Milling Software

XpertMill

Manual

Version 1.0

Contents

CHAPTER 1

Introduction

In this chapter

The XpertMill software controls PC-controlled milling machines.

The scope of functions that the software provides enables complete preprocessing of geometric data into 2 1/2 D milling data.

This manual helps you to use the extensive functions optimally. Read the manual carefully before using the software!

Conventions

Before using this manual, it is important that you familiarise yourself with the typographic conventions used.

The formatting styles in the following provide the following basic information:

Formatting	Information type
Arrows (➢)	Step-by-step instructions. Work through the activities described in order to carry out the tasks in full and correctly.
Bold	Important information that must not be overlooked by the reader is emphasised in bold.
Italic	Menu options, buttons and checkboxes that the user must choose, select or deselect in the software for working with the machine.
SMALL CAPITALS	Names of ports and buttons.

Product ID

Identification data

Software	XpertMill
Software name	
Serial number	
Controller number	
Product key	

Customer data

Inventory no.	
Location	

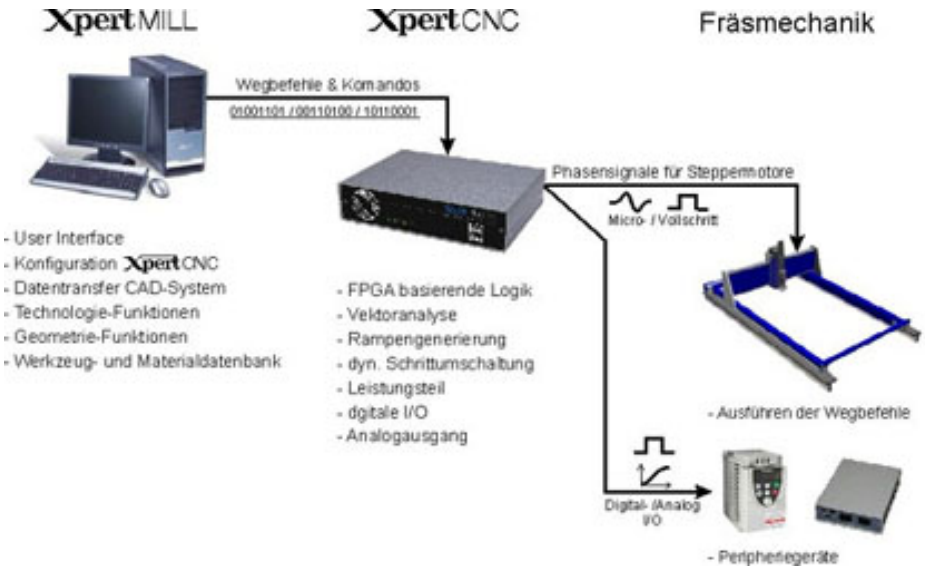
Manufacturer address

Company name	STEP FOUR GmbH
Street	Bayernstraße 380
Town/city	5071Wals-Siezenheim
Country of origin	Austria
Telephone	+43 (0) 662/459378-0
Fax	+43 (0) 662/459378-20
E-mail	office@step-four.at
Internet	www.step-four.at

The Xpert system concept

Interaction between XpertMill and XpertCNC

XpertMill and XpertCNC work as a team. The geometric data is preprocessed into milling data in the XpertMill software. The route commands and commands are transferred from the XpertMill software to the XpertCNC controller. The processor in the XpertCNC converts these commands into signals for stepper motors and peripheral devices.



CHAPTER 2

First steps

In this chapter

Before you can use XpertMill and the controller, you need to ***install*** (See "Installation" Page 9) the software and carry out ***basic configuration*** (See "Start XpertMill for the first time" Page 19).

System requirements

The PC used has the following basic requirements for ensuring smooth operation:

- 1GHz CPU
- 256MB RAM
- Microsoft Windows 2000, Microsoft Windows XP
- Standard graphics card
- Network interface card
- Free, serial interface
- 20MB free memory
- CD-ROM drive

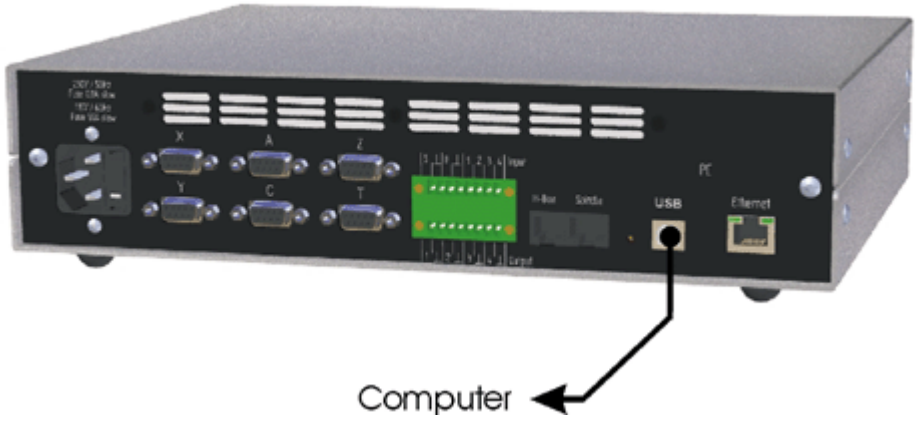
Wiring up the controller

For all required connections, the relevant cables are provided ready-made.

Connecting the controller to the PC

The controller needs to be connected to the computer at the **USB** port.

NOTE: The **ETHERNET** port is required for updating the controller firmware.



Connecting the controller to the mechanics

The outputs **A, C** and **T** need to be connected to the mechanics.

Connecting the peripheral devices to the controller (optional accessory)

NOTE: The emergency stop button is an add-on and is not required for launching the controller. We recommend you use an emergency stop button!Connect the emergency stop button to the **INPUT**.

Connecting the H-box to the controller (optional accessory)

The H-box needs to be connected to the controller at the **H-box** output.

Installation

All of the software components are available on the CD-ROM supplied. You do not require an Internet connection to install the software.

- Exit all open applications.
- Place the CD in the CD-ROM drive.

If *Autostart* is active, the ***Installation Wizard*** opens to guide you through the installation process.

If *Autostart* is not active, you need to start the ***Installation Wizard*** by executing *Setup.exe*.

Start Installation Wizard manually

Carry out the following instructions if Microsoft Windows does **not** automatically recognise the content of the CD-ROM and does not run the Installation Wizard automatically.

➢ ***Installation without autostart***

- Open Windows Explorer.
- Access the drive on which you have installed the XpertMill CD.
- Go to the /`Setup/` directory.
- Run the `Setup.exe` file.

Setup starts the ***installation process***.

Installation Wizard

The Installation Wizard guides you through the entire installation process.

NOTE: Make sure that you read the notes and explanations in detail and follow the instructions.

First, the Installation Wizard is loaded. The screenshot below shows the status of the loading process.

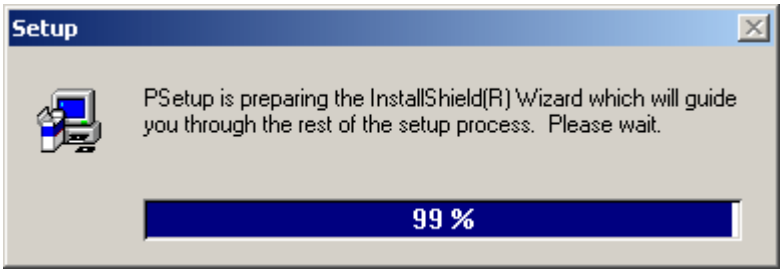
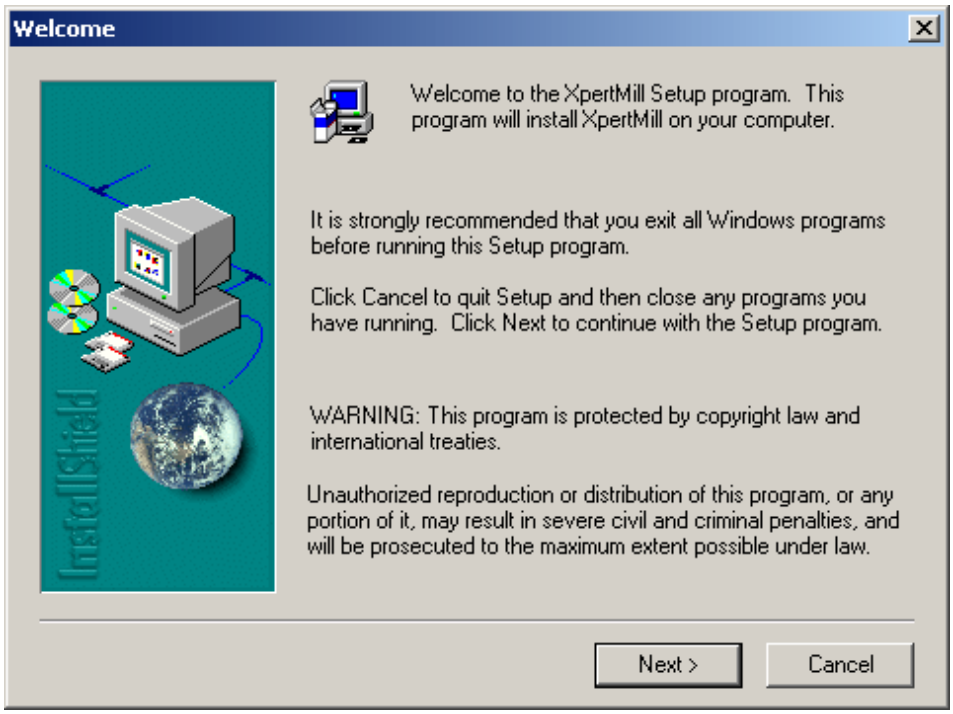


Abbildung 1: Installation Wizard is loaded

Welcome - Start installation process

The screenshot below appears at the start of the installation process.

NOTE: If any applications are still open, you must exit these now! `Alt + Tab` enables you to switch to other open applications.

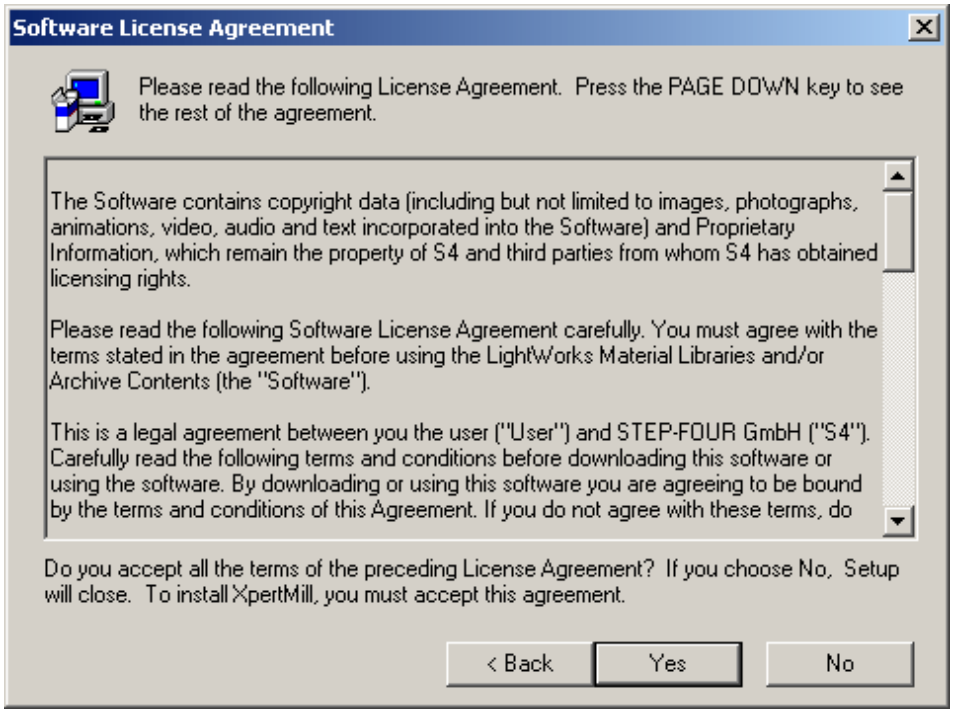


Choose *Continue* > to continue with the installation process.

Software license agreement

The licence agreement is part of the purchase contract.

NOTE: You cannot continue to install the software successfully until you have accepted the licence agreement (by choosing *Yes*). Read the agreement carefully in order to avoid any misunderstandings!



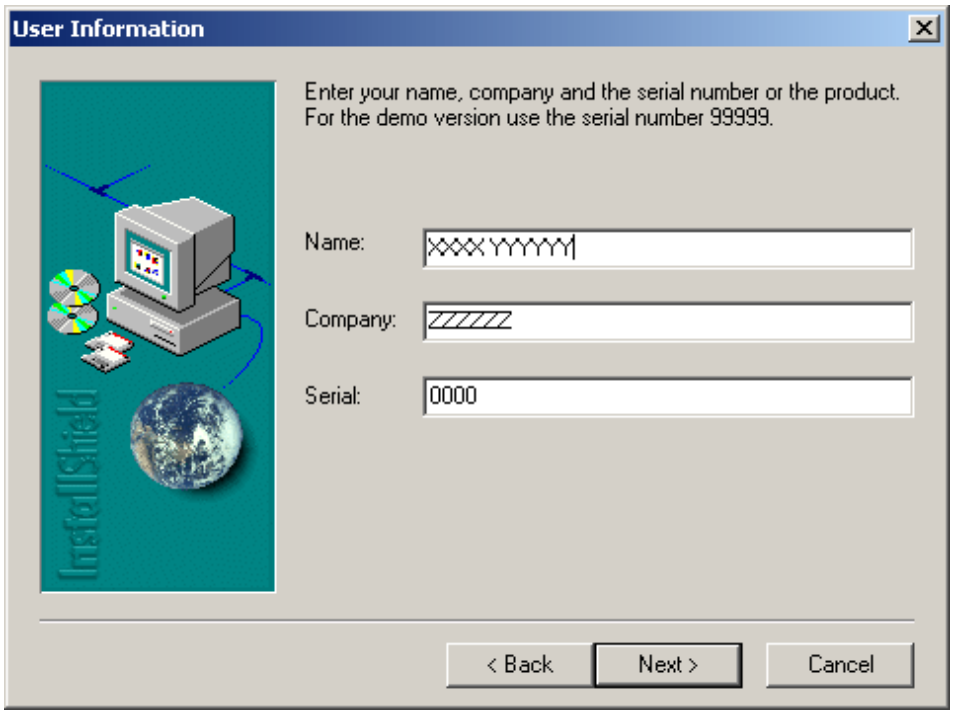
<Back takes you back to the previous screen.

Yes accepts the licence agreement and continues the installation process.

No does not accept the licence agreement and cancels the installation process.

User information

In this window, the Installation Wizard asks for information about the user and for the serial number of the XpertCNC controller.



<*Back* takes you back to the previous screen.

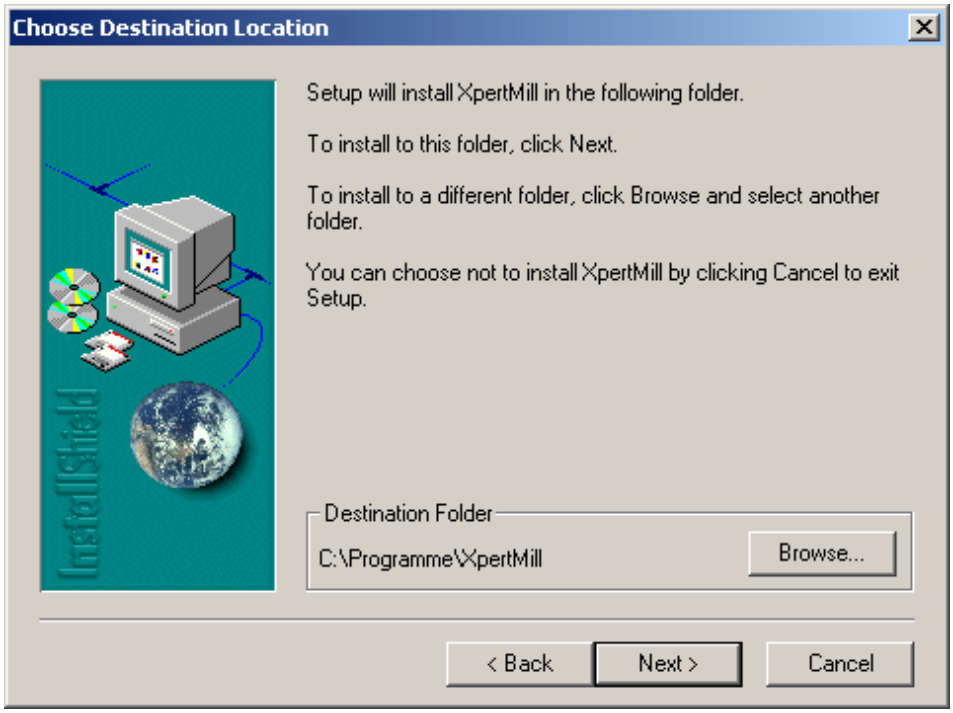
Continue> continues the installation process.

Cancel cancels the installation process.

Choose target path

In the *Choose Target Path* window, the Installation Wizard proposes a folder as the target folder in which to store the installation files.

The *Search...* option enables you to choose a different target folder.



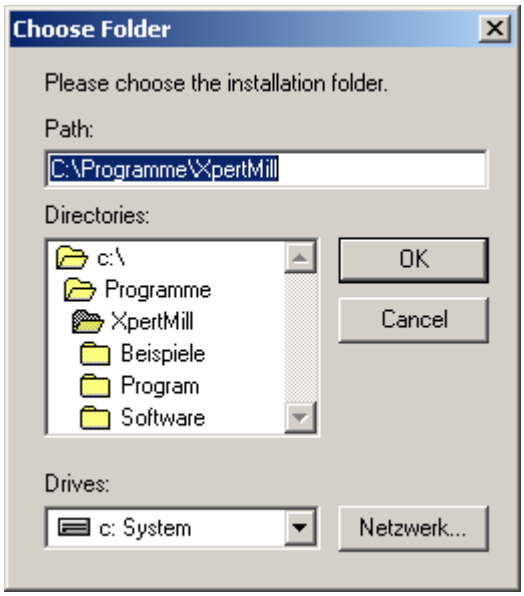
<*Back* takes you back to the previous screen.

Continue > continues the installation process.

Cancel cancels the installation process.

Search

When you choose *Search...*, the *Choose Folder* window opens.

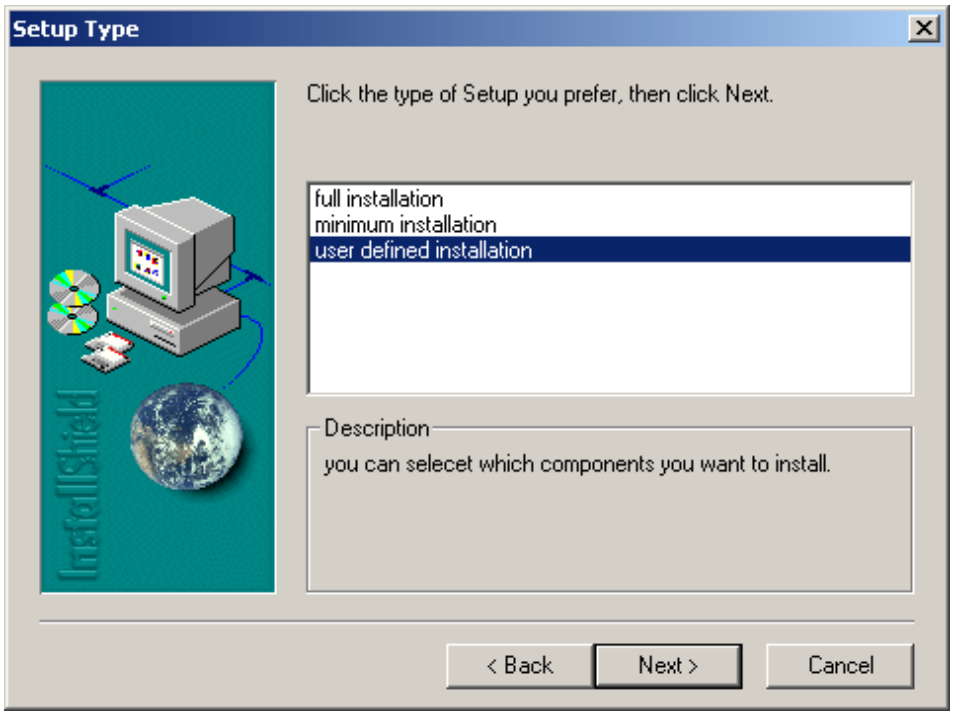


- Choose *Drive*.
- Specify the *directory*.
- Choose *OK* to use the selected folder as the target folder.

Choose *Network...* to assign the target folder in the network.

Setup categories

For the installation, you can choose between three installation categories.



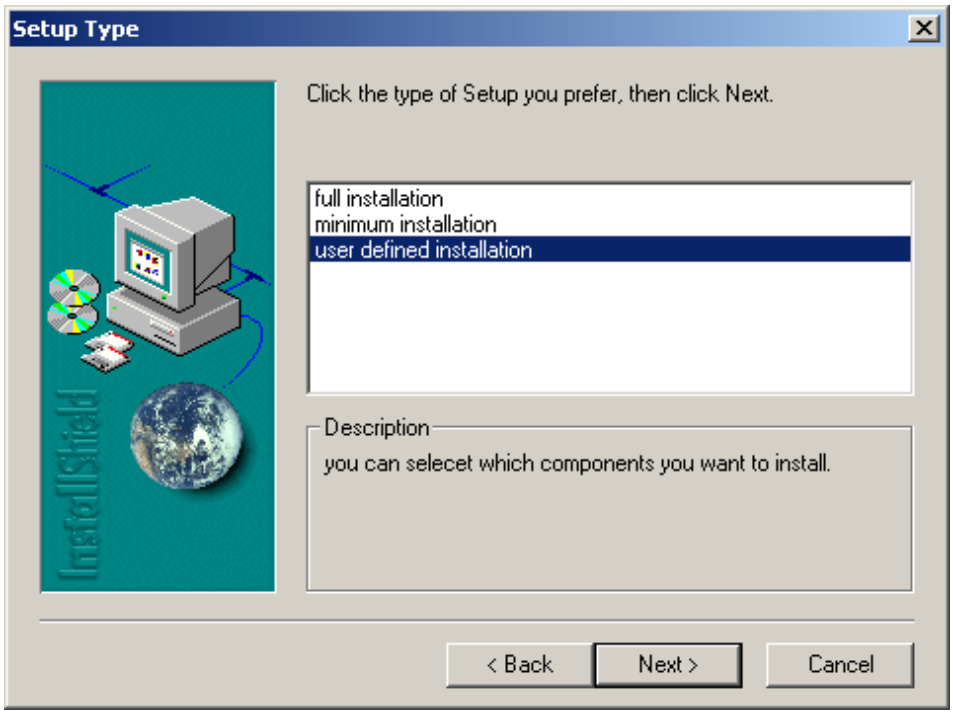
<*Back* takes you back to the previous screen.

Continue > continues the installation process.

Cancel cancels the installation process.

User-defined installation

In the case of *user-defined installation*, you can choose which components you want to install.



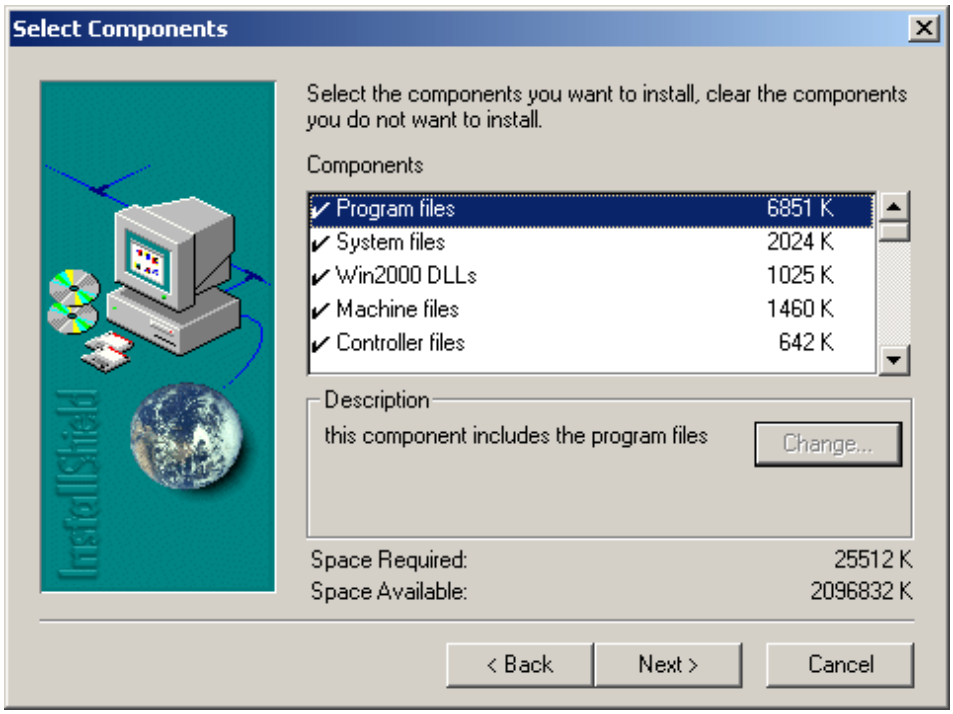
<*Back* takes you back to the previous screen.

Continue > continues the installation process.

Cancel cancels the installation process.

Select components

In this window, you can select the components that you want to install.



<*Back* takes you back to the previous screen.

Continue > continues the installation process.

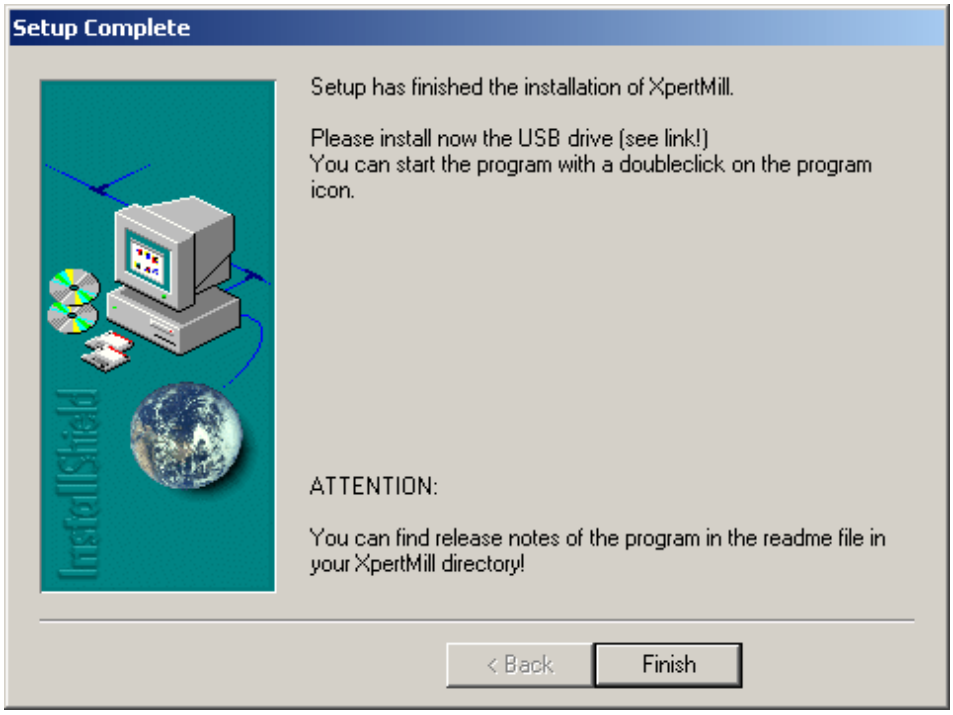
Cancel cancels the installation process.

Installation progress

This installation is carried out.

Installation complete

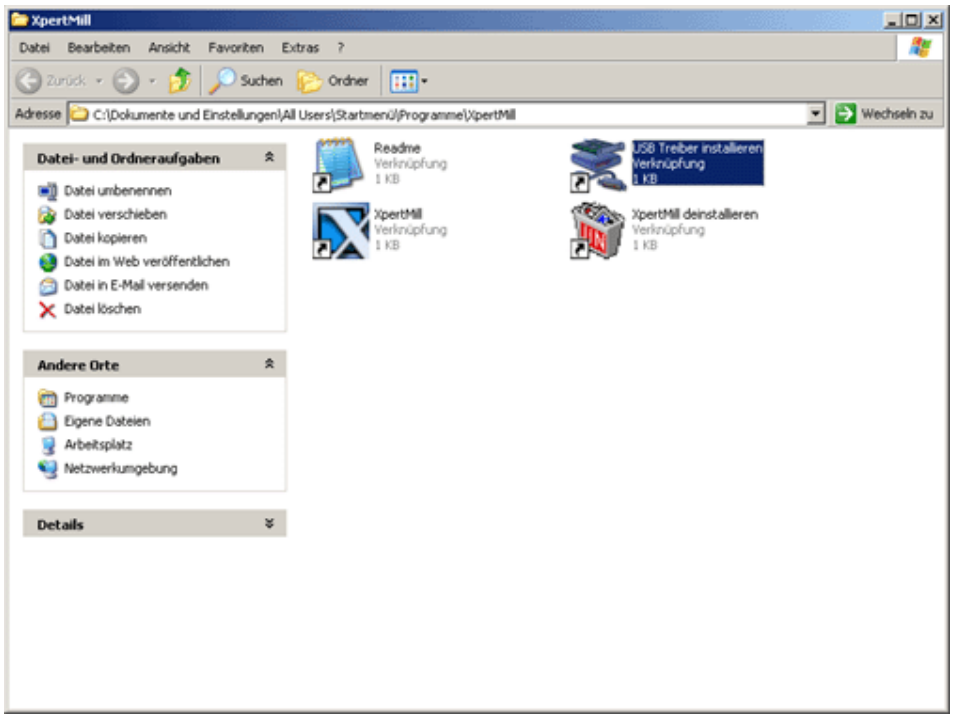
This installation is complete.



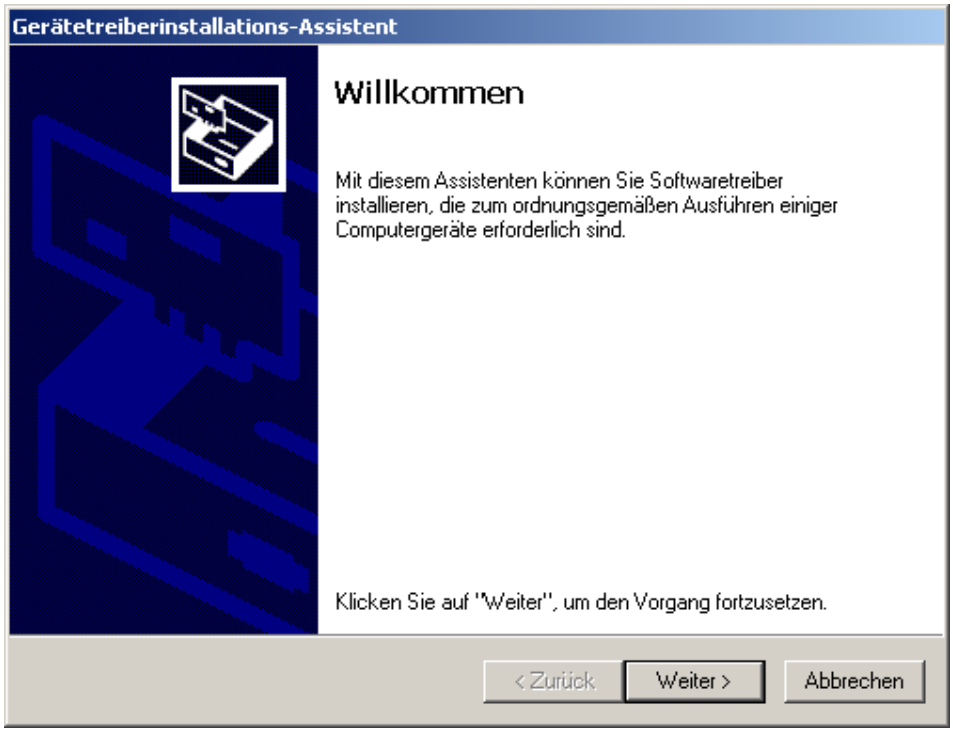
Finish closes the window.

USB driver installation

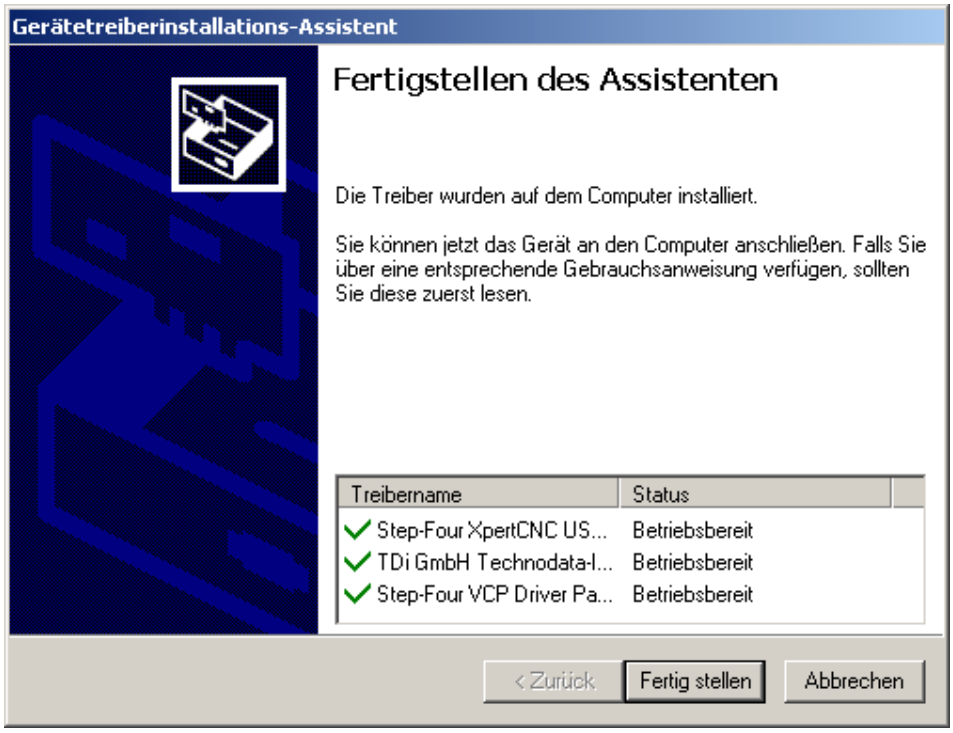
Once the installation is complete, a window opens containing the XpertMill **PROGRAM ICON** and a **DRIVER ICON**.



If you want to connect the controller to the computer via the USB port, you need to install a driver for this. Choose the *Install USB Driver* icon to start the Installation Wizard.



Continue > starts the installation process.



The Installation Wizard was completed and the drivers are active.

Complete closes the Installation Wizard.

Open XpertMill by choosing the program icon in the open window or from the start menu.

Start XpertMill for the first time

When you start the software for the first time, you are prompted to specify the ***usage*** (See "Software mode" Page 20) and to ***register*** (See "Registration" Page 21).

NOTE: You can make subsequent changes to the usage and registration details by choosing the menu option **HELP - INFO**

ABOUT XPERTMILL.

Software mode

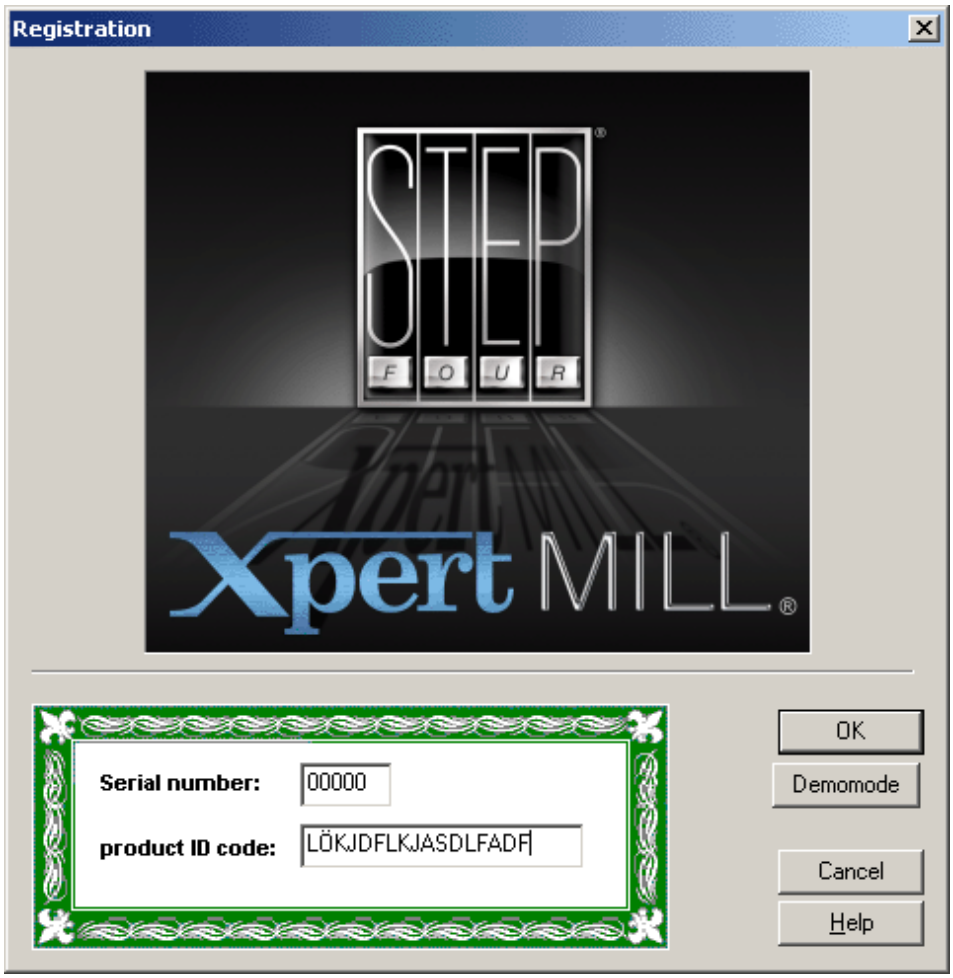
Demo version: all of the software functions are available, but there is no output to the controller.

Data preparation with dongle: is used to prepare data for subsequent implementation of the created milling projects.

Milling software with XpertCNC controller: software is used in connection with the controller.

Registration

When you register, the *modules* are released.



Serial number: enter the serial number of the software.

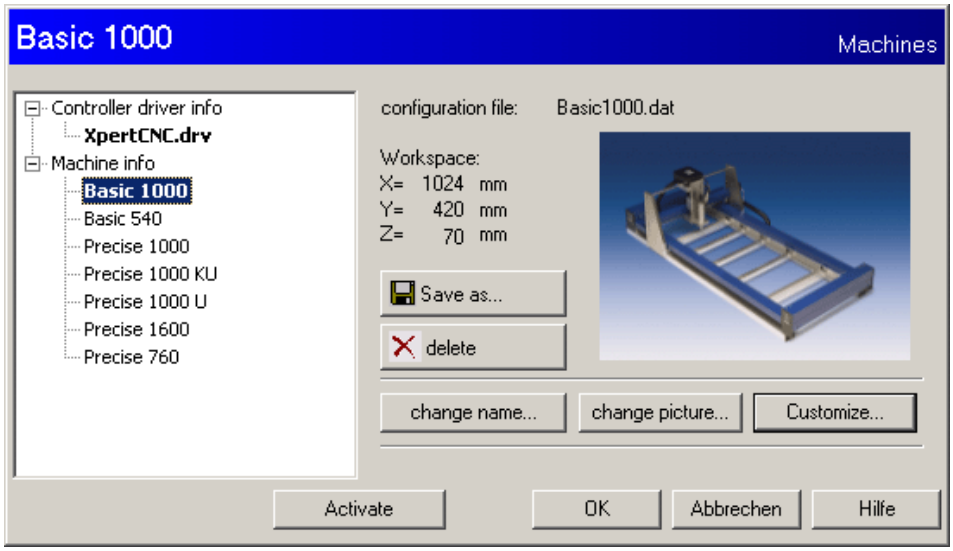
Product ID code: enter the product ID code of the software.

Demomode: starts XpertMill in demo mode.

Basic settings

Choose 

Machine Driver to switch to the *Driver Info* subwindow.



