding markings, or bend lines.
- Click the penultimate button to show all contour elements in the list.
- The last button exits the 'Analyser' and goes back to the screen for selecting a drawing.

# Check the component.




Zoom in on your component to the required magnification level in order to check it accurately.

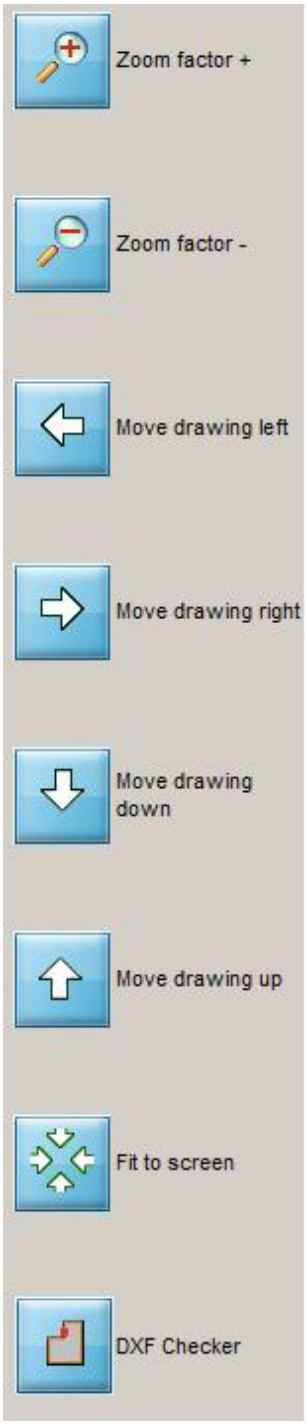
All zoom windows have a function for measuring contours and gaps.

Access this window by clicking the bottom button in the navigation panel of the drawing selection screen or by clicking on the preview window.

The 'Zoom DXF' screen allows you to zoom in and out as you wish in order to inspect your component.

- The left frame [1] offers various options for changing the display.
- A preview of the component is shown to the right [2].
- The lower button in the navigation panel [1] allows you to call the DXF Checker to examine the drawing for flaws. The DXF-Checker is opened as a dialog box, but can also be contained in an integrated frame, allowing you to assign the mouse particular functions in the checker's zoom window.

1

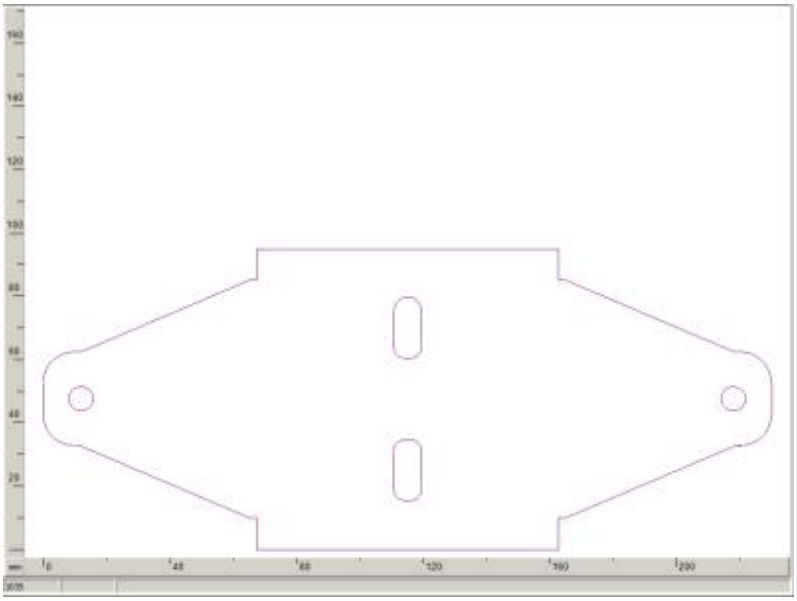



Use these buttons to examine your component. To zoom in or out you must first click the corresponding zoom button (+ or -) to select the zoom tool to use, then click in the drawing to apply that tool and zoom in or out.

The penultimate button fits the component to the screen.

Click the last button to open the DXF Checker. This allows checking the vectors directly from the zoom window. The Checker has priority in the programming sequence, and must be closed before you can continue. There is more detailed help available for this is the 'Checker's own help page' .

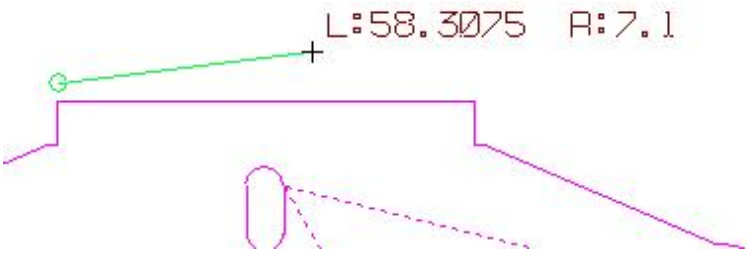
2



This frame shows a larger display of the component. This allows a more easy going. Move the Cursor in the drawing and zoom the component with the mouse wheel to the desired size.
They can also zoom with a mouse click; nevertheless, condition is that this function has been released by your administrator.

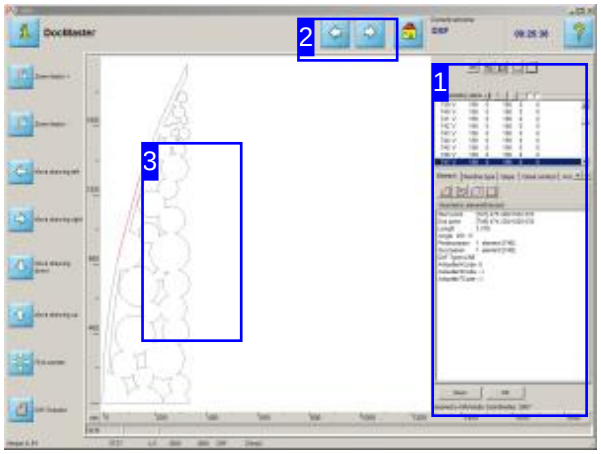
To measure a contour of gap, press <CTRL> and drag the cursor between the points to be measured.

21




Move the cursor to the start point of the line to be measured, and <CTRL>-click. Drag the cursor to the end point of the line, then release to see how long the line is, and at what angle it lies.

# Repairing flaws in a drawing



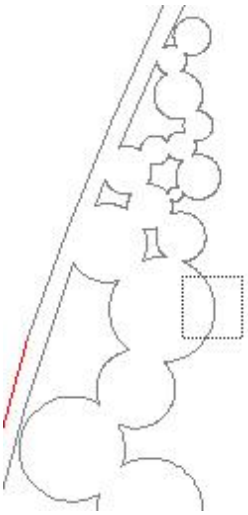

The screenshot shows the DXF selection screen's zoom window with a frame open for finding and repairing errors in your DXF drawing file.

The Checker in *cncCUT* offers the opportunity to examine a drawing for flaws, and correct any that are found.

The workshop may exhibit gaps, duplicate elements or superflous elements. These errors should all be corrected; the Checker [1] can help you to do this. The Checker can close gaps, eliminate flawed elements anf join separated vectors.

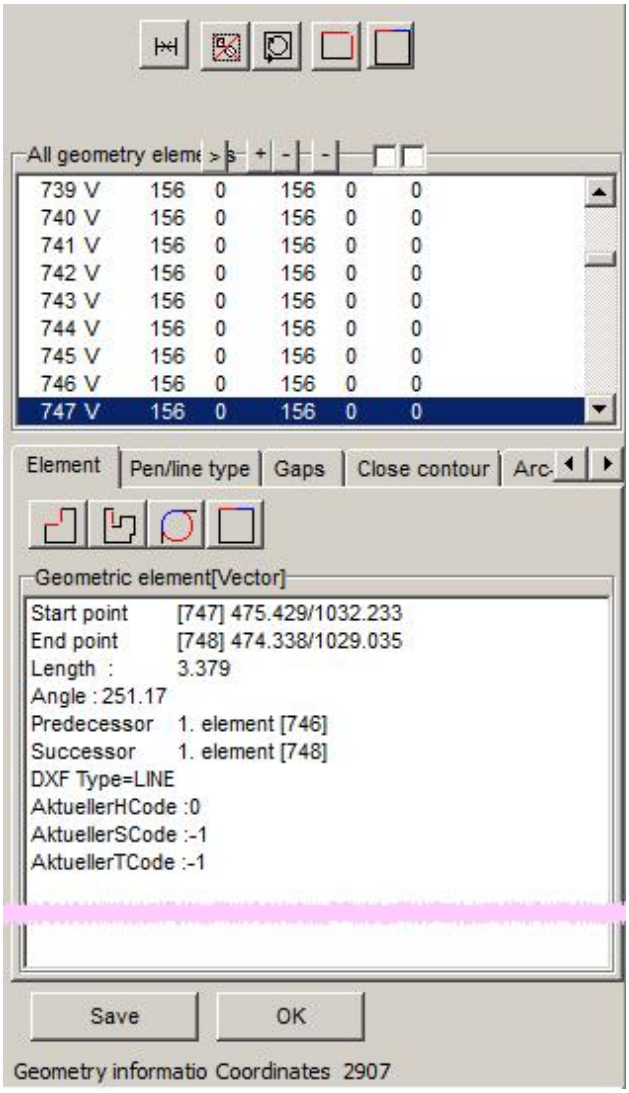
The vectors in the zoom window can be checked directly in the zoom window. Click to select a contour and the corresponding element will be highlighted in the Checker's element list.

3



Click a point to mark an element, and the correspoing element will be highlighted in the checker. See the Checker's own help page for more details.

1




The dialog showing the results of the analysis, and the available tools for fixing errors.

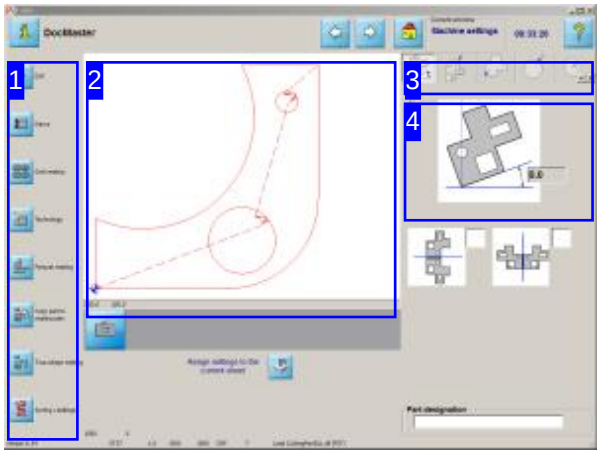
- The top list lists all elements in the drawing. Flawed elements are marked with a '>'.
- An additional button panel directly over the top frame allows you to change the display in the parent (Zoom) window.
- You can repair flaws quickly using the buttons in the header panel.
- You can display errors sorted by category. The buttons in the middle panel allow this.
- The bottom panel shows either the details of an element selected from the top list or a list of all elements with the same type of flaw.
- Close the dialog box and return to the zoom window.

2

These buttons allow you to leave the zoom window and return to the next step.

# Cutting settings

## Set Lead-ins, Mirroring and Turning.




There are various options for editing your component in the settings screen. You can rotate, mirror and angle it. Every internal contour can be lead into using a straight line (vector) or an arc. You can set the angle and length of the vector or arc respectively,amongst other properties.

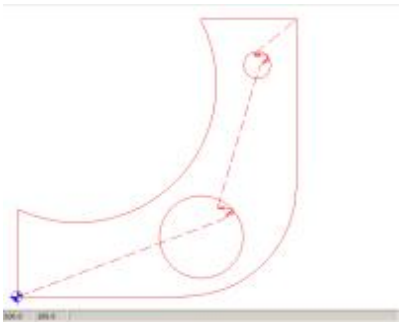
The Cutting settings screen allows you to set how your component should be worked.

- Bring your component to the correct orientation, set the basis for lead-ins.
- Set the Lead-ins for external and internal contours which are not circular.
- Set the Lead-ins for circular external and internal contours.

Oval parts also count as circular here!

Depending on your post-processor there may be further settings to be made. Find out more in the help page for your post-processor .

2



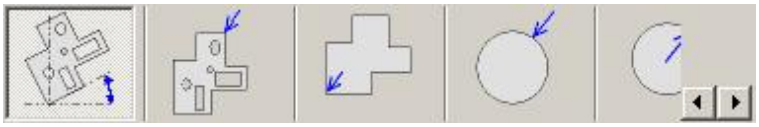
This frame shows you the component with the lead-out point for the cutting tool, the cutting path and the lead-ins for each individual contour.

1

You can choose your next steps via the navigation panel:

- DXF: switch to DXF processing .
- Technology: switch to the Technology window .
- Sorting / Settings: switch to the Zoom window to sort contours and place lead-ins.

3

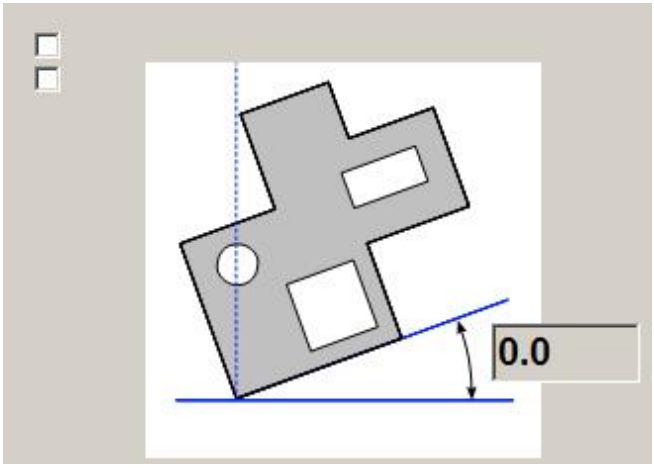


Use the tabs to access the individual processes and define the lead-ins for your component.