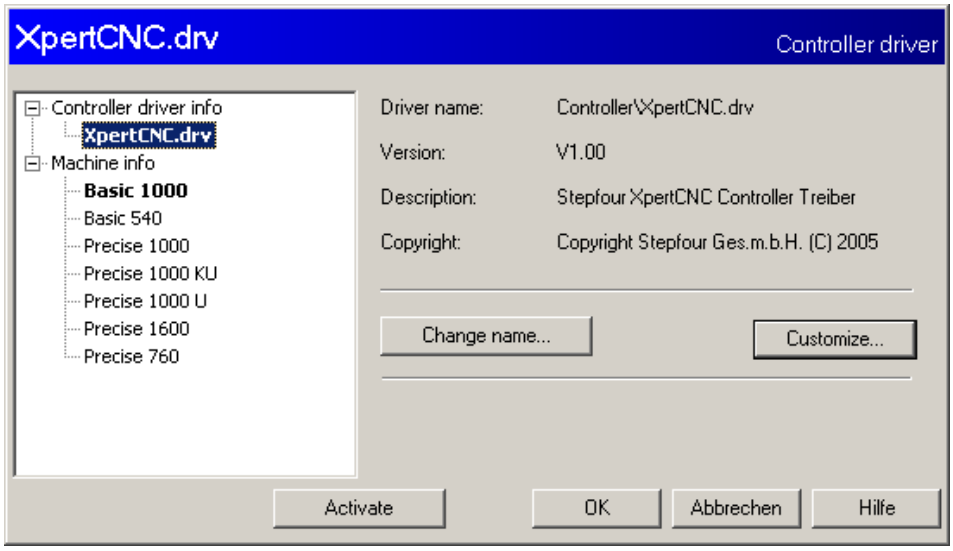
➢ ***Select machine driver***

- Select the desired driver.
- Choose *Activate* to load the driver.

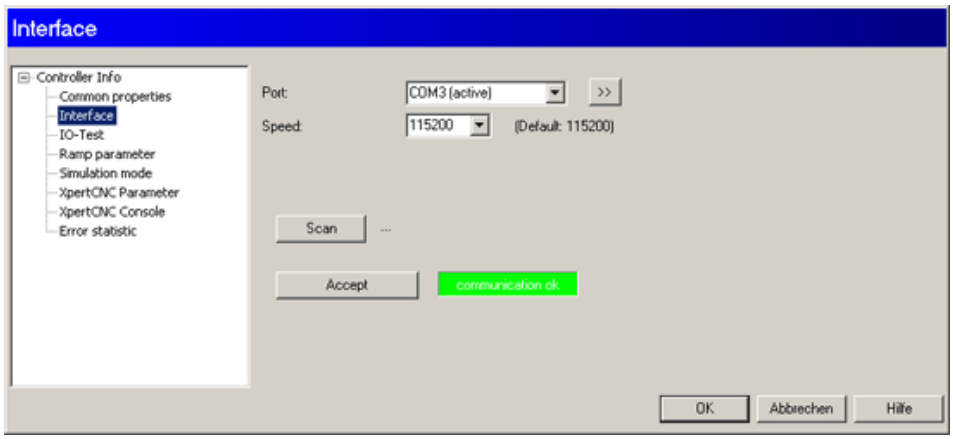
CAUTION! Incorrect machine drivers damage the mechanics!

➢ ***Define connection to the controller***

- Select the controller driver *XpertCNC.drv*.
- Choose *Activate* to load the controller driver.



- Choose *Customize...* to switch to the *Controller Info* subscreen.
- Select *Interface*.



- Choose *Scan* to search for the controller.

Once you have found the relevant controller, the status changes to *Communication ok*.

- Choose *Accept* to confirm your settings.
- Choose *OK* to exit the *Controller Info* subwindow.
- Choose *OK* to exit the *Driver Info* subwindow.

Completion

The machine starts when the controller and a reference run are initialised.

CHAPTER 3

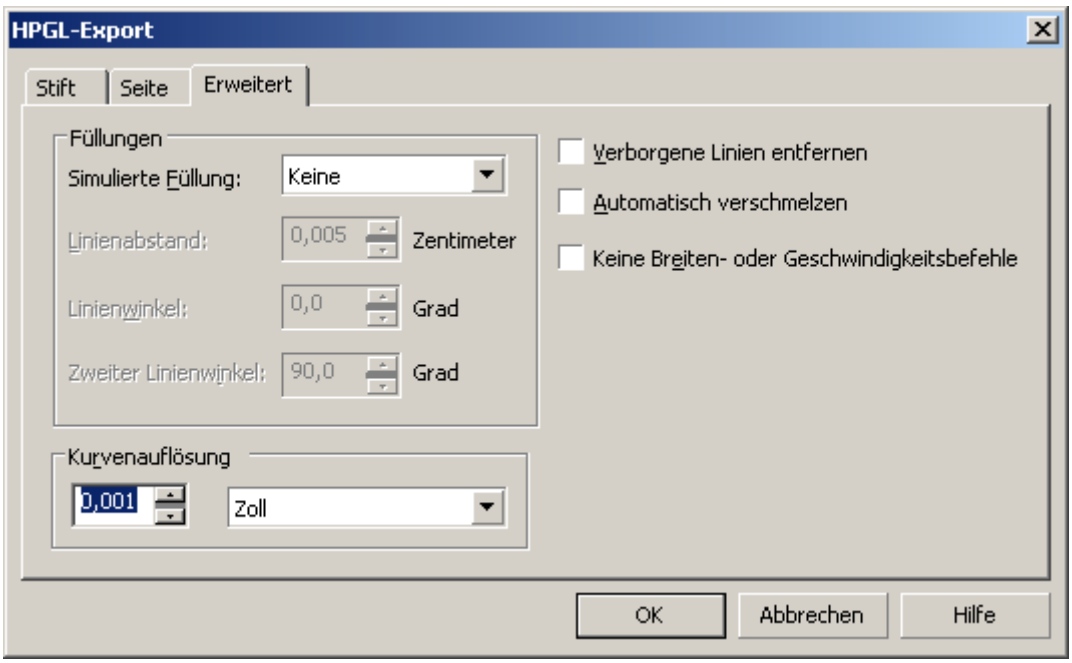
Milling object 1: Logo in .plt format

In this chapter

On the basis of the first example, a logo (= milling object) is milled from a 3mm plywood board. The geometric information was created using a suitable tool (such as Corel Draw, AutoCAD etc.; in this case, Corel Draw) and saved as a .PLT file.

NOTE: When exporting or saving geometric information, note the settings such as curve resolution and scaling.

Example for the curve resolution setting in Corel Draw:



We recommend a resolution of 0.001 inches.

Basic requirements for geometric data:

- Closed objects
- No duplicates (two or more objects with the same geometry that are on top of each other)
- Resolution larger than the increment of the machine

NOTE: Not all of the graphics and values in the graphics in the following relate to this milling example.

Checklist

NOTE: Before processing the data, make sure that the required tool/material is in the standard milling set/material set!☑ Open/import geometry

☑ Align/move

☑ Ungroup

☑ Contour definition

☑ Sort order

☑ Start point, direction (up-cut milling /synchronous milling)

☑ Layer properties

☑ Clamp material and milling cutter

☑ Set zero point (touch)

☑ Start processing

Open

➢ ***Load the geometric information***

1 When you choose the button, the ***Open subs***creen (See "Open" Page 138) appears on which you can select the desired data.

2 Under *File type*, choose *.plt.

3 Search for the milling object in the directory.

4 Adjust the settings (scaling, curve resolution etc.) to match the file values.

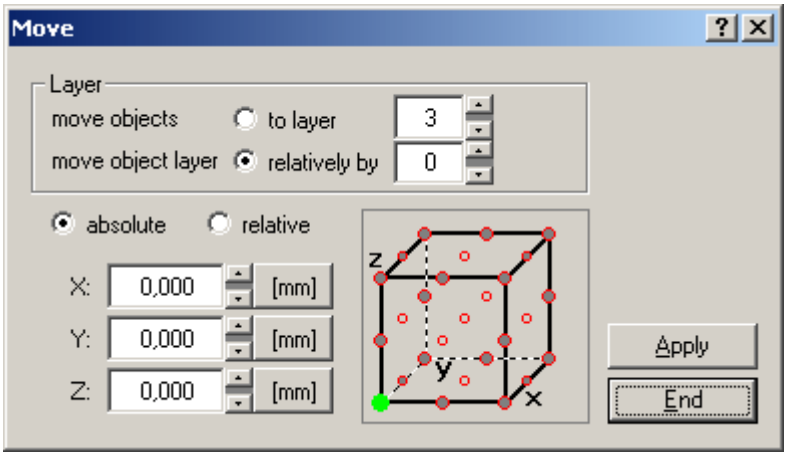
5 Choose *Open* to open the milling object.

Align/move

➢ ***Move milling object to the zero point (X=0, Y=0, Z=0)***

1 Select the milling object.

2 Right-click the object and choose *Edit*➔*Move* to open the **MOVE** subwindow.



NOTE: Set the layer settings to *move relatively by 0 layers*.

3 Choose the *Absolute* radio button.

4 Set the axes (*X*, *Y* and *Z*) to the value *0.00*.

5 Choose *Apply* to close the window and move the milling object to the zero point.

Ungroup

When you open a *.plt file, all objects in this file are grouped together into one group. In order to carry out further processing steps, you need to ungroup these objects.

➢ ***Ungroup***

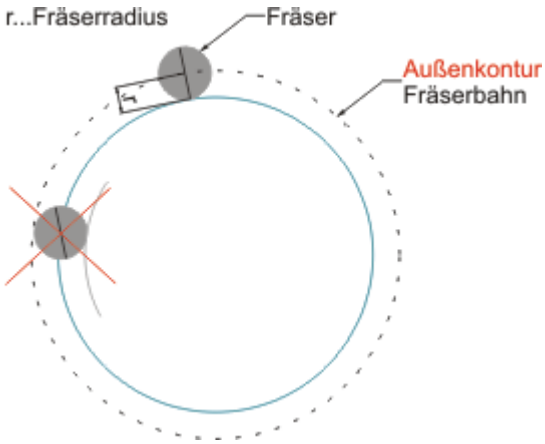
1 Select a group.

2 Right-click the object ➔*Ungroup.*

Contour definition: general

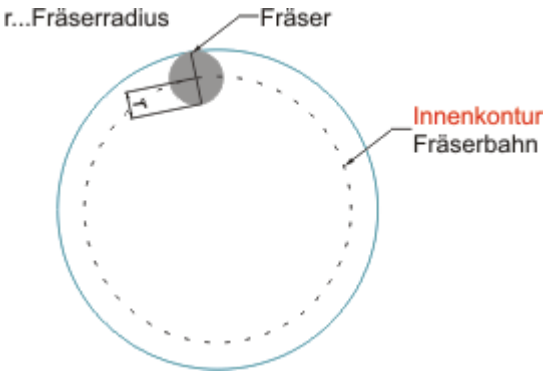
The contour needs to be defined in order for the cutting radius to be taken into consideration. In achieve the object that you require, the cutter centre must be positioned at a distance of its radius away from the cutting radius.

The graphic below aims to illustrate this.



In order to mill around the blue circle, you need to define an **outside contour**. This means that the path of the milling cutter around the cutting radius (r) is corrected **outwards** and the outer circumference of the milling cutter must therefore be aligned with the circumference of the circle to be milled.

If you do not define an outside contour, the path of the milling cutter would be equal to the circumference of the circle to be milled and the diameter of the milled circle would be too small (crossed out in red in the graphic).

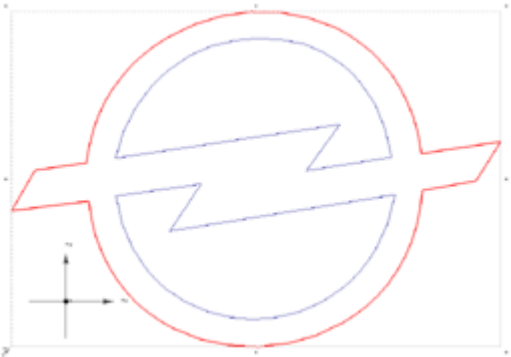


The same logic applies to an **inside contour**.

Contour definition of the objects

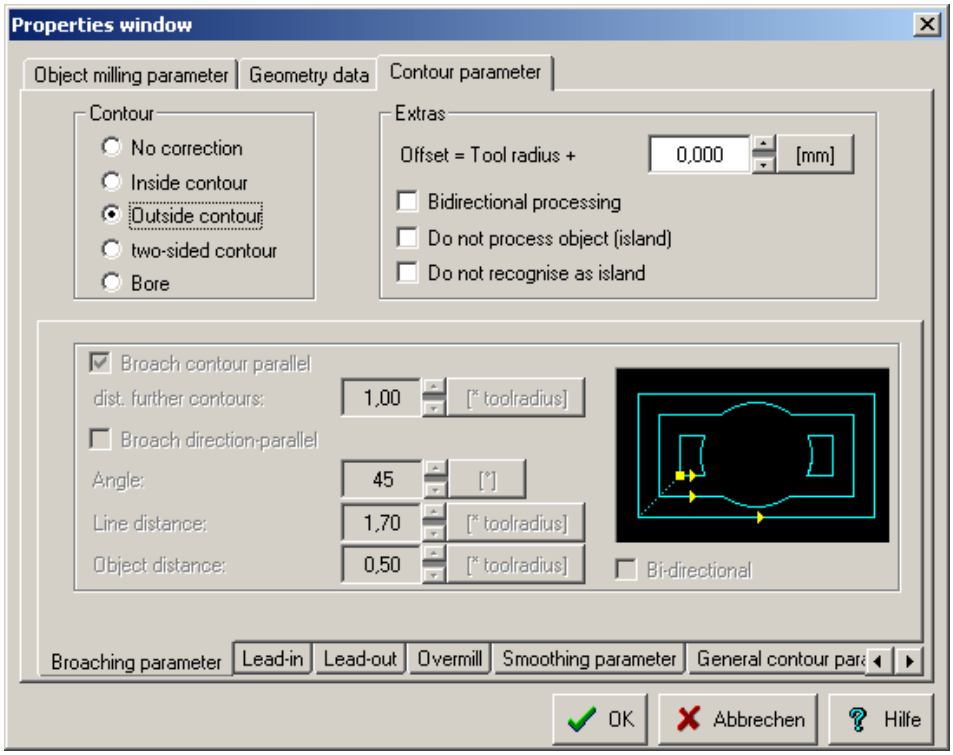
➢ ***Define contour***

1 Select the outer object.



2 Right-click the object ➔*Properties* to open the *Properties window* subwindow.

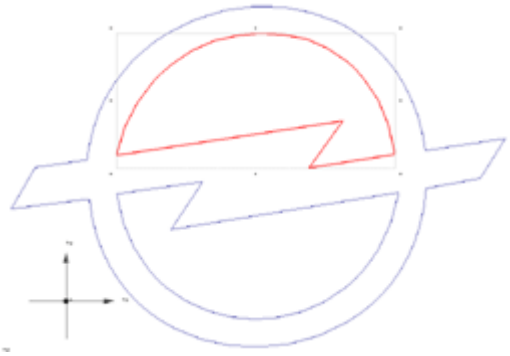
3 On the *Contour parameter* tab page, make settings for the contour definition.



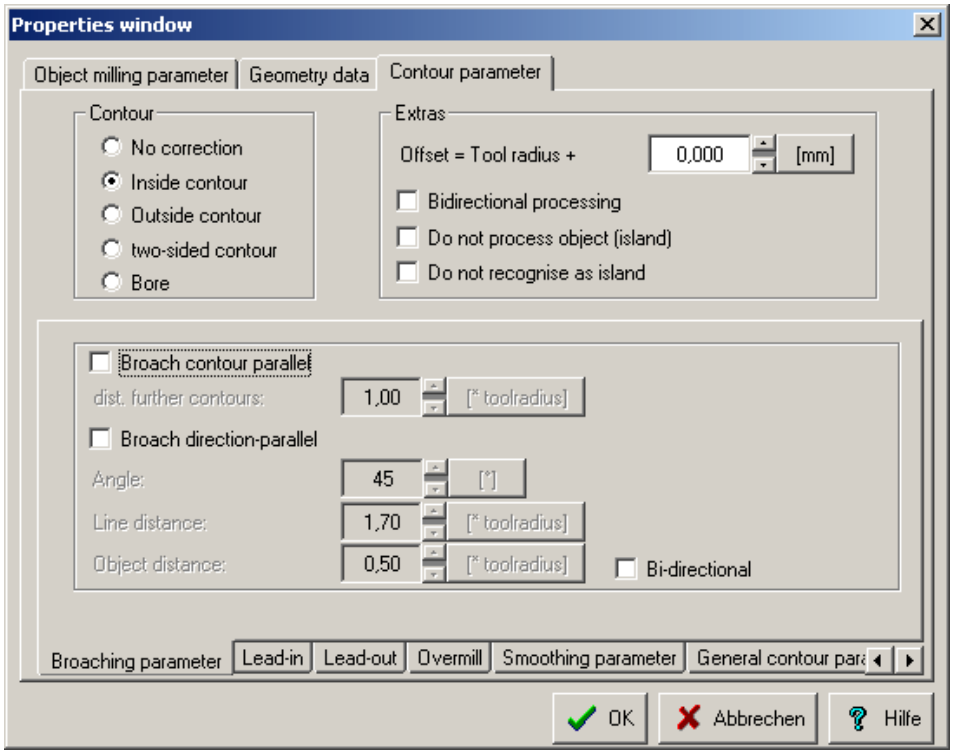
4 Choose the *Outside contour* radio button.

5 Confirm your data by choosing *OK*.

6 Select the inner object.



7 Right-click the object ➔*Properties* to open the *Properties window* subwindow.



8 Choose the *Inside contour* radio button.

9 Confirm your data by choosing *OK*.

10 Repeat steps 5 to 8 for the second inner object.

The finished contour definition looks as follows:

NOTE: To emphasise the contour in this graphic, a milling cutter with a large cutting radius (r) was chosen.

NOTE: You can also define contours using the *contour* tool. With this tool, you can also assign several objects to contour definitions at the same time.

Set routing order

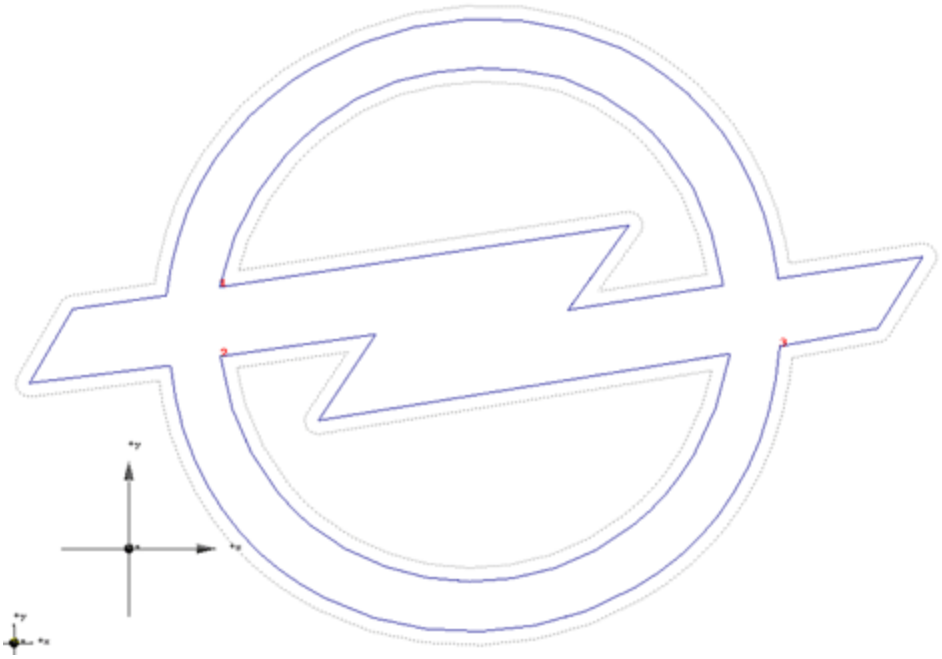
Sets the sort order for the logo objects to be milled.

First, the inner objects are processed (cut out) and, in the final step, the outermost contour is milled.

➢ ***Set sort order***

1 Choose the 

2 *Sort order* button from the Object edit toolbar to set the routing order.



3 Click an object to change the sort order.

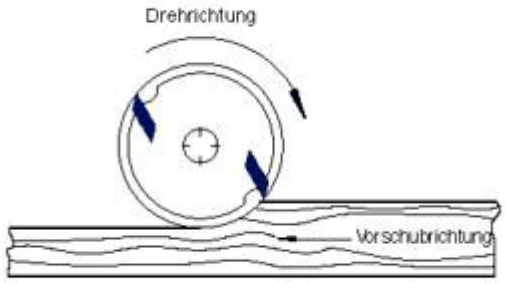
Left-click to increase and **right-click** to decrease the number by one.

NOTE: To redefine the routing order, you can use the *selection tool* to set an ***automatic*** (See "Automatic renumber" Page 217) or ***manual*** (See "Manual renumber" Page 217) sort order by right-clicking (a free work area)➔*Manual/Automatic renumber*.

Synchronous milling/up-cut milling

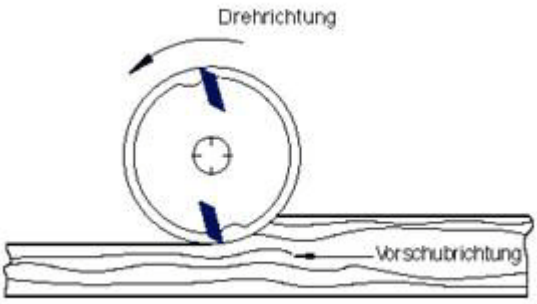
A distinction is made between **synchronous** and **up-cut milling**.

Synchronous milling



In the case of synchronous milling, the work piece or milling cutter is moved **in the direction of rotation** of the milling cutter.

Up-cut milling



In the case of up-cut milling, the work piece or milling cutter is moved **in the opposite direction to the direction of rotation** of the milling cutter.

NOTE: Synchronous milling achieves better surface quality.

Define start point and direction

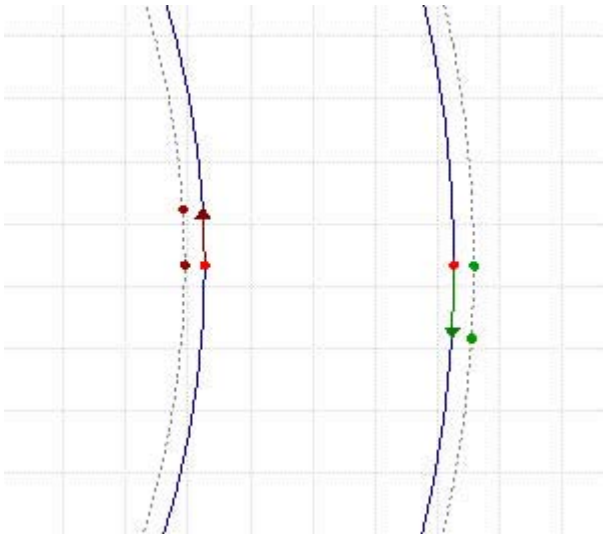
Which start point and direction is defined depends on whether **up-cut** or **synchronous milling** is to be carried out.

Define start point

Left-click the start point to transfer it to the desired position.

Change milling direction

Right-click the start point to reverse the milling direction.

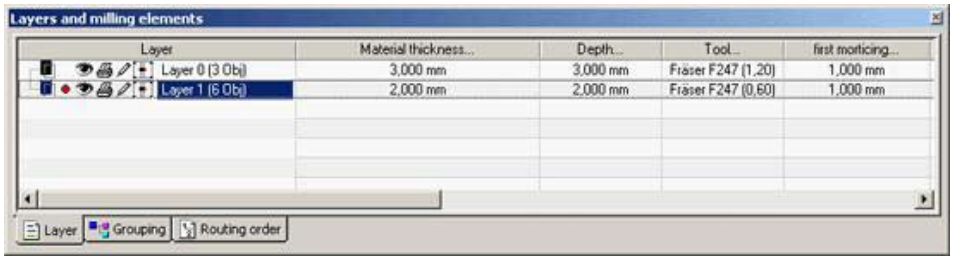


NOTE: If the ***Automatic definition of direction*** (See "Assignments" Page 148) checkbox is active, you can no longer change the milling direction for a defined contour.

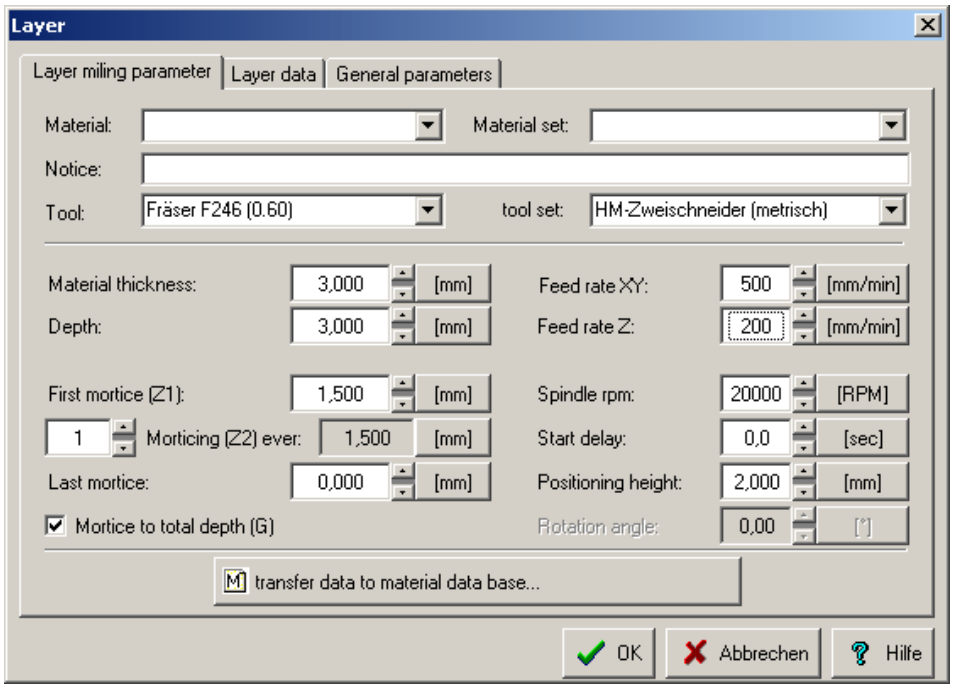
Layer properties

You make milling-relevant settings, such as material thickness and feed rate, under the layer properties.

NOTE: You can also define the milling parameters individually for each object.Set layer properties



1 Double-click the layer in the layer window to open the *Layer* subwindow, *Layer milling parameter* tab page.



2 Select a *material set* and a *material*.

The parameters defined in the material definitions (feed rate, spindle RPM etc.) are adopted for the layer. (***Material definition*** (Page 152))

3 Select a *tool set* and a *tool*.

Individual tool sets consisting of one or more milling cutters can be grouped together in the tool database. (***Tools*** (Page 156))

NOTE: If you require different parameters to those defined in the material definition, you can change the parameters.

4 Choose *OK* to confirm your entries and close the subwindow.

NOTE: You can make individual settings for selected layers by double-clicking the relevant column in the layer window.

Clamp material and milling cutter

Now you need to clamp the material and milling cutter.

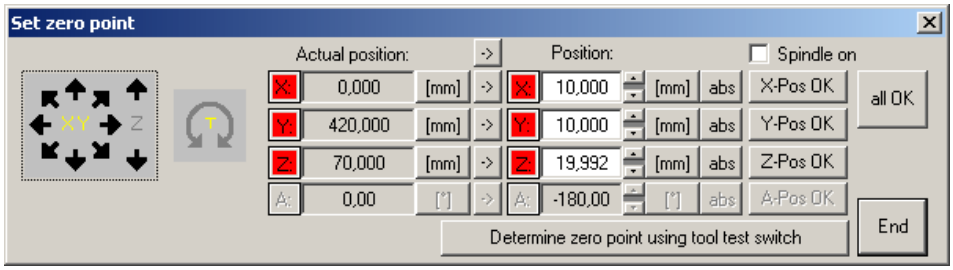
- When clamping the plywood board, make sure that the board is laid correctly.
- In this example, a spiral-toothed milling cutter with a 0.8mm diameter is clamped in the spindle as the tool.

Set zero point

The zero point is the reference position for the work piece. In order to mill a work piece from the material at the required position, you need to specify the X and Y coordinates and touch the surface of the material with the milling cutter; this defines the Z coordinate.

➢ ***Set zero point***

1 Choose the button to open the *Set zero point* subwindow.



2 Use the arrows or arrow keys to move the milling cutter over the material to the desired X and Y position of the zero point with approx. 5mm spacing.

NOTE: You can use additional keys, such as SHIFT and ALT GR or CTRL, to change the increment, position the milling cutter accurately and move it more quickly. You can press the space bar to switch between *XY* and *Z*.

3 Transfer the actual position from the *Actual position* column to the *Position* column using the *arrow buttons*.

4 Choose *X-Pos OK* and *Y-Pos OK* to save the values for the X and Y zero point.

5 For the Z zero point position, use the arrow keys to touch the milling cutter onto the material surface.

NOTE: You can use additional keys, such as SHIFT and ALT GR or CTRL, to change the increment, position the milling cutter accurately and move it more quickly. You can press the space bar to switch between *XY* and *Z*.

6 Save the Z position as described in steps 3 and 4.

7 Choose  , *Move to tool change position Z*, to move the milling cutter upwards.

8 Choose *End* to exit the subwindow.

The zero point is set.

Start processing

1 Set the correct speed for the milling motor and activate the motor (necessary in the case of analogue milling motors such as Proxxon or Kress).

2 Activate the extraction system, if available.

3 Choose  to start the mill process.

The system outputs a confirmation prompt about the accuracy of the zero point and tool. If all the settings are correct, the mill process can be started.

CAUTION! Risk of injury! If unforeseen developments occur during the mill process, for example, if the work piece wobbles or slips, **UNDER NO CIRCUMSTANCES** should you attempt to reach into the machine and stop or readjust the work piece.Use the **Emergency stop** button to bring the machine to a standstill and only then reach into the machine!

Your fingers are worth much more than even the most expensive material!

GOOD LUCK!

CHAPTER 4

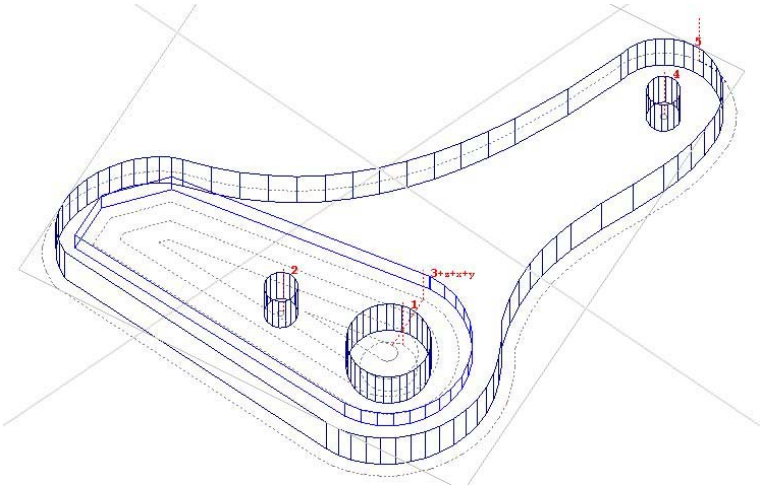
Example 2: Mill throttle as 2.5D object from 3mm GRP

In this chapter

This example builds on example 1 and explains the additional steps that are required to mill a 2.5D object.

Object description:

Throttle for a model motor (3W 150ccm Walbro carburettor).



The lever is manufactured from 3mm GRP and has a perfectly fitting clearance of 1.5mm for the existing carburettor air brake lever.

To create 2.5D objects, you basically need to carry out the same steps as in example 1. In addition, the objects with a different milling depth are moved to a different layer and different milling depths are defined for this purpose.

Checklist

NOTE: Before processing the data, make sure that the required tool/material is in the standard milling set/material set!

☑ Open/import geometry

☑ Align/move

☑ Ungroup

☑ Contour definition

☑ Sort order

☑ Start point, direction (up-cut milling /synchronous milling)

☑ Move objects to layers

☑ Layer properties

☑ Clamp material and milling cutter

☑ Set zero point (touch)

☑ Start processing

Preparation

As a preparatory activity, basically carry out the following steps from example 1:

1 ***Open*** (Page 26)

2 ***Align/move*** (Page 27)

3 ***Ungroup*** (Page 28)

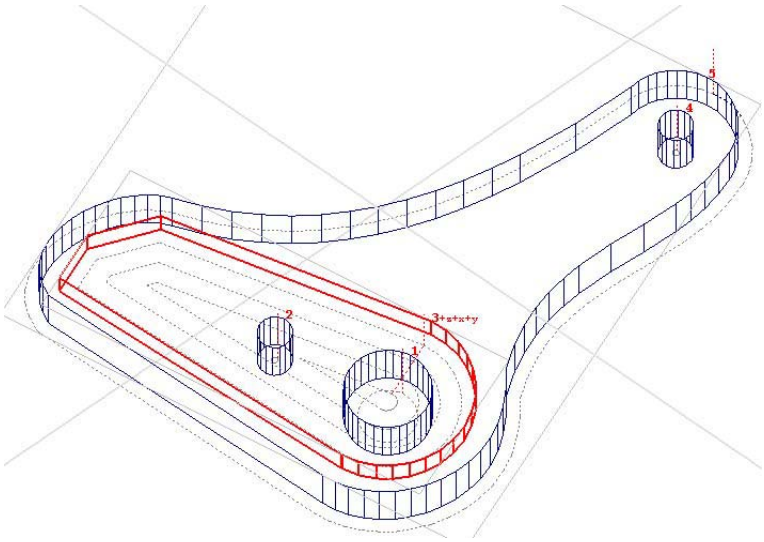
4 ***Contour definition*** (See "Contour definition of the objects" Page 29)

(Help for ***broaching*** (See "Broach the clearance" Page 41))

5 ***Set routing order*** (Page 32)

6 ***Define start point and direction*** (Page 33)

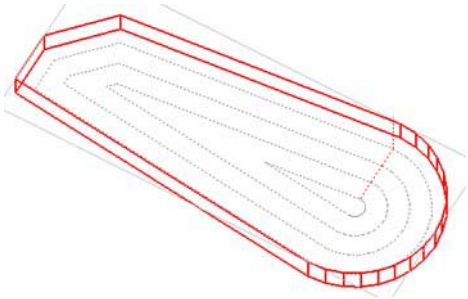
Broach the clearance



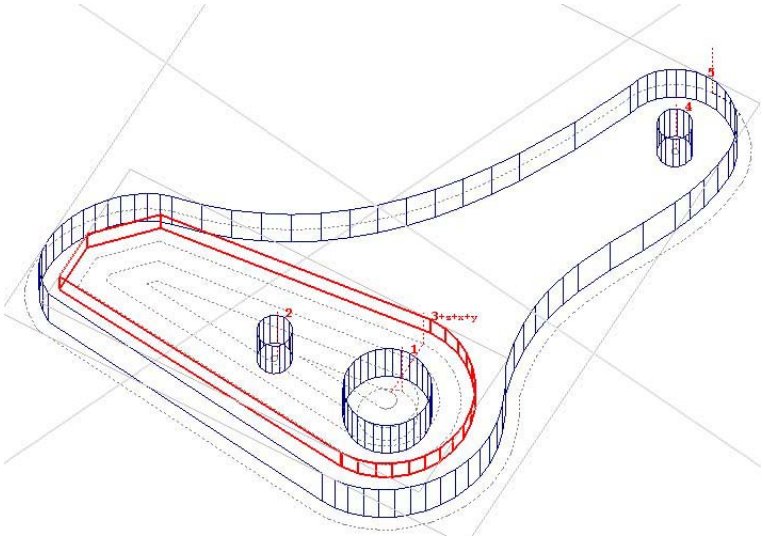
In order to, in this example, mill the clearance for the original lever (marked in red in the graphic above), you need to "broach" the area.

The *broach* function is just part of the *contour definition* (See "Properties - Contour parameter" Page 122). In this example, the broaching parameters were set in accordance with the values shown in the graphic.

The result can be seen in the following image. The cutting paths (broaching lines) run parallel to the contour at the distance set.



Move objects to layers

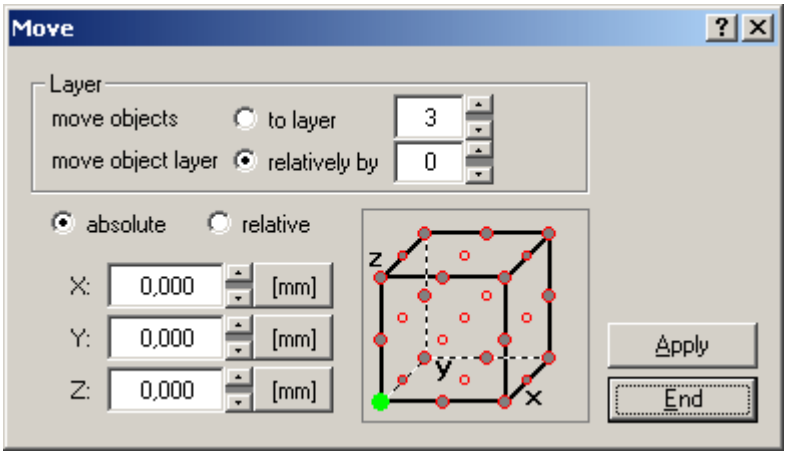


You can use the *move* function to move objects to a different layer.

1 Select the objects that you want to move (in red in the image).

2 Right-click the object and choose *Edit*

3 *Move* to open the *Move* subwindow.



NOTE: Choose the *Relative* radio button and set 0.00.

4 Choose the *To layer* radio button.

5 Enter the desired layer number.

Choose *Apply* to move the milling object to the desired layer.

Choose *End* to close the window.

Datenaufbereitung abschließen

After the objekts have been moved to the layers, follow the steps below.

1 ***Layer properties*** (Page 34)

2 ***Clamp material and milling cutter*** (Page 36)

3 ***Set zero Point*** (Page 36)

CAUTION! Glassfiber dust can seriously damage your health. Wear protectors for mouth and eyes!

4 ***Start Processing*** (Page 37)

CHAPTER 5

User interface (GUI)

In this chapter

XpertMill user interface

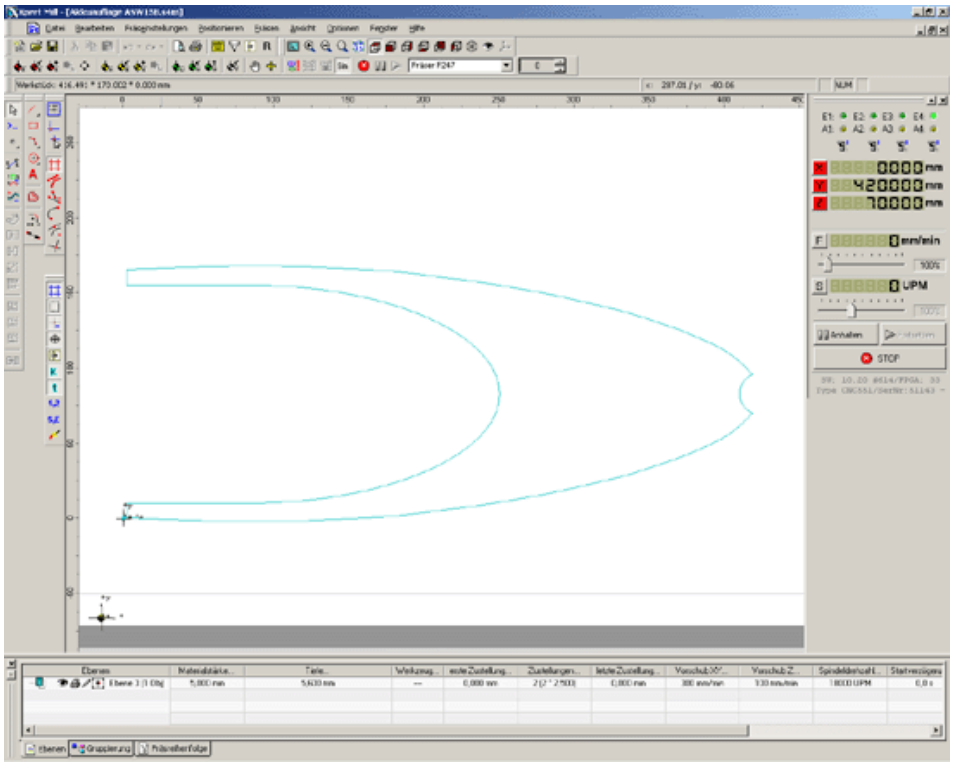
General setup

The XpertMill interface enables you to adapt the appearance of the software to meet your individual requirements.

You can hide and display individual areas and position them as you require.

NOTE: Individual interface configuration is **not** covered in this manual.

NOTE: Screenshots in this manual may differ from the screens displayed on your PC if the software package you have purchased does not include all modules.