- The 'Part parameter' tab allows you to set the orientation of the part, and the lead-out point.
- 'External Contours' allows you to set lead-ins for non-circular external contours.
- 'Internal Contours' allows you to set lead-ins for non-circular internal contours.
- Set the lead-ins for any external circles in the 'External Circles' tab.
- Set the lead-ins for any internal circles in the 'Internal Circles' tab.
- The 'Cut open contours' tab allows you to cut open contours with tool cutting-path corrections from the left or right.
- If you wish to set the cutting sequence for a part's internal contours, you can do so in the 'Sort internal contours' tab.

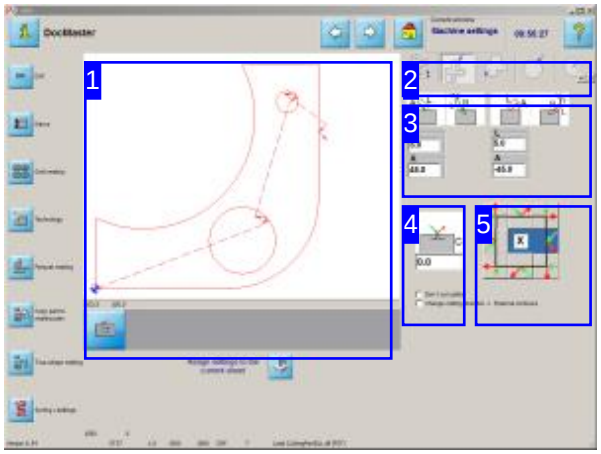
Depending on the post-processor in use there may be further tabs available here for making further settings. To access these tabs, use the arrow button to slide further along the tab bar. There is more help for these post-processor dependant features in the post-processor's own help file .

4




To turn your component, enter the angle to turn by in the input field to the right.
The angle is relative to the X-axis. Please note that a negative value turns the part clockwise, while a positive number turns it counter-clockwise.

# Set the Lead-ins for External Contours.



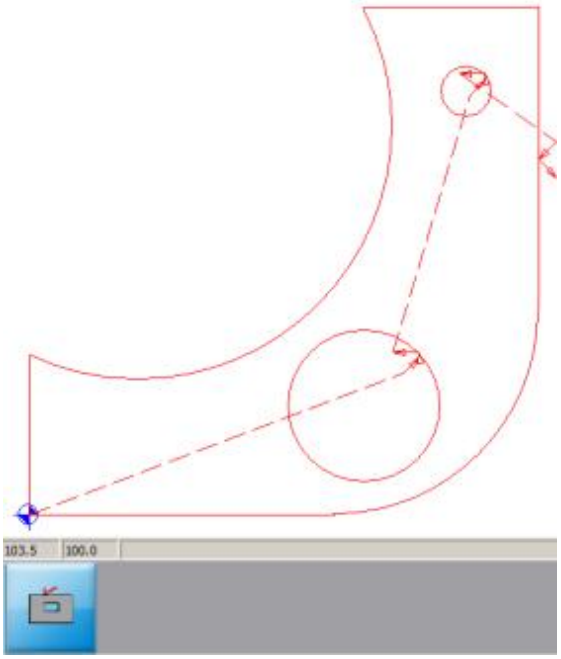

This window allows you to set up lead-ins and -outs for non-round external contours.

Set your lead-ins from this screen.
You can set the properties for lead-in as well as lead-out elements. Lead-ins are always shown in green, lead-outs always in red.
Lead-ins and -outs can have straight or arced paths.

- Set the the positions of lead-ins and lead-outs [5].
- Set the lead-ins' and lead-outs' forms [3].
- Set the cuts' sizes.
- Set where cutting bridges should be added [4].

The help for the left navigation panel is in the 'Cutting settings' page.

1

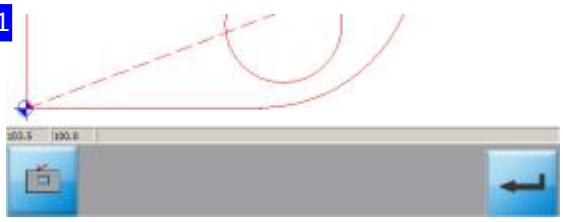



This frame (the preview) shows you the component with its final lead-out point, cutting path and all lead-ins for each contour that makes up the component.

The Zoom button below zooms in on the lead-in you are currently editing and displays it in close-up in the preview window.

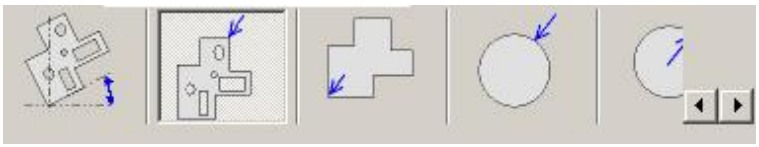
If you make any changes to the lead-ins then an additional 'Enter' button will appear.

11



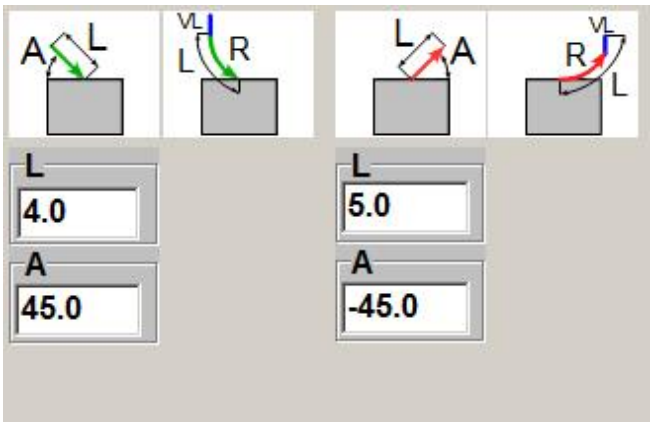
Changes made to the lead-ins will only become effective once you have clicked the 'Enter' button to the right. If you do not press this confirm button then the previous values will be restored when you leave this window.

2



The second tab 'External contours' allows you to set the lead-ins and -outs for non-circular external contours.

3

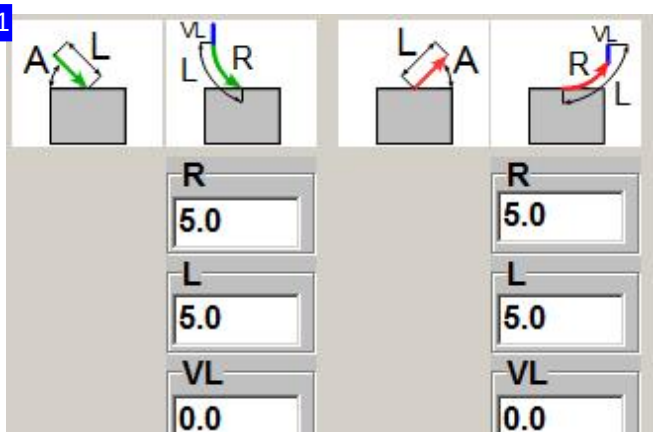



This frame allows you to set the form and size of lead-ins and -outs. You can set both the length and angle of straight lead-ins.
When entering the angle you should note that both negative and positive values are valid. A negative angle turns the lead-in clockwise, a positive number turns it counter-clockwise.
The parameters for a corner lead-in are different.
Lead-ins are always shown in green, lead-outs always in red.

The number of settings that can be made is different for arced lead-ins.

You can activate or deactivate a lead-in by clicking on an icon. On lead-ins you will be using, a list will appear into which you can enter the lead-in's settings.

31

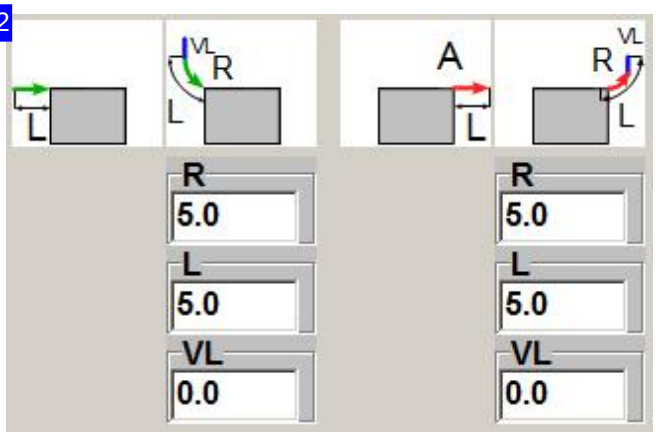



This frame allows you to set the size and angle of lead-ins. You can set the lead-in length, radius and the length of an additional vector when programming arced lead-ins. If leading-in at a corner the paramters will be different. Lead-ins are always shown in green, lead-outs always in red.

The number of parameters to be set is different for straight lead-ins.

You can activate or deactivate a lead-in by clicking on an icon. On lead-ins you will be using, a list will appear into which you can enter the lead-in's settings.

32

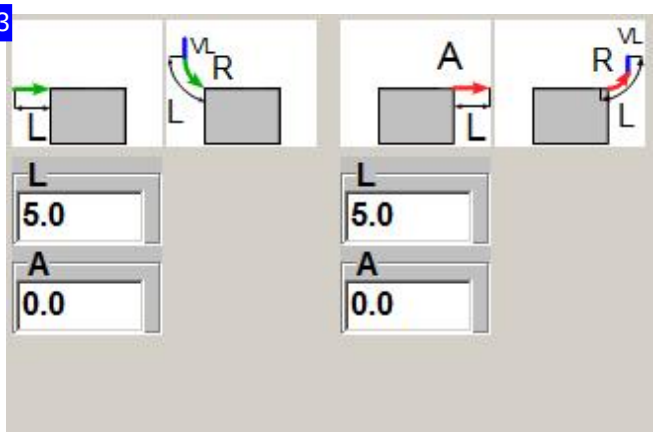



Lead-ins' lengths and forms are defined in this window. If using an arced lead-in you can set the length, radius and length of an additional vector before the arc. If leading-in at a corner the paramters will be different.

If using a straight lead-in the nuber of parameters to be defined is different.

You can activate or deactivate a lead-in by clicking on an icon. On lead-ins you will be using, a list will appear into which you can enter the lead-in's settings.

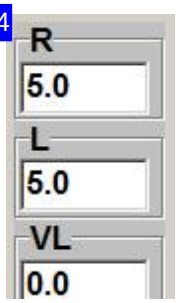
33




If making a straight lead-in at a corner you will be able to set the length and angle for the lead-in.

If leading-in at an edge the parameters will be different.

34



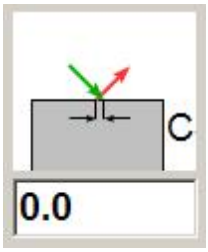

The parameters and their meanings:

- A - Angle in degrees. A positive angle turns the lead-in or -out counter-clockwise. A negative angle turns the cut clockwise.
- R - Radius of an arced lead-in or -out in mm. If you enter a negative value the lead-in will be mirrored.
- L - Length of the cut for straight or arced cuts, given in mm.
- VL - The length of a straight vector to cut before an arced lead-in in mm. If you enter a negative value the value will be treated as an angle entry (absolute).

The text fields for vector length need not just be real decimal numbers (ie, 1.0 or 5.6); mathematical formulae are also permissible, such as (4*5 or 2/3).
It is often useful to set your lead-ins to be dependant on sheet thickness or, for circles, dependant on radius. You can do this in *cncCUT* using variables. These are identified with fixed tags. For a circle you could, for example, enter this formula into the input field: '$GEOM.RADIUS/2'.
The most important variables are: $SHEET.THICKNESS for the material thickness and $GEOM.RADIUS for the radius of the element being lead-into.

There are also functions available for the costing calculation, which adapt to generally valid expressions in most programming languages. The most important are SIN, COS and TAN for the angle function, together with their opposite function ACOS, ASIN and ATAN which can calculate the required angle automatically. The function SQRT calculates the square root for you.

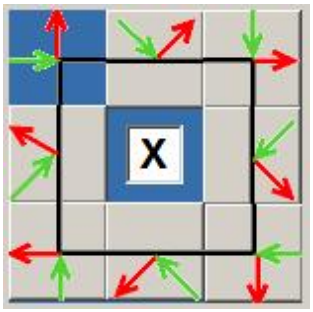
4




In some cases it can make sense not to cut the component out completely, but to leave it hanging using so-called micro-bridges, or cutting-bridges. This practice is useful for larger contours which should not be allowed to fall once they have been cut but should rather be punched out.

If you do not make an entry into this field, or enter 0, then no cutting bridges will be used. Negative valus create an overlap. The chages made in this field will be shown in the preview immediately.

5

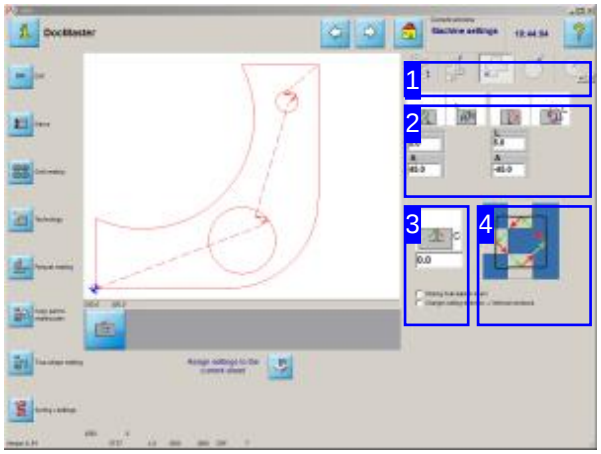



You may lead-in to your component at a corner or an edge. Mark one of the eight checkboxes to select the position to lead-in at. This will then be shown in the preview window [1].

The middle checkbox represents something of a speciality. If you select this checkbox *cncCUT* will look for the optimal place to lead-in at on the selected side. If you do not highlight this checkbox, *cncCUT* will simply cut at the middle of the edge. The checkbox has no affect on corner lead-ins.

The parameters for the lead-in will change depending on whether you select a corner or edge lead-in.

# Set the Lead-ins for Internal Contours.




This window allows you to set up lead-ins and -outs for non-round internal contours.