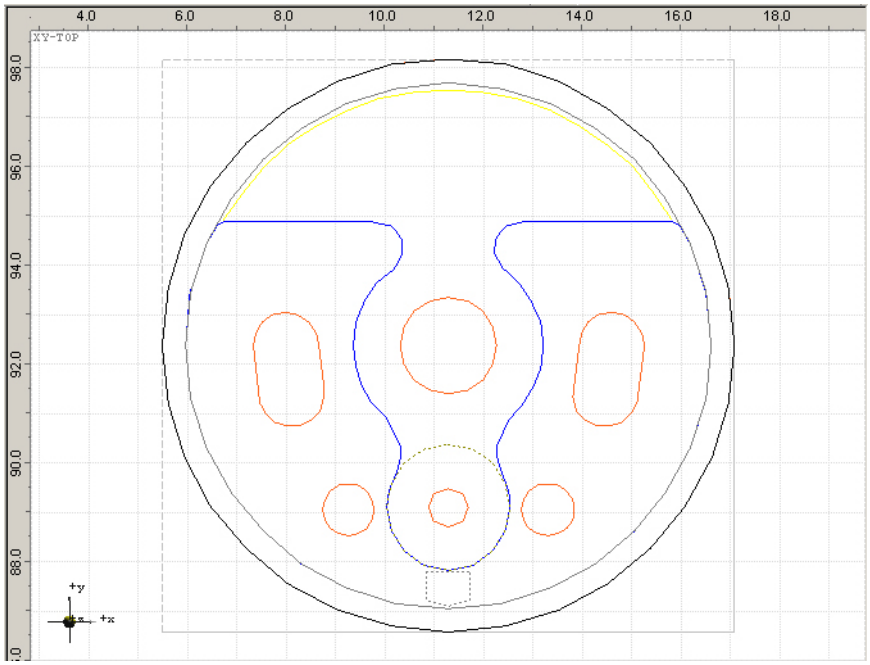


Areas of the user interface

Area	Contents
Top	▪ Menu ▪ Toolbars (horizontal) ▪ Status bar
Left	▪ Toolbars (vertical)
Middle	▪ Work area
Right	▪ Machine status window
Bottom	▪ Layer window

Work area

Geometric data is shown in this area. Functions that can be displayed, such as rulers at the edges and the representation of the machine, help you orient around the work area.



Orientation guides

- Rulers
- Representation of the machine
- Machine points
  - Reference point
  - Zero point
  - Tool change point
  - Material zero point
  - Tool test point
- Tool position
- Gridlines

Context menu

If you right-click a free space, the *View context menu opens*. (See "View" Page 215)
This context menu provides additional options for the work area.

CHAPTER 6

Menu

In this chapter

File

New

 Ctrl+N

Opens an empty file.

Open

 Ctrl+O

Opens an existing file. You can make file-related settings in the ***Open*** (Page 138) subwindow.

XpertMill can load the standard formats *.smf, *.s4m, *.plt, *.dxf and *.s4g.

Close

Closes the active milling project.

Save

 Ctrl+S

Saves the current milling project in the **original folder**. For **unknown files**, the *Save As...* (See "Save as..." Page 49) procedure is initiated.

Save as...

Saves the milling project under a user-defined file name.

Export

Alt+E

Opens the ***Export*** (Page 134) window.

Import

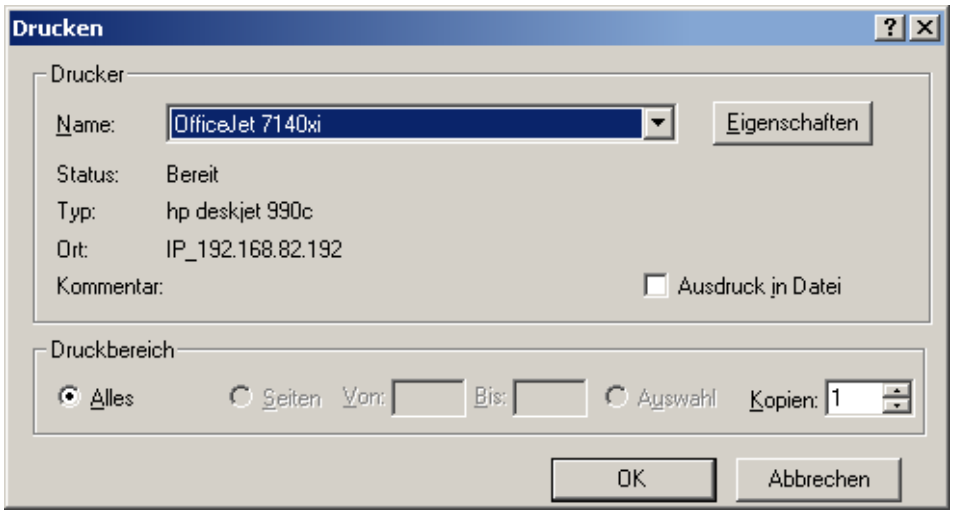
Alt+I

Opens the ***Import*** (Page 136) window.

Print

Ctrl+P

Opens the print menu.



Select the desired printer and choose *OK* to confirm your selection.

Print preview

In the window that appears, the objects that can be printed on paper are displayed.

Printer setup

Opens the Microsoft Windows printer setup.

File information

Opens the ***File information*** (Page 140) subwindow.

Exit

Exits the XpertMill program.

Edit

Button group - History

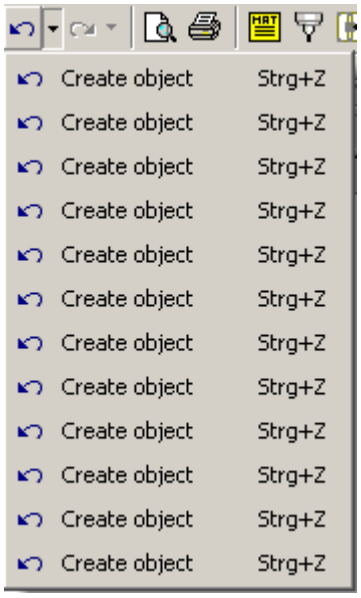
Ctrl+Z / Ctrl+Y

You can undo editing steps using the history function.

You can redo undone steps.

History list

Can include up to 16 entries. You can undo each editing step individually.



Cut

 Shift+Delete

Moves selected objects to the buffer.

Copy

 Ctrl+C

Copies selected objects to the buffer.

Paste

Ctrl+V

Pastes objects from the buffer into the work area.

Move

Is activated if you select one or more objects. Opens the *Move subwindow* (See "Move" Page 129).

Rotate & Mirror

Is activated if you select one or more objects. Opens the *Rotate & Mirror subwindow* (See "Rotate and mirror" Page 131).

Scale

Is activated if you select one or more objects. Opens the *Scale subwindow* (See "Scale" Page 132).

Duplicate

Is activated if you select one or more objects. Opens the *Duplicate subwindow* (See "Duplicate" Page 150).

Repeat duplicate procedure

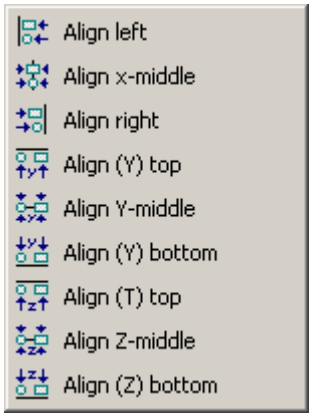
Ctrl+D

Repeats the duplicate procedure using the settings that you last made.

Align

You can use these functions to align several objects to each other.

The following options are available:



Convert contour into object

Is activated if you select one or more objects.Converts the **contour** of the selected objects into an **object**.

Reduce

Opens the ***Reduce*** (Page 167) subwindow.

Group

Groups are several independent objects that are recognised and handled as one object as a result of grouping when objects are selected, duplicated etc.

The buttons are activated if you select a group or several objects.

Group

If several objects are selected, these objects are combined into one group.

Ungroup

Existing groups are split up into their individual elements (objects).

Delete

 Delete

Deletes the selected element.

Move layer +

Ctrl+F1

Moves the selected objects up a layer.

Move layer -

Ctrl+F2

Moves the selected objects down a layer.

Select all

Ctrl+A

Selects all objects in the milling project.

Reverse selection

Ctrl+I

Reverses the selections of the individual objects, that is, unselected objects become selected objects and vice-versa.

Recalculate contours

Ctrl+K

Once new contour parameters have been set, you can update the old settings by choosing *Recalculate contours*.

Milling settings

Tools

Switches to the ***tool database*** (See "Tools" Page 156).

Material database

Switches to the ***material database*** (See "Material definition" Page 152).

Layer separation

Opens the ***Layer separation*** (Page 127) subwindow.

Position

Set reference point

 Ctrl+Shift+R

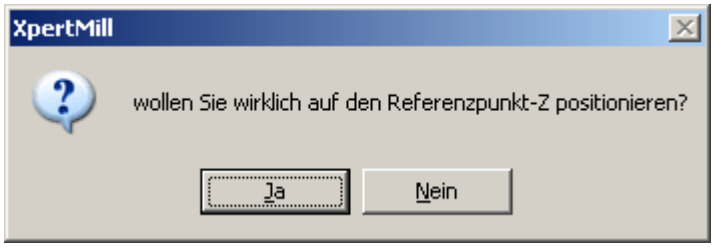
Switches to the *Set reference point* ***subwindow*** (See "Set reference point" Page 159).

Move to reference point XY

The defined reference point is approached from the X and Y axes.

Move to reference point Z

The defined reference point is approached from the Z axis. The system displays the following prompt before executing the command:



- Choose *Yes* to **execute** the command.
- Choose *No* to **reject** the command.

Set zero point

 Ctrl+Shift+N

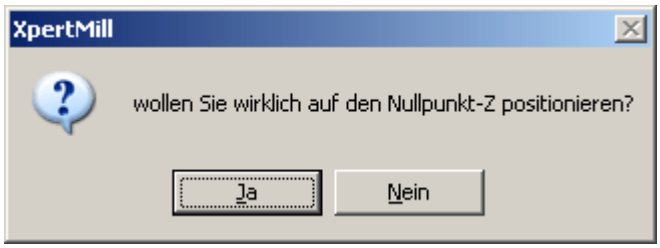
Switches to the *Set zero point* ***subwindow*** (See "Set zero point" Page 165).

Move to zero point XY

The defined zero point is approached from the X and Y axes.

Move to zero point Z

The defined zero point is approached from the Z axis. The system displays the following prompt before executing the command:



- Choose *Yes* to **execute** the command.
- Choose *No* to **reject** the command.

Move to zero point rotation axis

The defined zero point of the rotation axis is approached.

Set tool change point

 Ctrl+Shift+W

Switches to the *Set tool change point* ***subwindow*** (See "Set tool change point" Page 167).

Move to tool change point XY

The defined tool change point is approached from the X and Y axes. If the Z axis is not in the tool change position, this axis is moved to the change tool position before an X or Y movement is carried out.

Move to tool change point Z

The defined tool change point is approached from the Z axis.

Move to tool test point

The defined tool test point is approached from the X and Y axes.

Manual operation

Switches to the ***Manual operation*** (Page 163) subwindow.

Mill

Routing start

Starts the mill process.

Mill only selected objects

Is activated if you select one or more elements. Starts the mill process for the selected elements.

Continue routing at point at routing was aborted

Is activated following *abortion* (See "Stop" Page 58) of a mill process. Continues the mill process at the last point before it was aborted.

NOTE: Following an *EMERGENCY STOP*, you cannot continue routing at the point at which routing was aborted.

Repeat last mill process

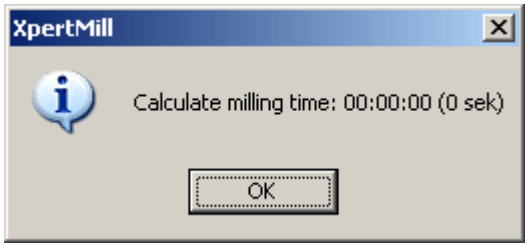
The last mill process is repeated.

Mill by layer order

When activated, the mill processes are carried out by layer order.

Milling time calculation

Opens the *XpertMill* subwindow.



Calculates the *milling time* for the elements to be milled.

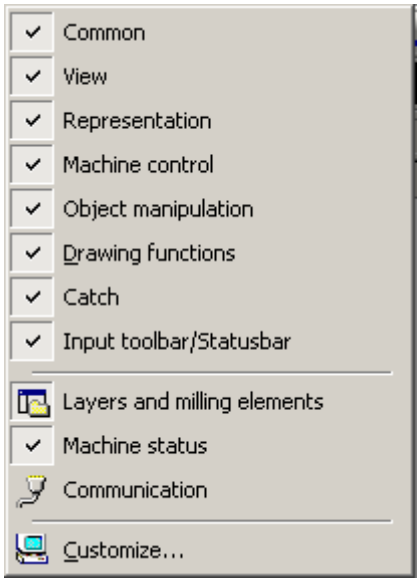
Stop

Routing is aborted, the milling cutter is lifted out of the material and the tool change position is approached.

You cannot continue the mill process.

View

Toolbars



You can activate or deactivate the individual toolbars.

If you choose *Customize...*, the *Customize* ***subwindow opens.*** (See "Change (configuration)" Page 141)

Status bar

Displays the status bar in the top area of the user interface.

Display rulers

 Alt+L

Displays the rulers for the work area.

Show grid

 Alt+G

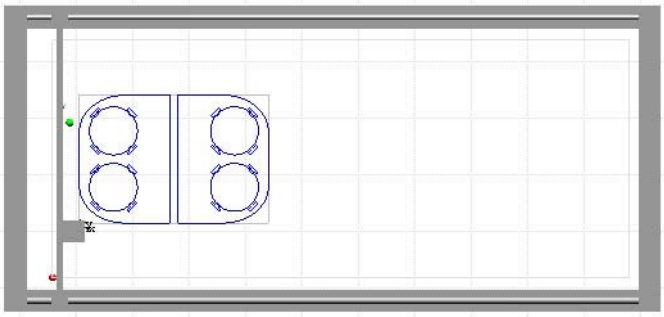
Displays the grid in the work area.

Display toolbar headers

Displays the toolbar headers.

Show machine

Displays the mechanics in the work area.



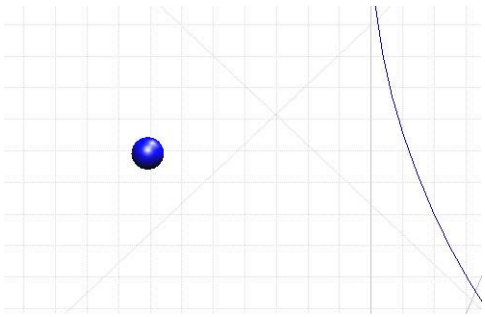
Show machine points

Displays

- Reference point
- Zero point
- Tool change point
- Tool test point

Show tool position

Displays the milling cutter in the work area. The diameter of the display is to the scale of the selected milling cutter.

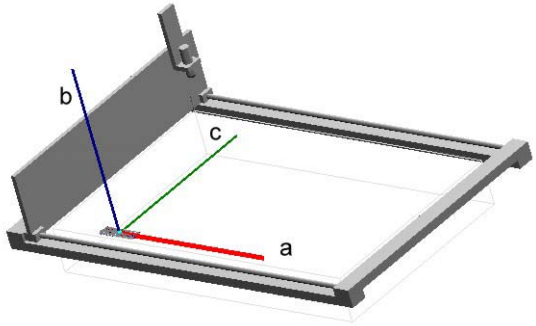


General views

Opens ***General views*** (Page 206).

Rotate

Displays a rotation point in the zero point.



a Rotate about the X axis (red)

b Rotate about the Z axis (blue)

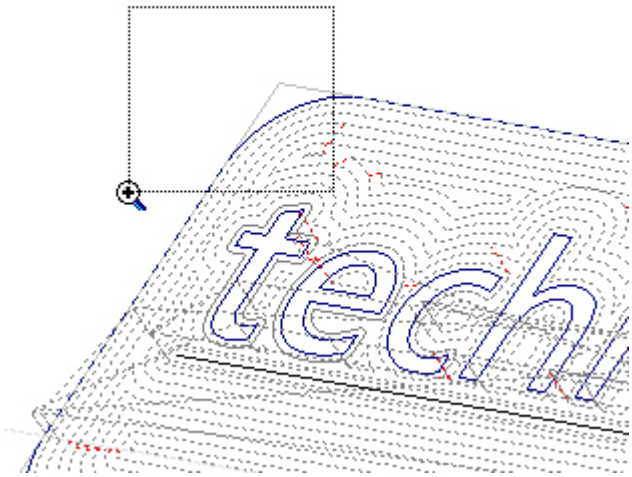
c Rotate about the Y axis (green)

➢ ***Rotate about an axis***

- Click one of the axes and hold down the mouse button.
- You can move the mouse to rotate the view around the selected axis.

Enlargement of an image section

You can select this icon to drag a box.



The section defined in this way is enlarged and adjusted to fit the work area.

Adjust

Selects the zoom factor automatically so that all objects are displayed in the work area. If one or more objects are selected, it is these objects that are adjusted to fit the display.

If objects are **far** outside the machine area, the fit to display function can be used to find the position more easily. These objects are then always positioned at the edge of the displayed section.

Zoom in

Enlarges the objects in the work area to double the size.

Zoom out

Shrinks the objects in the work area to half the size.

Named views...

Opens the ***Named views*** (See "Labelled views" Page 128) subwindow.

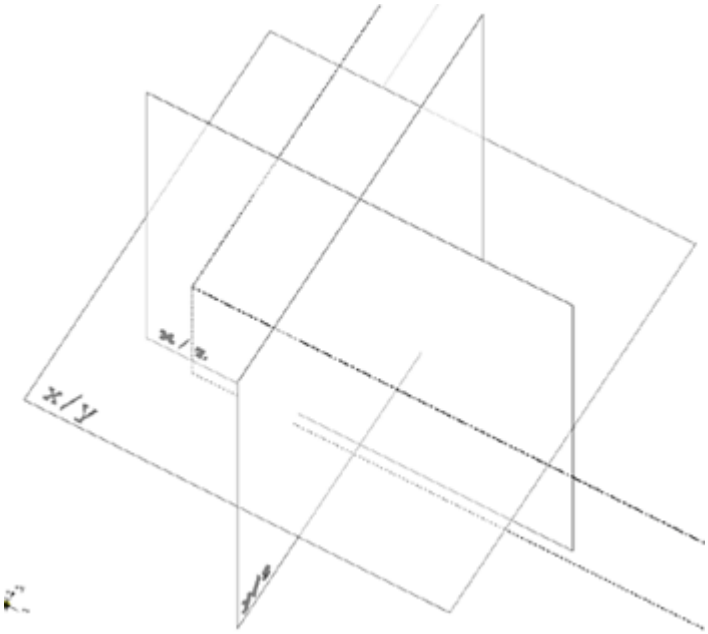
Previous view

 Ctrl+F5

Switches to the previous view.

Hide/display layers

Displays a layer point in the zero point. Labelling the layers helps you to orient around the layers.



Zoom all

 A

The view of the work area is changed in such a way that all elements are displayed.

Zoom machine

 M

The view of the work area is changed in such a way that the milling machine is displayed in full.

Zoom selected elements

 S

The view of the work area is changed in such a way that only the selected elements are displayed.

Options

Language

Opens the ***Language selection*** (Page 172) subwindow.

Notepad

Opens the Notepad link.

NOTE: For information about creating and deleting links, see ***Extras*** (Page 143).

Paintbrush

Opens the paintbrush link.

Windows Explorer

Opens the Windows Explorer link.

STEP-FOUR online

Opens the homepage of the company STEP-FOUR.

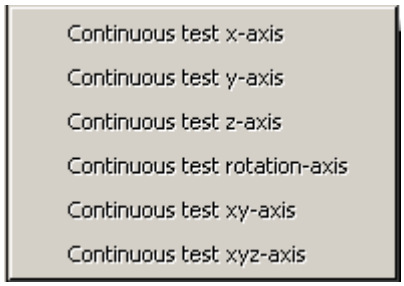
Configuration

Opens the ***Customize*** (See "Change (configuration)" Page 141) subwindow.

Machine test

The milling machine is tested for the function capability of its axes.

The following options are available for this purpose:



Machine configuration

Switches to the *Machine configuration* ***subwindow.*** (See "Machine configuration" Page 180).

Manual tool change

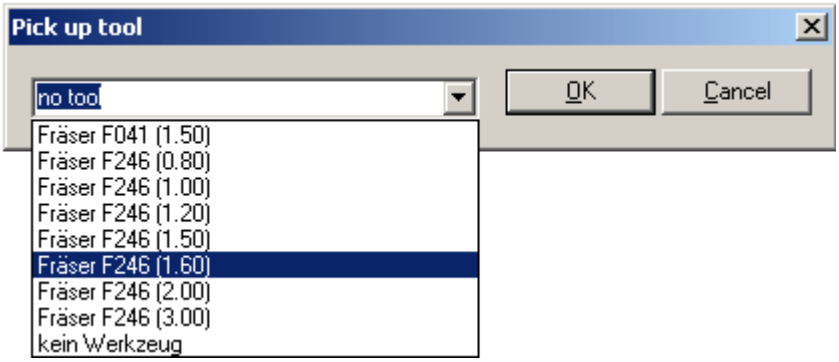
Opens the ***Manual tool change*** (Page 160) subwindow.

Pick up tool

Pick up tool is active only if you have activated the tool changer and chosen a tool set.

For information about activating and implementing the tool changer, see ***Tool changer*** (Page 198).

For information about selecting a tool set, see ***Tools*** (Page 156).



➢ ***Pick up tool***

- Choose a milling cutter from the selection window.
- Confirm your selection by choosing OK.

The machine goes to the predefined position at the tool changer and picks up the tool set selected.

Store tool

Once the tool has been used, it is stored at the predefined position in the tool ***changer; see*** Tool changer (Page 198).

Tool changer

Opens the ***Tool changer*** (Page 162) subwindow.

Macro editor

Opens the macro editor. MakroEdit is the programming interface for realising special-purpose solutions (e.g.: tool changer).

Macros (subprograms) can be created and edited in the programming language Visual Basic.

CAUTION! Changes to macros may cause failures. On request, adjustments can be carried out by STEP-FOUR.

Execute macro

Switches to the *Execute macro subwindow* (See "Execute macro" Page 207).

Allow macro processing

Macro processing is possible only with the module of the same name following consultation with STEP-FOUR.

Allow macro processing activates or deactivates the macro **common.s4b**.

Description of common.s4b

common.s4b is a general macro. This macro enables the realisation of **process flows** at the different trigger points (routing start, layer change etc.) during the milling process. Such a process flow can be a **status request** such as layer processed, current milling tool and inputs read. It is also possible to **bring about**

statuses such as the display of an error message, abortion of the mill process and the setting of outputs. These process flows can be programmed in this macro as required. On request, common.s4 can be adjusted by STEP-FOUR.

For information about programming macros, see ***Macro editor*** (Page 66).

Application example

A work piece is processed **on both sides**.

It is attached to an manually adjustable bracket that has 2 end switches. At layer 1, the apertures are processed.

After the 1st layer has been processed, macro processing **sets** an **output** that, by means of an indicator lamp, signals to the user that the bracket needs to be rotated.

Once the end switch has been activated, which confirms that the work piece has been rotated, the mill process continues at layer 2.

A **prompt** that appears at the routing start ensures that the work piece is positioned correctly, if the user starts the mill process.

Window

New window

Opens a new work area for the milling project.

Overlapping

Arranges the open windows so that they overlap.

On top of each other

Arranges the open windows so that they are on top of each other.

Split

You can split the active work area into four windows on the basis of a user-defined size splitting. You can change the size splitting at a later date.

Next window

Switches to the next work area.

Previous window

Switches to the previous work area.

Close window

Closes the active work area.

Windows

Opens the ***Windows*** (Page 172) subwindow.

Help

Contents

Switches to HTML help.

Find

Switches to the search function in HTML help.

Index

Switches to the index function in HTML help.

Help Keyboard

Opens the ***Help Keyboard*** (Page 174) subwindow.

About XpertMill

Opens the ***About XpertMill*** (Page 175) subwindow.

CHAPTER 7

Toolbars

In this chapter

Toolbars contain buttons. Each button activates a function or opens a submenu.

Button properties

Not all buttons behave in the same way when chosen. How a particular button behaves depends on its function. The different ways in which different buttons behave are described in the following.

If you move the cursor over a button, the **name** of the button and the **shortcut**, if applicable, are displayed.

Function buttons

Execute a function and then return to the normal state.

For example

Mill

Triggers the mill process.

Tool buttons

Make a tool available. The button/tool remains active. The button/tool is not deactivated again until you choose a different tool button.

For example

Contour definition

Activates the *contour definition* tool.

 Normal state

 Active

On/Off buttons

Activate utilities and remain active. Choose the button again to deactivate the utilities.

For example

Machine points

Displays the *machine points* (reference point, zero point etc.).

 Normal state

 Active

Further buttons

Open a subwindow. Remain active until the subwindow is closed.

For example

Manual operation

Opens the *Manual operation* subwindow.

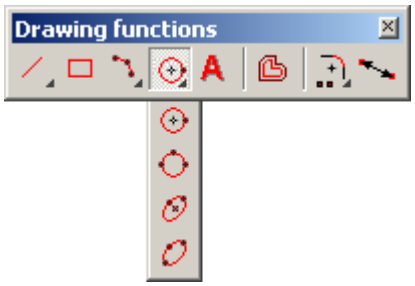
Pop-up buttons

Pop-up buttons conceal additional options. You can detect that a button is a pop-up button by the small arrows in the bottom corner of the button.

➢ ***Use of pop-up buttons***

- Click the button and hold down the mouse button.
- Select an option using the mouse, but without releasing the mouse button.
- To choose an option, release the mouse button.

For example **Circle**



Change toolbars

Display and hide toolbars

You can display and hide toolbars. You can find the option for this in the

View/Toolbars ***menu*** (See "Toolbars" Page 59) or in the *Context menu.* (See "Toolbars" Page 231)

Position toolbars

You can use the drag and drop function to position toolbars at any position and use them as free-standing toolbars. If a free-standing toolbar is dragged to the toolbar area, this toolbar becomes embedded in the toolbar area. You can also use drag and drop to position a toolbar in the toolbar area and thereby make maximum use of the available screen area.

Context menu

If you **right-click** a free space in the **toolbar area**, the *Toolbar* ***context menu opens.*** (See "Toolbars" Page 231)

This context menu provides additional options for the toolbars.

Standard

Contains buttons for the basic functions of the software.

New

Ctrl+N

Opens an empty file.

Open

Ctrl+O

Opens an existing file. You can make file-related settings in the ***Open*** (Page 138) subwindow.

XpertMill can load the standard formats *.smf, *.s4m, *.plt, *.dxf and *.s4g.

Save

Ctrl+S

Saves the current milling project in the **original folder**. For **unknown files**, the *Save As...* (See "Save as..." Page 49) procedure is initiated.

Cut

Shift+Delete

Moves selected objects to the buffer.

Copy

Ctrl+C

Copies selected objects to the buffer.

Paste

Ctrl+V

Pastes objects from the buffer into the work area.

Button group - History

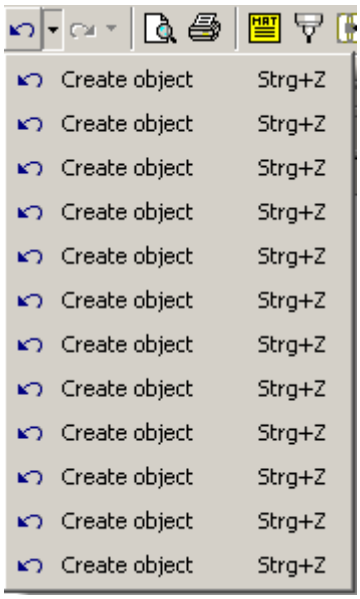
Ctrl+Z / Ctrl+Y

You can undo editing steps using the history function.

You can redo undone steps.

History list

Can include up to 16 entries. You can undo each editing step individually.



Page display

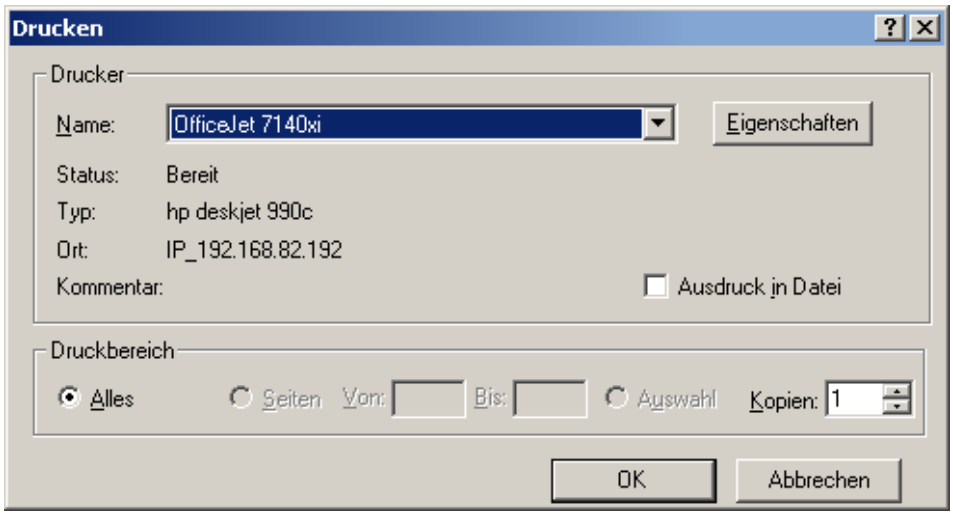
Opens the print preview.

NOTE: Only objects for which the *Print* setting is active are displayed.

Print

 Ctrl+P

Opens the print menu.



Select the desired printer and choose *OK* to confirm your selection.

Material database

Switches to the ***material database*** (See "Material definition" Page 152).

Tools

Switches to the ***tool database*** (See "Tools" Page 156).

Machine configuration

Switches to the *Machine configuration* ***subwindow.*** (See "Machine configuration" Page 180).

Reset

You require the reset button following an emergency stop in order to reinstall the controller.

CAUTION! Your current **reference point** will be lost!

View

Contains buttons that enable you to adjust the view in the work area to meet your requirements.

Adjust

Selects the zoom factor automatically so that all objects are displayed in the work area. If one or more objects are selected, it is these objects that are adjusted to fit the display.

If objects are **far** outside the machine area, the fit to display function can be used to find the position more easily. These objects are then always positioned at the edge of the displayed section.

Zoom in

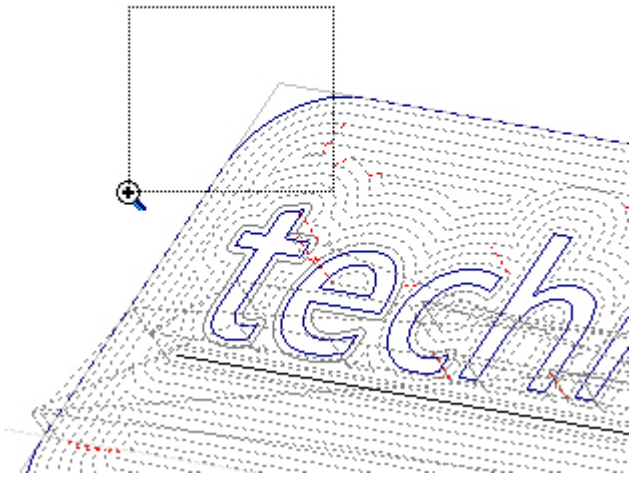
Enlarges the objects in the work area to double the size.

Zoom out

Shrinks the objects in the work area to half the size.

Enlargement of an image section

You can select this icon to drag a box.



The section defined in this way is enlarged and adjusted to fit the work area.

General views

Opens ***General views*** (Page 206).

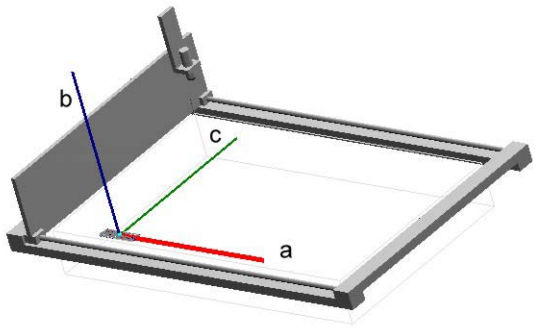
Button group - View

The entire button group controls the view. The work area is displayed on the basis of the position selected.

In the case of the perspective view, the  *Rotate view about XYZ axis* (See "Rotate" Page 61) button is active.

Rotate

Displays a rotation point in the zero point.



a Rotate about the X axis (red)

b Rotate about the Z axis (blue)

c Rotate about the Y axis (green)

➢ ***Rotate about an axis***

- Click one of the axes and hold down the mouse button.
- You can move the mouse to rotate the view around the selected axis.

Appearance

Activates/deactivates the design or processing tools.

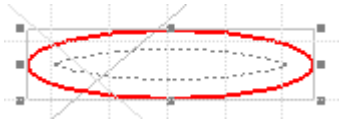
Show grid

Alt+G

Displays the grid in the work area.

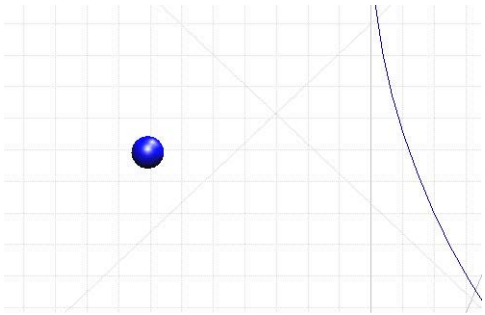
Box

Shows a box around the selected object (illustrated by the grey lines).



Show tool position

Displays the milling cutter in the work area. The diameter of the display is to the scale of the selected milling cutter.



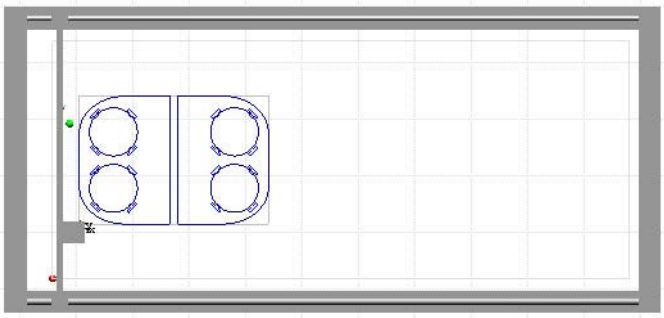
Show machine points

Displays

- Reference point
- Zero point
- Tool change point
- Tool test point

Show machine

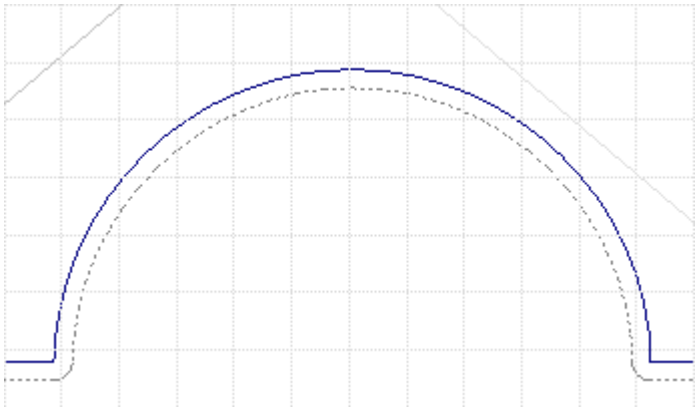
Displays the mechanics in the work area.



Contour graph

K

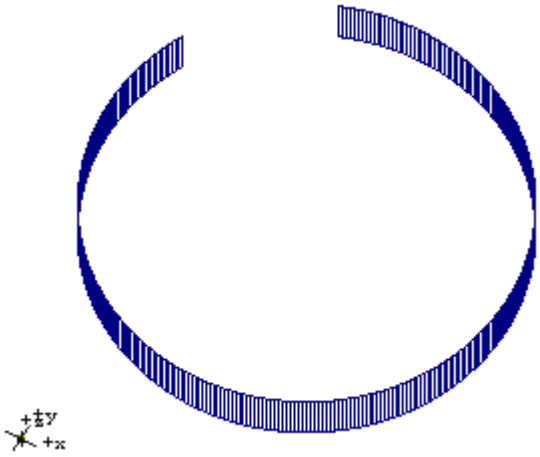
Displays the corrected cutting paths (represented by the dotted line).



Milling depth display

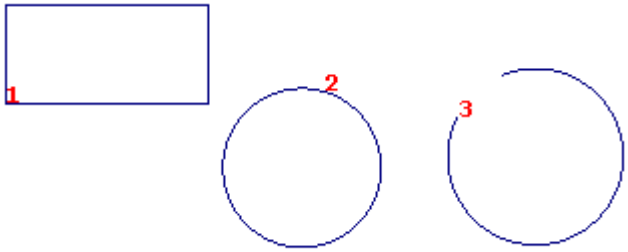
t

Displays the milling depth set for the objects.



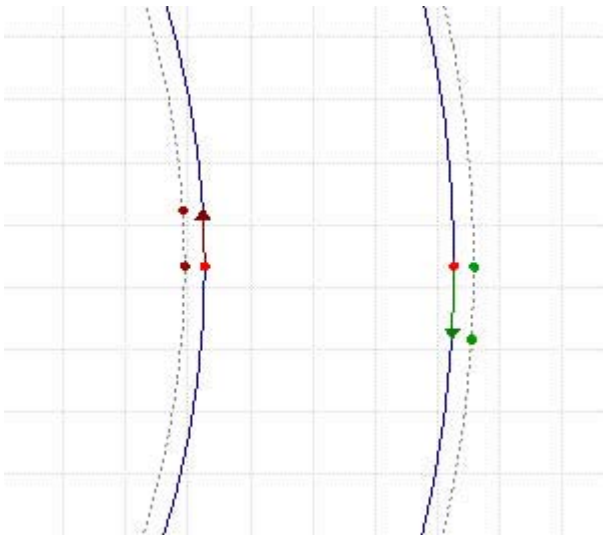
Display numeration

Displays the routing order number for each object.



Display start point and direction

The start point and direction for processing are displayed for each individual object.



Reset milling gradient

When the milling cutter has processed the object, all processed contours are represented by a thicker line. *Reset milling gradient* resets the contours to "Not processed", a thin line.

Drawing functions

Xpert [DRAW] enables you to create and change geometric data.

NOTE: Accurately defined creation and change of objects using the ***Input toolbar/Statusbar*** (Page 86) toolbar.

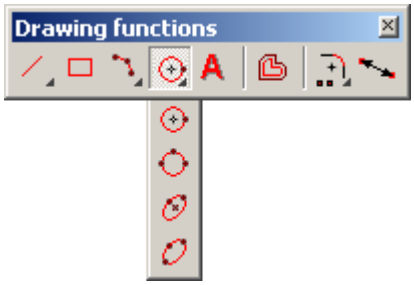
The *Drawing functions* toolbar is available once the **Xpert [DRAW]** module has been activated.

Some of the buttons are pop-up buttons. Pop-up buttons conceal additional options. You can detect that a button is a pop-up button by the small arrows in the bottom corner of the button.

➢ ***Use of pop-up buttons***

- Click the button and hold down the mouse button.
- Select an option using the mouse, but without releasing the mouse button.
- To choose an option, release the mouse button.

For example **Circle**



Line

Draws a straight line between the start point and end point. The function remains active until you right-click the line to end it.

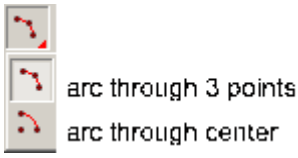
Rectangle

Creates a rectangle of any size.

➢ ***Create rectangle***

- In the work area, specify the start point by clicking and holding down the left mouse button.
- Drag the rectangle to the desired size.
- To fix the end point, release the mouse button.

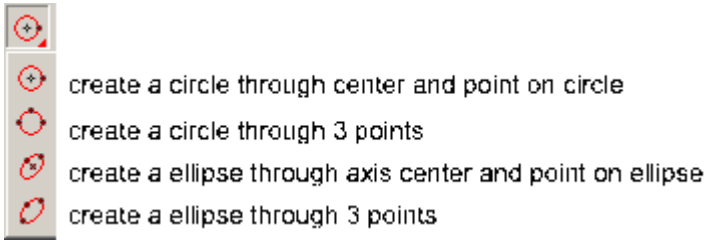
Arc



Provides the option of creating an arc in two different ways.

For information about *creating arcs*, see ***Arc through 3 points*** (Page 89).

Circle



Provides the option of creating a circle or ellipse in four different ways.

For information about *creating circles and ellipses*, see ***Circle through centre*** (Page 90) and subsequent pages.

Text

Activates **text mode.** The cursor moves to the Edit text symbol.

➢ ***Create text***

- To activate text mode, choose *Text*.
- Define text position.

Switches to the *Text* ***subwindow*** (See "Text" Page 170)

Contour offset

For information about *creating contour offsets*, see ***Contour offset*** (Page 92).

Round edges

For information about *rounding edges*, see ***Round edges*** (Page 92).

Bevels

For information about *creating bevels*, see ***Bevel*** (See "Chamfer" Page 93).

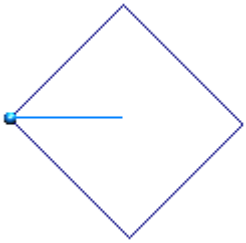
Round

For information about *rounding*, see ***Round*** (Page 94).

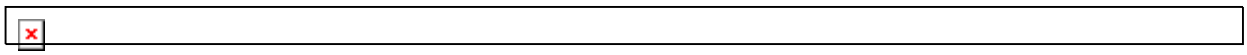
Measure

➢ ***Measure***

- When you select the start point is selected, it is displayed in light blue.
- Move the cursor and accompanying line to the end point, but do **not** click the mouse (see graphic).