As with external contours you can make settings for internal contours' lead-ins and lead-outs.
Lead-ins are always shown in green, lead-outs always in red.
Lead-ins and -outs can have straight or arced paths.

- Set the the positions of lead-ins and lead-outs [4].
- Set the lead-ins' and lead-outs' forms [2].
- Set the cuts' sizes [2]. A definition for sizes is given in the help page for external contours.
- Set where cutting bridges should be added [3].

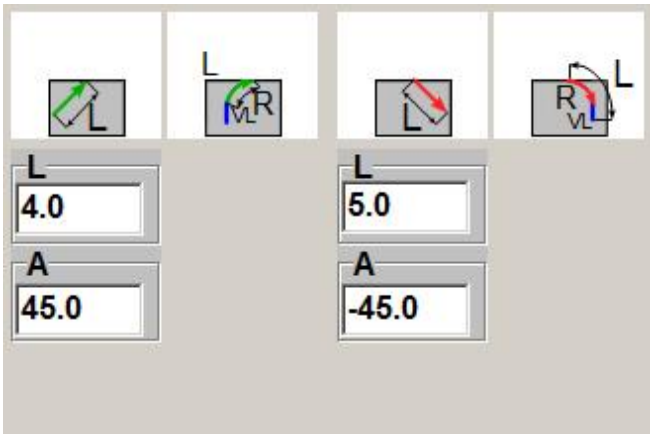
You will find a description of the preview and the settings in the page for external contours.

Help for the navigation panel to the left is available in the 'Cutting settings' page.

1

The third tab 'Internal contours' allows you to set the lead-ins and -outs for non-circular internal contours.

2

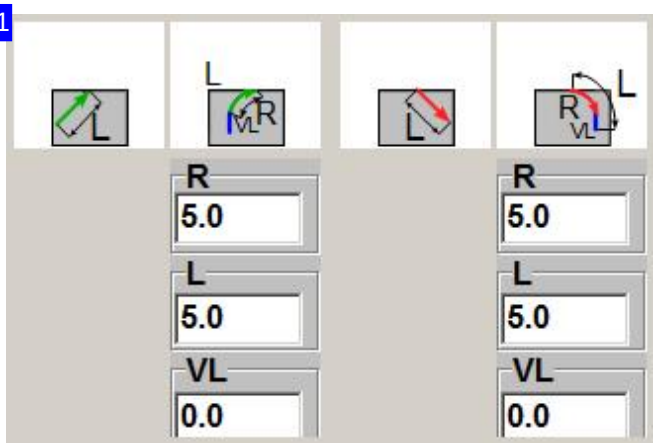



This frame allows you to set the form and size of lead-ins and -outs. You can set both the length and angle of straight lead-ins.
When entering the angle you should note that both negative and positive values are valid. A negative angle turns the lead-in clockwise, a positive number turns it counter-clockwise.
Lead-ins are always shown in green, lead-outs always in red.

The number of settings that can be made is different for arced lead-ins.

You can activate or deactivate a lead-in by clicking on an icon. On lead-ins you will be using, a list will appear into which you can enter the lead-in's settings.

21

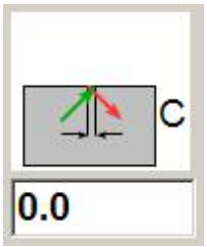



This frame allows you to set the size and angle of lead-ins. You can set the lead-in length, radius and the length of an additional vector when programming arced lead-ins. If leading-in at a corner the paramters will be different.
Lead-ins are always shown in green, lead-outs always in red.

The number of parameters to be set is different for straight lead-ins.

You can activate or deactivate a lead-in by clicking on an icon. On lead-ins you will be using, a list will appear into which you can enter the lead-in's settings.

3

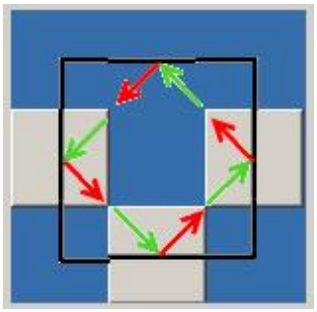



In some cases it can make sense not to cut the component out completely, but to leave it hanging using so-called micro-bridges, or cutting-bridges. This practice is useful for larger contours which should not be allowed to fall once they have been cut but should rather be punched out.

If you do not make an entry into this field, or enter 0, then no cutting bridges will be used. Negative valus create an overlap. The chages made in this field will be shown in

the preview immediately.

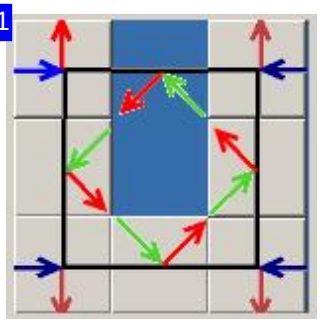
4



You can lead-in to your component from any side. Click one of the four checkboxes to select which one, and this will be shown in the preview window.

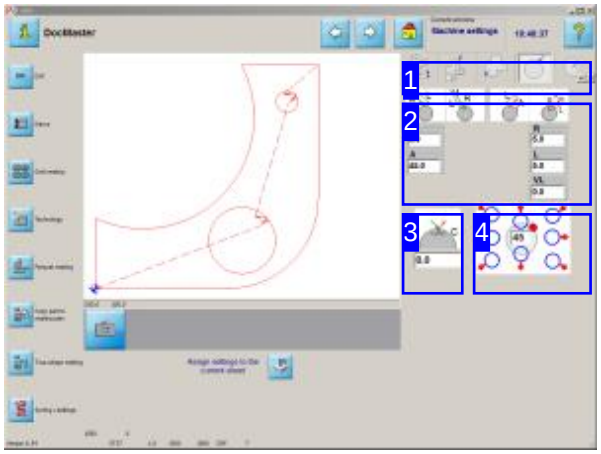
If you wish to use corner lead-ins, you can access this option by holding <CTRL> and double-clicking the middle box. The Input field will then be supplemented with the options for corner lead-ins.

41



This frame gives you the option to lead-in to your workpiece's internal contours from a corner. Click one of the four corners' boxes to set, and see a preview of the lead-in made at that corner.

# Set the Lead-ins for External Circles.



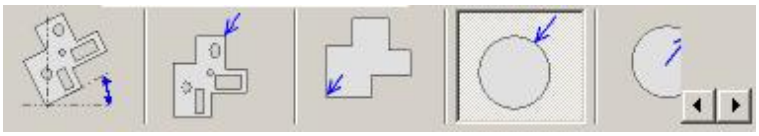

This window allows you to set up lead-ins and -outs for round external contours.

You can cut the circular external contours of your component however you wish. The standard options are shown in the bottom right window.Lead-ins are always shown in green, lead-outs always in red.
Lead-ins and -outs can have straight or arced paths.

- Set the the positions of lead-ins and lead-outs [4].
- Set the lead-ins' and lead-outs' forms [2].
- Set the cuts' sizes [2]. A definition for sizes is given in the help page for external contours.
- Set where cutting bridges should be added [3].

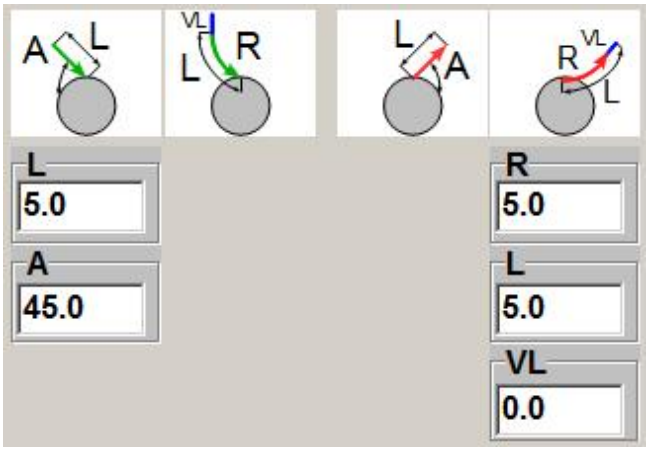
You will find a description of the preview and the settings in the page for external contours.

Help for the navigation panel to the left is available in the 'Cutting settings' page.

1 

The forth tab 'External circles' allows you to set the lead-ins and -outs for circular external contours.

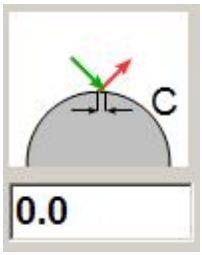
2




This frame allows you to set the form and size of lead-ins and -outs. You can set both the length and angle of straight lead-ins.
When entering the angle you should note that both negative and positive values are valid. A negative angle turns the lead-in clockwise, a positive number turns it counter-clockwise.
Lead-ins are always shown in green, lead-outs always in red.

You can activate or deactivate a lead-in by clicking on an icon. On lead-ins you will be using, a list will appear into which you can enter the lead-in's settings.

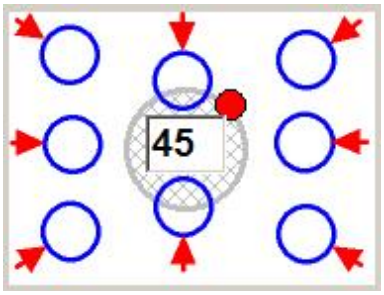
3




In some cases it can make sense not to cut the component out completely, but to leave it hanging using so-called micro-bridges, or cutting-bridges. This practice is useful for larger contours which should not be allowed to fall once they have been cut but should rather be punched out.

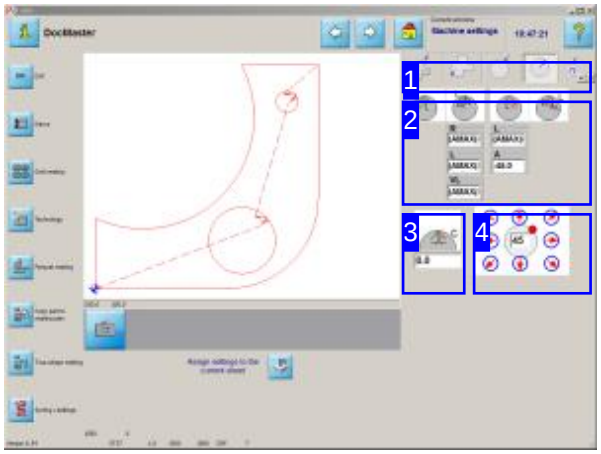
If you do not make an entry into this field, or enter 0, then no cutting bridges will be used. Negative valus create an overlap. The chages made in this field will be shown in the preview immediately.

4




You can lead-in to your round external contours from any direction. Simply enter the angle in the text field in the middle.
The blue circles around the central circle offer you 8 standard lead-in angles at 45° steps. Simply click one of the eight markings around the circle to make the lead-in there, and the change will be displayed in the preview window.

# Set the Lead-ins for Internal Circles.



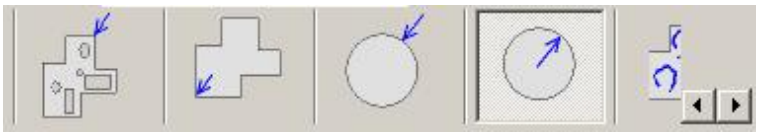

This window allows you to set up lead-ins and -outs for round internal contours.

You can cut the circular internal contours of your component however you wish. The standard options are shown in the bottom right window.Lead-ins are always shown in green, lead-outs always in red.
Lead-ins and -outs can have straight or arced paths.

- Set the the positions of lead-ins and lead-outs [4].
- Set the lead-ins' and lead-outs' forms [2].
- Set the cuts' sizes [2]. A definition for sizes is given in the help page for external contours.
- Set where cutting bridges should be added [3].

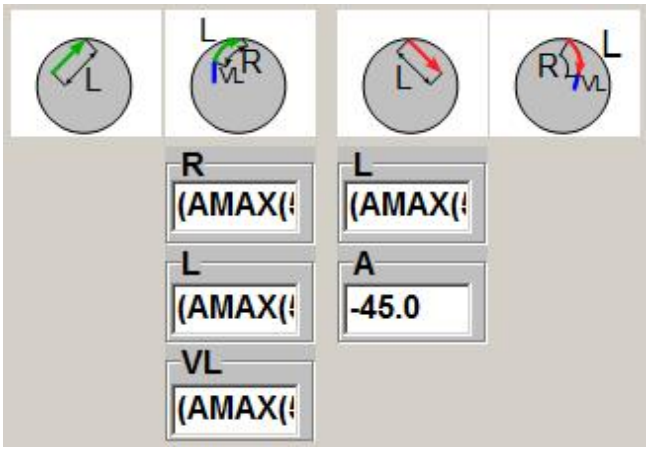
You will find a description of the preview and the settings in the page for external contours.

Help for the navigation panel to the left is available in the 'Cutting settings' page.

1 

The fifth tab 'Internal circles' allows you to set the lead-ins and -outs for circular internal contours.

2

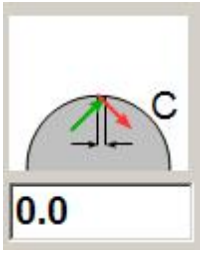



This frame allows you to set the form and size of lead-ins and -outs. You can set both the length and angle of straight lead-ins.
When entering the angle you should note that both negative and positive values are valid. A negative angle turns the lead-in clockwise, a positive number turns it counter-clockwise.
Lead-ins are always shown in green, lead-outs always in red.

You can activate or deactivate a lead-in by clicking on an icon. On lead-ins you will be using, a list will appear into which you can enter the lead-in's settings.

If formulae have been used here, right-click the cell to view them. If there are changes, click the display to restore.

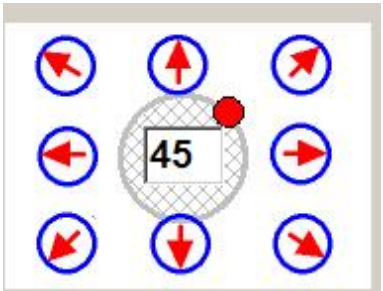
3




In some cases it can make sense not to cut the component out completely, but to leave it hanging using so-called micro-bridges, or cutting-bridges. This practice is useful for larger contours which should not be allowed to fall once they have been cut but should rather be punched out.

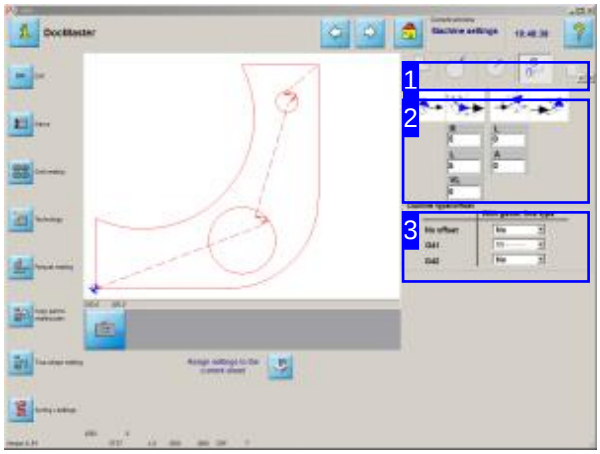
If you do not make an entry into this field, or enter 0, then no cutting bridges will be used. Negative valus create an overlap. The chages made in this field will be shown in the preview immediately.

4




You can lead-in to your round external contours from any direction. Simply enter the angle in the text field in the middle.
The blue circles around the central circle offer you 8 standard lead-in angles at 45° steps. Simply click one of the eight markings around the circle to make the lead-in there, and the change will be displayed in the preview window.

# How to Cut an Open Contour.




*cncCUT* usually treats open contours as faulty. This screen allows you to mark open contours and allocate them cutting settings.

The cutting path can lie exactly on the contour, or be given a cutting-tool corrected path. The corrected path can lie to the left (G41) of the contour, or the right (G42). With a normal closed contour the routine will automatically decide where to set the cutting path relative to the contour, but with an open contour you must decide, since both options are possible. The setting is made through the line type you asign the open contour from the Checker .
Each line type can be allocated a path correction type.

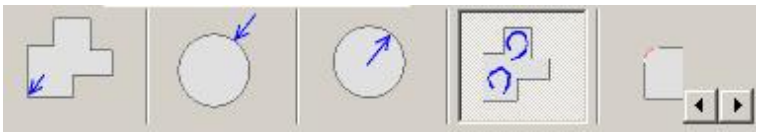
You can cut your open contour with a straight or an arced lead-in.

- Set the forms of the lead-in and -out [2].
- Allocate a correction type to the line type.

You will find a description of the preview and the parameters in the 'External Contours' page.

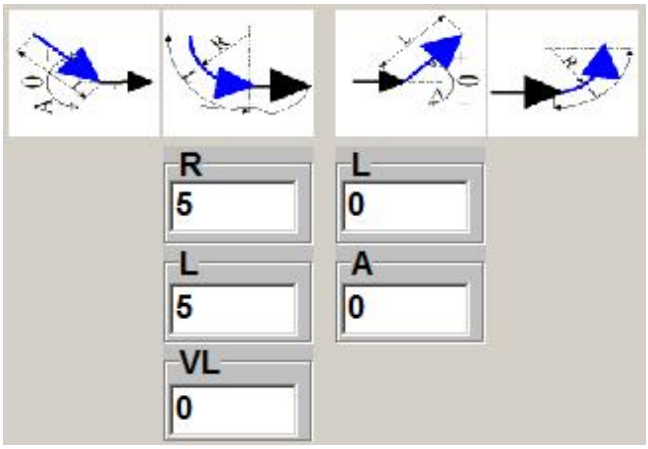
The description for the navigation panel to the left is in the 'Cutting technologies' screen.

1



The tab 'Cut Open Contours' allows you to set cutting information including cutting-path corrections, lead-ins and lead-outs for open contours using predefined line-types.

2

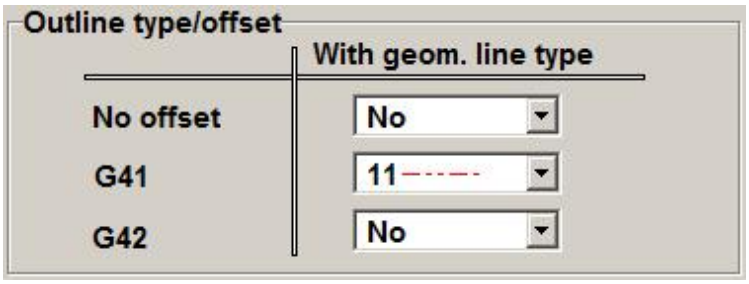



This frame allows you to set the size and form of lead-ins and lead-outs.

You can set the length and angle of a straight lead-in.
You can set the length and radius and the length of an additional straight lead-in vector for arced lead-ins.

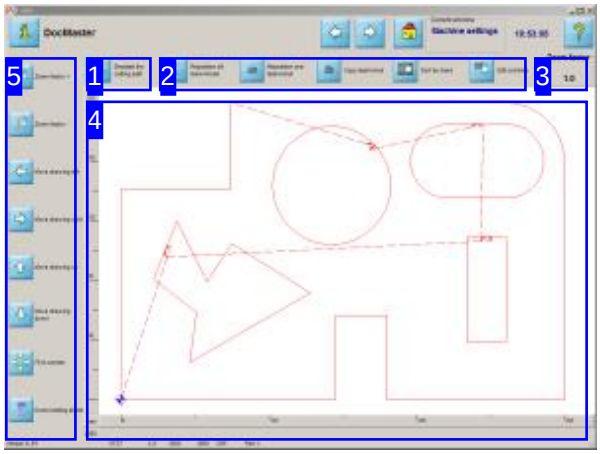
Click on an icon to activate or deactivate the lead-in. When you've decided on a lead-in type, a panel will appear for you to enter its parameters.

3




You can lay the cutting-path exactly onto the contour (no offset) or allocate the cutting-path a tool-corrected path. The correction can take the path left (G41) or right (G42) of the contour. Use line-types to define how a path should be cut. You can allocate the contour a line-type using the Checker .

# Sort or Reposition the Lead-ins.




Zoom in on your part and check the cutting path. Use the options in the navigation panel [2] to zoom in on, and move the drawing into the desired position.

Start a simulation to check the cutting process. You can then observe the sequence in which the machine will cut the part's contours.

Use the exact data for your costing calculation.

This screen allows you to zoom in and out, and move your drawing in any direction, so that you can check it thoroughly. A simple keypress displays exact cutting data for you in an MS Excel® table.

1


Clicking this button starts a simulation of the cutting process. You can see in which sequence the contours will be cut.
While the simulation is running you will see a Slider in the top right corner of the screen. This allows you to set the speed of the simulation.

11


You can change the speed of a simulation while it runs. Move the slider bar right to slow the simulation down, or left to speed it up.

2

These buttons allow you to sort or reposition the lead-ins of your contour, or copy a lead-in from any contour to another.

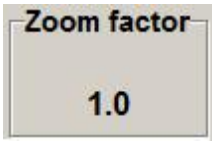
To redefine all lead-ins, use the mouse to define the new cutting path. Use the left-most button for this.

To move just one lead-in, press the second button .

The third button allows you to copy any lead-ins to other contours.

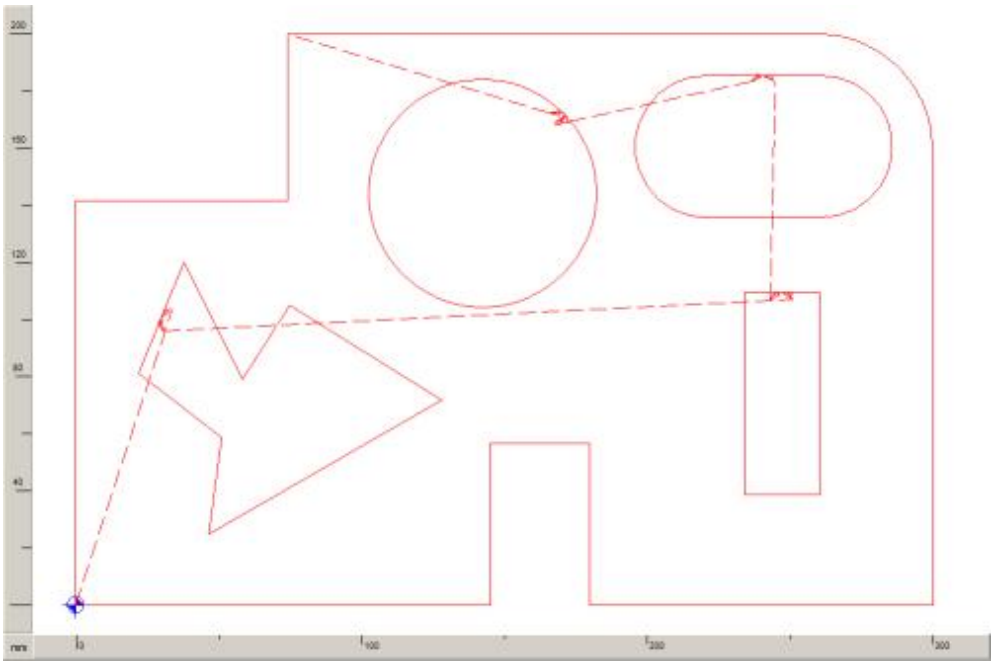
If you wishes to sort contuors manually, use the right button.

3




The current zoom factor is shown here.
The zoom buttons in the navigation panel [5] allow you to increase (+) or decrease (-) the zoom factor.

4



This frame shows you the cutting-path for the current component. You can zoom in and out to check the part, and move the part within the viewer. To zoom in or out, click the navigation panel [5] buttons to increase (+) or decrease (-) the zoom factor. If your mouse has a scroll wheel, then you can use that to zoom in or out around the cursor's location.

21


You are given detailed instructions as to what to do for the next step . If you wish to use the function more than once, mark the bottom checkbox. Use the right button to exit the function.
A second, top checkbox is post-processor dependant, and its function will be explained in more detail in the post-processor's help page.

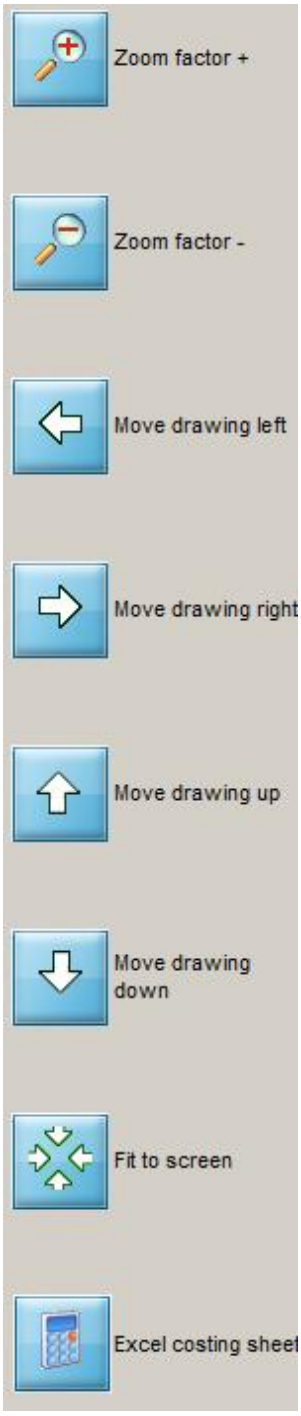
22


Use the mouse to indicate the required new lead-in position on one of the component's contours.

23


Use the mouse to indicate the required new lead-in position on one of the component's contours.

5

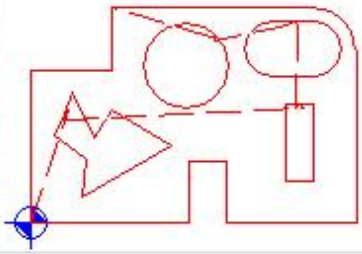



Use this chance to zoom in on your part and move it around to examine your component carefully.
To zoom in or out, click appropriate button to increase (+) or decrease (-) the zoom factor.

Click on the 'Calculation' button to see an Excel® sheet with the exact cutting data. The simulation will be run to gain exact data! This function is enabled from a setting in the POSTPR.INI file.

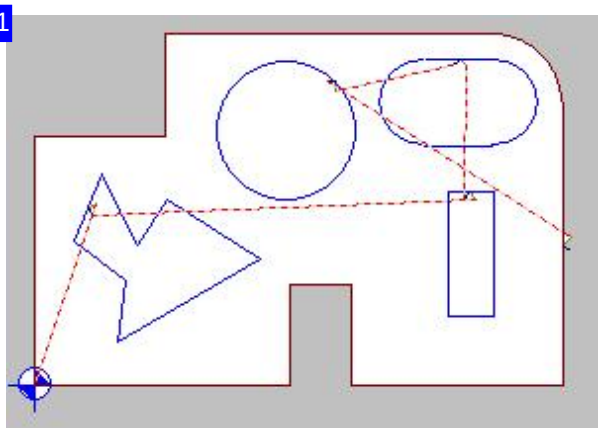
51

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Numbers of moves | 4 | | 2 | |
| 2 | Length of moves | 572,31 | | 0,6359 | |
| 3 | Length of cutting | 2165,07 | | 10,82535 | |
| 4 | Cutting speed | 900 | | | |
| 5 | Time | 144,34 | | | |
| 6 | | | | 13,46125 | |
| 7 | Material | ST37 | | | |
| 8 | Thick | 1 | | | |
| 9 | Widht | 1000 | | | |
| 10 | Height | 1000 | | | |
| 11 | | | | | |
| 12 | Abrasiv | 1 | | | |
| 13 | | 0 | | | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | | |
| 17 | | | | | |
| 18 | | | | | |
| 19 | | | | | |
| 20 | | | | | |
| 21 | | | | | |



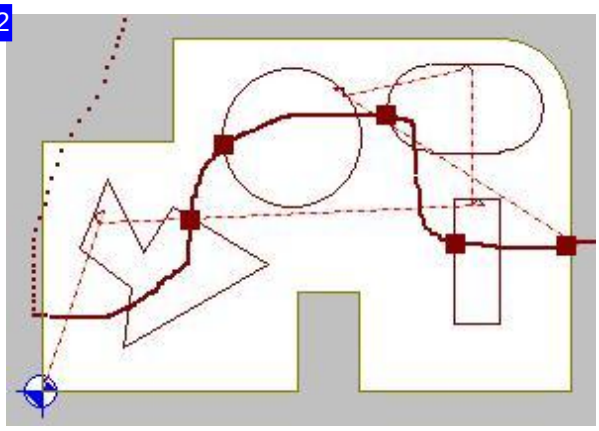
This excel® table gives you the exact cutting data.