- Read the values in the status bar (see graphic).



- Measurement can be continued: When you click the mouse, the end point becomes the start point for the new measurement.
- Right-click to end the measurement process.

Input toolbar/Statusbar

This tool consists of two components. The left-hand component is the status bar and the right-hand component contains the input fields.

In the *status bar* you can read information, depending on which tool or work step is active.

An *input field* is a dynamic toolbar and changes depending on the action (such as create rectangle).

Command line processor

A command line processor is integrated in each numerical input field. This enables you to carry out arithmetic operations. You can also carry out more complex arithmetic functions, such as 5+3+(60/3).

In addition to the basic arithmetic operations (+,-,*,/,=, ^, %) , additional functions are available.

Once you have entered the arithmetic operations, press ENTER to carry out the calculation. The result is displayed in the field.

NOTE: Instead of *expr*, an expression, numeric value or arithmetic operation is given in brackets.

CAUTION! The expressions for the trigonometric functions must be specified in **rad** (radians)!

Functions

Math. name	Command syntax	Description
abs	abs (expr)	Returns the absolute value of the expression.
Acos	Acos(expr)	Returns the arc cosine of the expression.
Asin	Asin(expr)	Returns the arc sine of the expression.
Atan	Atan(expr)	Returns the arc tangent of the expression.
cos	cos(expr)	Returns the cosine of the expression.
cosh	cosh(expr)	Returns the hyperbolic cosine of the expression.
deg	deg(expr)	Converts radians into degree. Is specified in rad.
exp	exp(expr)	Returns the exponent of the expression.
ln	ln(expr)	Returns the natural (neperian, base-e) logarithm of the expression.
log	log(expr)	Returns the decimal (base-10) logarithm of the expression.
logn	logn(expr, n)	Returns the base-n logarithm of the expression. n determines the logarithm.
rad	rad(expr)	Converts degree into radians. Is specified in degree.
sin	sin(expr)	Returns the sine of the expression.
sinh	sinh(expr)	Returns the hyperbolic sine of the expression.
sqrt	sqrt(expr)	Returns the square root of the expression.

Math. name	Command syntax	Description
sqrtn	sqrtn(expr, n)	Returns the nth root of the expression.
tan	tan(expr)	Returns the tangent of the expression.
tanh	tanh(expr)	Returns the hyperbolic tangent of the expression.

The constants pi and e are predefined.

pi (3.14159265358979323846264338327 95)
e (2.71828182845904523536028747135 27)

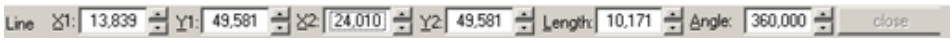
In the following, the different input fields are listed according to action.

Point

➢ ***Create point***

- Enter values for the *X* and *Y* coordinates in the input fields or using the arrow keys.
- Confirm your entries by pressing ENTER.

Line



➢ ***Create line***

- Enter values for the X and Y coordinates of the start point (*X1, Y1*) and end point (*X2, Y2*) of the line in the input fields or using the arrow keys. **Or** enter values for the start point (*X1, Y1)* as well as the *length* and *angle*.
- Confirm your entries by pressing ENTER.
- The line can be extended.
- Complete the line by right-clicking it.

Close

Closes the line.

Rectangle

➢ ***Create rectangle***

- Enter values for the start point (*X, Y*) of the rectangle in the input fields or using the arrow keys.
- Enter the *width*.
- Enter the *height*.
- Enter the position of the rectangle *(angle)*.
- Confirm your entries by pressing ENTER.

Arc through 3 points

➢ ***Create arc through 3 points***

- Enter values for the start point (*Mp-X, Mp-Y*) of the arc in the input fields or using the arrow keys.
- Enter values for the end point (*X, Y*).
- Enter the third point by specifying the diameter (*dm*) **or** radius (*r*) **or** inverse angle *(w)*.
- Confirm your entries by pressing ENTER.

CW

Stands for *clockwise*.

CCW

Stands for *counter-clockwise*.

If you activate this option, the arc will be created in a counter-clockwise direction.

Arc through centre

➢ ***Create arc through centre***

- Enter values for the centre (*Mp-X, Mp-Y*) of the arc in the input fields or using the arrow keys.
- Position of the start point: Enter the diameter (*dm*) **or** radius (*r*) and angle *(sw)* for the arc.
- Enter the inverse angle (*bw*).
- Confirm your entries by pressing ENTER.

CW

Stands for *clockwise*.

CCW

Stands for *counter-clockwise*.

If you activate this option, the arc will be created in a counter-clockwise direction.

Circle through centre

➢ ***Create circle through centre***

- Enter values for the centre (*Mp-X, Mp-Y*) of the circle in the input fields or using the arrow keys.
- Enter the diameter (*dm*) **or** radius (*r*).
- Enter values for the end point (*X, Y*).
- Confirm your entries by pressing ENTER.

CW

Stands for *clockwise*.

CCW

Stands for *counter-clockwise*.

If you activate this option, the arc will be created in a counter-clockwise direction.

Circle through 3 points

➢ ***Create circle through 3 points***

- Enter the *X* and *Y* coordinates of the three points on the circle.
- Confirm your entries by pressing ENTER.

CW

Stands for *clockwise*.

CCW

Stands for *counter-clockwise*.

If you activate this option, the arc will be created in a counter-clockwise direction.

Ellipse through centre

➢ ***Create ellipse through centre***

- Enter values for the centre (*Mp-X, Mp-Y*) of the ellipse in the input fields or using the arrow keys.
- Enter the length of the principal axis (*HA*) of the ellipse.
- Enter the length of the secondary axis (*NA*) of the ellipse.
- The *angle* determines the position of the ellipse.
- Confirm your entries by pressing ENTER.

CW

Stands for *clockwise*.

CCW

Stands for *counter-clockwise*.

If you activate this option, the arc will be created in a counter-clockwise direction.

Ellipse through 3 points

➢ ***Create ellipse through 3 points***

- Enter values for the first point (*P1-X, P1-Y*) of the ellipse in the input fields or using the arrow keys.
- Enter the length of the principal axis (*HA*) of the ellipse.
- Enter the length of the secondary axis (*NA*) of the ellipse.
- The *angle* determines the position of the ellipse.
- Confirm your entries by pressing ENTER.

CW

Stands for *clockwise*.

CCW

Stands for *counter-clockwise*.

If you activate this option, the arc will be created in a counter-clockwise direction.

Contour offset

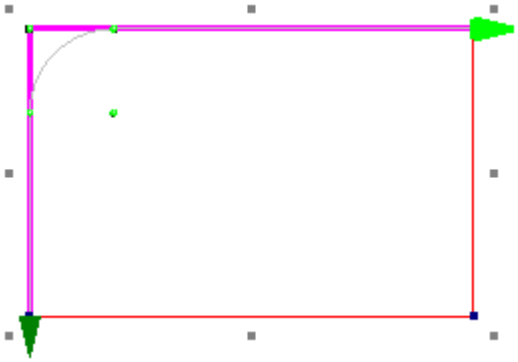
➢ ***Set contour offset***

- Enter a value for the offset.
- Select object(s) individually.
- Where you position the cursor makes the distinction between external and internal contour. If you position the cursor on the object, a two-sided contour is created.
- Left-click to create the contour.

Round edges

➢ ***Round edges***

- Select the two edges to be rounded or the inverse vertex with the cursor so that the edges turn violet (see graphic).



- Enter the *radius* in the input field or using the arrow keys and confirm your entry by pressing ENTER. **Or** determine the size of the radius by moving the cursor and left-click to confirm your data.

NOTE: Click a vertex to round the corner selected in this way.

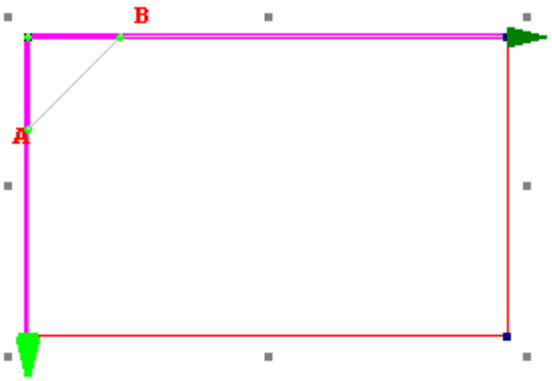
NOTE: If you drag a window, all corners within the selection are rounded automatically.

NOTE: If you round **several edges with the same radius**, the ***round*** (Page 94) action is quicker.

Chamfer

➢ *Create chamfer*

- Select both edges or the inverse vertex so that the edges turn violet (see graphic).

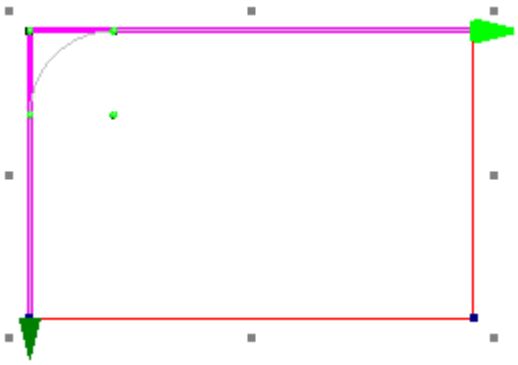


- Enter the distance between the vertex and *A*.
- Enter the distance between the vertex and *B*.
- Enter the *angle*.
- Confirm your entries by pressing ENTER.

Round

➢ ***Create curve***

- If *Round* is active, move the rounding circle with the cursor. Select the two edges that you want to round with the cursor.
- Enter the *radius* in the input field or using the arrow keys and confirm your entry by pressing ENTER. The size of the rounding circle changes depending on the radius entered.
- Position the quadrants of the rounding circle at the two edges that you want to round (see graphic).



- Left-click to create the curve.

NOTE: If you want to round **several edges with the same radius**, you simply need to position the rounding circle and confirm this by clicking; you do not need to redefine the radius.

Command interface

The command interface is used for entering commands that are not available as buttons.

Commands - Command interface

The command interface commands are listed below.

Command prefix

The general structure of a command is as follows:

1 **#M** ... Machine commands; commands that refer to the machine

#S ... Selection commands; commands that have an impact on the selected objects

2 **cmd** ... Command

3 A specific command will follow this prefix.

For example: **PA** ... Absolute positioning

4 The **expression** consists of numerical values or arithmetic operations.

Machine commands

NOTE: Numerical values and not coordinates are specified in the square brackets []

#M cmdPA [X],[Y],[Z],[A]	Absolute positioning: The **expression** consists of coordinates with reference to the zero point in **mm**.
#M cmd PR [X],[Y],[Z],[A]	Relative positioning: The expression consists of coordinates with reference to the current position.
#M cmd GA [X],[Y],[Z],[A]	Rapid feed absolute positioning: The expression consists of coordinates with reference to the zero point.
#M cmd VS [speed]	Set positioning speed: The expression consists of a speed value in **mm/min**.

Selection commands

#S cmd SPEED = [expr]	In the case of 3D lines (polylines that are positioned in the space), the speed value of each individual point is changed.

Autoload

The files that were last opened are loaded when the program is loaded.

#C cmd AL	Autoload is read (0 ... deactivated, 1 ... activated)
#C cmd AL 0	Deactivate autoload
#C cmd AL 1	Activate autoload

Multi-document

Several files can be open at the same time.

#C cmd MDI	Multi-document is read
	(0 ... deactivated, 1 ... activated)
#C cmd MDI 0	Activate multi-document
#C cmd MDI 1	Deactivate multi-document

Sort order

You can change the routing order of the objects using the following toolbar.

➢ ***Change sort order***

- Select a reference object.
- Change the sort order by changing the *number* in the input field or using the arrow keys.
- Confirm your entries by pressing ENTER.

Replace

Number 8 should become number 12. The numbers of the two objects exchange places.

Insert

The object selected is inserted at the position specified; the surrounding position numbers change dynamically.

Automatic renumber

Opens the ***Sort automatically*** (Page 162) subwindow.

Snap

Contains buttons for precise work.

If a snap function is active and the cursor is close to the point to be snapped, a symbol for the active snap appears next to the cursor. Click the symbol that appears to snap the point.

Background and grid settings

Opens the ***Depiction*** (Page 179) subwindow.

Grid origin to zero

The grid origin is set to zero.

Reposition grid origin

With a click of the mouse button, positions the grid origin at any position.

Snap grid

During design/processing, left-click the mouse button to snap the cursor at the next grid point.

Snap object points

During design/processing, left-click the mouse button in the vicinity of an object to snap the cursor at the next object point.

Snap vertexes

During design/processing, left-click the mouse button in the vicinity of an object to snap the cursor at the next vertex.

Snap start-end points

During design/processing, left-click the mouse button in the vicinity of an object to snap the cursor at the next start point or end point.

Snap middle points

During design/processing, left-click the mouse button in the vicinity of an object with middle point to snap the cursor at the next middle point.

Snap intersection point

During design/processing, left-click the mouse button in the vicinity of intersecting objects to snap the cursor at the next intersection point.

Machine functions

Contains buttons for the software functions relevant for milling.

Set reference point

 Ctrl+Shift+R

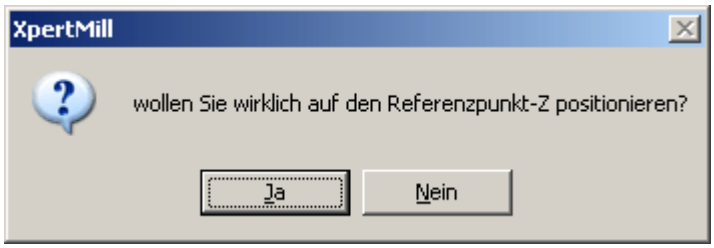
Switches to the *Set reference point* ***subwindow*** (See "Set reference point" Page 159).

Move to reference point XY

The defined reference point is approached from the X and Y axes.

Move to reference point Z

The defined reference point is approached from the Z axis. The system displays the following prompt before executing the command:



- Choose *Yes* to **execute** the command.
- Choose *No* to **reject** the command.

Move to reference point rotation axis

The defined reference point of the rotation axis is approached.

Position

Switches to the *Emergency positioning subwindow.* (See "Emergency positioning" Page 206)

Set zero point

 Ctrl+Shift+N

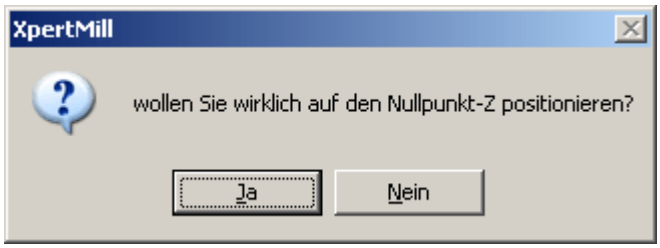
Switches to the *Set zero point* ***subwindow*** (See "Set zero point" Page 165).

Move to zero point XY

The defined zero point is approached from the X and Y axes.

Move to zero point Z

The defined zero point is approached from the Z axis. The system displays the following prompt before executing the command:



- Choose *Yes* to **execute** the command.
- Choose *No* to **reject** the command.

Move to zero point rotation axis

The defined zero point of the rotation axis is approached.

Set tool change point

 Ctrl+Shift+W

Switches to the *Set tool change point* ***subwindow*** (See "Set tool change point" Page 167).

Move to tool change point XY

The defined tool change point is approached from the X and Y axes. If the Z axis is not in the tool change position, this axis is moved to the change tool position before an X or Y movement is carried out.

Move to tool change point Z

The defined tool change point is approached from the Z axis.

Move to tool test point

The defined tool test point is approached from the X and Y axes.

Manual operation

Switches to the ***Manual operation*** (Page 163) subwindow.

Position at cursor position

Activates the **Position at cursor position** mode.

When you choose this button, the cursor changes to  . You can select any position within the work area. The machine traverses in X and Y direction to the selected position.

Routing start

Starts the mill process.

Mill only selected objects

Is activated if you select one or more elements. Starts the mill process for the selected elements.

Continue routing at point at routing was aborted

Is activated following *abortion* (See "Stop" Page 58) of a mill process. Continues the mill process at the last point before it was aborted.

NOTE: Following an *EMERGENCY STOP*, you cannot continue routing at the point at which routing was aborted.

SIM

Is displayed when the **simulation driver** is active.

Stop

Routing is aborted, the milling cutter is lifted out of the material and the tool change position is approached.

You cannot continue the mill process.

Pause

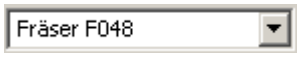
The mill process is stopped. The Z axis moves to the tool change position.

The mill process can be continued.

Continue

Choose Continue to continue the mill process if you have paused it.

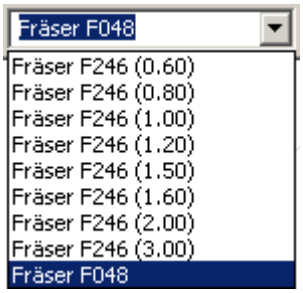
Tool change



The tool currently defined is displayed in the button field.

➢ ***Tool change***

- Activate the selection by clicking the arrow.



- Select a new tool.

Switches to the ***Tool change*** (See "Manual tool change" Page 160) subwindow.

Spindle RPM

Controls the milling spindle.

➢ ***Activate and deactivate milling spindle***

- Choose the button to activate the milling spindle.
  - The RPM set is highlighted in red.

- Choose the button again to deactivate the milling spindle.

➢ ***Change the milling spindle RPM***

Use the arrow keys to control the milling spindle RPM. The up arrow increases the RPM and the down arrow decreases the RPM.

You can also control the RPM while the machine is in operation.

NOTE: The RPM is **not** available for analogue milling spindles.

Object edit

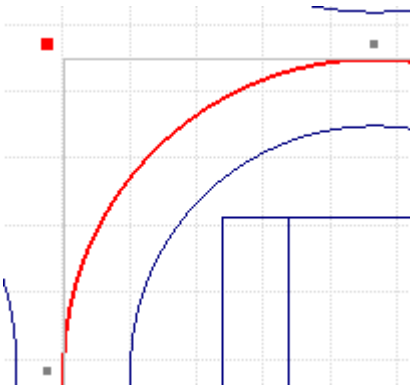
Contains buttons for editing objects.

Select

Functions

- Click individual objects to include them in your selection.
- Click and drag all of the truncated objects contained in the selection window to include them in your selection.
- Choose *Shift* and click any objects to include them in the existing selection or to deselect them.
- Move objects.
- Change objects.

➢ ***Change objects***



- Select an object.
- Move the cursor over one of the perimeter points until the point turns red and the cursor appears as a double arrow.
- Click and hold down the mouse button.
- Keep the mouse button held down to change the object as required.
- To confirm your changes, release the mouse button.

Command interface

For information about executing commands on the command interface, see ***Command interface*** (Page 95).

Point editing

You can use this tool to select and edit one or more object points. The colour of the point or points selected changes to red (see graphic below). You can manipulate points selected in this way as required. You can use the *context menu* (See "Dot menu" Page 218) (right-click) to access additional point editing options.

Cross-object point editing

Has the same features as point editing but you can manipulate points of several objects. You can use the*context menu* (See "Multi dot menu" Page 221) (right-click) to access additional point editing options.

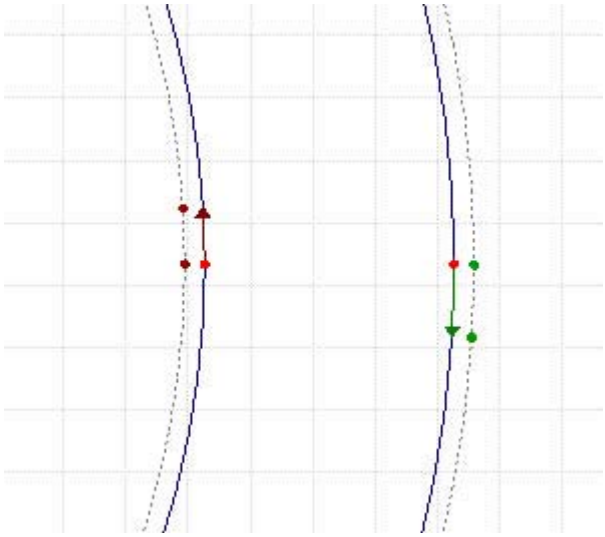
Start point and direction

Define start point

Left-click the start point to transfer it to the desired position.

Change milling direction

Right-click the start point to reverse the milling direction.



NOTE: If the ***Automatic definition of direction*** (See "Assignments" Page 148) checkbox is active, you can no longer change the milling direction for a defined contour.

Sort order

Choose this button to set a sort order.

➢ ***Change sort order using cursor***

- **Left-click** an object to increase the sort order.
- **Right-click** an object to decrease the sort order.

For information about the sort order with change entry toolbar, see ***Sort order*** (Page 98).

Contour definition

Activates the *contour definition* tool.

When you select an object, the *Contour parameter* ***subwindow opens*** (See "Properties - Contour parameter" Page 122) for this object.

Rotate & Mirror

Is activated if you select one or more objects. Opens the *Rotate & Mirror subwindow* (See "Rotate and mirror" Page 131).

Move

Is activated if you select one or more objects. Opens the *Move subwindow* (See "Move" Page 129).

Duplicate

Is activated if you select one or more objects. Opens the *Duplicate subwindow* (See "Duplicate" Page 150).

Scale

Is activated if you select one or more objects. Opens the *Scale subwindow* (See "Scale" Page 132).

Align

Is activated if you select one or more objects. Opens the *Align subwindow.* (See "Align" Page 130)

Group

Groups are several independent objects that are recognised and handled as one object as a result of grouping when objects are selected, duplicated etc.

The buttons are activated if you select a group or several objects.

Group

If several objects are selected, these objects are combined into one group.

Ungroup

Existing groups are split up into their individual elements (objects).

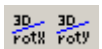
Cancel subgroup

Subgroups of the selected group are dissolved.

Convert contour into object

Is activated if you select one or more objects.Converts the **contour** of the selected objects into an **object**.

Convert 3D object into rotation object



Converts a 3D object into a rotation object. The conversion can take place via either the X **or** Y axis. During the conversion process, the three-dimensional data is converted from the Cartesian coordinates system into the polar coordinate system.

H-box

You can use the H-box to control the milling mechanics.

NOTE: The H-box cannot be used in simulation mode!

Positioning using the H-box

NOTE: No positioning functions are active until a positioning window is opened.

1 Press the *X*, *Y* or *Z* key to select an axis.

NOTE: The active axis is visualised by a luminous indicator lamp.

1 If you **hold down** the +/- key, the axis moves with the feed rate defined under ***Speed; see H-box*** parameters (See "Hbox parameters" Page 204).

If you **press** the +/- key, the axis moves by the increment set under *Steps*; see ***H-Box parameters*** (See "Hbox parameters" Page 204).

2 If you press an axis, the current position, e.g. for setting the zero point, is accepted and saved.

3 Once you have positioned all axes using the H-box, choose *All OK* in the positioning window.

To speed up the positioning process, you can also activate the rapid feed 
.

If you are carrying out the positioning process manually, you can use the spindle override key  to activate and deactivate the milling motor.

Mill process

You can use the H-box to control the mill process by aborting routing, pausing routing and starting/continuing routing.

These three parameters are indicated on the keys in blue and are not active until the *Active routing control keys* checkbox is selected; see ***H-box parameters*** (See "Hbox parameters" Page 204).

For information about aborting routing, see ***Stop*** (Page 58).

For information about pausing routing, see ***Pause*** (Page 104).

For information about starting/continuing routing, see ***Continue*** (Page 104).

CAUTION! When you use these keys for the mill process, ensure that **no** positioning window is open.

Speed control

This key activates control of the milling spindle speed. When this is activated, the key is illuminated.

The - key can then be used to reduce the speed by the *override* set; see ***H-box parameters*** (See "Hbox parameters" Page 204). The + key increases the speed by the *override* set.

NOTE: You can activate and deactivate the spindle during manual operation.

Feed rate control

This key activates feed rate control. When this is activated, the key is illuminated.

The - key can then be used to reduce the feed rate by the *override* set; see ***H-box parameters*** (See "Hbox parameters" Page 204). The + key increases the feed rate by the *override* set.

CHAPTER 8

Subwindow - The software

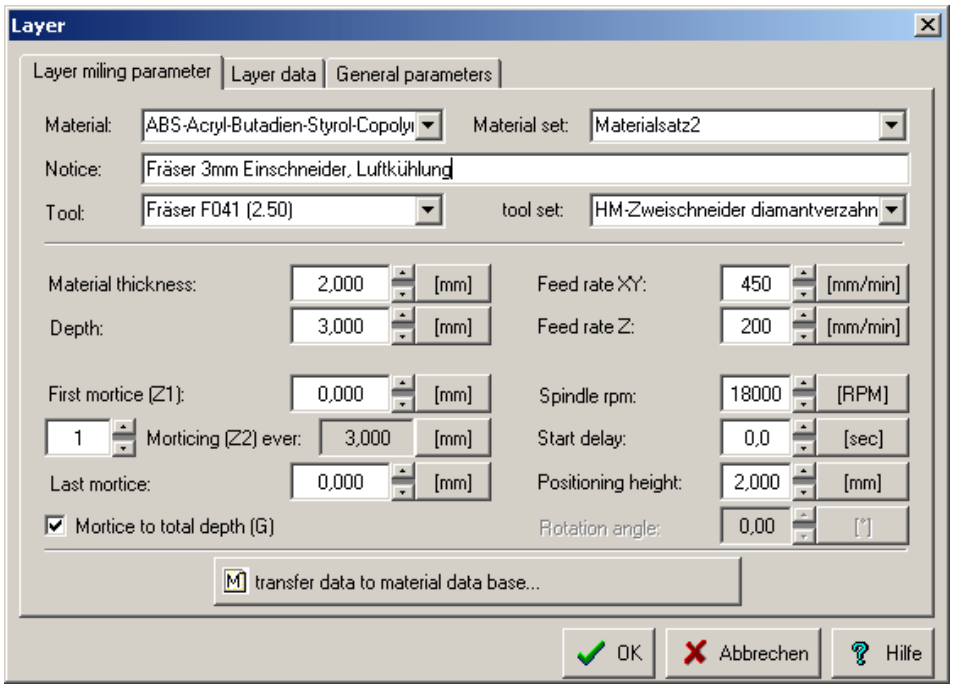
In this chapter

Layers

All the parameters defined here are valid for all the objects on this layer.

Layer milling parameter

All milling-related parameters of the layer are defined here.



➢ ***Define material***

(Providing no global material has been defined for the milling project).

- Select *Material set*.
- Select *Material* from the dropdown menu.

The settings defined in the material set are applied to the layer. Individual amendments only affect this layer.

➢ ***Define tool***

(Providing no global tool has been defined for the milling project).

- Select *Tool set*.
- Select *Tool* from the dropdown menu.

➢ ***Transfer data to material data base...***

In the event of individual amendments of parameters, these can be entered as **new** material in the material database.

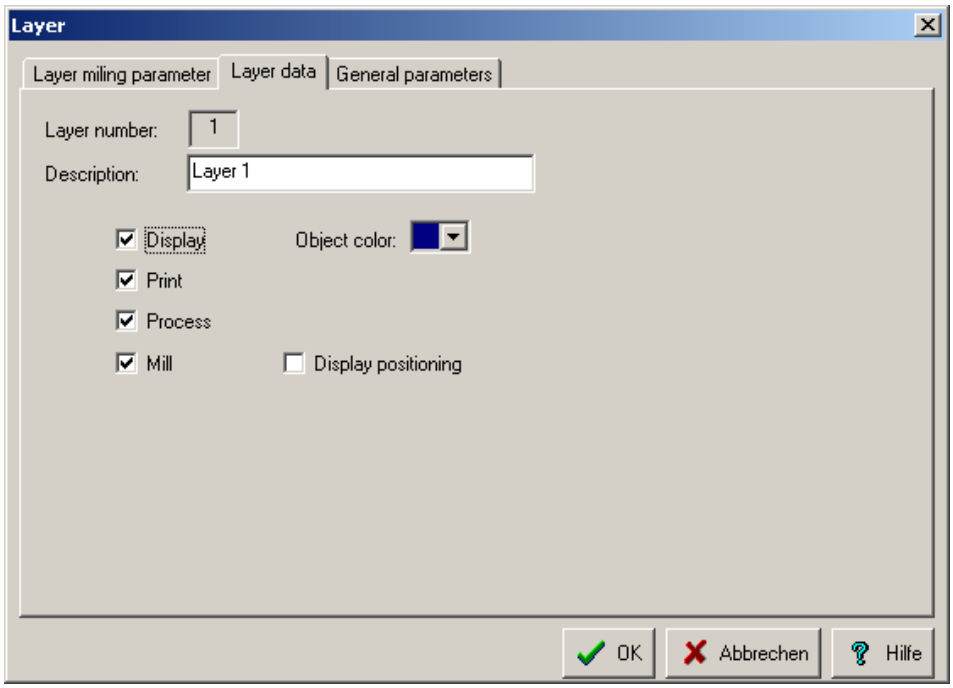
- Click on *Transfer data to material data base...*
- Material data base is opened. The new material has already been entered.
- After making any other modifications, choose *OK* to confirm the parameters.

Milling parameters

Are taken from the ***Material database*** (See "Material definition" Page 152) and can be individually adjusted.

Layer data

Contains settings for the behaviour of the layer.



Description

Shows the name of the level. Can be user-defined.

Display

Shows and hides the objects of the layer within the work area.

Print

Shows or hides the objects of the layer when printed.

Edit

Saves the objects of the layer for further editing.

Mill

Objects of the layer are considered during milling.

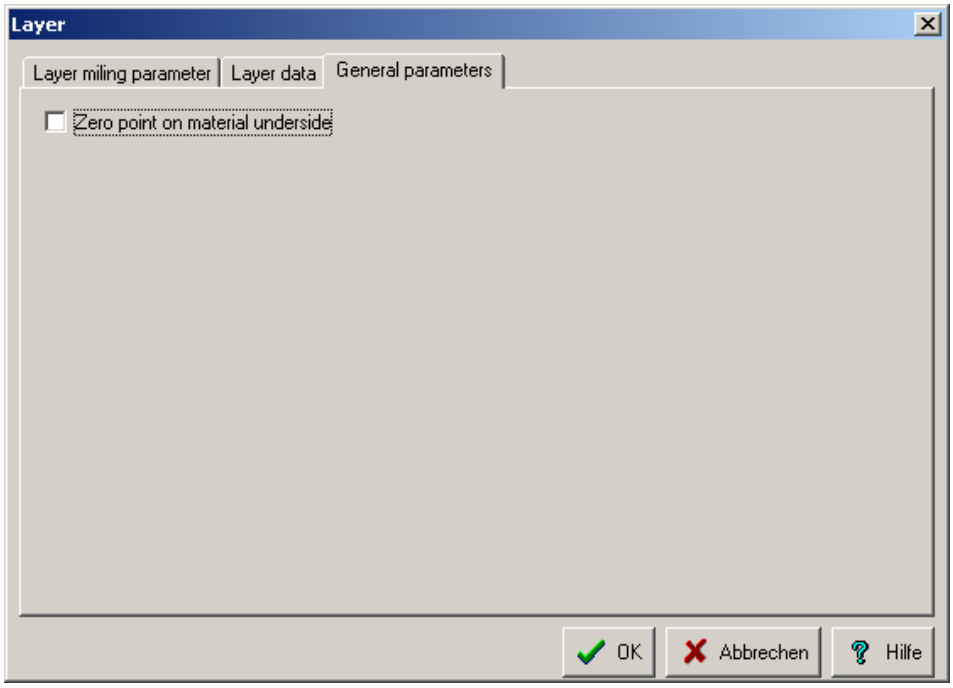
Display positioning

Displays the positioning height over the workpiece.

Object colour

Colour of the objects on this layer. Can be user-defined.

General parameters

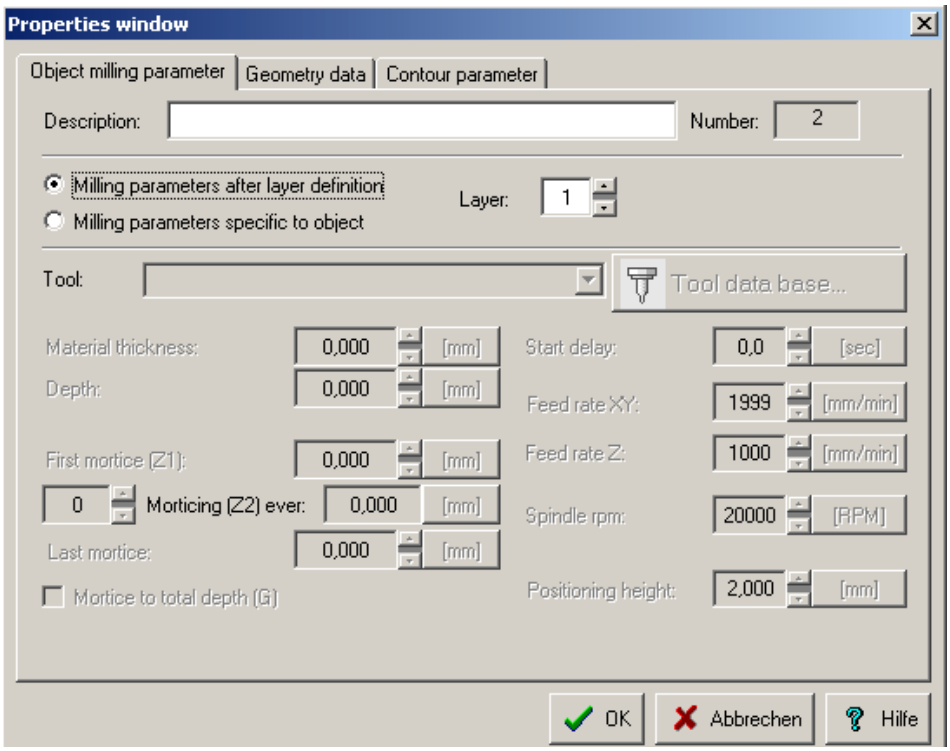


Zero point on material underside

Places the zero point on the material underside. All mortices depend on the material thickness!

Properties

Defines milling parameters, which are only valid for this object.



Description

Shows the name of the object. Can be user-defined.

Milling parameters after layer definition

Means the object is subject to the settings in the layer.

Layer

Defines which layer the object belongs to.

Milling parameters specific to object

Activates the object-specific milling parameters.

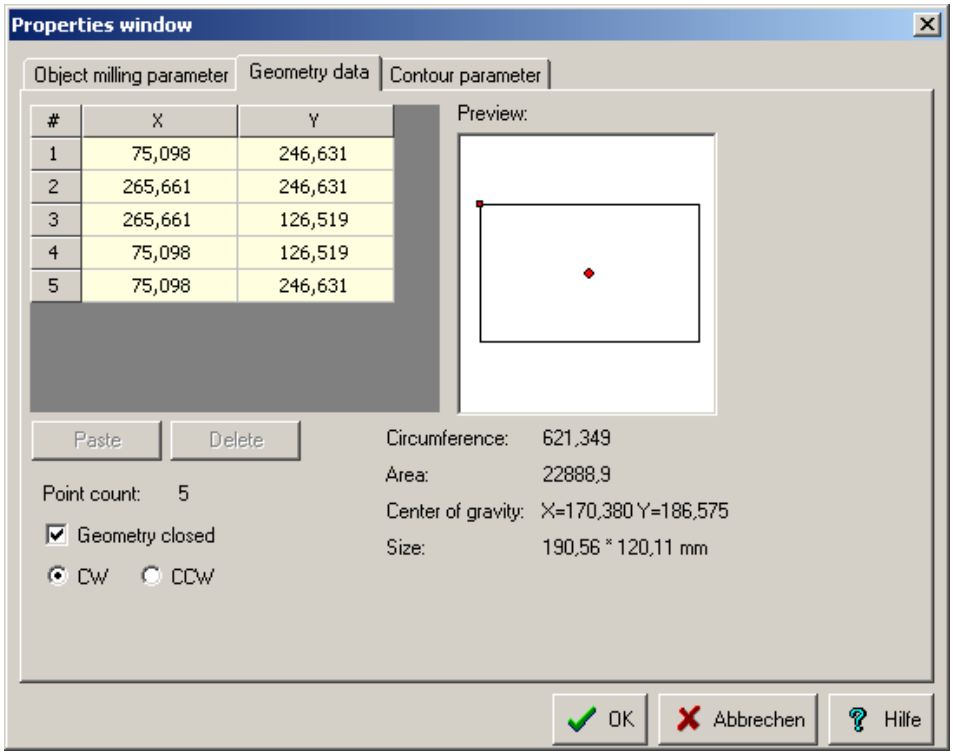
- *Tool:* defines the tool used for this material.
- *Tool data base:* opens the subwindow *Tool.* (See "Tools" Page 156)
- *Material thickness:* defines the thickness of the material used.
- Depth: defines the milling depth (total).
- *Mortice:* the first (Z1) and the last mortice can be user-defined. Z2 is automatically calculated from the entry of the mortice quantity.
- *Mortice to total depth (G)*: this option effects the mortice calculation for *Z2* up to the specified *Depth.* If the option is not selected, the *Material thickness* is used as a basis for calculation.
- *Start delay:* shows the length of the delay before the spindle reaches operating rpm after being switched on.
- Feed rate XY/Z: defines the feed rate for the XY axis and the Z axis.
- *Spindle rpm:* defines the operating rpm for the material.

NOTE: Does not apply to spindles with a separate speed control!

Positioning height: shows the height above the material for rapid feed positioning.

Geometry data

Lists the geometric object properties. All points of the object are listed and editable.



Paste: adds a new point in the selected position.

Delete: removes the selected point.

Geometry closed: means that the polygon is closed.

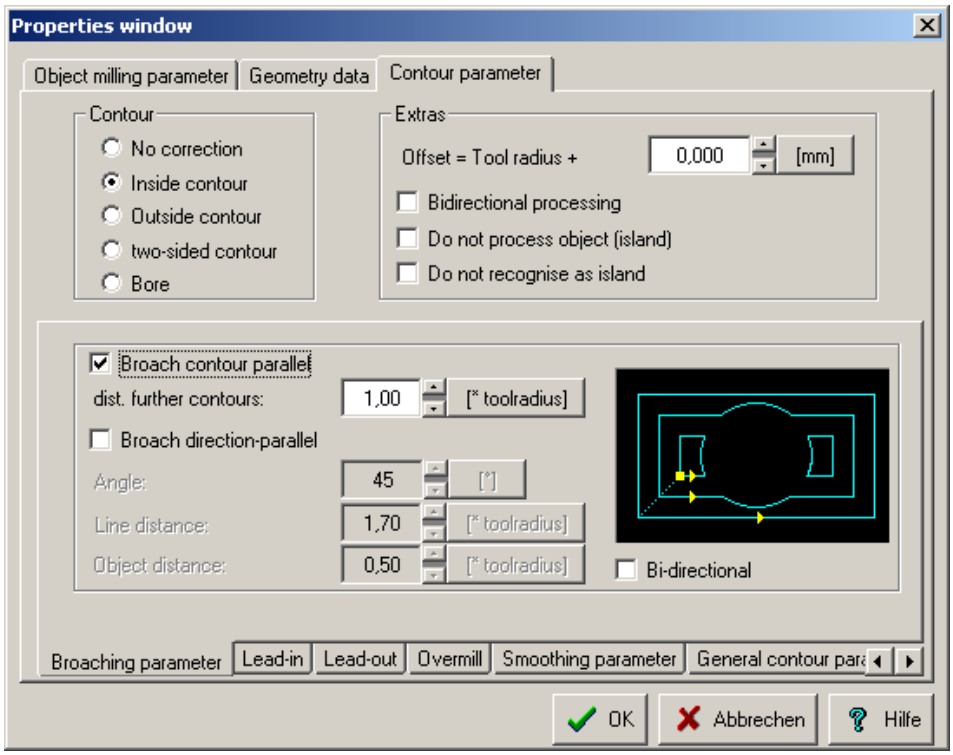
Scaling: opens the window 'scaling'.

Scaling sets a fixed number of points or distance between points.

The *Preview* shows a preview of the geometry.

Properties - Contour parameter

The contour parameters define how the contours will be treated during the mill process.



Contour area

The options in this area define the offset direction for the cutting radius correction.

Extras area

Offset: adds the entered value to the cutter radius correction.

Bidirectional processing: allows processing in either direction.

Do not process object (island): shows that an object may not be overmilled and remains as an island.

Do not recognise as island: object disregarded when broaching.

Broaching parameter

Can be selected when an object is defined as an inside contour.

Broach contour parallel: the broaching lines run parallel to the contour.