41



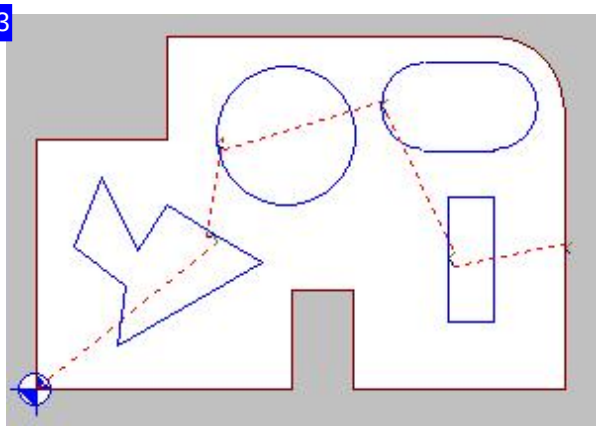
This is what the original cutting path looks like. To set the new cutting path use the mouse to go to the cutting process's start point. You must enclose all contours when doing this.

42



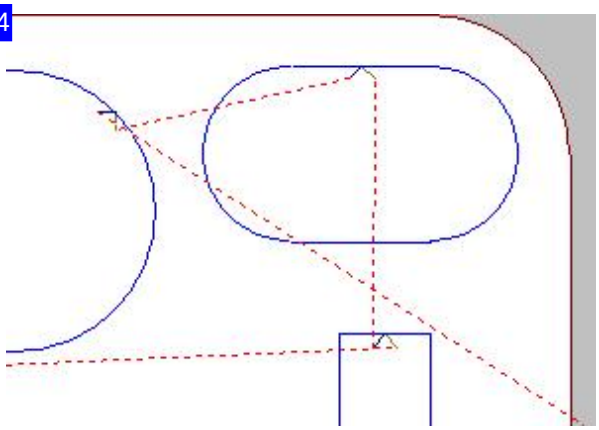
Press the left mouse button and drag the cutting path across the drawing. Next you will see the new cutting path superimposed on the component.

43



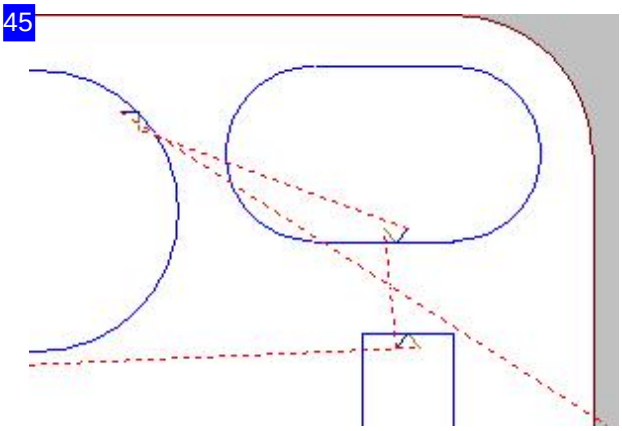
The new cutting path would run like this.

44



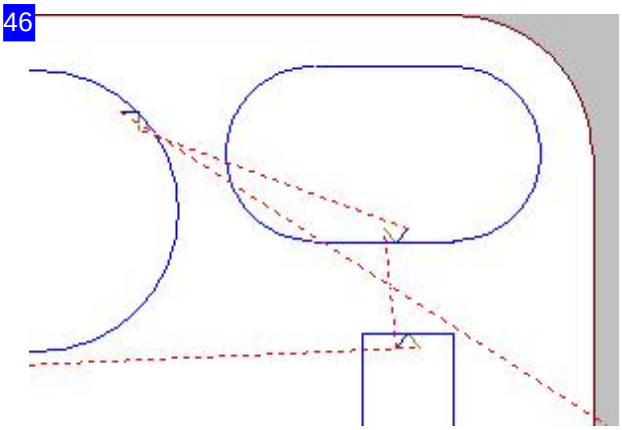
Clicking the new position repositions the lead-in to this point .

45



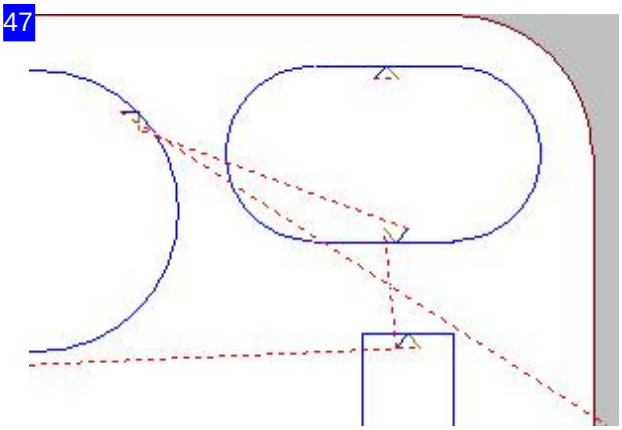
The cutting path with its repositioned lead-in looks like this.

46



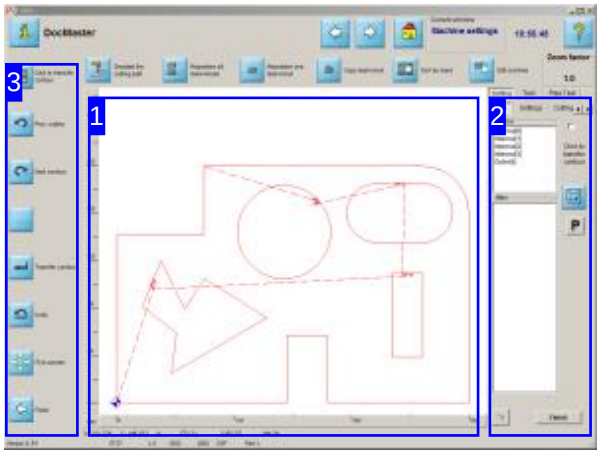
Clicking the new position copies the lead-in to this point .

47



The result - a copy of the lead-in, placed on this contour.

# Sorting your Cutting Parts Manually.

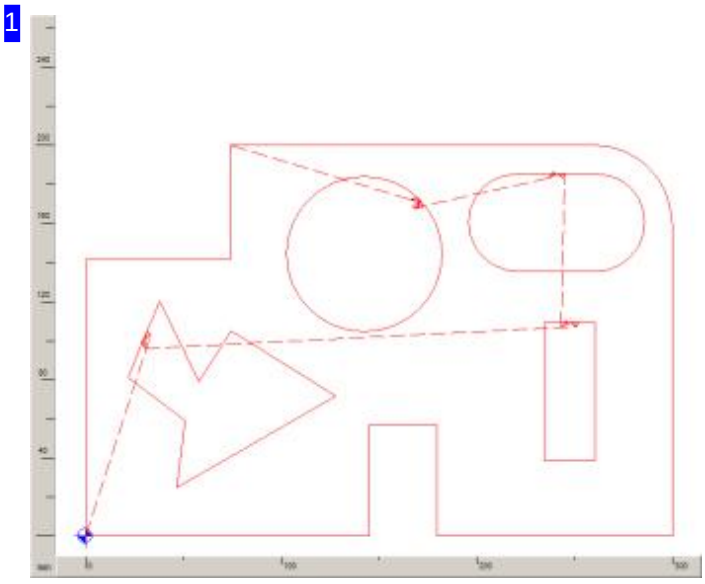



The preview [1] shows you the workpiece with its individual elements.

The frame to the right presents the elements ready for further processing. You can set the elements into the required sequence simply by using the mouse.

A second tab (Test) allows you to check for and remove collisions between lead-ins and contour elements.

This screen allows you to sort your contour's elements manually and remove any collisions between lead-ins and contour elements.

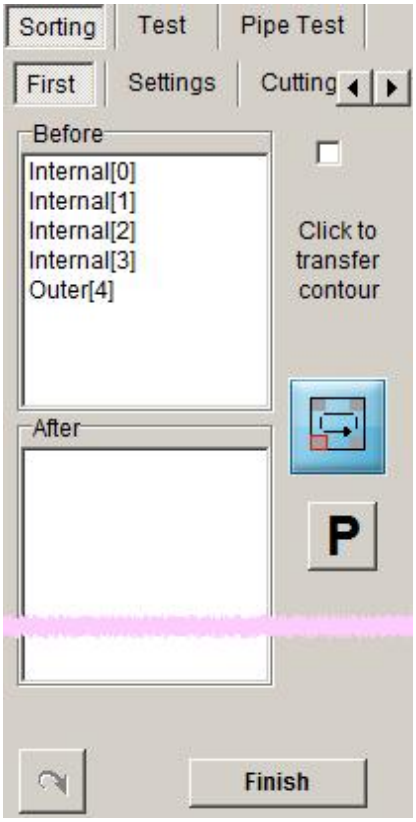



You can bring the drawing to the desired position in the window using your mouse's scrollwheel. Move the cursor to the desired center and use the mousewheel to zoom in and out about this center.

Selecting an element from the selection list to the right [2] will see it highlighted in the drawing using a different color. Transferring the element to the new sorting list will see it drawn in a third color, thereby allowing you to easily keep track of what you have done.

Click on a contour to mark it in the contour list at the top of the window [2]. If you have marked the 'Mouse-click = Transfer Contour' checkbox in the sorting window [2], then selecting a contour will transfer it into the new list.

2




All elements in the drawing are listed in the top list within this frame. Selecting an entry in the list will see the corresponding element highlighted in the drawing with a different pen color. Click the button to the right to transfer the element to the new list.
You can also mark and transfer multiple elements to the new list simultaneously.

The button at the bottom left allows you to undo the previous action.

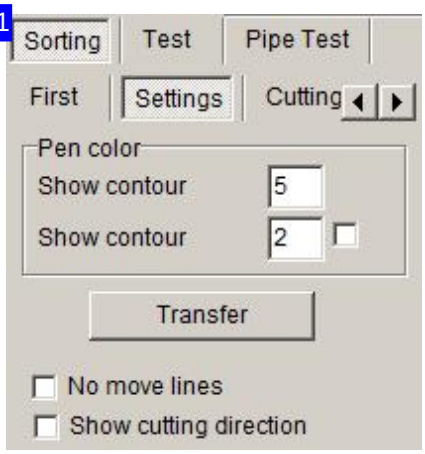
The 'Parameter' tab allows you to allocate different colours to your contours.

The 'Cut Parameter' tab allows you to change the cutting parameters.

The 'Lead-ins' tab allows you to modify the lengths of the lead-ins.

You can click the 'End' button at the bottom right or the bottom of the navigation panel [3] to finalize the sorting process and confirm the application of the new list in the dialog box that appears once all elements are in the required sequence.

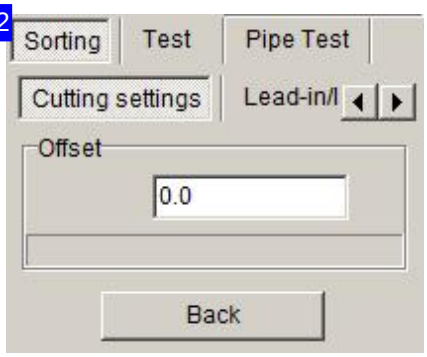
21




You can allocate different colors to your contours here. Enter a color number for the contour type and click the 'Apply' button. When the contour is seleceted from the preview window or the sorting list it will be displayed in the color you defined.

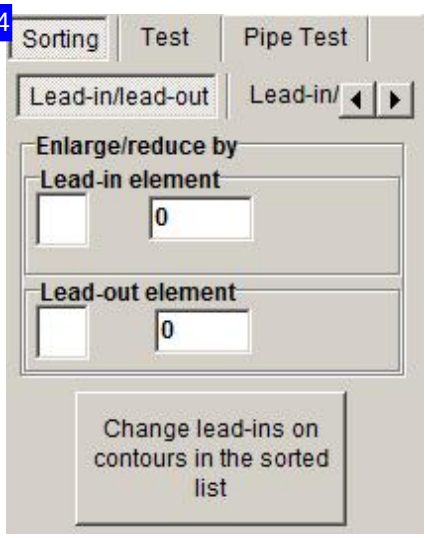
The bottom select boxes allow you to suppress display of the cutting path or show the cutting direction on the contours, simply mark the corresponding check-box.

22

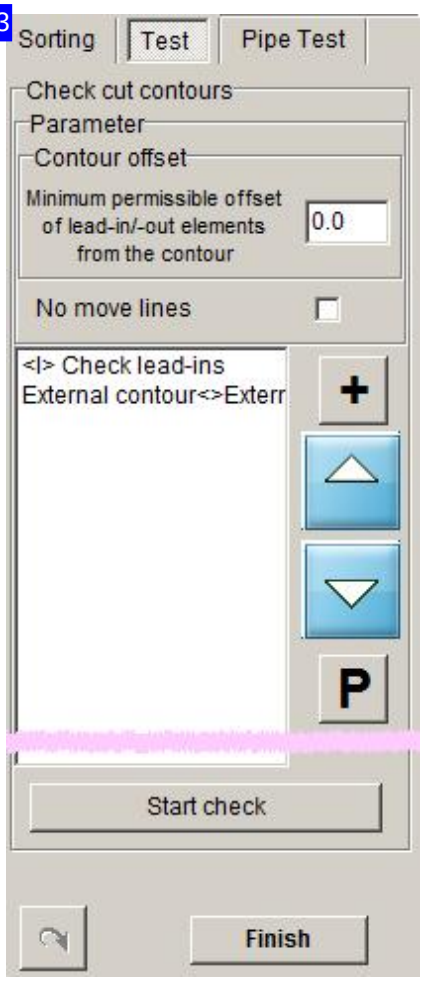



You can adapt the cutting path offset here. Enter the desired value in the text box.

24

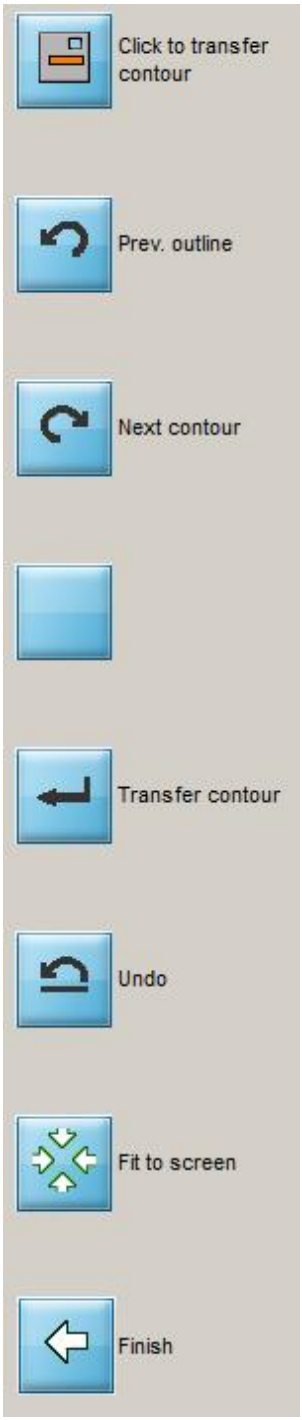



You can modify the length od the lead-ins here. Enter the desired value in the text box mark the corresponding check-box.



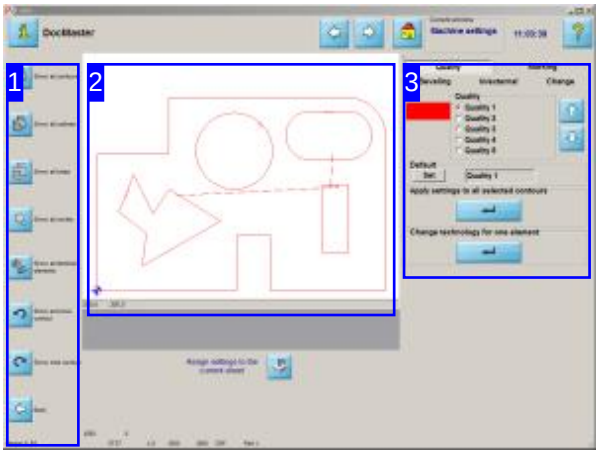

You can test the offsets to your lead-ins and -outs here, and set a minimum offset to be kept clear. Collisions are shown in the list, allowing you to make modifications on an individual basis. Click the 'P' button for a menu allowing you to make targetted changes to lead-in lengths.

3




The navigation panel offers all options required for working in the sorting frame, and allows you to use the second and third buttons to navigate the contour elements.

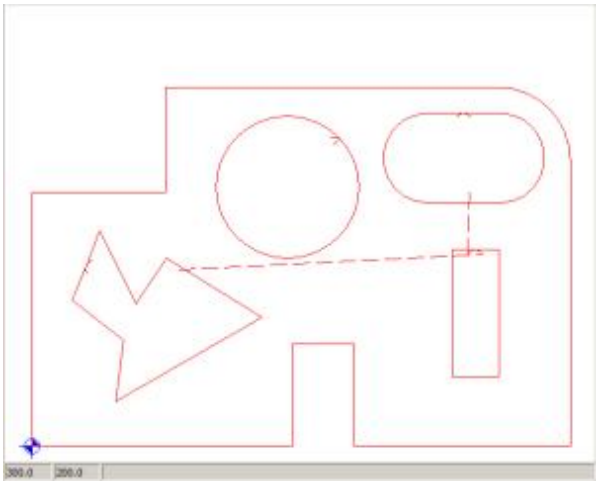
# Cutting Settings for Individual Contours.




A component's contours can have very different settings for cutting speed and method; they can be marked out for 'Cutting', 'Marking', 'Bevelling' or 'Piercing' or many others [3].

This screen lets you look at individual groups of contours. Cutting speed and type can be entered for the contours, though this is post-processor dependant. More information about cutting types can be found in the help pages for your post-processor.

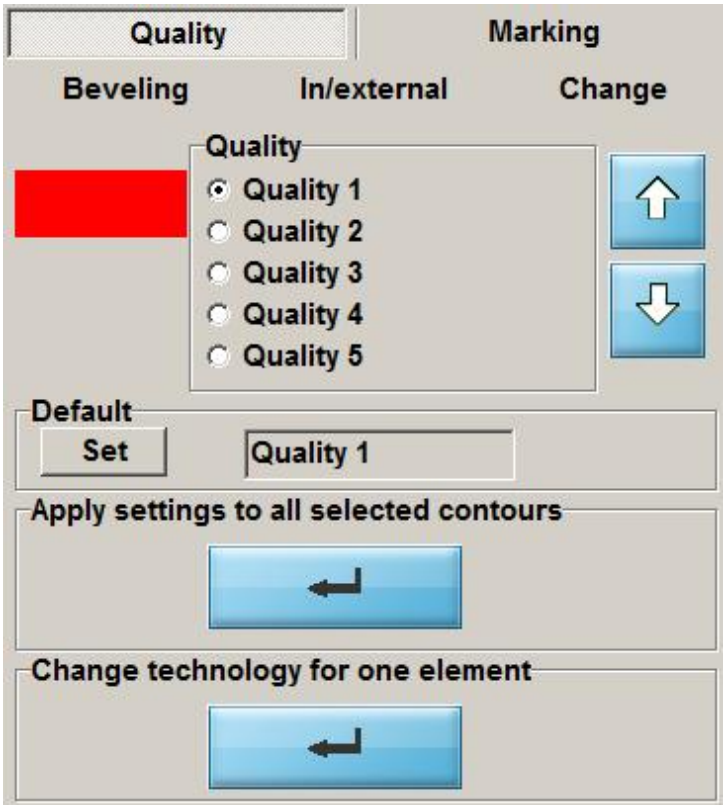
2



This frame shows you a preview of the contours according to your inptus. The contours will be shown in a different colour and form when selected.

Click in the preview to enter the technologies zoom window.

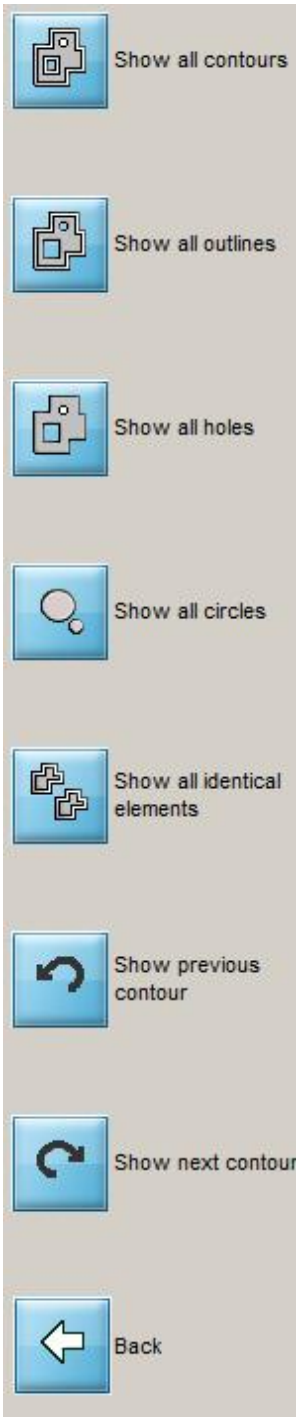
3




This frame is dependant on the post-processor you are using. The available options will be described in the help files for your post-processor.

This frame allows you to make changes (cutting speed, contour type and quality, etc.) to the machine settings for your cutting parts
Enter the values and mark the check-boxes if a change should be made, and click the button at the bottom to make that change to all highlighted contours.

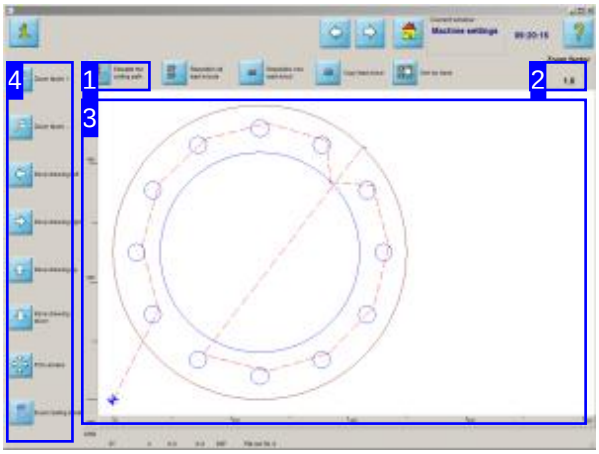
1




Use the navigation panel [4] to select individual elements specifically. The upper button always shows you the whole component. The buttons underneath display elements according to groups, as described. The bottom buttons allow you to cycle through elements sequentially.

# Simulation

## Simulating a Sheet's Cutting Process.




Zoom in on your sheet and check the nesting and cutting paths. Use the options in the navigation panel [2] to move the drawing into the desired position.

Start a simulation to check the cutting process. You can then observe the sequence in which the machine will cut the parts.

Use exact cutting data in your price estimates.

This screen allows you to zoom in and out, and move your drawing in any direction, so that you can check it thoroughly. A simple keypress displays exact cutting data for your price estimates in an excel® table.

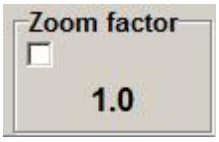
1


Clicking this button starts a simulation of the cutting process. You can see in which sequence the parts will be cut.
While the simulation is running you will see a slider in the top right corner of the screen. This allows you to set the speed of the simulation.

11

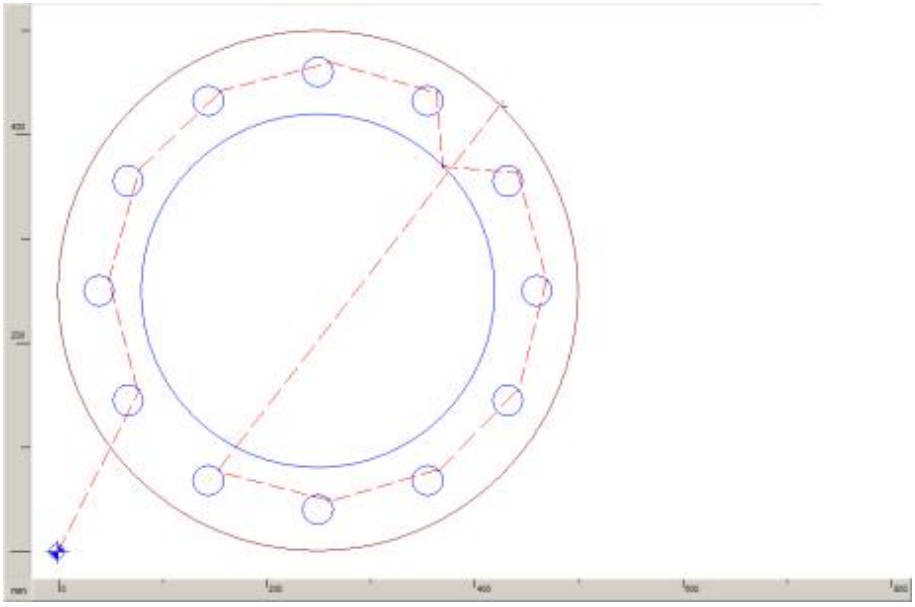

You can change the speed of a simulation while it is running. Move the slider bar right to slow the simulation down, or left to speed it up.

2



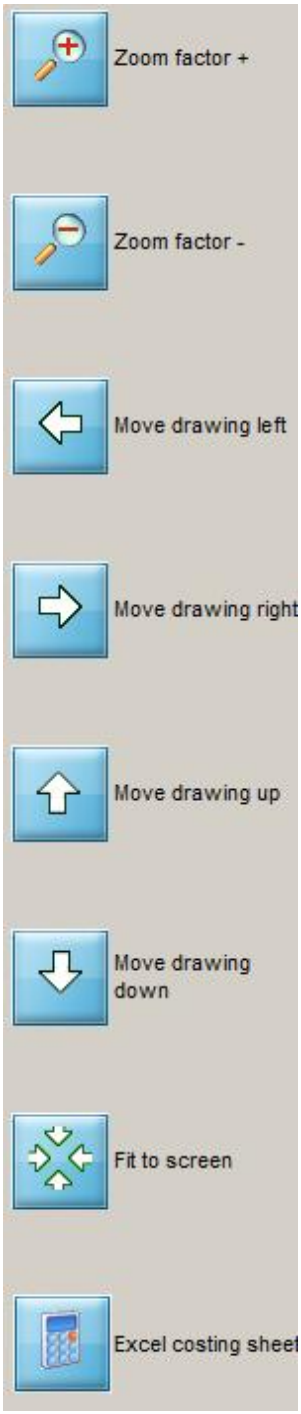

The current zoom factor is shown here. This factor sets how clicking on it will change the display. If the value is smaller than 1.0, the view will be zoomed out.
To zoom in or out, click the navigation panel [5] buttons to increase (+) or decrease (-) the zoom factor.

3



This frame shows the part with the travel paths. You can zoom in to check the part in detail - click one of the 'Zoom' buttons in the navigation panel [4] and click on the drawing to place the zoom's focus point.

4




Use this chance to zoom in on your drawing and move it around to examine your component carefully.
To zoom in or out, click the appropriate button to increase (+) or decrease (-) the zoom factor. The zoom factor must be more than one to zoom in.