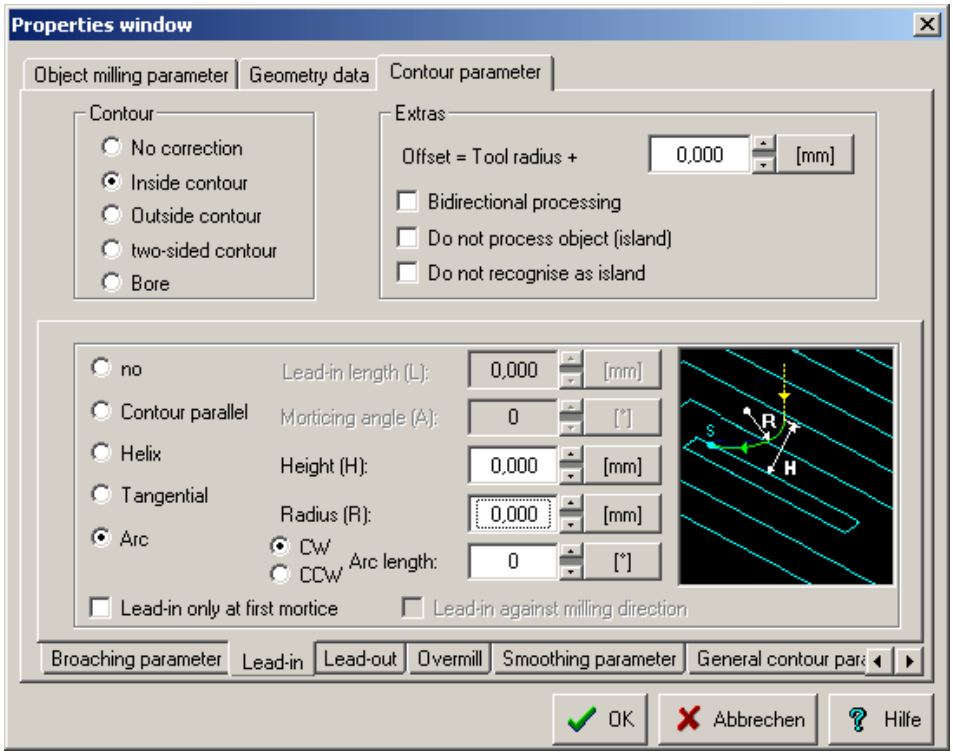
Dist. further contours: defines the distance between the broaching lines. The maximum value equates to twice the cutter radius.

Broach direction-parallel: the broaching lines run along the parameters *angle, line distance* and *object distance* parallel to the X axis.

Bidirectional: allows broaching in either direction.

Lead-in

Defines the form of the Z mortice during insertion into the material. To the greatest possible extent, the wide range of lead-in variants prevents the milling cutter from straying.



No: the groove directly follows the contour.

Contour parallel: the contour is already left during morticing.

Helix: the milling cutter moves spirally in the material during morticing.

Tangential: the mortice approaches the milling depth tangentially.

Arc: morticing occurs outside the contour and the milling cutter then travels in an arc to the contour.

CW: stands for **clockwise**.

CCW: stands for **counter clockwise**.

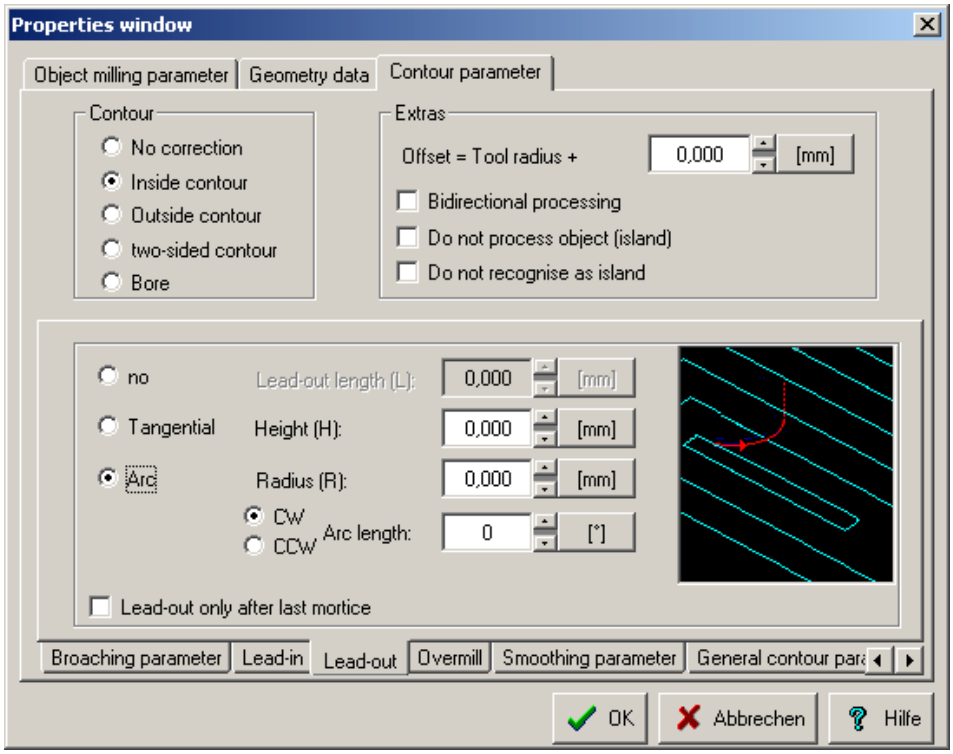
The *Helix* and *Arc* settings can be set as clockwise or counter clockwise.

Lead-in only at first mortice: means that the selected lead-in process shall only be used for the first mortice (Z1). Further morticing will be carried out without lead-in.

Lead-in against the milling direction: can only be activated with contour parallel infeed. The lead-in is carried out against the defined milling direction.

Lead-out

Defines the behaviour after the contour is completed.



No: Milling cutter is lifted straight out of the material.

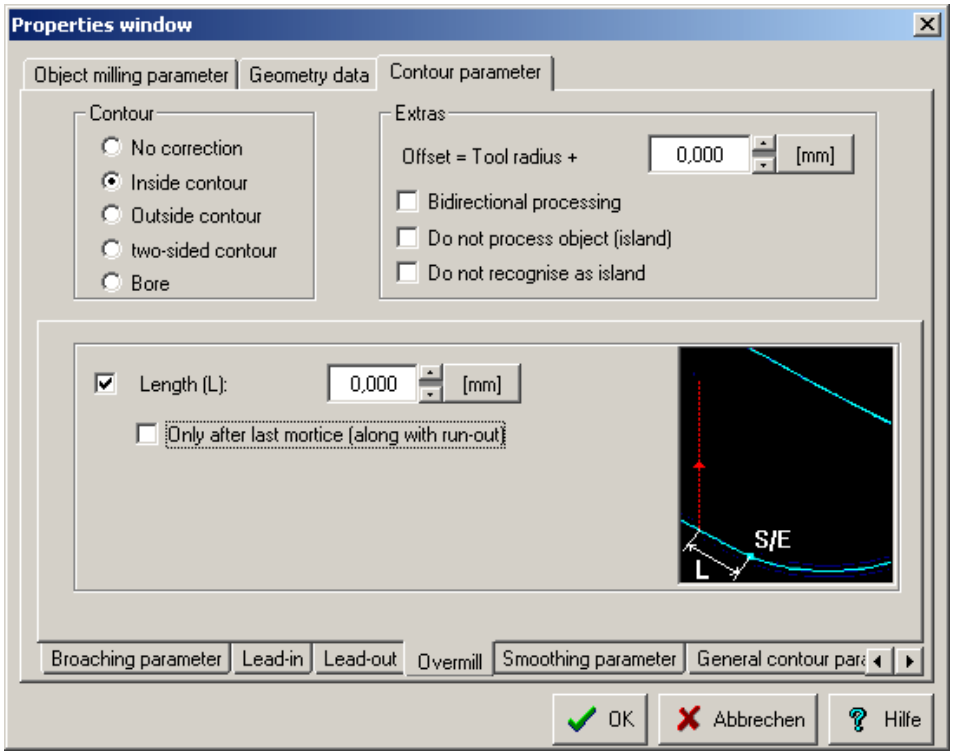
Tangential: The milling cutter is lifted out of the material at an angle along the lead-out length (L).

Arc: The milling cutter is removed from the contour in an arc. The lifting occurs outside the contour.

Lead-out only after last mortice: means that the selected lead-out process shall only be used for the last mortice (Z3).

Overmill

After the contour has been completed, the milling cutter is moved even further along a defined length before leaving the material.

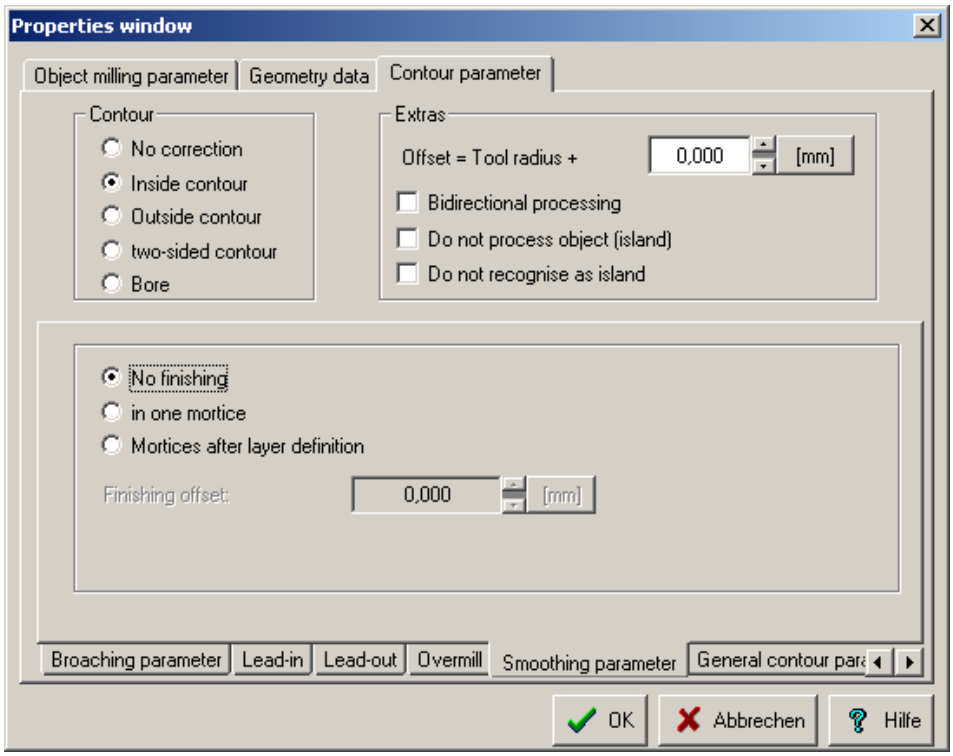


Length (L): defines the distance over which milling will continue.

Only after last mortice: restricts overmilling to the last mortice.

Smoothing parameter

A finishing process can be defined for improved surface quality.



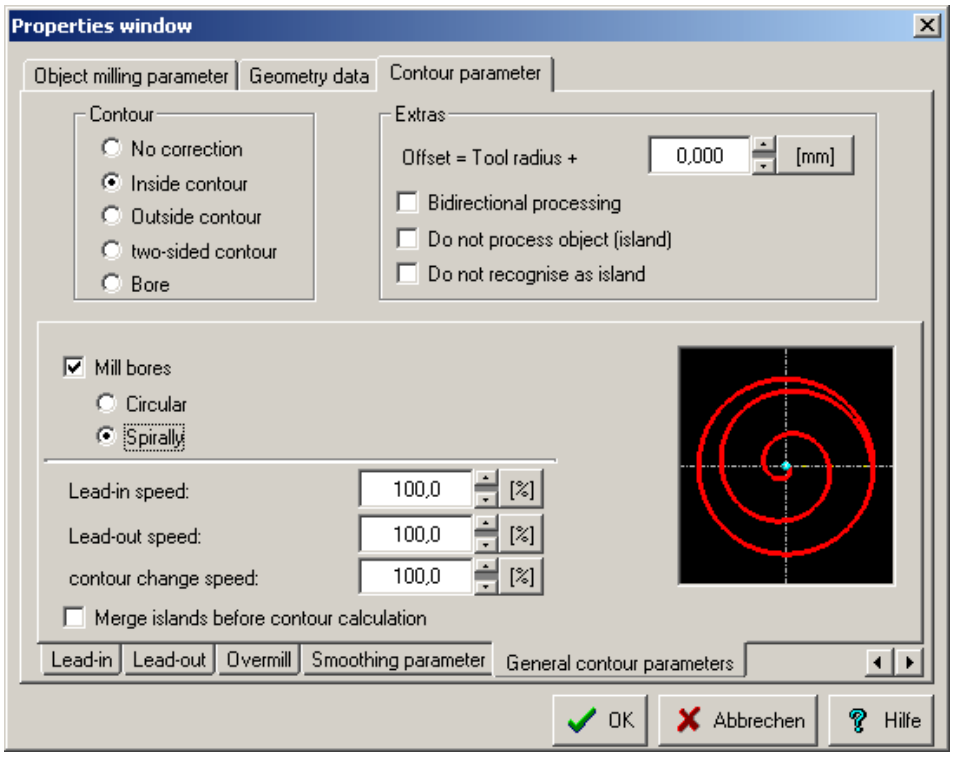
In one mortice: Finishing process carried out for the entire depth after the last mortice.

Mortices after layer definition: A finishing process takes place after every mortice defined in the layer.

Finishing offset: Excess which remains for the finishing process.

General contour parameters

General contour parameters are defined.



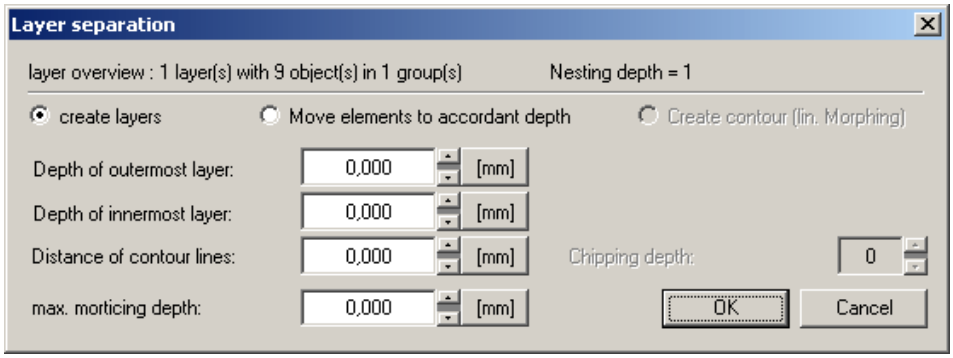
Mill bores: Depending on the tool, bores can be milled *circular* or *spirally*.

Lead-in speed, lead-out speed, contour speed: The speeds can be altered by amending the percentages entered.

Merge islands before contour calculation: Objects which are not going to be edited (islands) are merged before contour calculation.

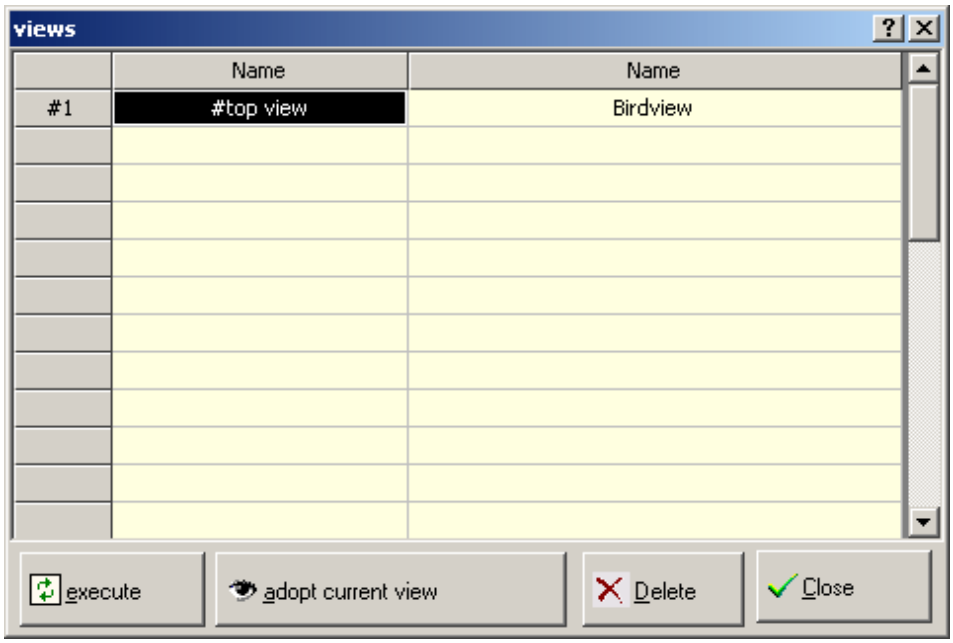
Layer separation

Allocates the selected objects to layers.



Labelled views

You can activate the views In *Labelled views*. You can create new views.



Execute

Switches the work area to the selected view.

Adopt current view

You can save the current view in the work area under a new entry.

Delete

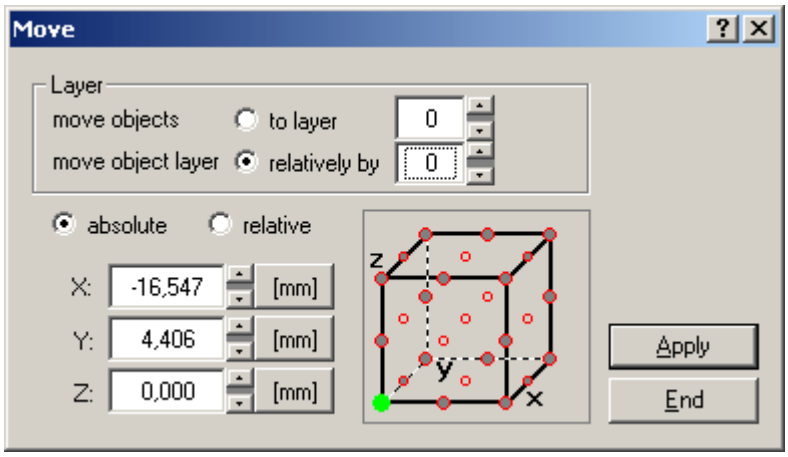
Deletes views from the list.

Close

Closes the subwindow.

Move

Moves elements within the work area and between layers.



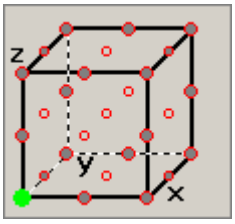
➢ ***Move object to a different layer.***

You can choose to move an object to a layer X or relative to the current layer, by a number X of layers.

- In the *Layer* area, select whether the object should be moved in an absolute (*move objects to layer*) or a relative (*move object layer relatively by*) manner.
- Enter desired layer or number of layers.
- Choose the option *relative*.
- Enter 0.000 for the *X, Y* and *Z* axes.
- *Apply* carries out the action.

➢ ***Move object in the work area absolutely.***

- Under *Layers* choose the option ... *relatively by* and set the quantity to 0.
- Choose the option *absolute*.
- Enter the absolute target coordinates (for the zero point) in the X, Y and Z fields.
- Select the object-related point of origin of the movement.

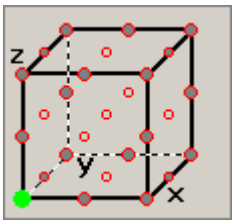


(In this case, the lower left-hand vertex was selected).

- *Apply* carries out the action.

➢ ***Move the object in the work area relatively.***

- In the *Layer* area, choose the option ... *relatively by* and set the quantity to 0.
- Choose the option *relative*.
- Enter the relative distances from the actual position of the object in the X, Y and Z fields.
- Select the object-related point of origin of the movement.



(In this case, the lower left-hand vertex was selected).

- *Apply* carries out the action.

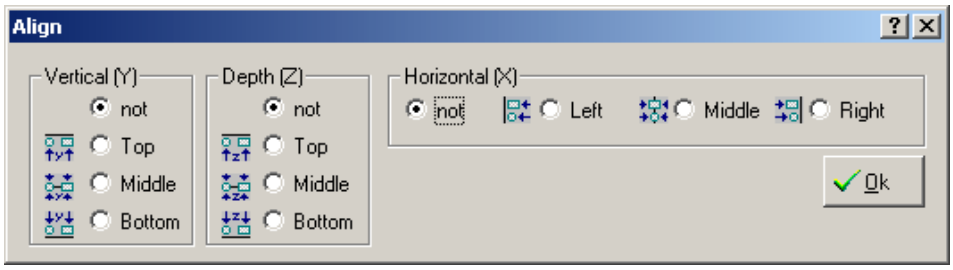
End

Closes the window.

NOTE: Unsaved settings will be lost!

Align

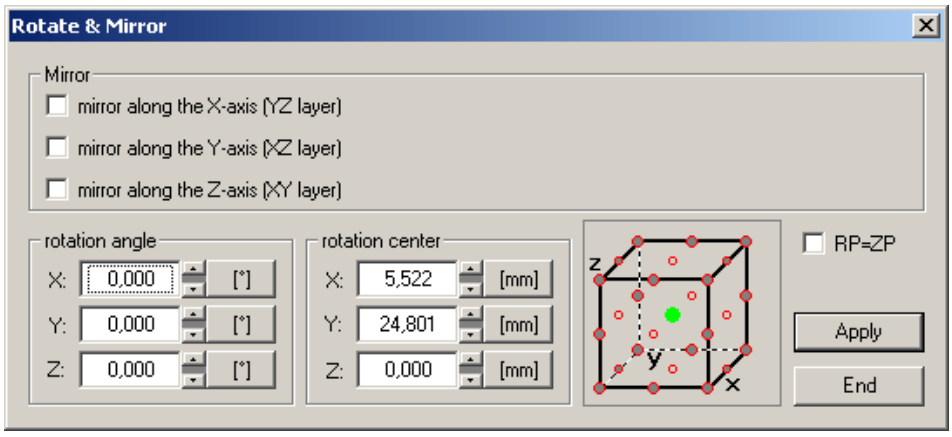
This function aligns several objects with each other. Alignment can occur simultaneously in several directions (X-Z, X-Y, Y-Z, X-Y-Z)



Ok carries out the action.

Rotate and mirror

Rotates and mirrors selected objects in the work area.

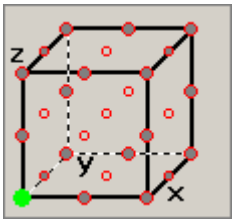


➢ *Mirror objects*

- Select one or more options in the *Mirror* area.
- Ensure that all angles are set to 0 under *Rotation angle*.
- *Apply* carries out the action.

➢ *Rotate objects*

- Enter the angle for the respective axes under *Rotation angle* .
- The *Rotation centre* can be user-defined **or** selected in the graphic.



(In this case, the lower left-hand vertex was selected).

You can select the zero point as the rotation centre using the option *DP=NP* (rotation centre equals zero point).

- *Apply* carries out the action.

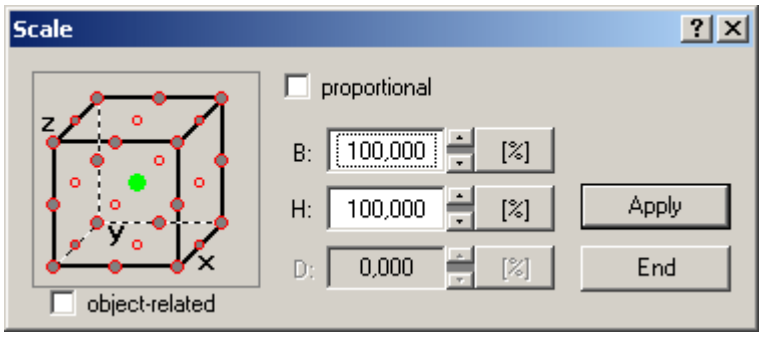
End

Closes the window.

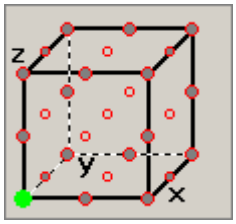
NOTE: Unsaved settings will be lost!

Scale

Changes the size of objects or groups. Amendments can be made using specific measurements or percentages.



Point of origin



Shows the point of origin of the scaling.

Proportional

This option changes all sides proportionally.

Entry fields B, H and D

Stand for **Breadth, Height** and **Depth.** Click the *%* button to switch between making measurement-based changes *(mm)* and percentage-based changes *(%)*.

Object-related

When deactivated, the scaling of various objects follows the bounding cube.

When activated each selected object is individually scaled. Is required for overlapping objects.

Apply

Activates the selected settings.

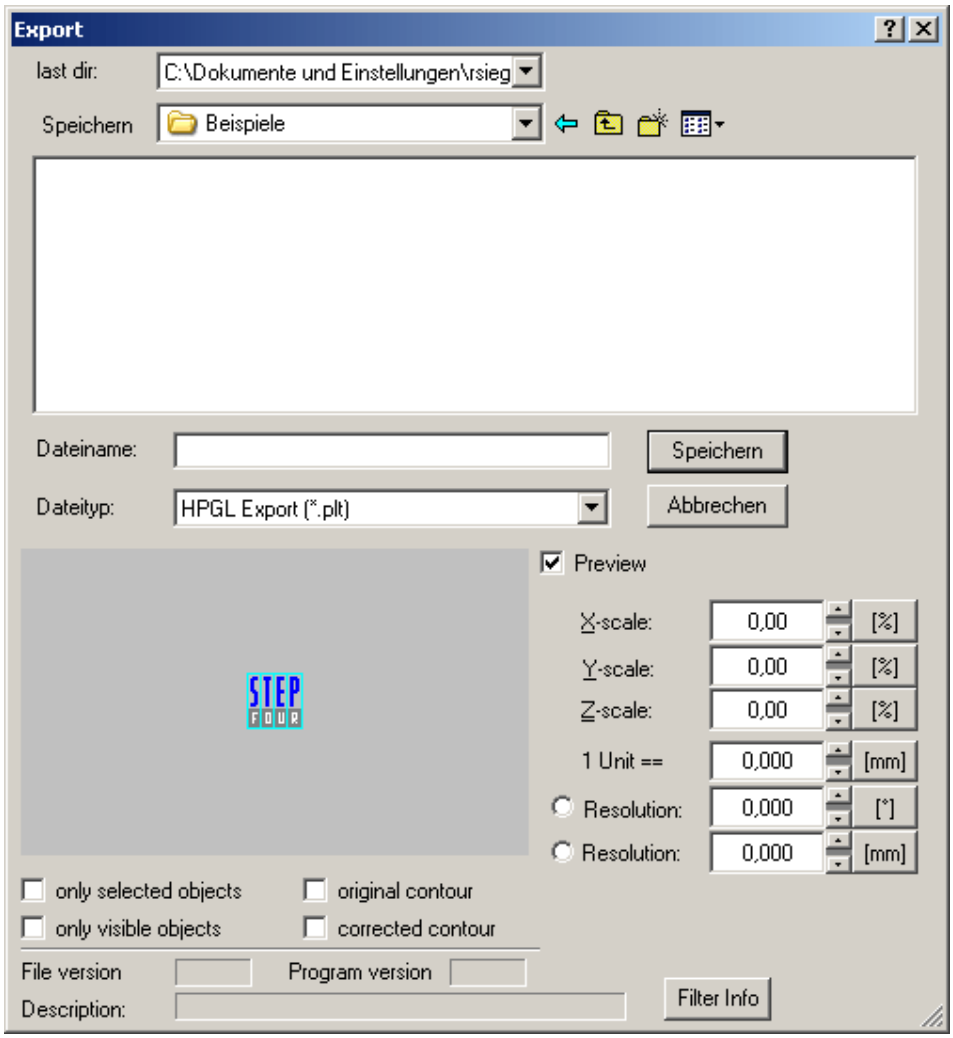
End

Closes the window.

NOTE: Unsaved settings will be lost!

Export

Saves the object information of existing milling projects as *.plt or *.dxf.



➢ ***Export file (.dxf, .plt)***

- Select folder
- Enter file name
- Select file type
- Set scaling details (*Scaling X, Y, Z*). (preset at 100%)
- Enter value for one *Unit*. (The standard values for individual formats are preset)
- Select arc resolution (*Resolution*) in degrees or millimetres and enter the desired value. (Standard values are preset)
- Left-click *Save* to save the file in the selected folder.

Options

You can view the file contents under *Preview*.

Only selected objects only exports the objects which were previously selected in the milling project.

Only visible objects only exports the objects which are visible.

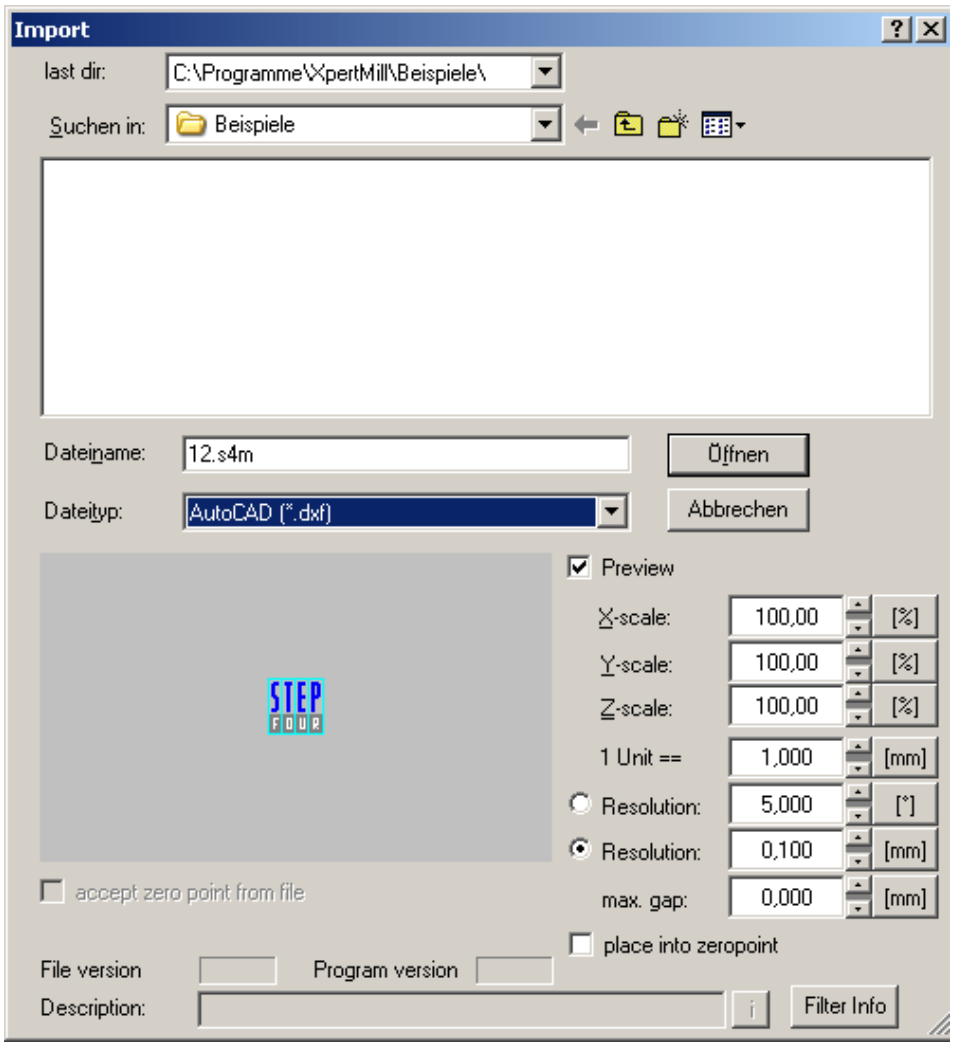
Original contour only exports the object data (without the cutter radius correction).

Corrected contour exports the contours corrected to the cutter radius.

Filter Info opens the Filter Info window.

Import

Adds object information from existing milling projects into the current milling project.



➢ ***Import file (.smf, .s4m)***

- Select folder
- Select file type *all Stepfour Files (.smf, .s4m)*.
- Select file.
- Left-click *Open* to import the file.

➢ ***Import file (.dxf, .exc, .s4g, .plt)***

- Select folder.
- Select file type.
- Select file.
- Set scaling details (*X, Y and Z scale*). (preset at 100%)
- Enter value for one *Unit*. (The standard values for individual formats are preset)
- Select arc resolution (*Resolution*) in degrees **or** millimetres and enter the desired value. (Standard values are preset)
- *Max. gap* means the maximum distance between the lines to be recognised as individual objects. Lines with a small distance between them are connected to one object.
- Left-click *Open* to import the file.

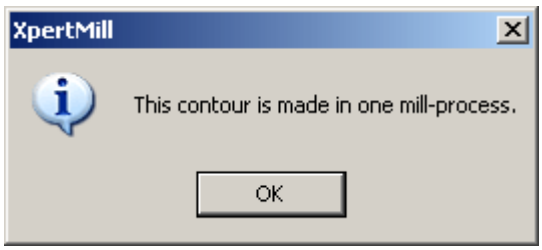
Options

you can view the file contents under *Preview*.

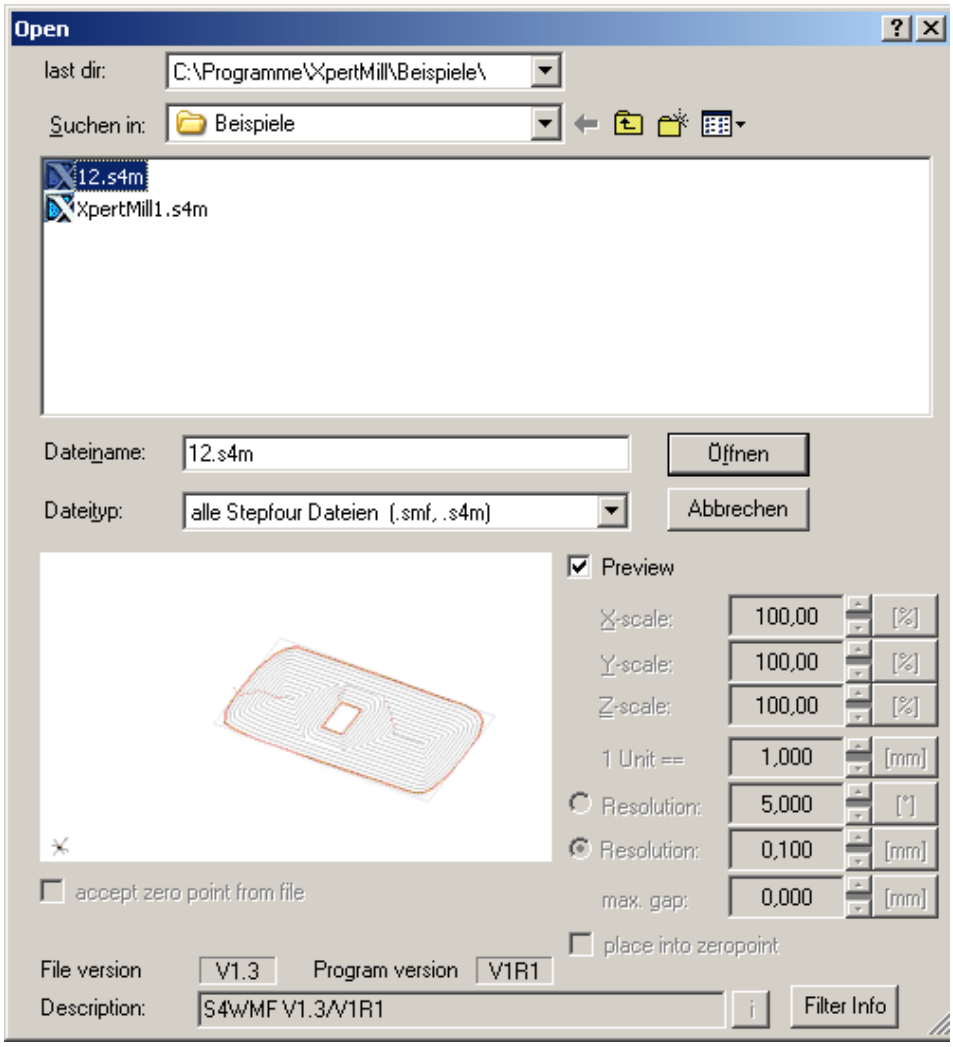
Place into zeropoint places the objects in the current zero point.

i

Shows available file information in a separate window. For information about creating file information, see File information.



Open



➢ ***Open file (.smf, .s4m)***

- Select folder.
- Select file type *all Stepfour Files (.smf, .s4m)*.
- Select file.
- Left-click *Open* to open the file.

➢ ***Open file (.dxf, .exc, .s4g, .plt)***

- Select folder.
- Select file type.
- Select file.
- Set scaling details (*X, Y and Z scale*). (preset at 100%)
- Enter value for one *Unit*. (The standard values for individual formats are preset)
- Select arc resolution (*Resolution*) in degrees **or** millimetres and enter the desired value. (Standard values are preset)
- *Max. gap* means the maximum distance between the lines to be recognised as individual objects. Lines with a small distance between them are connected to one object.
- Left-click *Open* to open the file.

Options

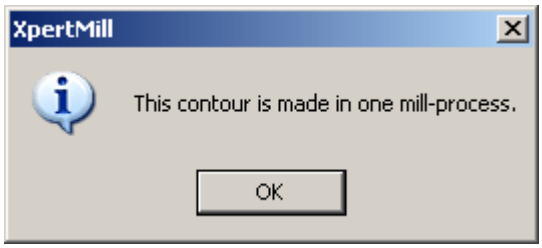
You can view the file contents under *Preview*.

Accept zero point from file loads the saved zero point from the file. The current zero point will be lost!

Place into zeropoint places the objects in the current zero point.

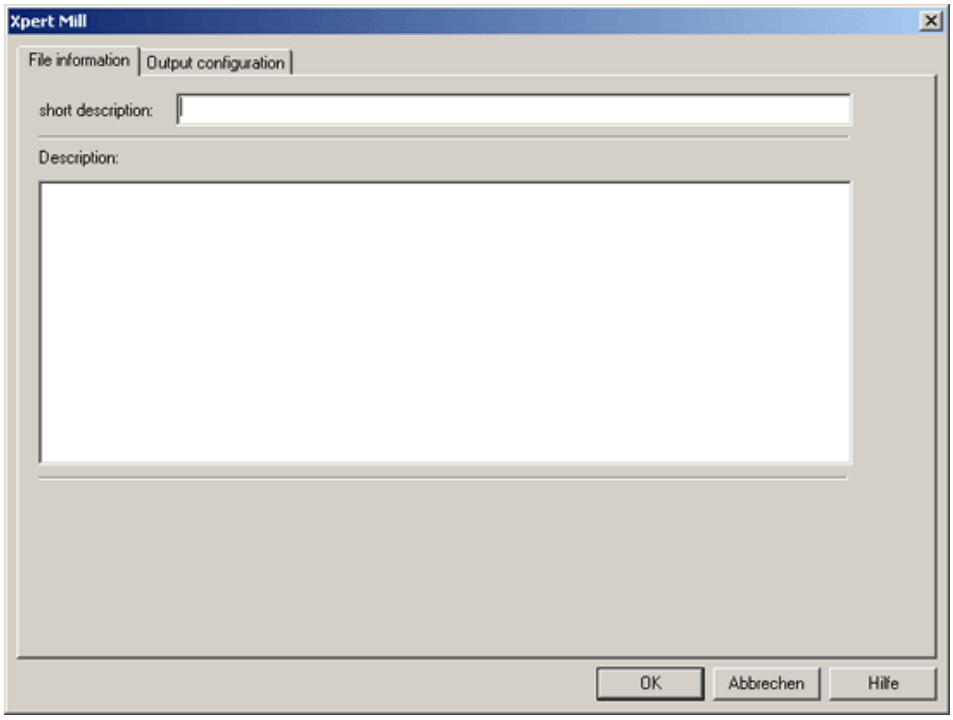
i

Shows available file information in a separate window. For information about creating file information, see File information.

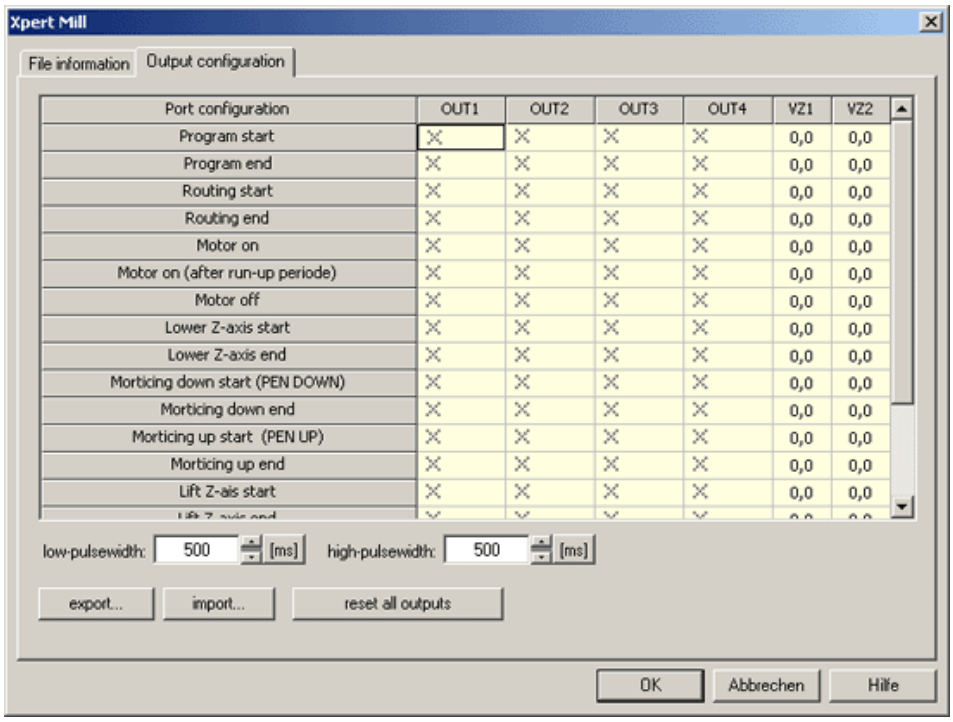


File information

You can create a *Short description* and a *Description* for the active milling project. You can view this information in the subwindow ***Open*** (Page 138) before the subsequent opening of the milling project.

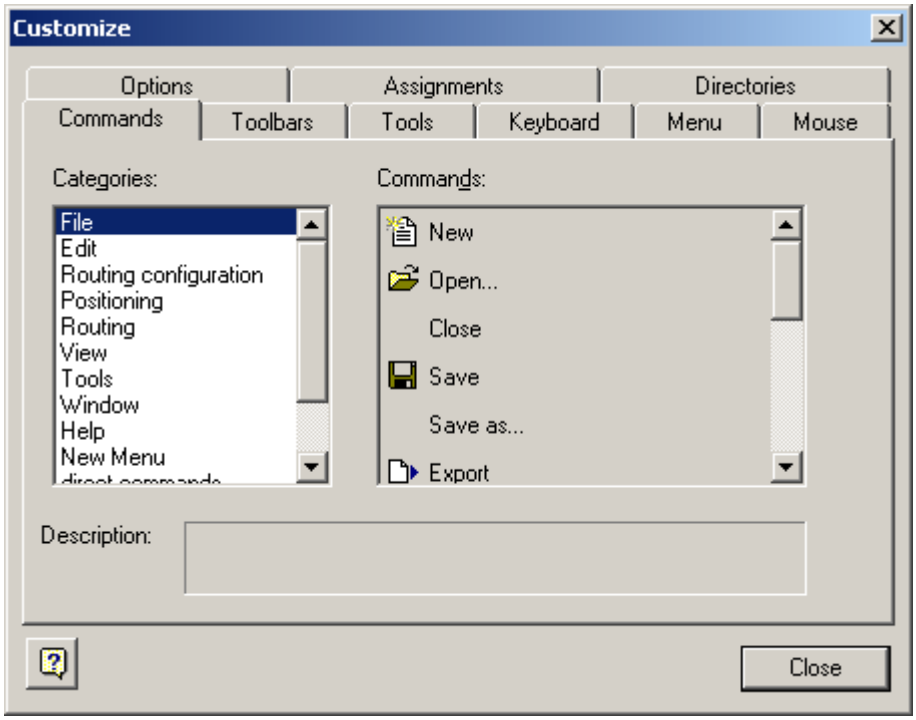


The **file specific** output configurations of the actions are defined here. For information on setting the switch statuses, see ***Machine parameters - Outputs*** (See "Outputs" Page 199).



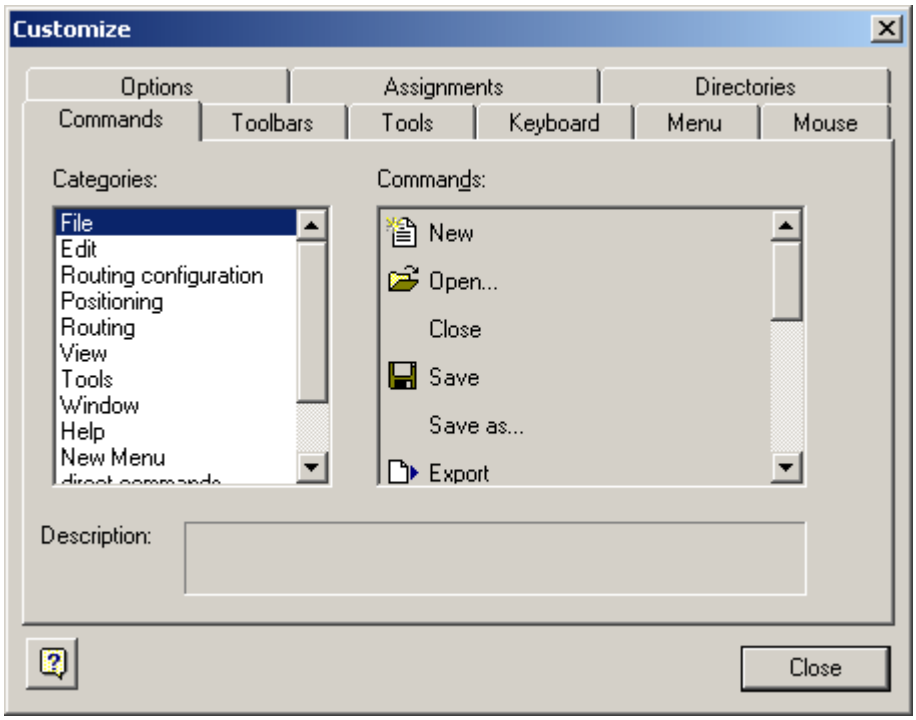
Change (configuration)

Serves the individual configuration of the user interface (GUI) and several general settings.



Commands

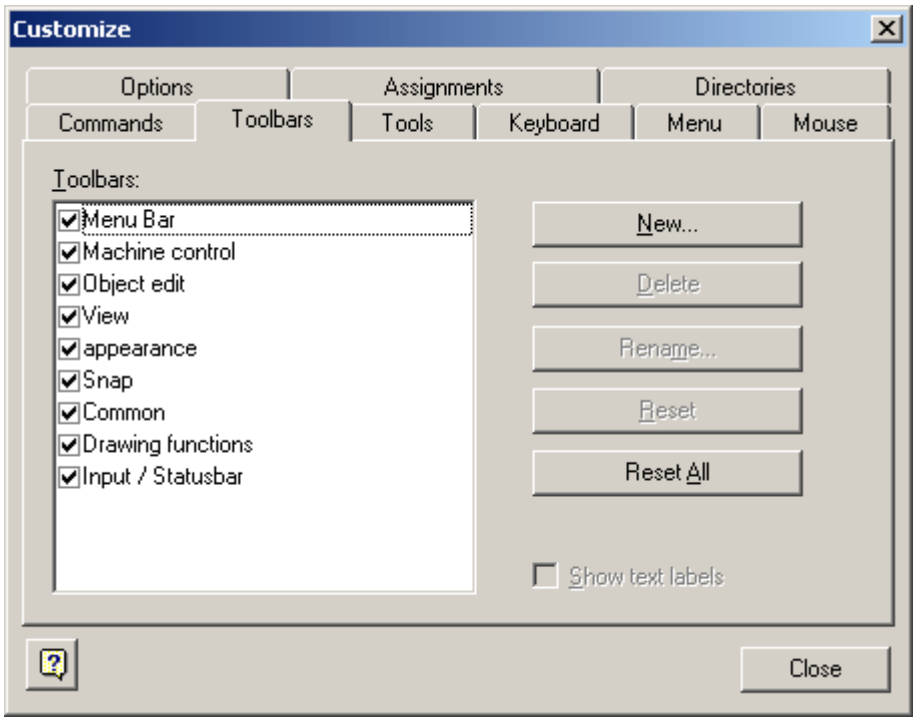
A categorised list of all commands. For every command, the icon and the description of the function are visible.



Single commands can be selected in this window and individually dragged to a toolbar or a menu.

Toolbars

All toolbars are listed under *Toolbars*.



New

Creates a new toolbar.

Delete

Deletes a toolbar. The following toolbars can not be deleted: menu bar, technology toolbar, editing toolbar, snap functions, standard functions and drawing functions.

Rename...

Renames a user-created toolbar. The following toolbars can not be renamed: menu bar, technology toolbar, editing toolbar, snap functions, standard functions and drawing functions.

Reset

Deletes all changes made to the selected toolbar and resets it to default.

Reset all

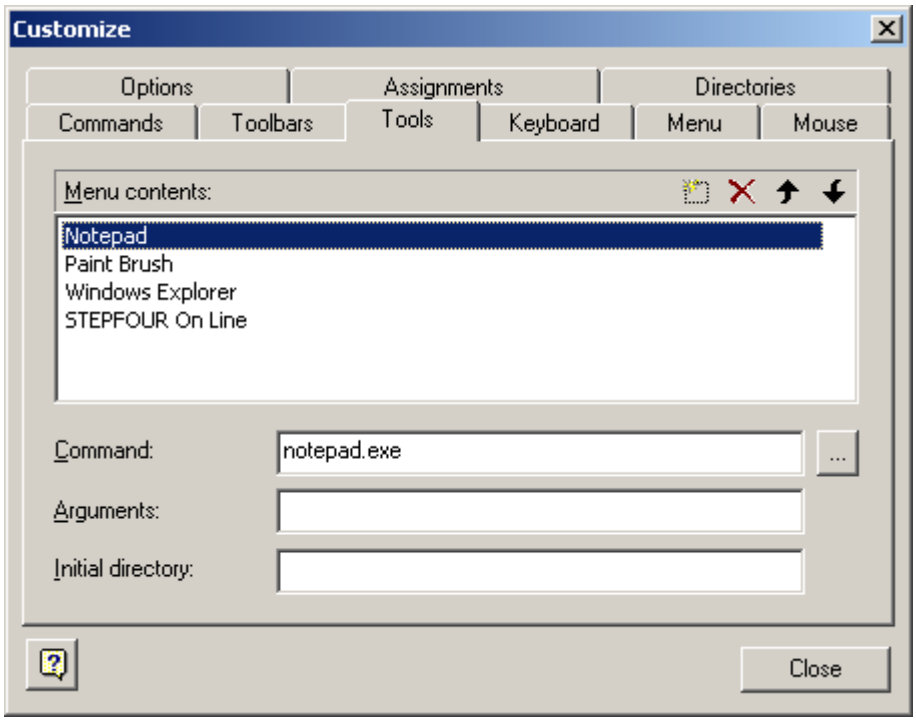
Deletes all changes made to all toolbars and resets them to default.

Show text labels

Shows the name under each button of the selected toolbar.

Extras

Additional menu items such as the notepad or paint brush can be activated using the *Options* menu.



New creates a new menu item.

Delete

Delete deletes a menu item from the list.

Alt + Up / Alt + Down

You can change the sort order of the list.

Command

Enter or find the command to run the application.

Arguments

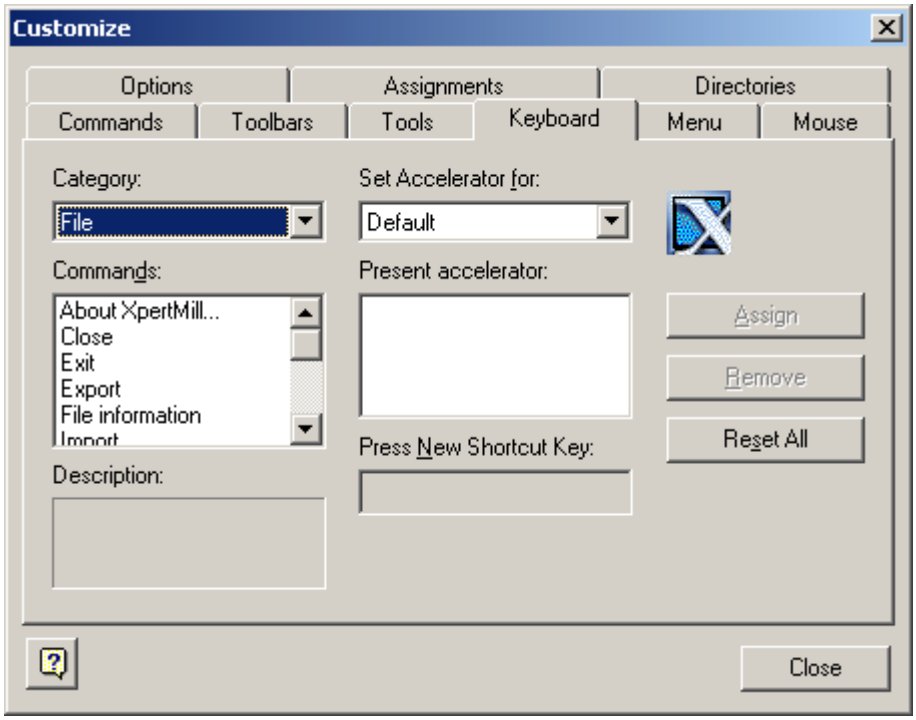
Additional parameters which are transferred when the application is run.

Initial directory

Path at which the application is found.

Keyboard

The individual commands as well as their shortcuts and descriptions are listed under *Keyboard*.



New shortcut

Defines a shortcut for a command.

Assign

The specified shortcut is allocated to the command.

Remove

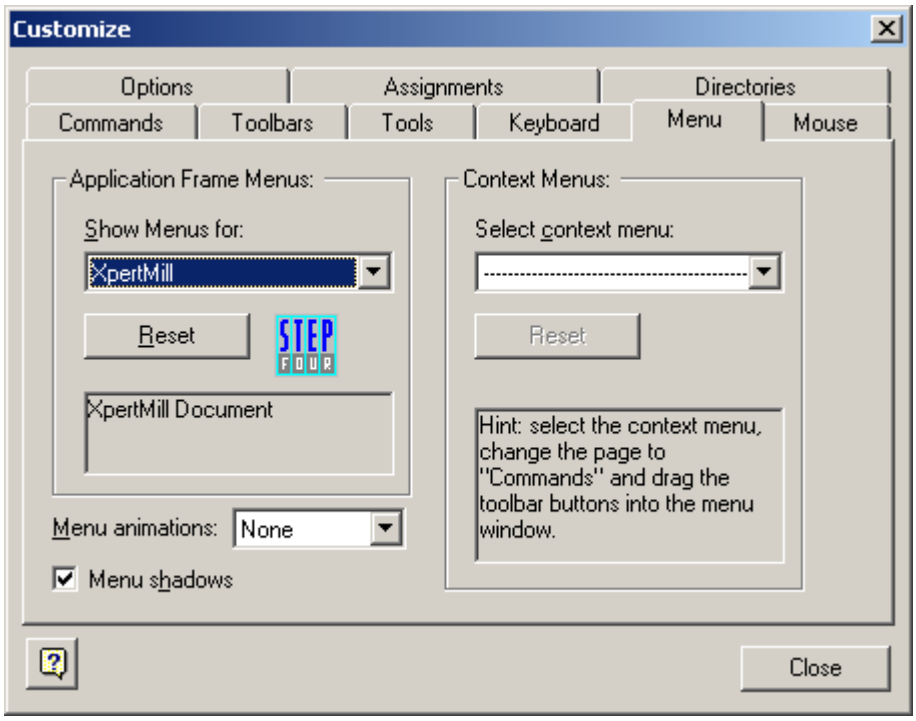
Removes the allocated shortcut.

Reset all

All changes made to shortcuts are reset to default.

Menus

You can make settings for *Main menus* and *Context menus* under *Menus*.



Main menus

Defines the menu used.

Context menus

Lists all context menus. Activate a context menu from the list to drag commands from the tab page *Commands* into the context menu.

Reset

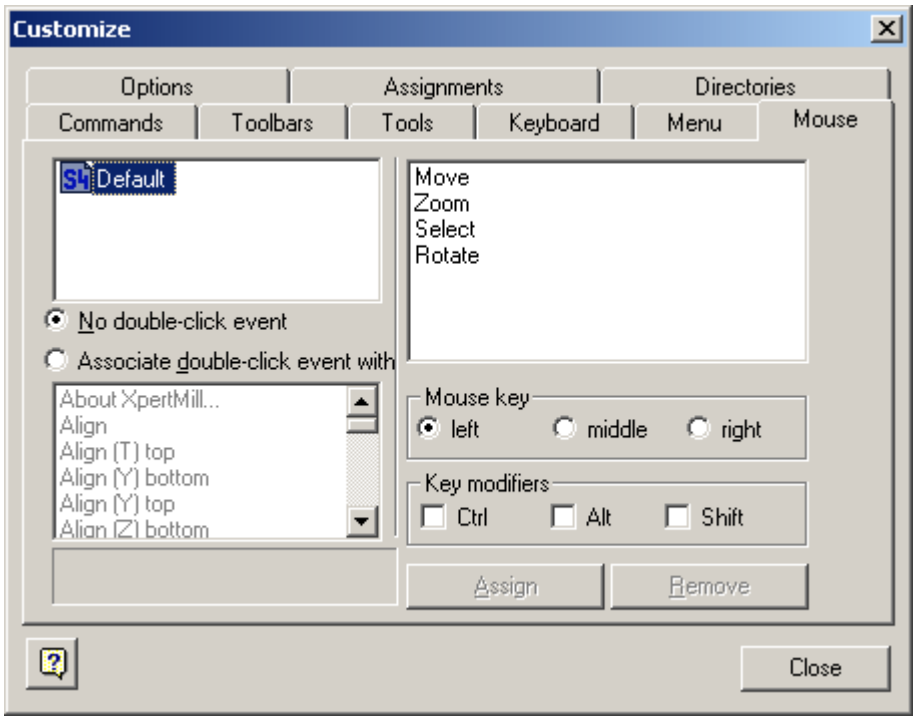
Resets all changes.

Menu animations / Menu shadows

Defines the appearance of the menus.

Mouse

Defines the settings for the use of the mouse.



Associate double-click event with:

You can activate commands with a double-click.

Mouse key

Defines which *Mouse key* (*left*, *middle* **or** *right*) you use to carry out a command.

Key modifiers

Defines which *Mouse key* (*left*, *middle* or *right)*

and

Key modifiers (*Ctrl*, *Alt* or *Tab*) you use to carry out a command.

Assign

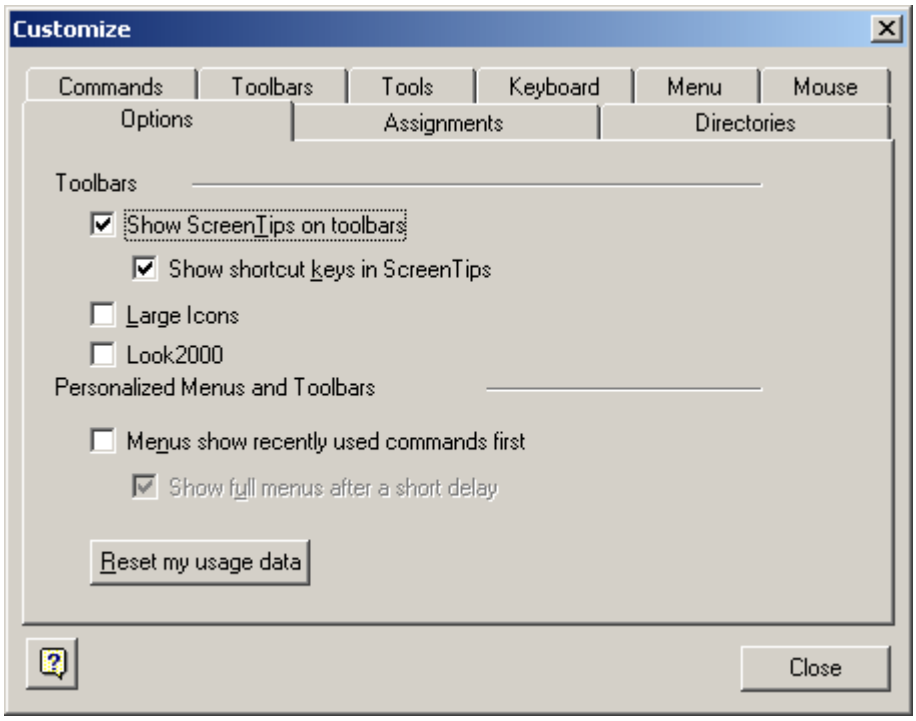
Assigns the mouse keys and Key modifiers to the commands.

Remove

Deletes the allocated settings.

Options

You can change the layout of the toolbars and menus under *Options*.



Toolbars

Show ScreenTips on toolbars displays a ScreenTip when you drag the cursor over a button.

Show shortcut keys in ScreenTips shows the shortcut keys in the ScreenTips when you drag the cursor over a button.

Large Icons makes the icons larger.

Look2000 changes the appearance of the toolbars.

User-defined menus and toolbars

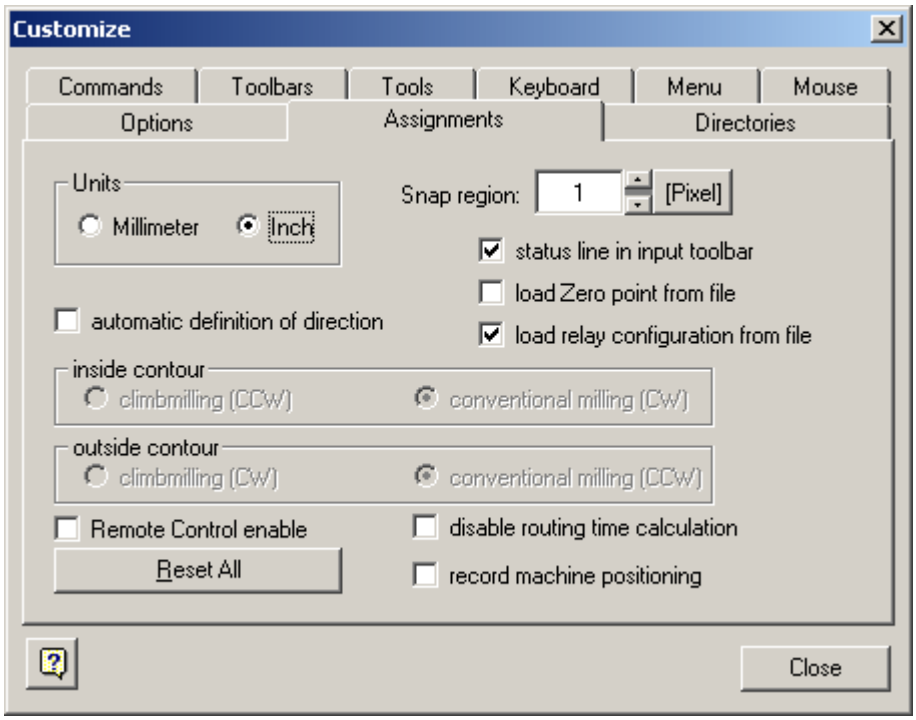
Last used commands are listed first in the menus. The entire menu is shown after a short delay.

Reset all

Resets all changes.

Assignments

You can make technical milling settings under *Assignments*.



Units

You can choose between millimetres and inches.

Snap region

Is the region around an object in which you can snap (select) it with the cursor.

Automatic definition of direction

Activates or deactivates the settings for the *inside contour*, *outside contour* in this subwindow.

Status line in input toolbar

When activated, the status bar is located in the input toolbar.

Load Zero point from file

Activates or deactivates the loading of the zero point from the file. The current zero point will be lost!

Load relay configuration from file

Activates or deactivates the loading of the file-specific output switch statuses from the file. These switch statuses are saved under Output configuration.

Inside contour

Defines the milling direction for the inside contour.

Outside contour

Defines the milling direction for the outside contour.

Remote Control enable

Using a software tool on your computer, you can monitor the operations on another computer with the XpertMill Software.

Disable routing time calculation

Activates or deactivates the routing time calculation.

Record machine positioning

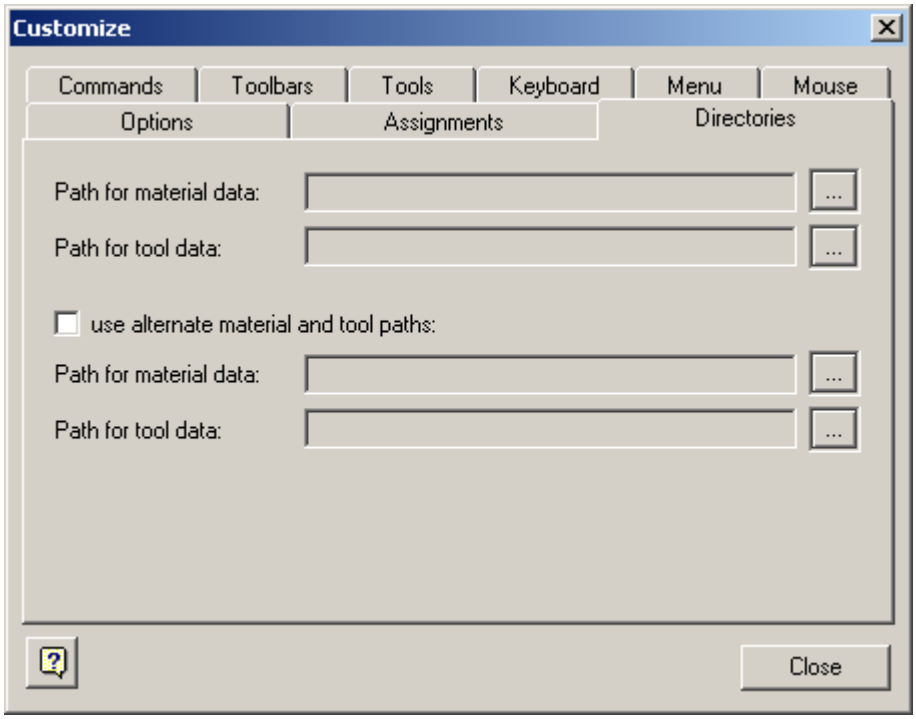
When activated the journey of the tool in the work area will be recorded graphically.

Reset all

Resets all changes.

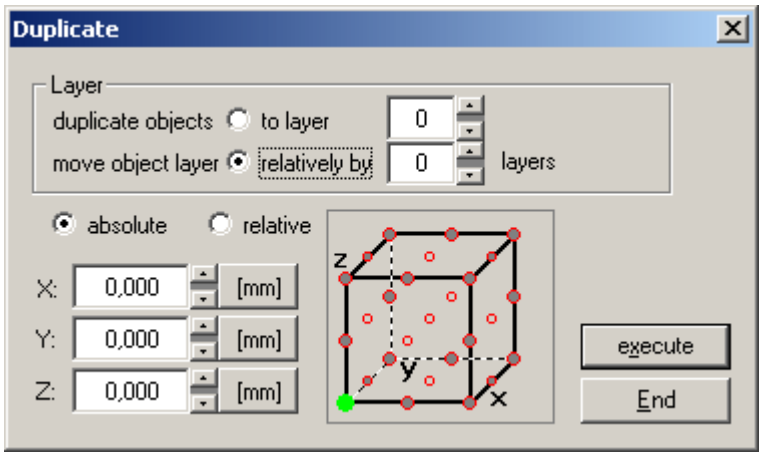
Directories

The path for *Material data* and/or for *Tool data* is displayed under *Directories*.



Duplicate

Duplicates objects and groups. When duplicating objects, you can move them around in the work area or to a different layer.



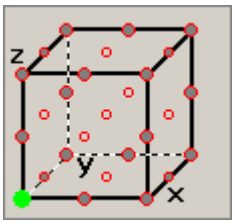
➢ ***Move duplicate to a different layer.***

You can choose to move a duplicate to a layer X or relative to the current layer, by a number X of layers.

- In the *Layer* area, select whether the object should be moved absolutely (*Duplicate objects to layer*) or relatively (*Move object layer relatively by layers*).
- Enter desired layer or number of layers.
- Select the option *relative*.
- Enter 0.000 for the *X, Y* and *Z* axes.
- *Execute* carries out the action.

➢ ***Move duplicate in the work area absolutely.***

- In the *Layer* area, choose the option *...relatively by layers* and set the quantity to 0.
- Choose the option *absolute*.
- Enter the absolute target coordinates (for the zero point) in the *X, Y* and *Z* fields.
- Select the object-related point of origin of the movement.

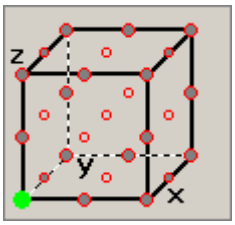


(In this case, the lower left-hand vertex was selected).

- *Execute* carries out the action.

➢ ***Move duplicate in the work area relatively.***

- In the *Layer* area, choose the option ...*relatively by layers* and set the quantity to 0.
- Choose the option *relative*.
- Enter the relative distances from the actual position of the object in the *X, Y* and *Z* fields.
- Select the object-related point of origin of the movement.



(In this case, the lower left-hand vertex was selected).

- *Execute* carries out the action.

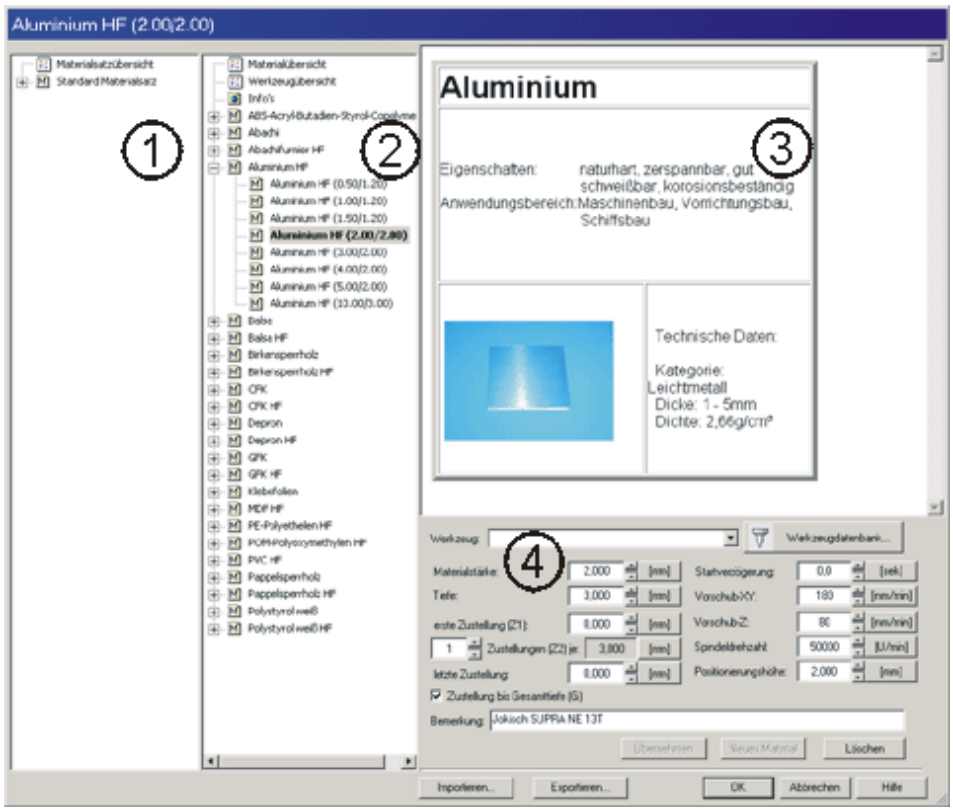
End

Closes the window.

NOTE: Unsaved settings will be lost!

Material definition

All available materials are recorded in the material area. Individual material sets can be created from this collection. These can contain the most diverse materials.



1 Material set overview

2 Material overview

3 Info box

4 Parameter

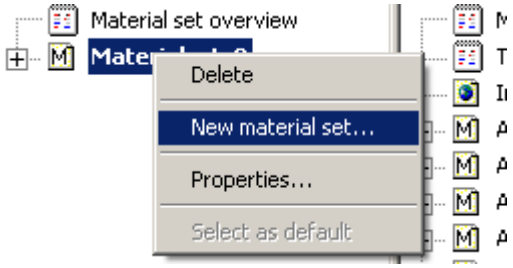
NOTE: Click on material overview to open a complete overview of all available materials in the info box.

Material set overview

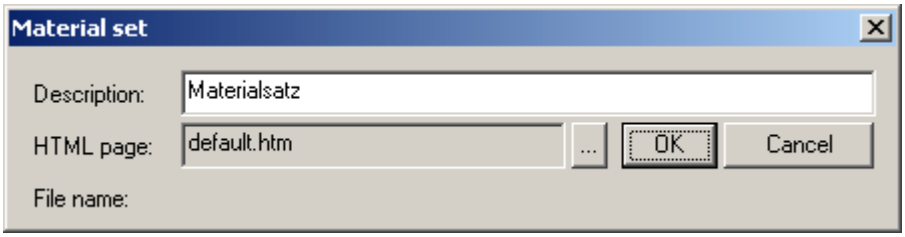
Lists the individual user-defined material sets.

➢ ***Create new material set***

- Right-click to open the context menu.



- *New material set* swaps to subwindow *New material set.*



- Enter the *Description* for the new material set and select the *HTML page* for the *Info box*.

You can now add the materials for the new material set from the material overview.

➢ ***Add materials to a material set***

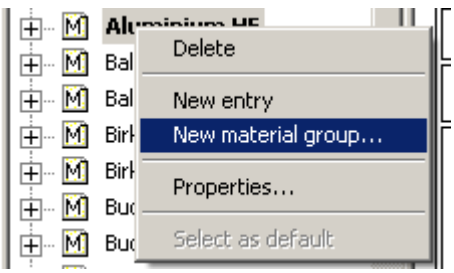
- Select material from the material overview.
- Click on the material, hold down the mouse button and drag to the desired material set.
- Once you release the mouse button, the material is allocated to the material set.

Material overview

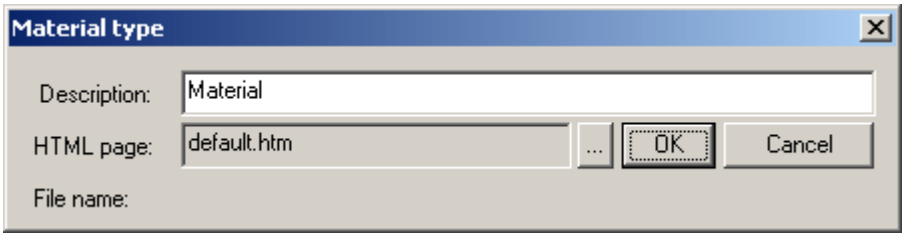
Lists all defined materials. The materials are split into categories (material groups).

➢ ***Create new material group.***

- Right-click to open the context menu.



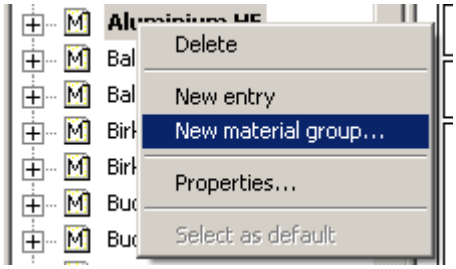
- *New material group* swaps to subwindow *New material group.*



- Enter the *Description* for the new material type and select the *HTML page* for the *Info box*.

➢ *Create new material*

- Select the material group in which the material should be created.
- Right-click to open the context menu.



- Click on *New entry* to create a new material entry.

➢ *Select standard material*

This function selects a material as standard for all new milling projects.

- Right-click to open the context menu.

- *Select as default* activates the material for all new milling projects.

➢ *Select global material for the current milling project*

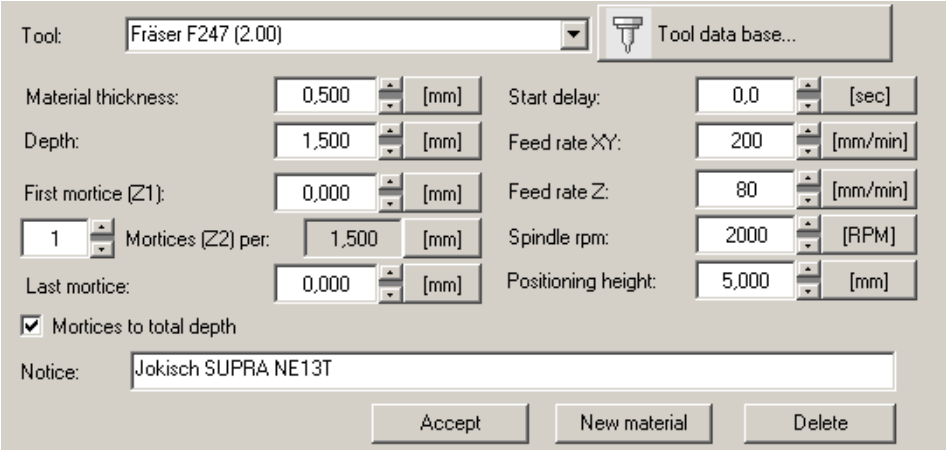
Double-click on a material to select this as the material used in the current milling project. The material settings are applied to all layers.

Info box

Shows additional information about the selected material.

Parameter

Use this field to make all the settings for processing the material.



- *Tool:* defines the tool used for this material.
- *Tool data base:* opens the subwindow *Tool.* (See "Tools" Page 156)
- *Material thickness:* defines the thickness of the material used.
- Depth: defines the milling depth (total).
- *Mortice:* the first (Z1) and the last mortice can be user-defined. Z2 is automatically calculated from the entry of the mortice quantity.
- *Mortice to total depth (G)*: this option effects the mortice calculation for *Z2* up to the specified *Depth.* If the option is not selected, the *Material thickness* is used as a basis for calculation.
- *Start delay:* shows the length of the delay before the spindle reaches operating rpm after being switched on.
- Feed rate XY/Z: defines the feed rate for the XY axis and the Z axis.
- *Spindle rpm:* defines the operating rpm for the material.

NOTE: Does not apply to spindles with a separate speed control!

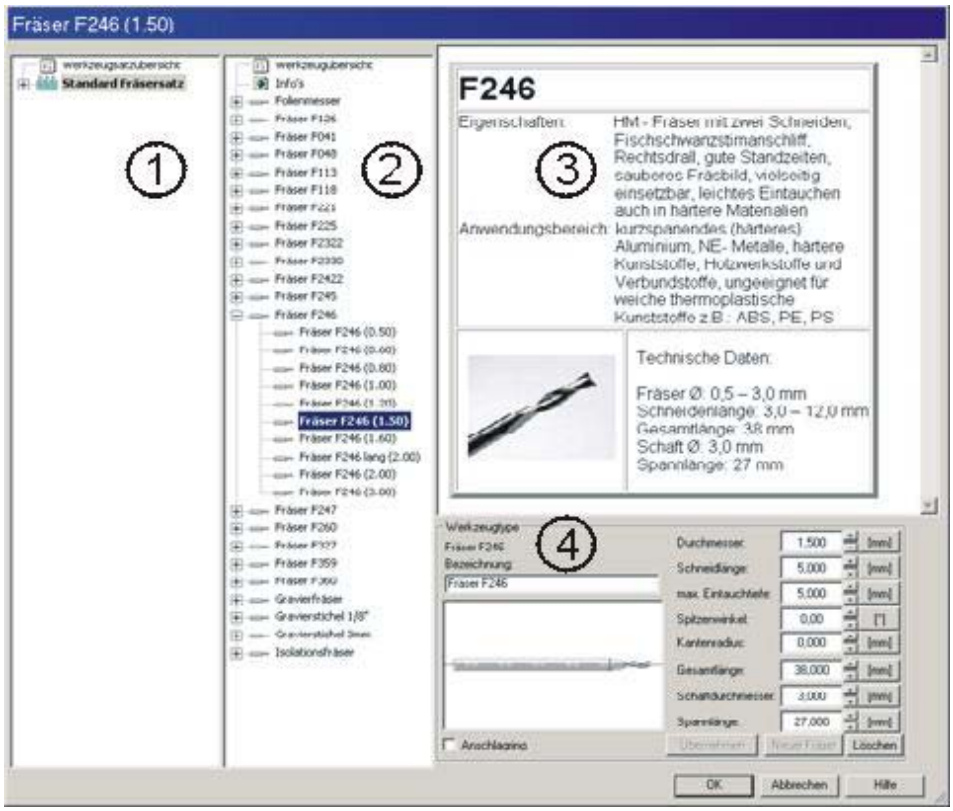
- *Positioning height:* shows the height above the material for rapid feed positioning.
- *Notice:* an empty field for notes on processing.
- *Delete:* deletes the material entry from the database.

After parameter changes have been made, the buttons *New material* and *Accept* are enabled.

New material saves the amended parameters as new material. *Accept* changes the selected material.

Tools

All available tools are recorded in the tools area. Individual tool sets can be created from this collection. These can contain the most diverse tools.



1 Tool set overview

2 Tool overview

3 Info box

4 Tool category

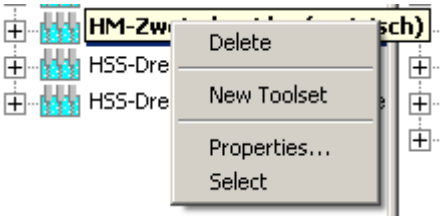
NOTE: Click on tool overview to open a complete overview of all available tools in the info box.

Tool set overview

Lists the individual user-defined tool sets.

➢ *Create new tool set*

- Right-click to open the context menu.



- *New tool set* swaps to subwindow *New tool set.*

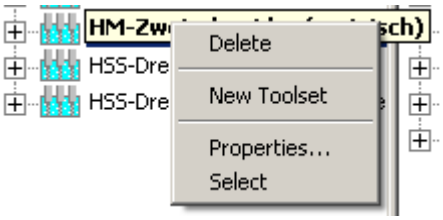
- Enter the *Description* for the new tool set and select the *HTML page* for the *Info box*.

You can now add the cutting millers for the new tool set from the tool overview.

➢ *Select standard tool set*

Use this function to select a tool set for the *Tool change* (See "Tool change" Page 104) function.

- Right-click to open the context menu.