Click on the 'Excel cost sheet' button to see an Excel® sheet with the exact cutting data for your cost estimation. A cutting simulation will be run from which the cutting data will be taken. This function must be permitted from the 'POSTPR.INI' settings file.

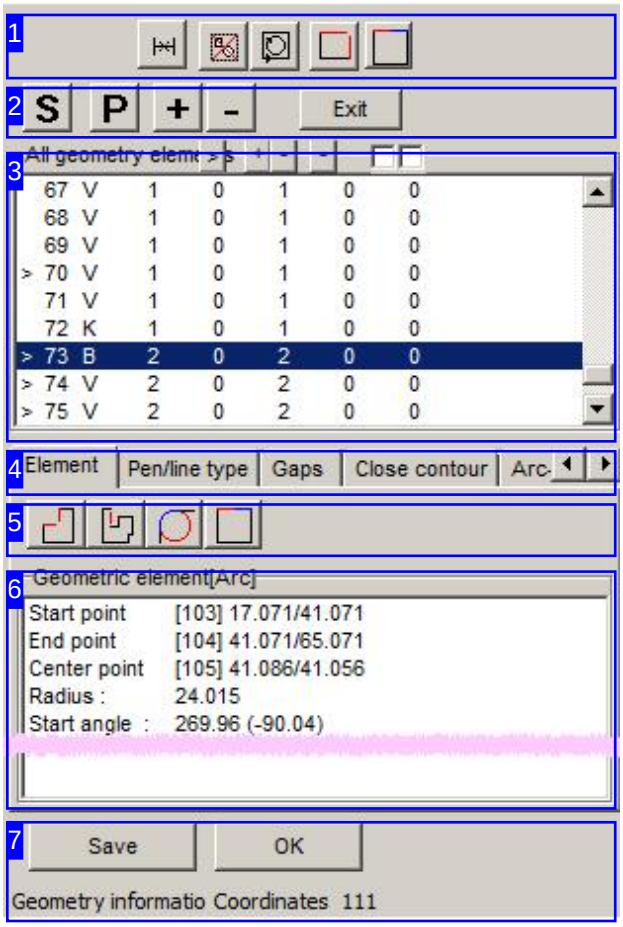
41

| | A | B | C | D |
|---|---|---|---|---|
| 1 | Numbers parts | 40 | | |
| 2 | Nb. of sheet | 1 | | |
| 3 | Eilganglänge | 1518,2972 | | |
| 4 | Schneidlänge | 4383,2913 | | |
| 5 | Schneidzeit | 292,2194 | | |
| 6 | Numbers of moves | 200 | | |
| 7 | Length of moves | 24060,36 | | |
| 8 | Length of cutting | 29937,94 | | |
| 9 | Zeit (Std) | 00:05:34 | | |
| 10 | Material | ST37 | | |
| 11 | Widht | 1000 | | |
| 12 | Height | 1000 | | |
| 13 | thick | 1 | | |
| 14 | Cutting Speed | 900 | | |
| 15 | Vorlochzeit (sec) | 4 | | |
| 16 | Markierungszeit(sec) | 0,5 | | |
| 17 | | TR 0 | | |
| 18 | | | | |
| 19 | | | | |
| 20 | | | | |
| 21 | | | | |
| 22 | | | | |
| 23 | | | | |
| 24 | | | | |

This excel® table gives you the exact cutting data for your cost estimation. This function must be permitted from the 'POSTPR.INI' settings file.

# The 'Checker' Function - The Drawing Checker

## Repairing Errors with the Drawing Checker.




The Drawing Checker offers you a tool to check the drawing of a component for errors and repair any you find.

- The upper panel [3] shows all elements present in the drawing. Those exhibiting errors are marked with a '>' symbol.
- The additional button panel [2] allows you to change the view in the zoom panel.
- Errors can be repaired quickly using the buttons in the header panel [1].
- The 'Elements' tab [4] in the bottom panel [6] shows the details of an element selected in the top panel [3], or a list of all elements exhibiting the same type of flaw. The 'Pen /line type' tabs [4] allow you to make settings to search by.
- You can use the buttons in panel [5] to display elements by type.

1

From left to right,the buttons mean:

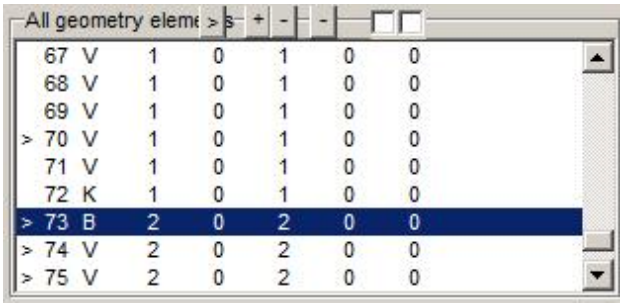
1. Delete the selected element.
2. Delete all duplicate elements.
3. Check if all contours are closed.
4. Close all gaps up to the given size.
5. Join all vectors/arcs with tangential intersections.

2

The buttons allow you to change the display in the Zoom (parent) window:

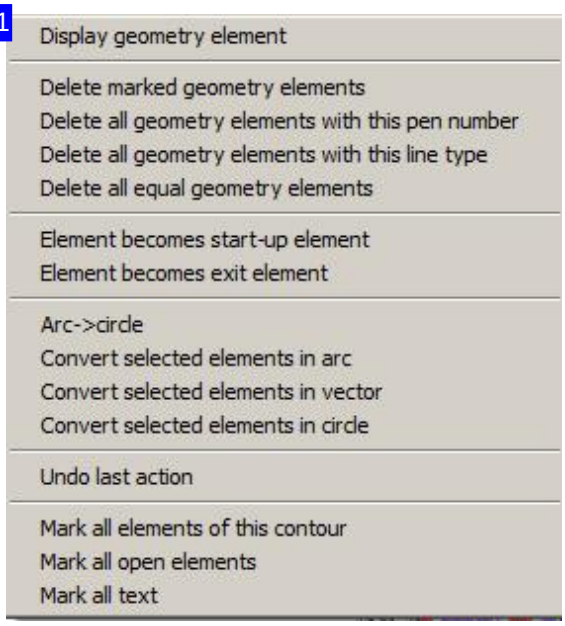
- 'S' - Show all; fit the drawing to the screen.
- 'P' - Show the drawing centred on the currently selected element.
- '+' - Zoom in on the current position.
- '-' - Zoom out on the current position.

3




All elements that make up your drawing are listed here. Those which exhibit errors are marked with a '>'.
Click on an element to show details about it in the bottom panel [6].
Flawed elements will be marked in the drawing with a cursor.
Right-click to open a context menu with options to repair errors.

31

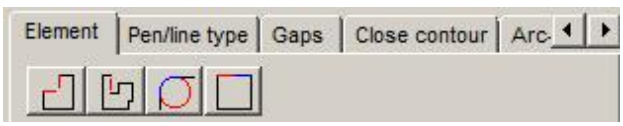



This menu allows you to directly access commands for repairing errors.

4

- The 'Elements' tab shows the values for the element selected in the element list [3].
- The 'Pen/ line type' tab offers the option to search more accurately by a line's color or consistency.
- The 'Gaps' tab allows you to search for gaps of a given size and close them.
- The 'Close contours' tab allows you to check if all contours are closed.
- The 'Arcs and Circles' tab allows you to join multiple arcs and circles together.
- The 'Save' tab allows you to save specific elements of your drawing in their own DXF files.
- The 'Change Pen/Line types' tab allows you to modify the colors and styles of your lines.
- The 'Settings' tab allows you to join tangential vectors.
- The 'Join' tab allows you to join vectors and arcs according to presets such as length and angle difference.
- The 'Hide' tab allows drawing attributes to be hidden according to pen and line types.
- The 'Arcs' tab allows you to join multiple arc elements into one arc.

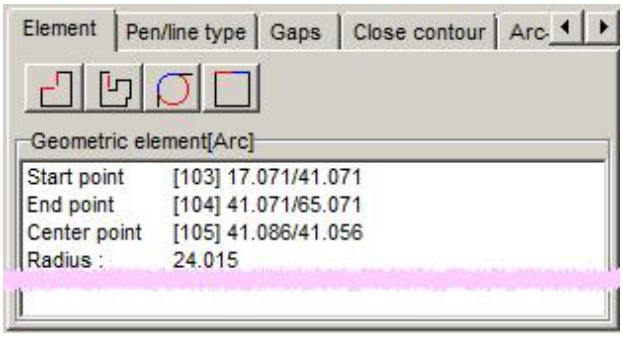
5




These buttons in the Elements tab allow you to seek for elements with a certain type of error. From left to right, the buttons mean:

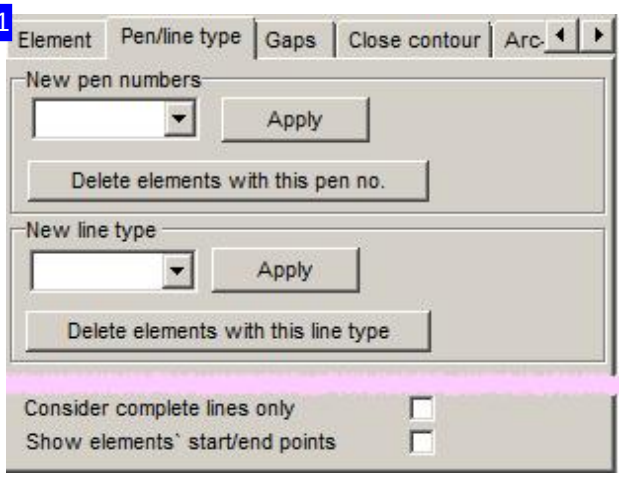
1. Find all elements without a connection to another element; one open edge.
2. Find all elements without any connection to another element; two open edges.
3. Find all circles whose centers and radii are the same as an arc's.
4. Find all vectors/arcs whose transitions are 180°.

6




This frame describes the vectors of an element in a drawing, or lists all errors of one Error type if you are searching using the buttons in panel [5].

61

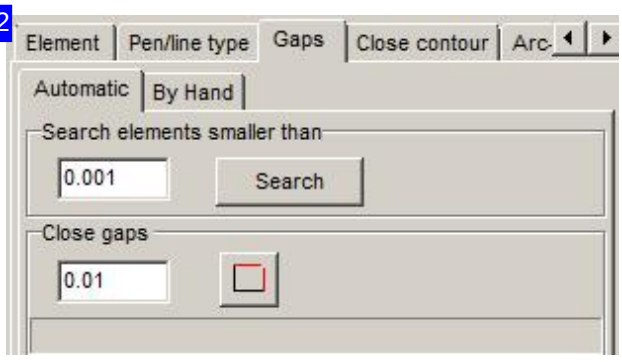



This frame allows individual elements to be allocated pen or line numbers. This 'marks' the element, allowing elements to be removed as a group, or searched within that group.

It is important to give open contours a special line type when cutting them. This line tpye can then be cut together as an 'open contour' .

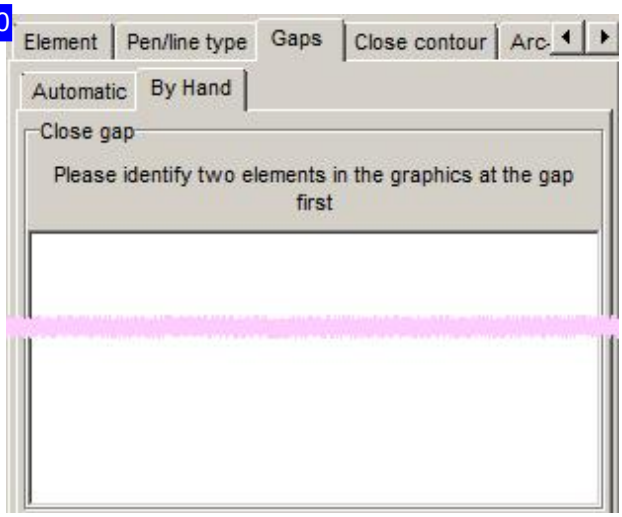
Line-type 0 signifies 'cut', while line-types 2 and 3 are preset for 'marking'. Other types are post-processor dependant, whereby types 2 and 3 must also be acticvated from the post-processor. See also 'Changing pen / line-types' .

62



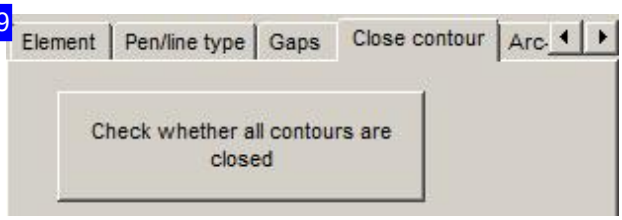

This frame allows you to seek the smallest of elements (faulty elements), or close gaps up to the given size.
If you have larger gaps, switch to the 'manually' tab to close them yourself.

70



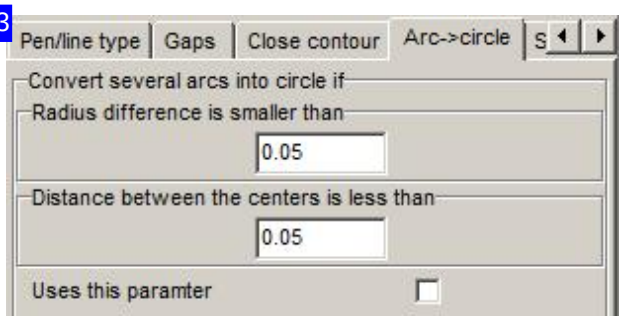

To close larger gaps manually, identify the gap in the drawing to highlight its start and end points in the list. You can then use a vector to close the gap, or trim to the correct length. Check the nature of the gap in the drawing and click the appropriate button. Switch to the 'Automatic' tab to close smaller gaps automatically.