- *Select* activates the tool set for the *Tool change**function.*** (See "Tool change" Page 104)

➢ ***Add tools to a tool set***

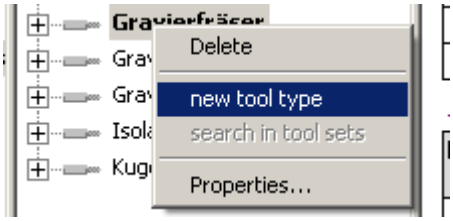
- Select tool from the tool overview.
- Click on the tool, hold down the mouse button and drag to the desired tool set.
- Once you release the mouse button, the tool is allocated to the tool set.

Tool overview

Lists all defined tools. The tools are split into categories (tool types).

➢ ***Create new tool type.***

- Right-click to open the context menu.

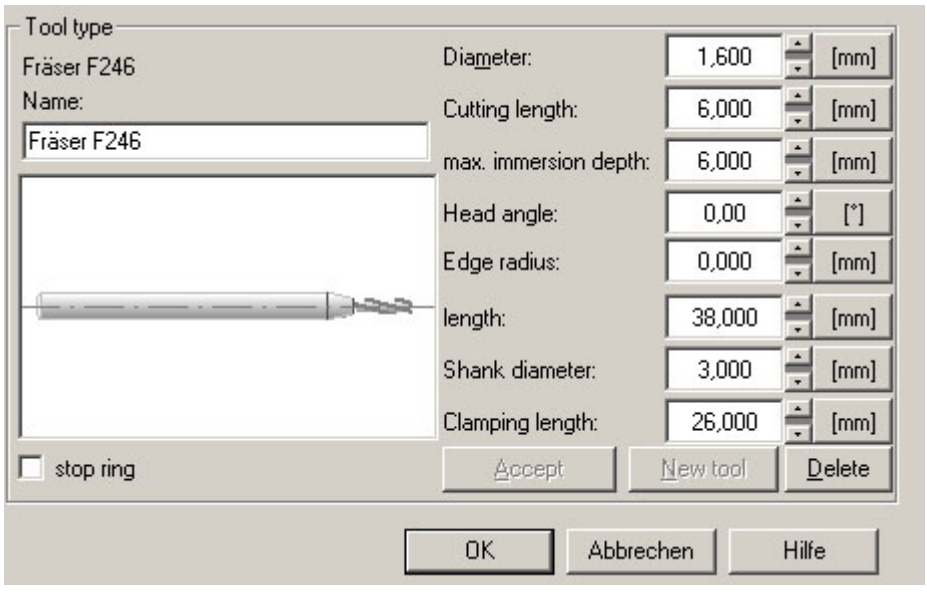


- *New tool type* swaps to subwindow *New tool type.*

- Enter the *Description* for the new tool type and select the *HTML page* for the *Info box*.

➢ ***Create new tools***

- Expand the tool type in which the tool should be created.
- Select the available tool from the tool type.
- Make changes under *Tool type*.



After parameter changes have been made, the *New tool* button is enabled.

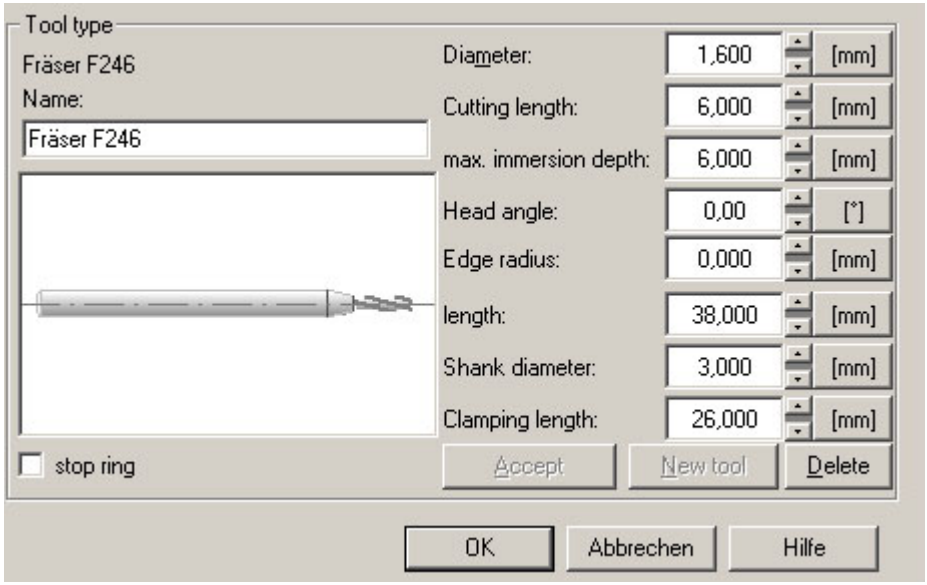
- Click on *New tool* to save the parameters as a new tool.

Info box

Shows additional information about the selected tool.

Tool type

Use the *Tool type* field to define the parameters for the tools.

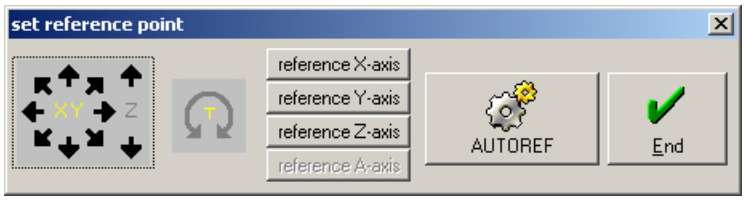


After parameter changes have been made, the *New tool* and *Accept* buttons are enabled.

New tool saves the amended parameters as new tool. *Accept* changes the selected tool.

Set reference point

In this window, the references are made for the axes.



➢ ***Set reference point manually***

- Move axes as far as they will go using the arrows or the cursor keys.
- Move the rotation axis into the reference position.
- Confirm the reference position of the individual axes using the *reference X-axis, reference Y-axis, reference Z-axis and reference A-axis* buttons.

➢ ***Set reference point automatically***

This function is only available when the machine has a reference switch.

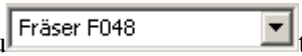
- Click on *AUTOREF* to start the referencing.

End

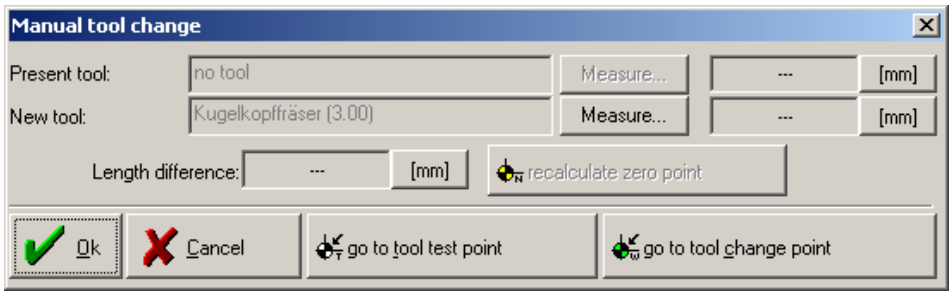
Closes the window.

NOTE: Unsaved settings will be lost!

Manual tool change

If you select a new tool in the ***Tool change*** (Page 104) dropdown menu 

the zero point will be amended by measuring both tools (present and new).



You can view the current tool in the *present tool:* row. The *Measure...* and *mm* buttons in this row refer to the present tool.

You can view the new tool in the *new tool:*row. The *Measure...* and *mm* buttons in this row refer to the tool which will be inserted.

➢ ***Manual tool change***

- Click *Measure...* in the *Present tool:* row to start the measurements.
- Once the length (*mm*) has been calculated and the *tool change point* has been reached, change the tool.
- Click *Measure...* in the *Present tool:* row to start the measurements.
- Once the measurements are complete, the *Length difference* of the two tools appears.
- Click *Recalculate zero point* to change the zero point for the new tool.

Go to tool test point

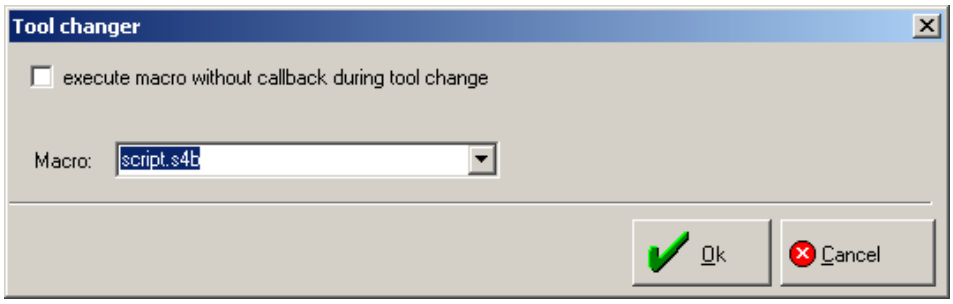
Manual option to go to the tool test point.

Go to tool change point

Manual option to go to the tool change point.

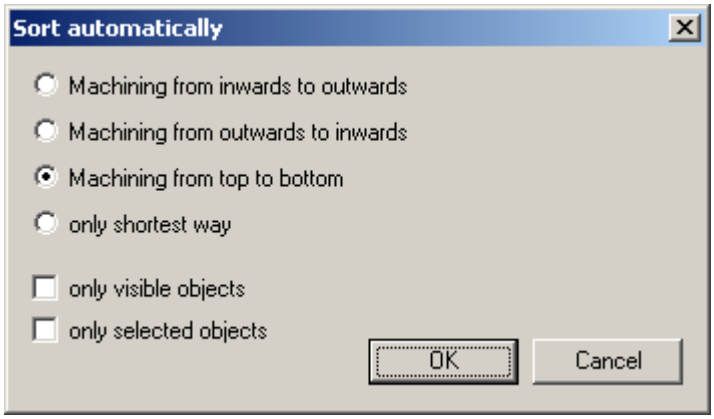
Tool changer

The macro used for the automatic tool change is specified in this window.



Sort automatically

Sets the sort order automatically.



Machining from inwards to outwards

Objects which are defined as inside contours are arranged with objects which are defined as outside contours.

Machining from outwards to inwards

Objects which are defined as outside contours are arranged with objects which are defined as inside contours.

Machining from top to bottom

Objects with low milling depths are arranged with objects with high milling depths.

Only shortest way

Calculates the sort order with the shortest zero route.

Only visible objects

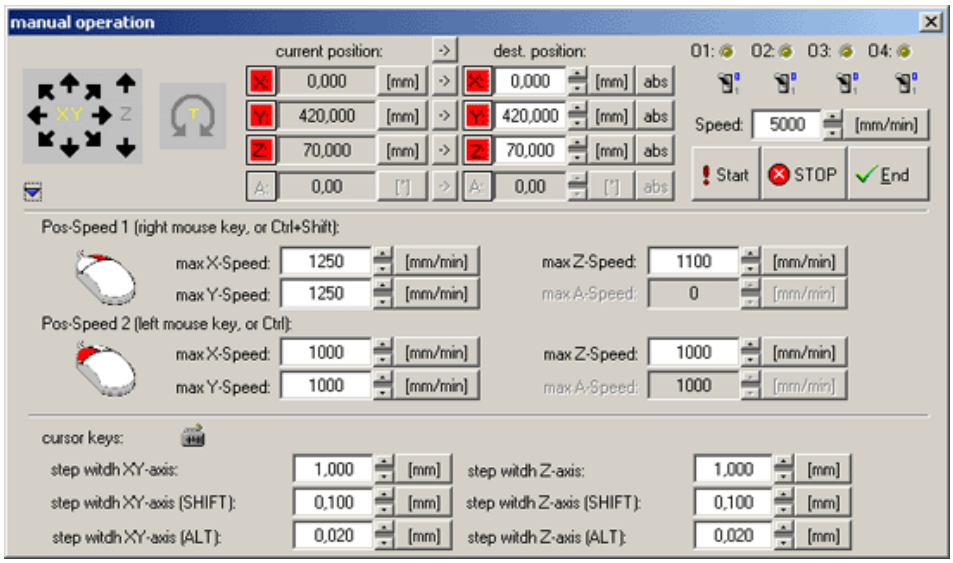
Sets the sort order for visible objects only.

Only selected objects

Sets the sort order for selected objects only.

Manual operation

You can use the manual operation to manually control all the axes and outputs of the machine.



Current position

Displays the current value for each axis.

Dest. position

The *destination values* for all axes can be entered absolutely or relatively in the *dest. position* column.

abs/rel

Switches between **absolute** and **relative** entries.

Outputs

Virtual 'lights' show whether an output is active. You can use the switches to manually activate/deactivate outputs.

Speed

Specifies the feed rate. (mm/min or steps/s)

Start

Starts the movement to the specified *dest. position.*

Stop

Stops the process.

End

Closes the window.

NOTE: Unsaved settings will be lost!

Pos-Speed 1, Pos-Speed 2

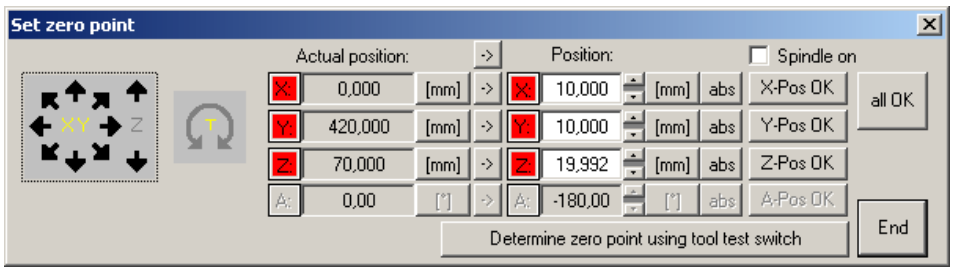
Right-click or left-click one of the arrows to operate the individual axes at the stipulated speed (mm/min or steps/s).

Step widths

You can define the step widths (mm or mm/min) using the cursor keys without holding down any keys or by holding down SHIFT, ALT GR. You must first click an axis (*XY* or *Z*) between the arrows so that this is highlighted in yellow.

Set zero point

The zero point provides the reference for the material position. The zero point is the most important point for the mill process. The zero point should preferably **not** be defined per entry.



➢ ***Set zero point***

- Place the milling cutter at the desired zero point position on the X axis using the arrows or the cursor keys.
- Transfer the actual position from the *Actual position* column to the *Position* column using the *arrow buttons*.
- Click on *X-Pos OK* to save the value.
- Repeat the process for all remaining axes.

abs/rel

Switches between **absolute** and **relative** entries.

All OK

Click on *all OK* to save all values

End

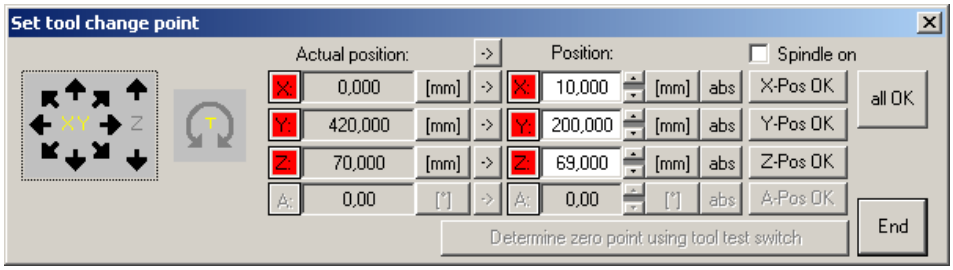
Closes the window.

NOTE: Unsaved settings will be lost!

Calculate zero point Z via the tool test switch

Specifies the zero point on the basis of the value saved under *Distance WKZ-TEST - Z-NP(H):* (See "Tool test configuration" Page 195).

Set tool change point



- Place the milling cutter at the desired zero point position on the X axis using the arrows or the cursor keys.
- Transfer the actual position from the *Actual position* column to the *Position* column using the *arrow buttons*.
- Click on *X-Pos OK* to save the value.
- Repeat the process for all remaining axes.

abs/rel

Switches between **absolute** and **relative** entries.

All OK

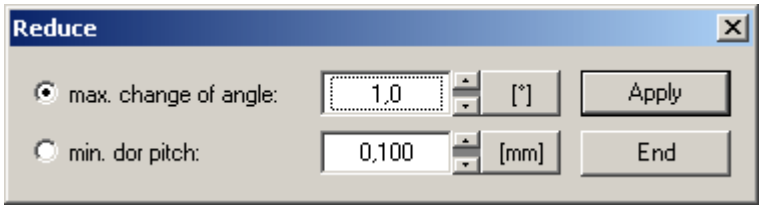
Click on *all OK* to save all values

End

Closes the window.

NOTE: Unsaved settings will be lost!

Reduce



To define a curve with more or fewer points, the distance between the points can be redefined.

Length: distance between the points in millimetres.

Angle: distance between the points in degrees.

Apply

Activates the selected settings.

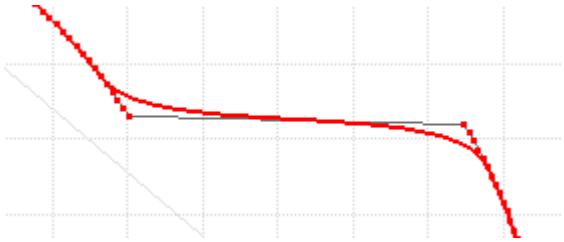
End

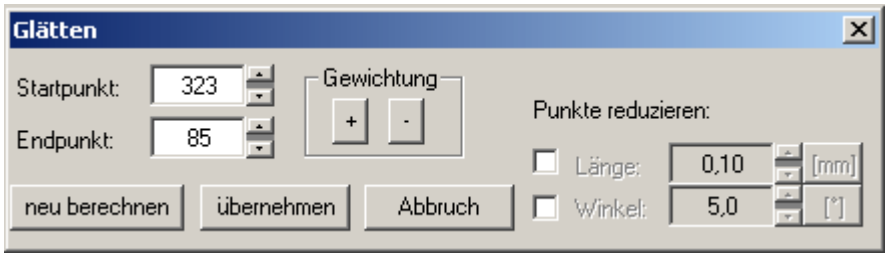
Closes the window.

NOTE: Unsaved settings will be lost!

Smoothen

Use the *Smoothen* function to create softer edges and direction changes (see diagram: grey line = original form, red line = smoothened curve).





Start point, End point

Start and end points of the area to be smoothened.

Weighting

Use the + and - buttons to define the level of the smoothening.

Reduce points

To define a curve with more or fewer points, the distance between the points can be redefined.

Length: distance between the points in millimetres.

Angle: distance between the points in degrees.

Recalculate

Recalculates the curve with the specified values (only works for *reduce points*).

Apply

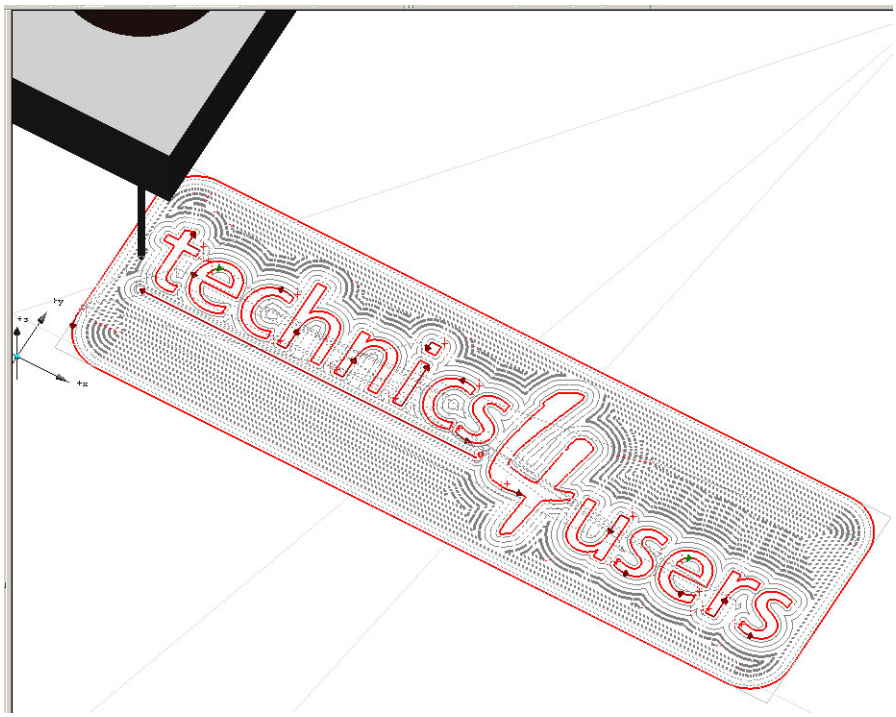
Activates the selected settings.

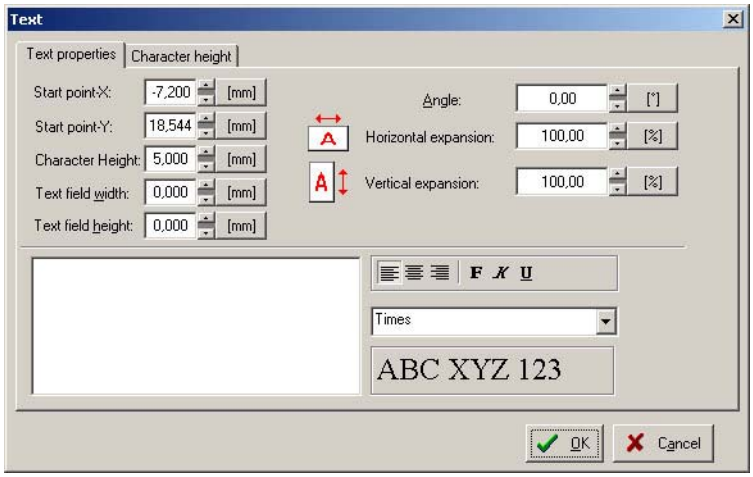
Cancel

Cancels the process and closes the window.

Text

Creates text fields in any desired font. The font used must be installed on the PC.





Start point X/Start point Y

Defines the start point of the text field.

Character height

Defines the font size.

Text field width/height

Defines the size of the entire text field. Is linked to the option *Character height*.

Horizontal expansion

Defines the horizontal size of the text field. Is linked to the option *Text field width*.

Vertical expansion

Defines the vertical size of the text field. Is linked to the option *Text field height*.

Entry field

Enter desired text here.

Alignment

Left aligns, right aligns or justifies the text.

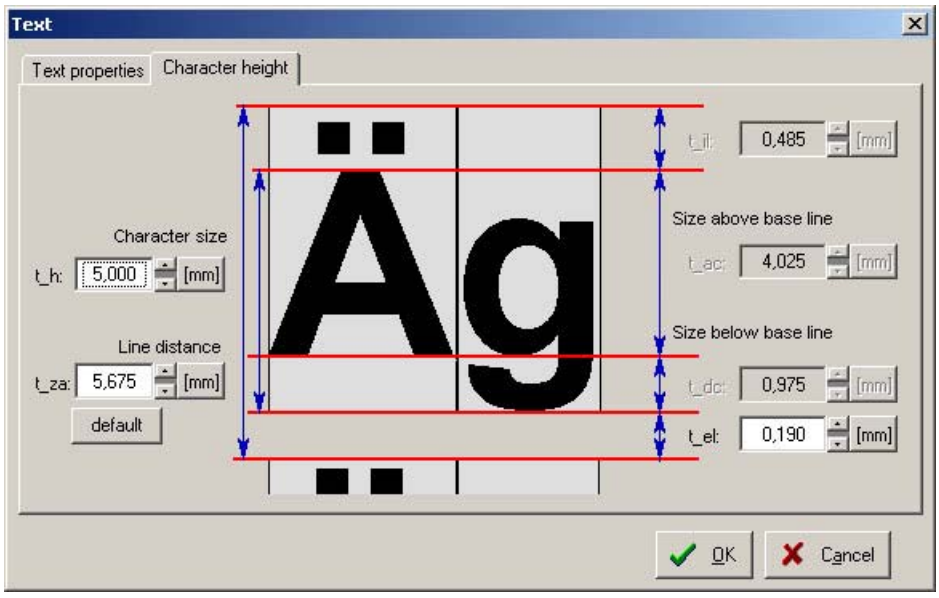
Formatting

Formats the text as bold, italic or underlined.

You can also use the dropdown menu to select the font.

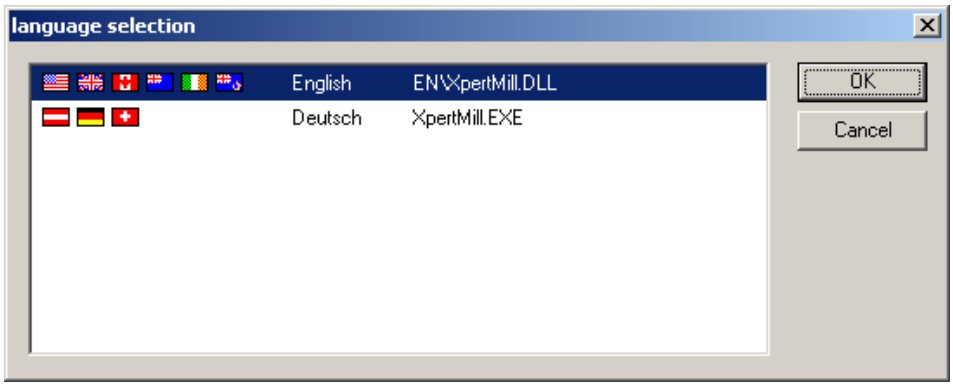
Character height

You can use this to enter individual text alignment parameters.



Language selection

Use *Language selection* to define the language settings for the user interface.

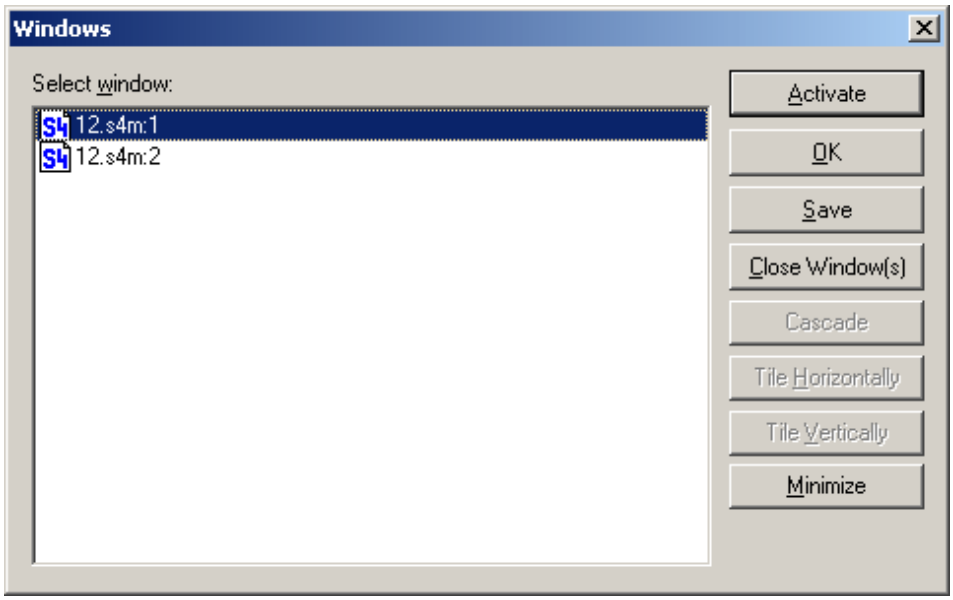


Select the desired language and choose *OK* to confirm your selection.

The user interface will be adapted to the language settings.

Windows

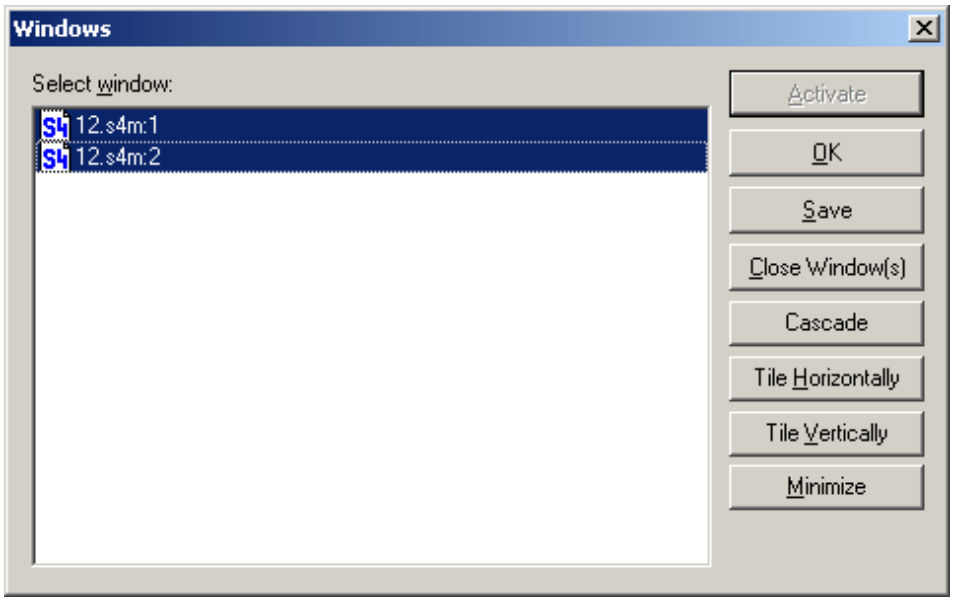
The following options are available when **one** window is selected.



- *Activate* closes the subwindow and swaps to the selected window.
- *OK* closes the subwindow.
- *Save* saves the changes in the milling project.

- *Close Window(s)* closes the milling project of the selected window(s). Changes to the milling project can be saved.
- *Minimize* minimises the selected window without closing the subwindow.

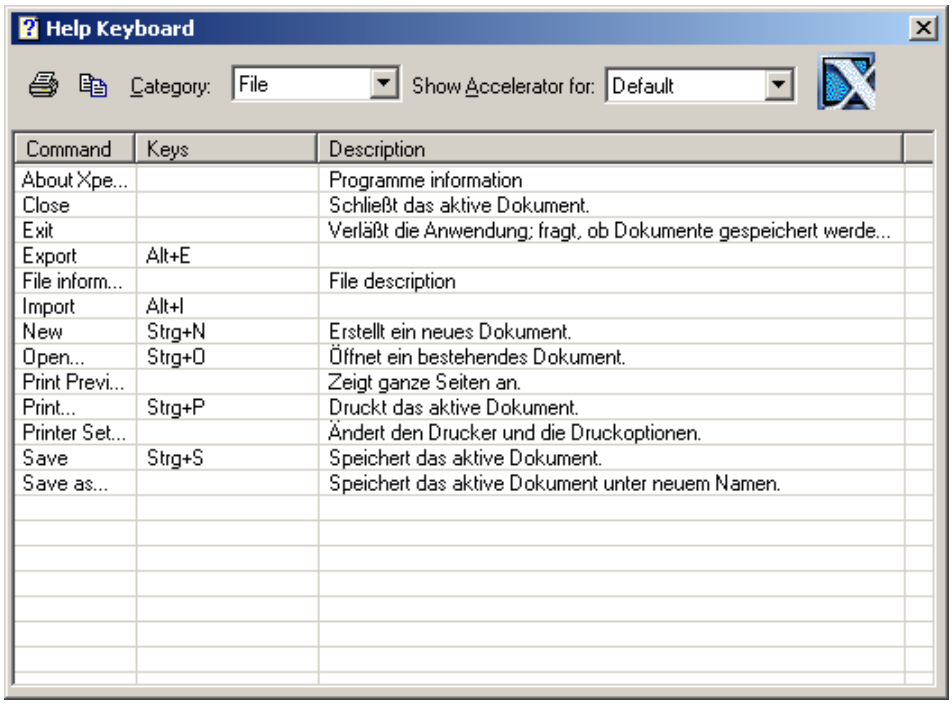
The following additional options are available when **numerous** windows are selected.



- *Cascade* cascades the selected windows.
- *Tile horizontally* arranges the selected windows on top of each other.
- *Tile vertically* arranges the selected windows next to each other.

Help Keyboard

The individual commands as well as their shortcuts and descriptions are listed under *Help Keyboard*.



About XpertMill

Information about this software program and user details can be viewed in this window.

Company details about STEP FOUR are also provided.

Module

Shows the software program modules.

System info

Displays the system information for the PC.

i

Opens a subwindow with all configuration data for the registration, the controller and the machine configuration. The configuration data can be saved.

Change program mode

Opens the ***Software mode*** (Page 20) subwindow showing the possible uses of the software.

Registration

Opens the *Registration* ***subwindow*** (See "Registration" Page 21)to access additional software modes.

Software mode

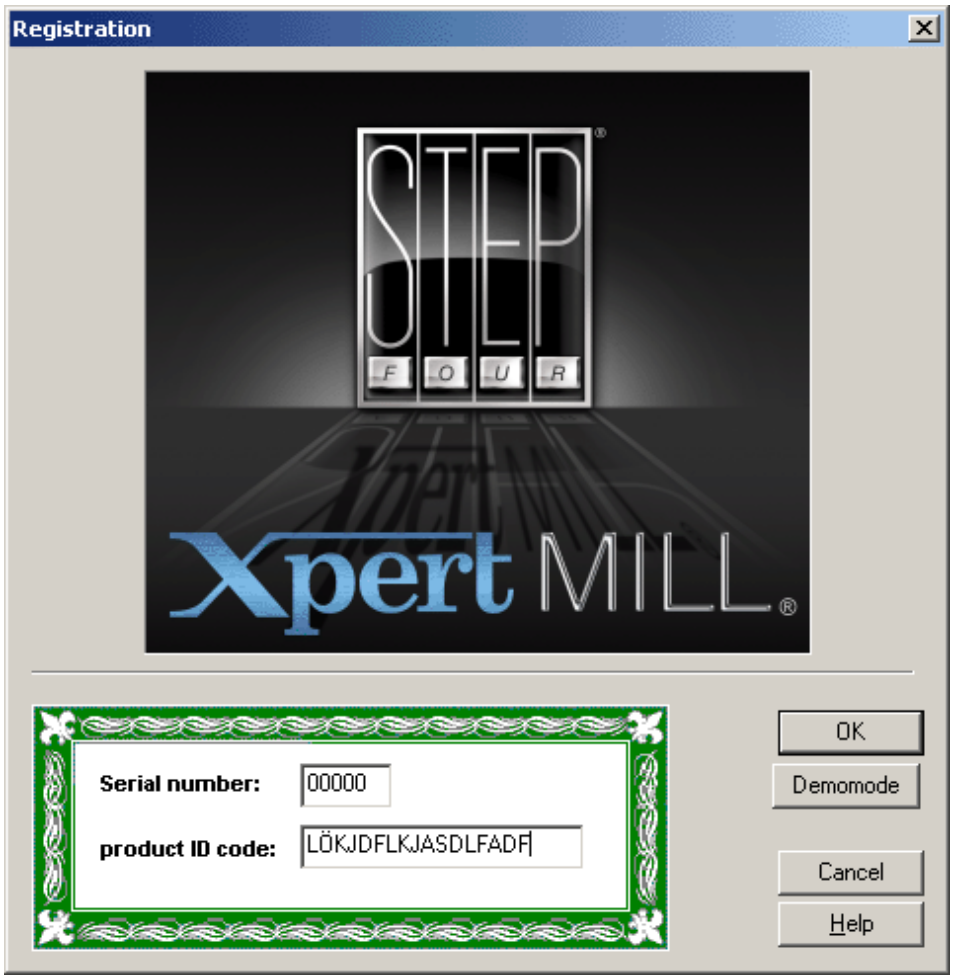
Demo version: all of the software functions are available, but there is no output to the controller.

Data preparation with dongle: is used to prepare data for subsequent implementation of the created milling projects.

Milling software with XpertCNC controller: software is used in connection with the controller.

Registration

When you register, the *modules* are released.



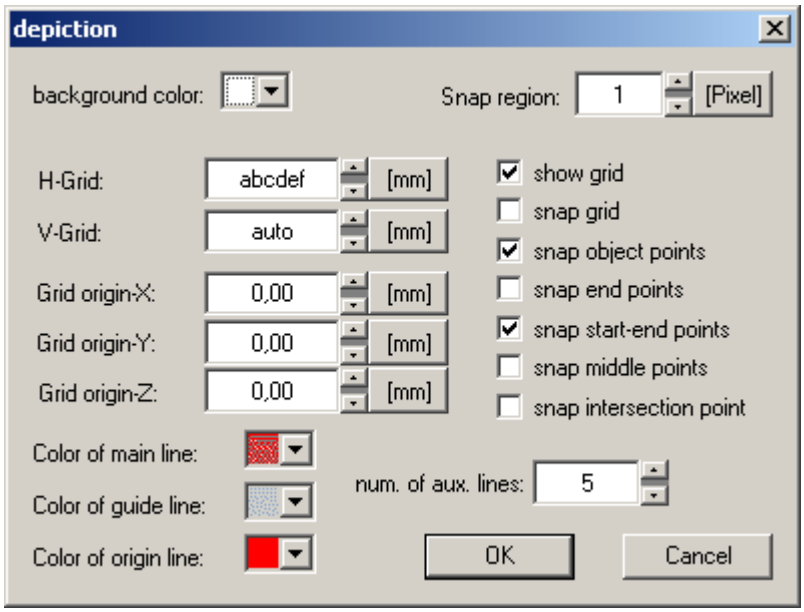
Serial number: enter the serial number of the software.

Product ID code: enter the product ID code of the software.

Demomode: starts XpertMill in demo mode.

Depiction

The work area depiction can be adjusted.



Background colour

You can specify the background colour using a colour palette.

Snap region

Defines the region around a marked point in which the snap function is activated.

H-Grid

Defines the height of a row in the grid.

V-Grid

Defines the width of a column in the grid.

Grid origin X, Y, Z

Shows the position of the grid origin.

Show grid

Shows a grid in the work area.

Snap grid, snap object points, snap end points, snap start-end points, snap middle points, snap intersection points

Activate and deactivate the individual snap functions of the ***Snap*** (Page 98) toolbar.

Colour of main line, colour of guide line, colour of origin line

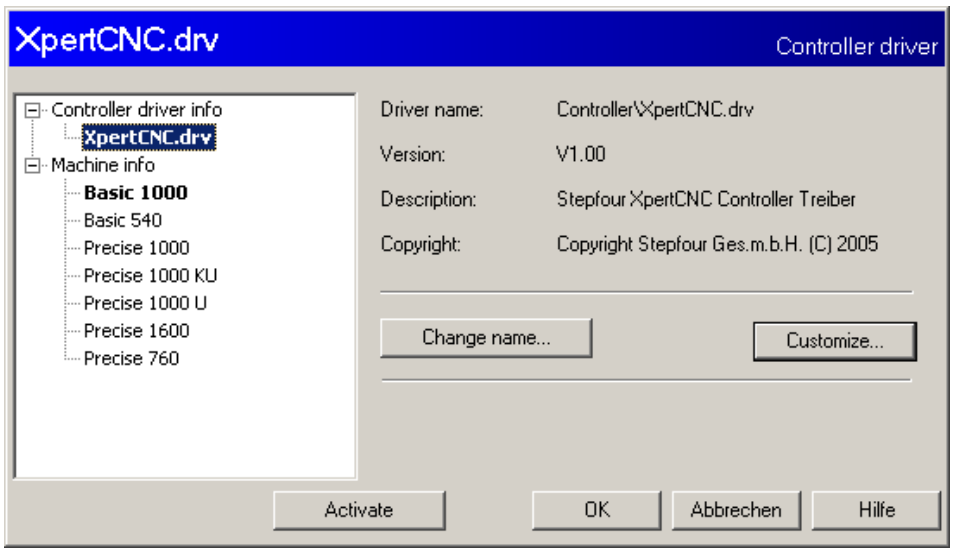
The colour of the main line, guide line and origin line for a grid can be defined using a colour palette.

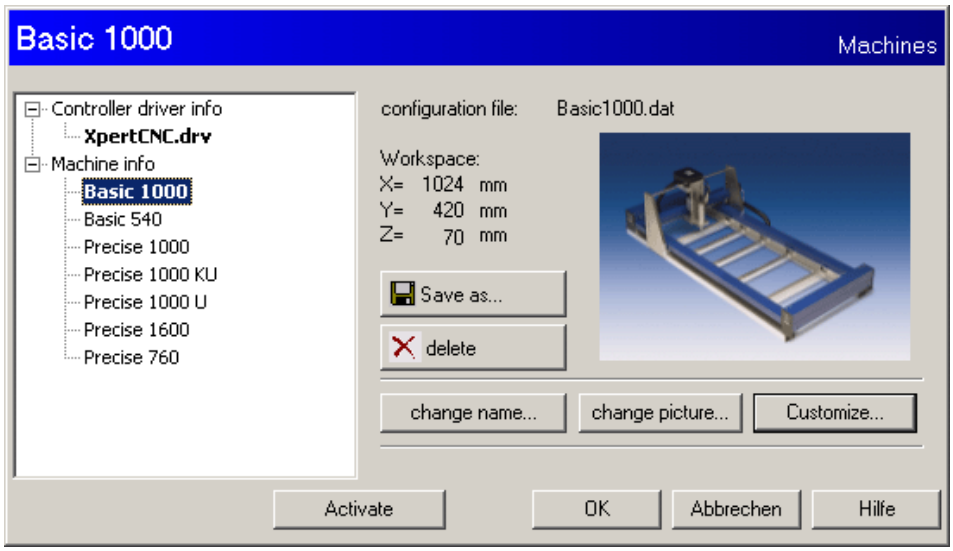
Num. of aux. lines

Shows the number of auxiliary lines in the grid.