69



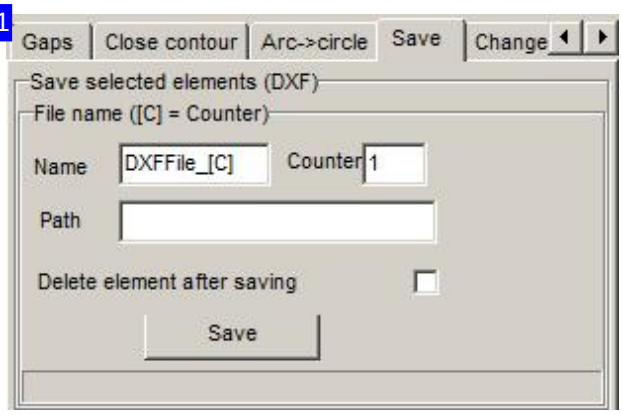

Here you can check if all contours are closed with a single mouseclick.

63



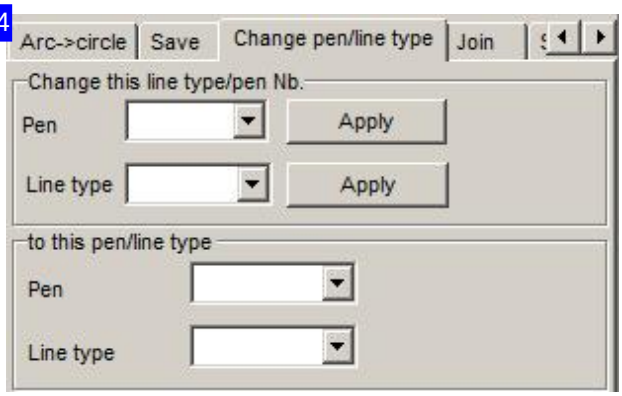

This frame allows multiple arcs to be fused together to form a circle. Set the threshold value above which arcs should be joined.

71



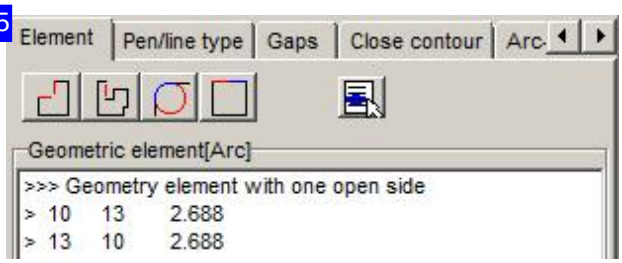

You can save identified elements as DXF files here. Enter the element's save path and name. The files will be given a counter as a suffix to the file name to keep all elements grouped together. Mark the check-box if the elements should be deleted after saving.

64



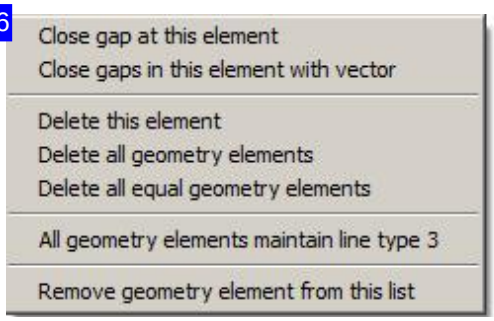

This frame allows you to allocate different colors and forms to your contour-elements' line-types. If the colors do not match your selection, check the color settings in the administrator's area. The colors can be individually adapted from that frame (Color values).
See also 'Pen/Line-type No.' .

65



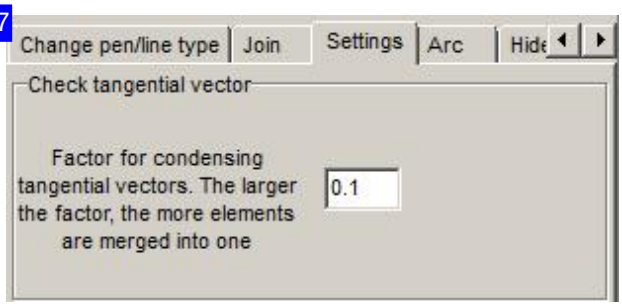

When searching specifically by error category using the buttons in panel [5], a list of the elements found under each category will be displayed. Clicking on an entry in the list switches back to the Vectors display.
Right-click to access a context menu for repairing errors.

66



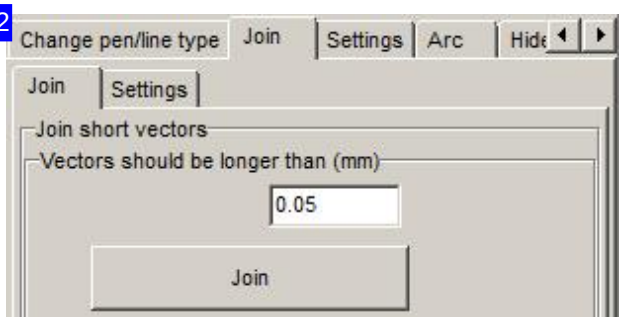

This menu allows you to directly access commands for repairing errors.

67



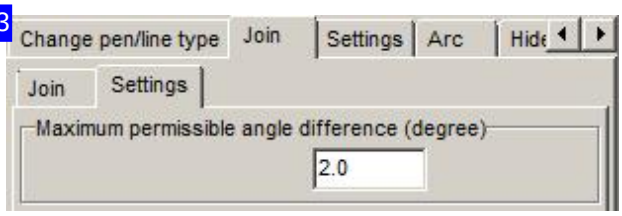

Many smaller vectors can be joined to simgle vectors by entering a limit. Enter the limit up to which vectors should be joined.

72



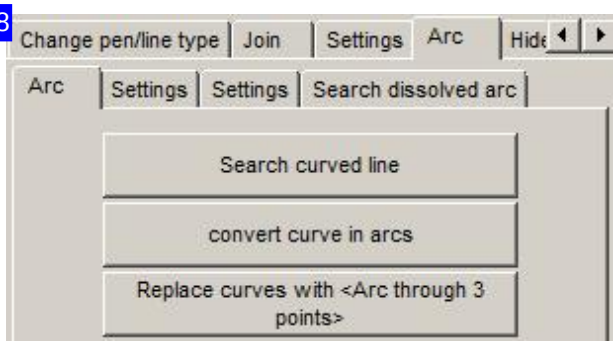

Contour groups which consist of multiple short vectors can be joined to one vector from this tab. Enter the limiting value for the maximum length of vector which should be joined. If you wish to join vectors together according to angle difference, switch to the 'Parameter' tab.

73



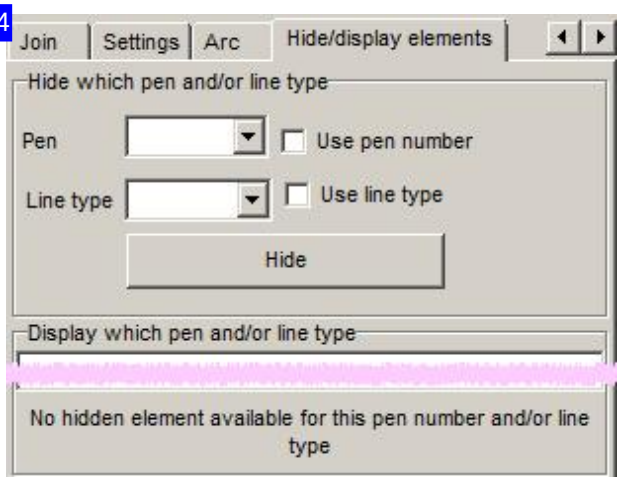

This frame allows you to set an angle difference limit for joining vectors. Enter the limiting value for the maximum angle difference which should be joined. If you wish to join vectors together according to vector length, switch to the previous tab.

68




There are three further tabs under the 'Arcs' tab for turning elements into arcs. More on this in the next chapter: ' Arc transformation '.

74

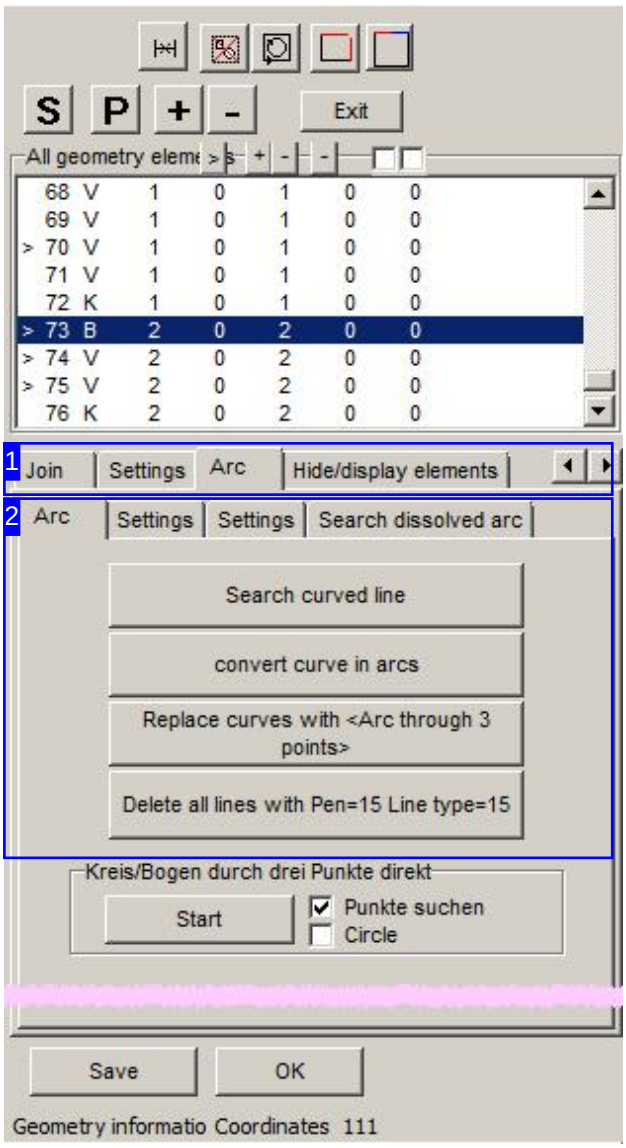



Imported drawings sometimes contain attributes which hinder your ability to process them using *cncCUT* . This tab allows you to hide elements by pen and line type, correcting such errors.

7

Close the DXF Checker and return to the DXF Selection screen.

# Arc Transformations in the Geo Checker.




The 'Geo Checker' allows you to transform many smaller arcs into a single longer arc series. Set the limits of arcs which should be joined to one arc series.

Once you have marked an element cluster, *cncCUT* will find the curve series, and mark the individual arcs. You can then change the curves into arcs, or replace the curve using an 'arc through 3 points'.

1

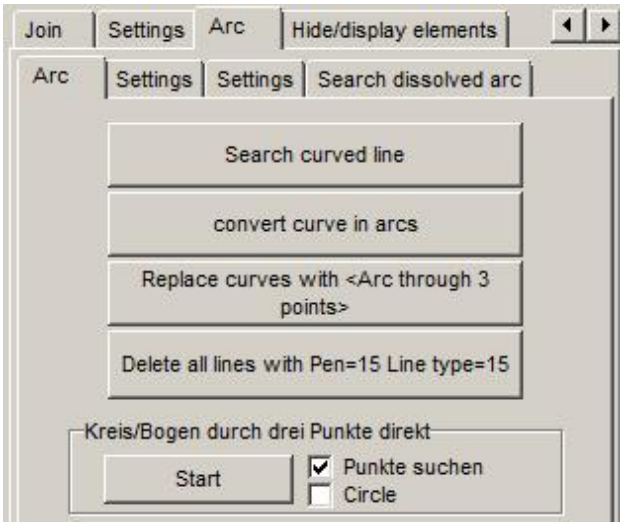
The 'Arc' tab contains 3 further tabs for making inputs on how to convert your curve series.

The 'Arcs' tab contains the buttons for making your transformation.

The first tab, 'Parameters' allwos for inputs relating to pen number and type and arc type for joining.

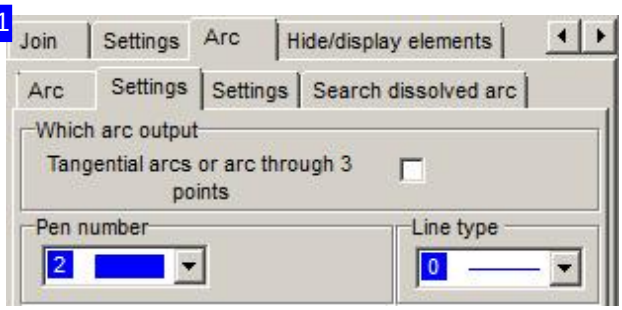
The second tab, 'Parameters' allows for inputs relating to the transformation.

2




In this frame, click the top button to search for a curve series. The elements around the mouse cursor will be sought through, checked against the limits you have set, and marked.
Click the second button to join the elements as arcs.
The third button allows you to replace the curve with an 'arc through 3 points'.
The bottom button gives a simple way to delete the replaced elements.

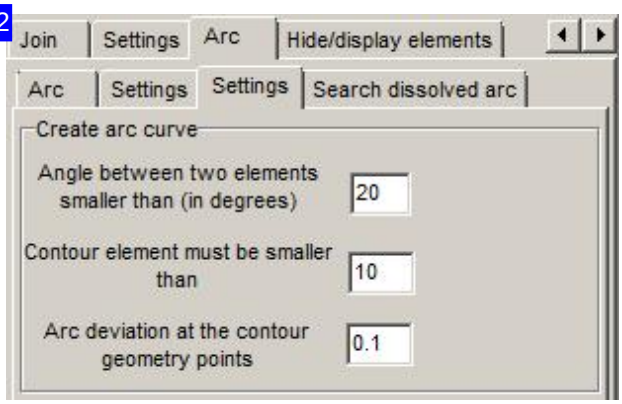
21




The 'Which arc output' frame allows you to set how to join elements. The default setting draws the arc as an 'arc through 3 points'. If you require tangential arcs as an output, check the relevant check box.

Select the pen and line types for joining from the selection lists. This option helps with processing your remaining elements.

22




Enter the limits for joining in the input fields.

The top frame sets the angle between two elements which should still be joined into an arc.

The middle frame sets the maximum length of a contour element which may be transformed to an arc.

The bottom frame sets the permissible deviation a new arc may have from existing geometric points.

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