Machine configuration

Controller drivers and machine drivers are specified in the machine configuration. Emboldened entries are currently active.





➢ ***Select machine driver***

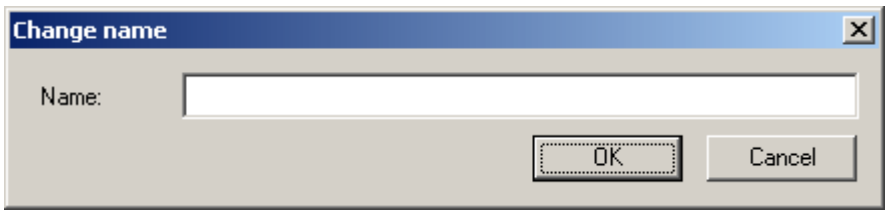
- Select the desired driver.
- Choose *Activate* to load the driver.

CAUTION! Incorrect machine drivers damage the mechanics!

Change name...

Changes the name of a driver.

- Click *Name* to open the window *Change name*.



- Enter the new name and choose *OK* to confirm your selection.

Customise...

Changes to the *Controller parameters.* (See "Controller parameter" Page 182)

Change picture...

Loads a different picture for the machine. Only pictures in Bitmap format (*.bmp) can be used.

Save as...

Saves the configuration under a user-defined file name.

Delete

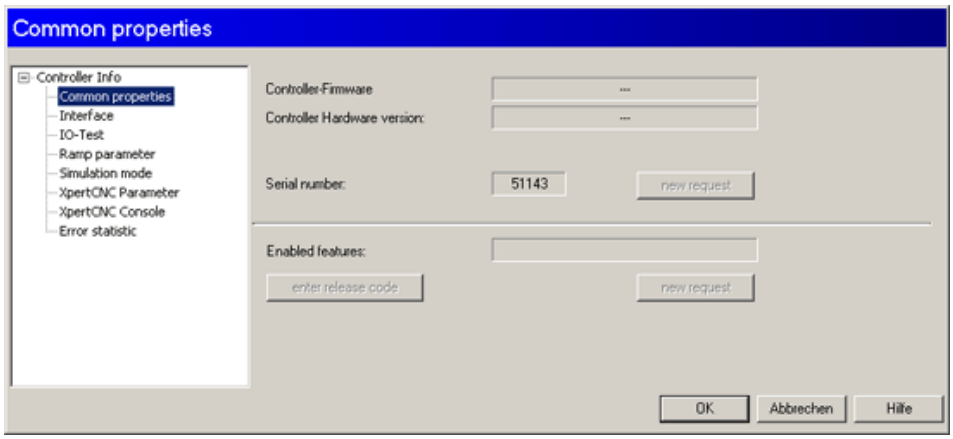
Deletes the machine configuration.

Controller parameter

You can specify the control-related parameters in this area.

Common properties

Shows the version, the serial number and the release of the controller.



New request

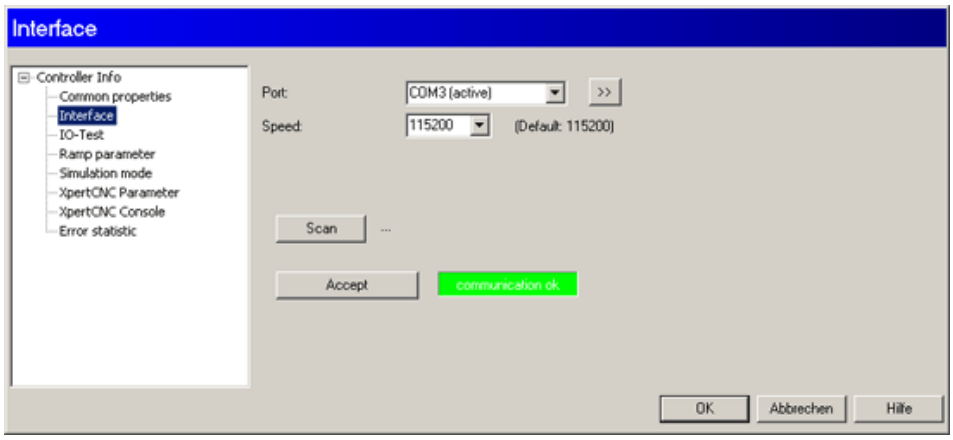
Updates the display.

Enter release code

The release code must be entered to use special functions of the controller such as the activation of the 4th axis as a rotation axis.

Interface

Settings for the serial connection to the controller.

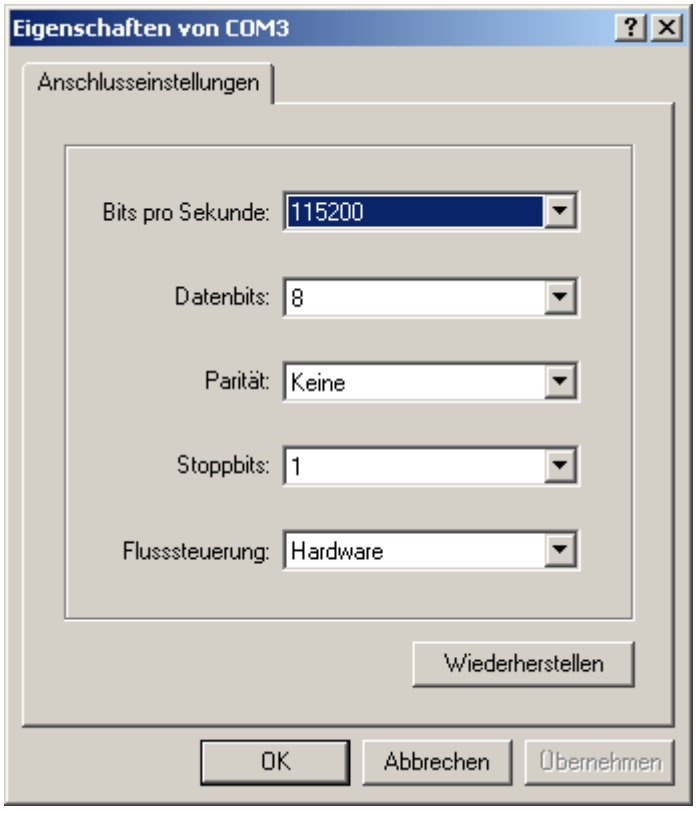


Connection

The serial interface used can be selected from the dropdown menu.

>>

Opens the *Properties of COM* subwindow, port for the manual configuration of the serial interface (COM Port).



Scan

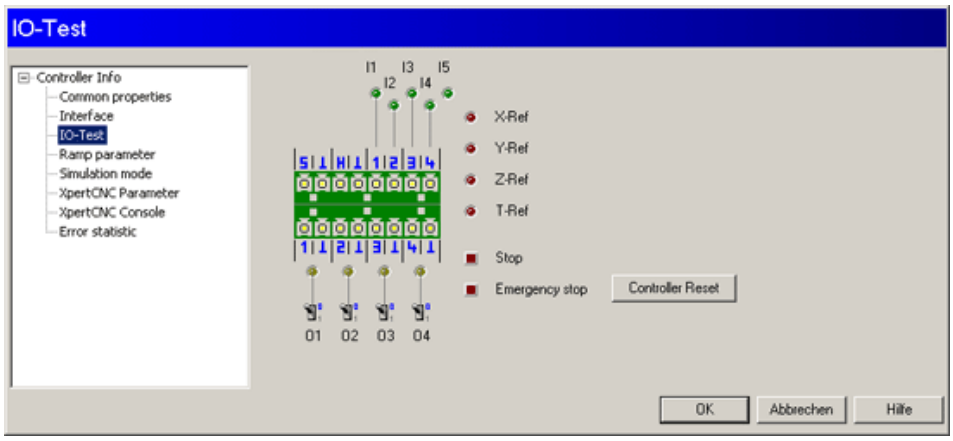
Activates an automatic search for the correct connection settings.

Accept

Saves and activates the settings made.

IO Test

Shows the status of the inputs and outputs as well as the stop and emergency stop statuses.

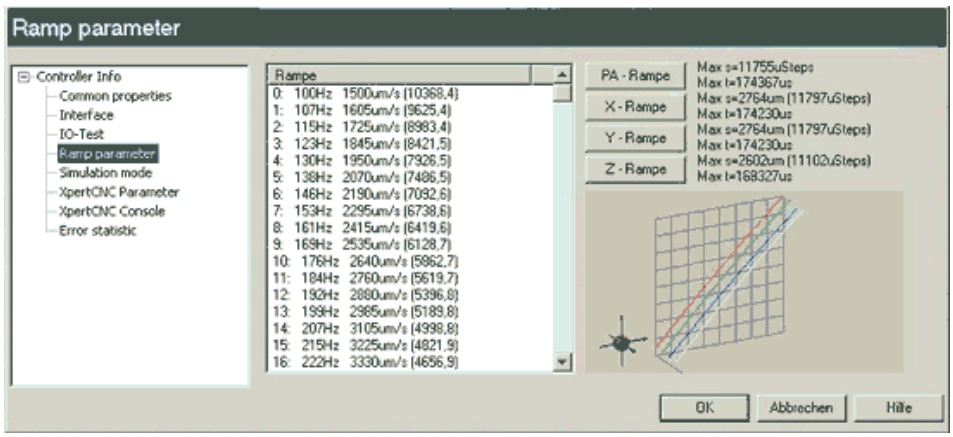


Controller Reset

Is required for testing the emergency stop input. Press the *Controller Reset* button after an emergency stop to make the controller respond again.

Ramp parameters

The acceleration ramps from the controller are selected and visualised.

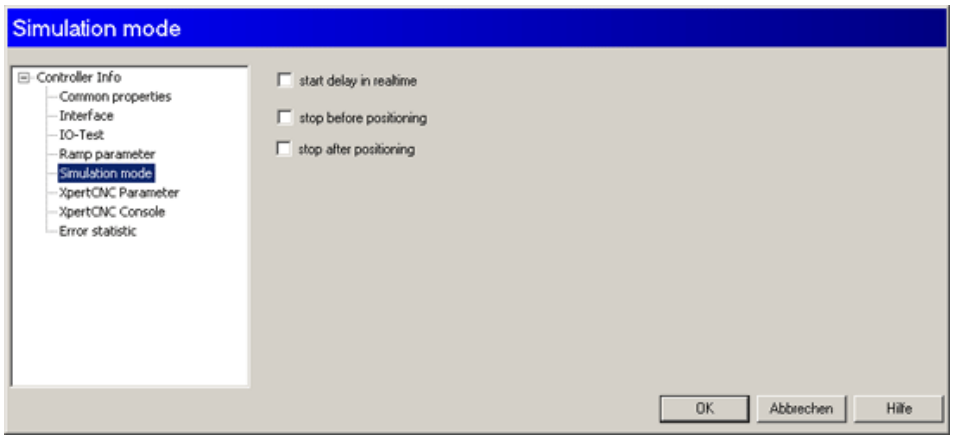


The *PA Ramp* is the ramp which moves along the milling contour during acceleration.

The *X, Y and Z Ramps* are the ramps which move along the positioning lines during acceleration.

Simulation mode

Contains settings which are only relevant to the simulation mode.



Start delay in realtime

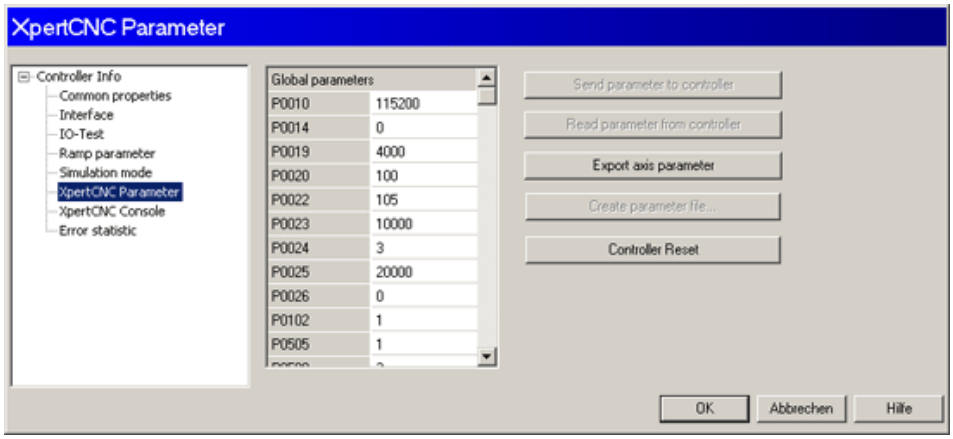
Denotes the time period which the software pauses for between the Z mortice and the XY positioning. You can set the start delay under ***Layer information*** (See "Layer milling parameter" Page 116).

Stop before/after positioning

When activated, the simulation stops before/after each rapid feed positioning and provides the current machine position in a report window.

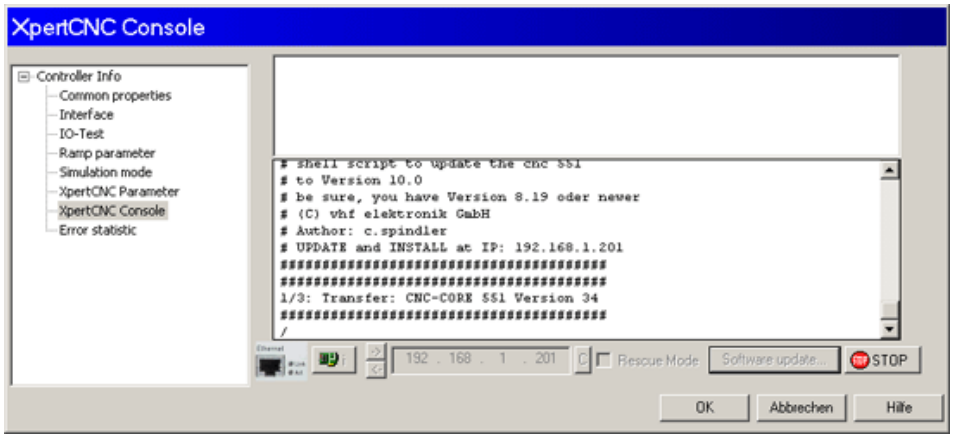
CNC 551 Parameters

CAUTION! Do not amend these parameters! Parameters may only be amended on the instructions of the STEP-FOUR support team.



CNC 551 Console

Settings for the network connection to the controller.



->

Loads the current IP address of the controller.

<-

Sends the entered IP address to the controller.

Connect

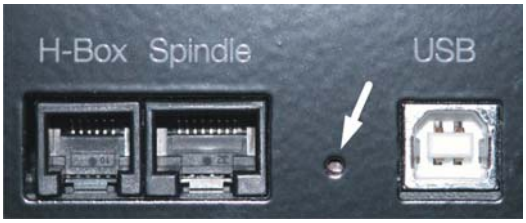
Checks the connection to the controller.

Rescue Mode

If the controller's firmware is lost, you can start the controller in rescue mode.

➢ ***Start controller in rescue mode.***

- Switch on the controller while pressing the *Rescue button*.



  Use a narrow pen to press the rescue button through the hole (see arrow).
- Click the *Rescue Mode* button to temporarily switch the PC over to the controller's default IP address.
- You can now use *Softwareupdate...* to install a new firmware.

Softwareupdate

Starts the update procedure for the controller firmware.

➢ ***Firmware update***

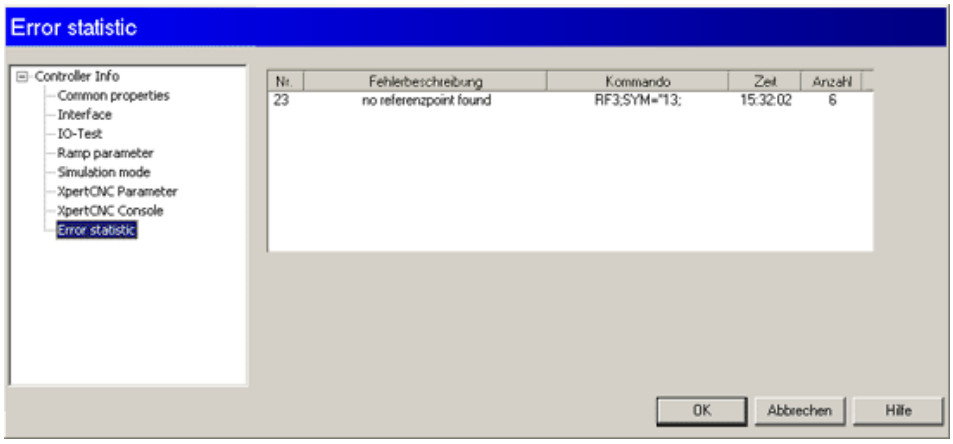
- Checks the network connection to the controller. (*Connect*)
- Click *Softwareupdate...* to start the update procedure.
- Enter the path for the update file.
- When prompted, switch the controller off and back on again.

Stop

Stops the update process.

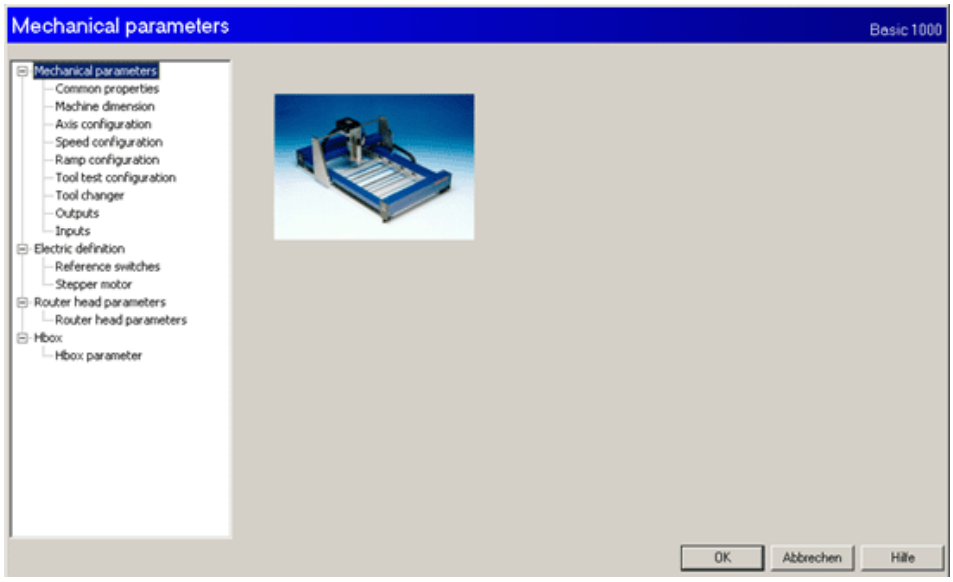
Error statistic

Error messages sent to the software from the controller are listed here.



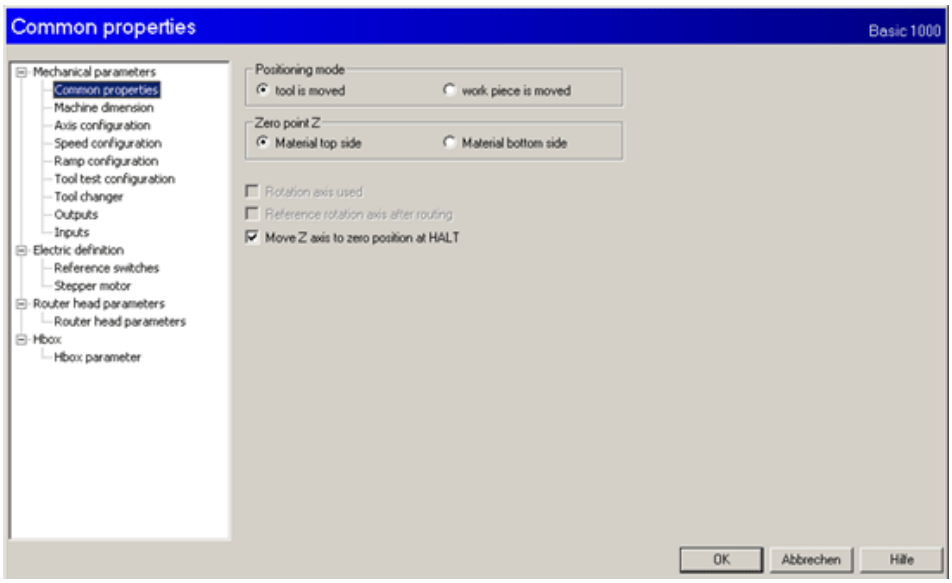
Machine parameters

These settings give the software information about the machine components and their settings.



Common properties

Defines the basic settings of the machine.



Positioning mode

Tool is moved: work piece remains stationary; the spindle moves.

Work piece is moved: work piece is moved; the spindle remains stationary.

Zero point Z

Specifies the position of the zero point on the work piece.

Rotation axis used

Activates the rotation axis functions in the software.

Reference rotation axis after routing.

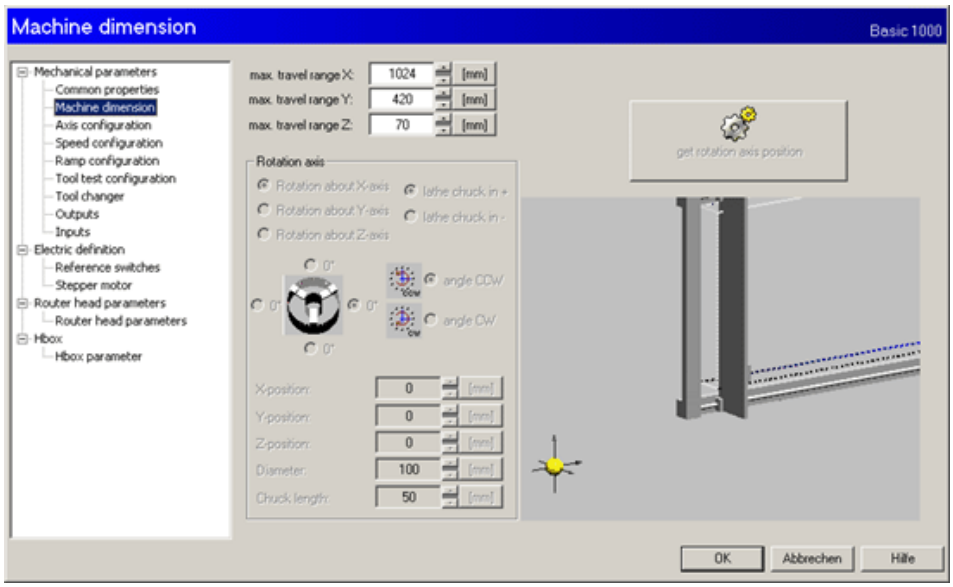
The rotation axis is automatically newly referenced after processing.

Move Z axis to zero position at HALT.

If the input causes a stop, the Z axis travels to the zero position.

Machine dimensions

Defines the dimensions and rotation axis position of the machine.



Max. travel range (X, Y, Z)

CAUTION! Incorrect values cause collisions!

The values entered here define the work area of the machine.

Rotation axis

If the rotation axis is available on the machine and is activated under ***common properties*** (Page 190), the rotation axis parameters become active.

Rotation about X/Y/Z axis

Allocates an axis (*X*, *Y* or *Z*) to the machine's rotation axis.

Lathe chuck in +/-

Activate the + or - direction of an axis depending on the installation of the chuck.

The origin position (*0*°) of the rotation axis is shown in this graphic.

Angle CCW/CW

Depending on the activation, degree allocation occurs either **clockwise** or **counter clockwise**.

Get rotation axis position

Once the button has been activated, a positioning window opens. Provide rotation axis position through a positioning window - see ***Set zero point*** (Page 165).

X/Y/Z position

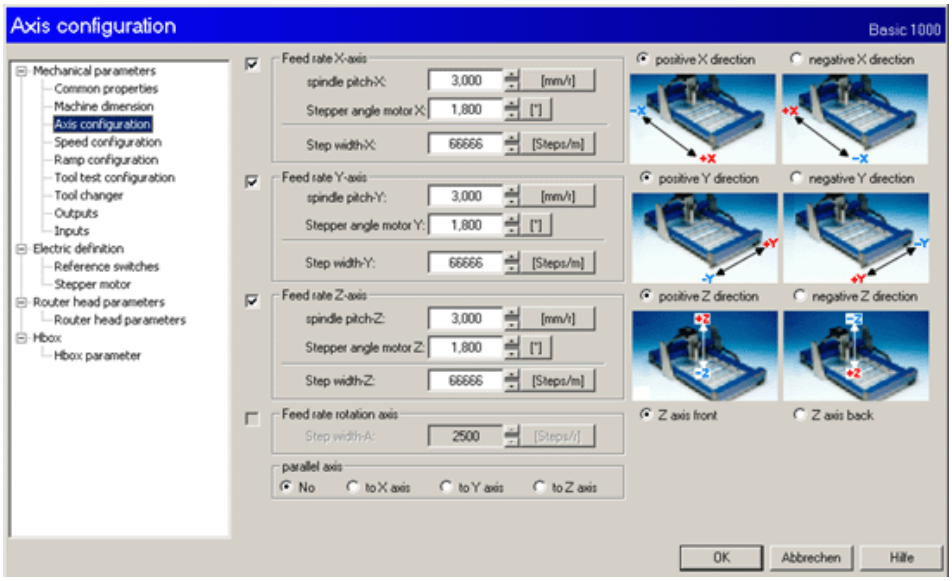
Quote the rotation axis position directly or via *get rotation axis position.*

Enter the *diameter* and *chuck length*.

Axis configuration

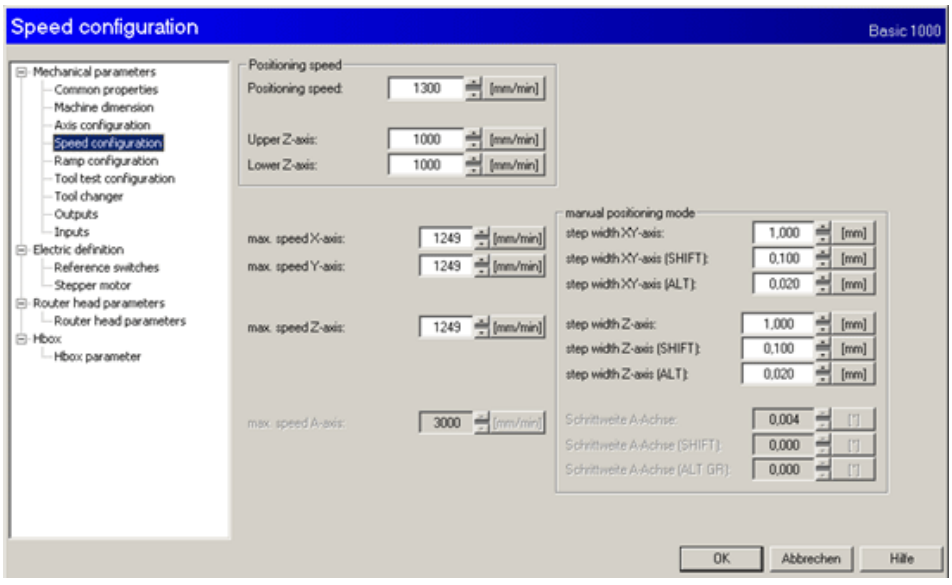
Defines the parameters for built-in spindles and motors.

CAUTION! Incorrect values cause collisions!The spindle pitch, the stepper angle of the motor and the movement direction can be entered for each axis. If an axis is driven by two mechanically separated motors, you should show this under the *parallel axis* option.



Speed configuration

NOTE: Amendments to the speed limits can lead to losses of pace!



Positioning speed:

Maximum speed for an empty run, valid for X and Y axes.

Upper Z axis/Lower Z axis

Maximum speed for an empty run, valid for the Z axis.

Max. speed X axis:

Limits the feed rate in the mill process to the value entered.

Max. speed Y axis:

Limits the feed rate in the mill process to the value entered.

Max. speed Z axis:

Limits the feed rate in the mill process to the value entered.

Max. speed A axis:

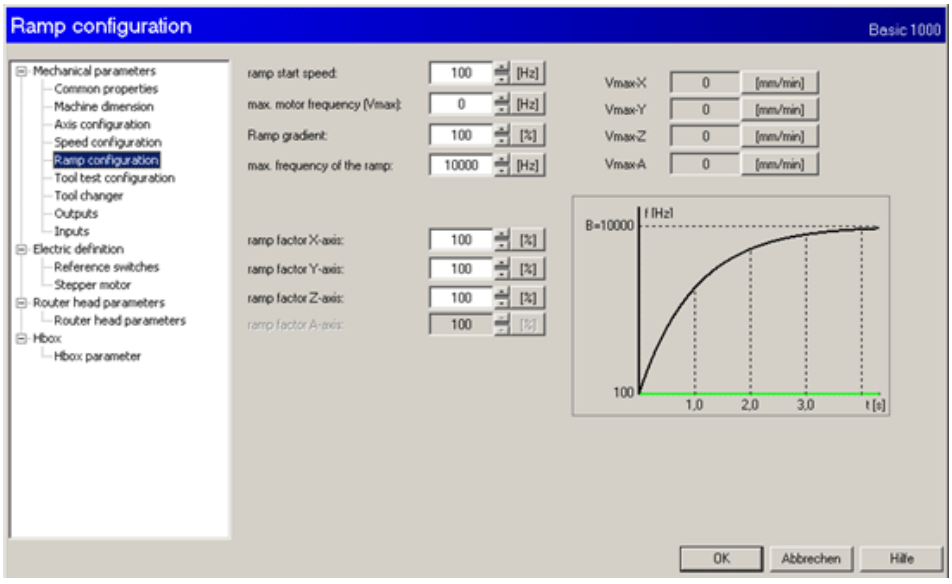
Limits the feed rate in the mill process to the value entered.

Manual positioning mode

You can define the step widths using the cursor keys without holding down any keys or by holding down SHIFT, ALT GR.

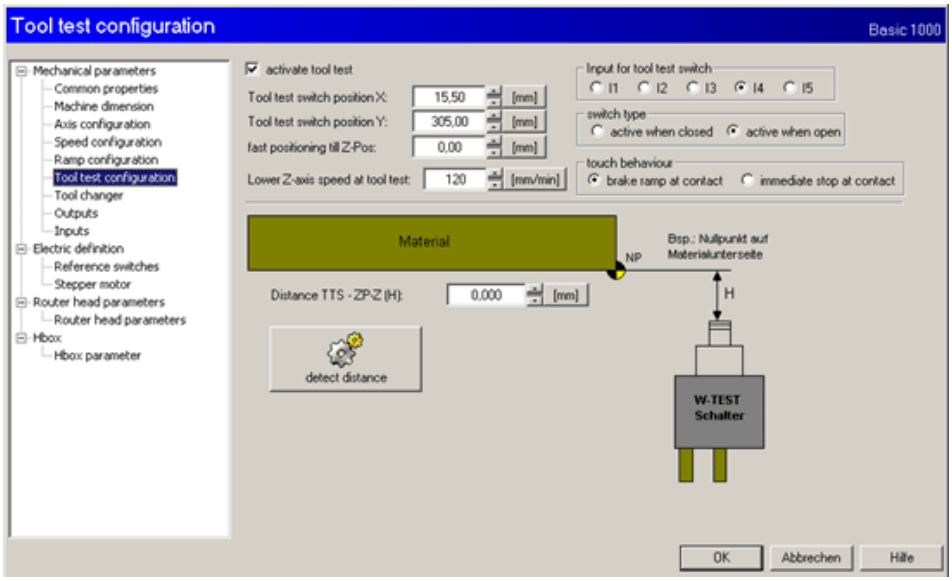
Ramp configuration

CAUTION! Do not amend these parameters! Parameters may only be amended on the instructions of the STEP-FOUR support team.



Tool test configuration

Defines the settings for the tool test switch.



Activate tool test

Activates the tool test function.

Tool test switch position X/Y

Defines the XY position at which the tool test switch is mounted. You can locate the position in the ***Tool test*** (Page 197) window.

Fast positioning till Z-Pos.

Specifies which absolute position Z the machine can be fast positioned in. This function measures the tool more quickly as it is not necessary to cover the entire Z route with the speed *Lower Z Axis speed at tool test*.

CAUTION! During positioning, the tool test switch is not active until at the Z-pos. Too low a value can lead to damage of the cutting miller or the switch.

A value must be used with which even the longest tool will not make contact with the switch.

Lower Z axis speed at tool test

Speed for the Z-axis during the tool test.

Input for tool test switch

Defines the input which the tool test switch is linked to.

Switch type

Choose the relevant option depending on the switch type.

Touch behaviour

Brake ramp at contact: is used for high touch speeds (above approx. 200mm/min), inexact.

Immediate stop at contact: stops the axis immediately (up to approx. 200 mm/min), exact

Distance TTS-ZP-Z(H):

Specifies the **Distance** from the tool test switch to the zero point Z.

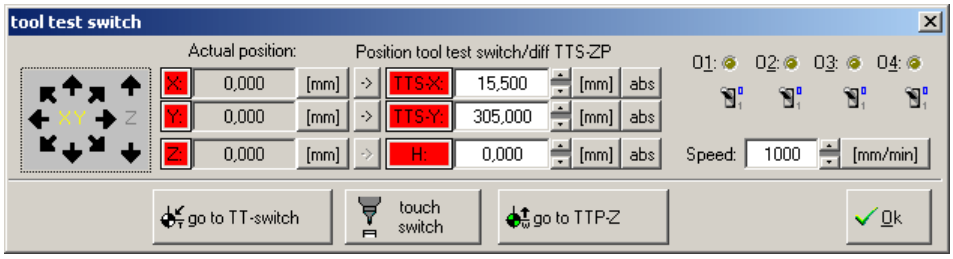
NOTE: This value is required when the ***Calculate zero point Z via the tool test switch*** (See "Set zero point" Page 165) button is used under *Set zero point*.

Calculate distance

Swaps to the window *Tool test* (See "Tool test" Page 197) and calculates the *Distance TTS-ZP-Z(H).*

Tool test

Calculates the position of the *Tool test switch* (See "Tool test configuration" Page 195) and the *Distance TTS-ZP-Z(H):* (See "Tool test configuration" Page 195)



➢ ***Calculate tool test switch position***

- Use the *positioning buttons* to move the position of the tool test switch.

- Use the - arrows> between *Actual position* and *Position tool test switch/diff TTS-ZP* to transfer the values for *X* and *Y*.

➢ ***Calculate distance***

Prerequisite: tool is fixed; tool test switch position is specified.

- Click the *Touch switch* button to miss the tool. If the tool is missed, the Z axis moves into the tool change position.
- Touch the desired zero point over the *positioning buttons*.

- Use the – arrows > between *Actual position* and *Position tool test switch/diff TTS-ZP* to transfer the values for *H*.

Go to TT-switch

Manual option to go to the tool test point.

Go to TTP-Z

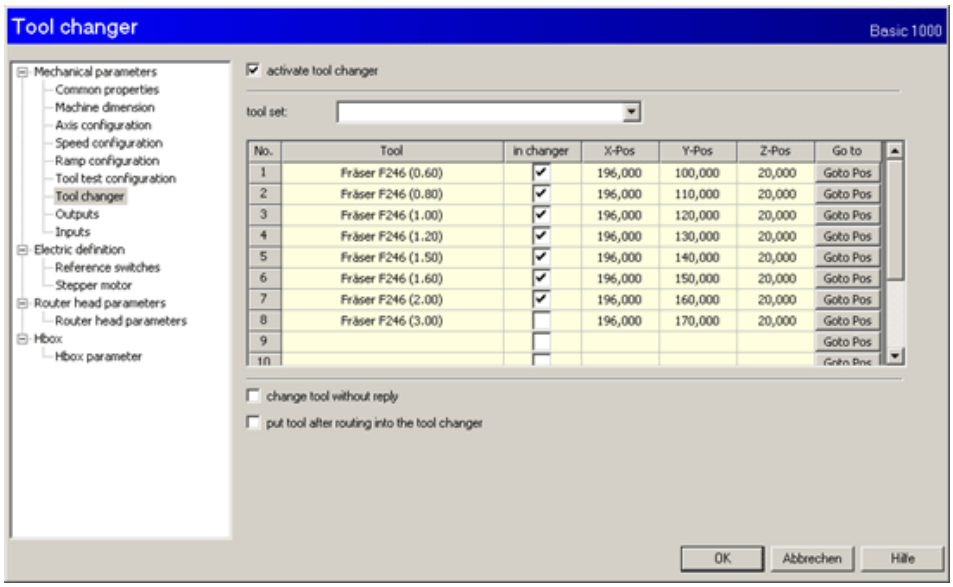
Manual option to go to the tool change point-Z.

Speed:

Defines the positioning speed.

Tool changer

Specifies the assembly of the tool changer.

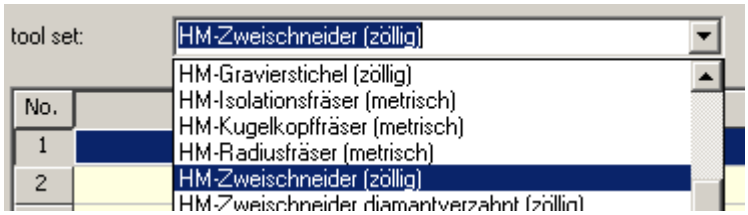


Activate tool changer

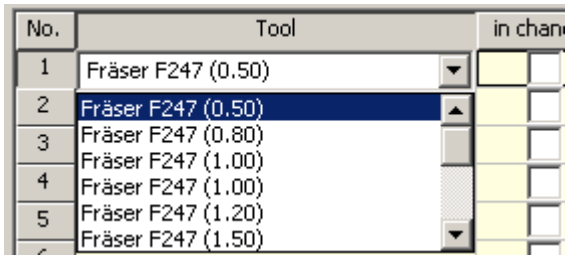
Activates the tool changer and its configuration.

➢ ***Assemble tool changer***

- Choose *Tool set* from the selection window.



- Choose *Tool* from the tool set in the selection window.



- A tick confirms the selected tool in the tool changer in the tool position (*Nr.*).
- *X-, Y- and Z-Pos* define the position of the tool in the tool holder.
- *Goto Pos* moves the tool supports into the position *(X-, Y-, Z-Pos)*.

CAUTION! The tool changer **must** be assembled after the settings made here!

Change tool without reply

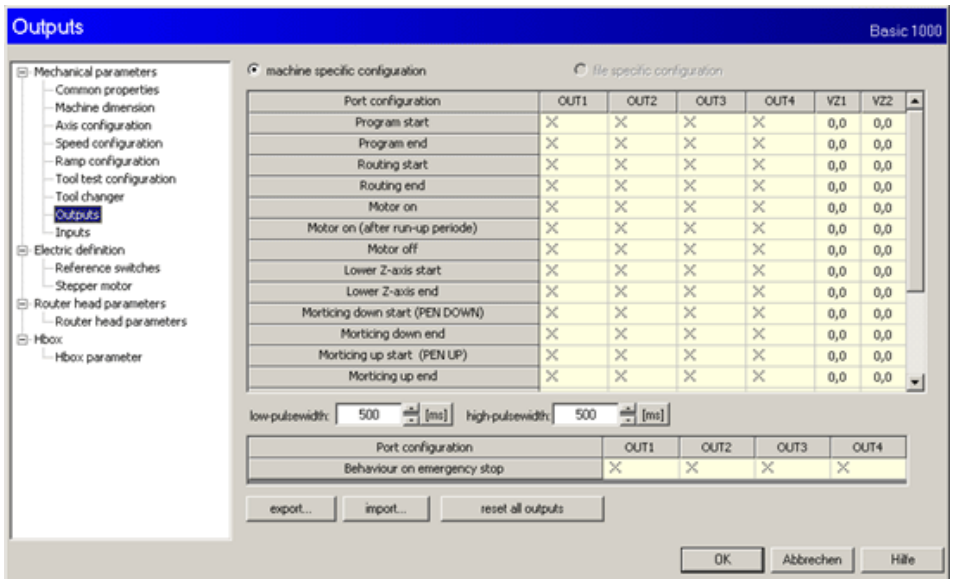
Tool change occurs without a reply.

Put tool after routing into tool changer

When activated the tool is placed in the predefined position in the tool changer after being used.

Outputs

Defines the behaviour of the outputs at the predefined times. The columns OUT 1 to 4 stand for the four user-defined outputs.



Machine specific configuration

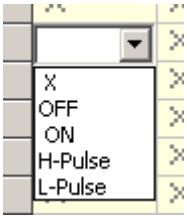
Setting the switch statuses in this window is machine-specific.

File specific configuration

Loads the file-specific switch statuses of the outputs from the Output configuration. Additional settings to the outputs can be made subsequently.

➢ ***Set switch status***

- Left-click on the field to be set to activate the entry.
- Click on the arrow to open the selection menu.



- Select the desired option: X, OFF, ON, High-Pulse, Low-Pulse.

NOTE: With an *H-Pulse* the output will be activated for a specific period, see below. With an *L-Pulse* the output will be inverted for a specific period, see below, meaning ON will go to OFF **or** OFF to ON.

Actions

The actions define a time at which an output switches on or off.

Action	Time
	The output switches *ON* or *OFF* or sends *pulses* during:
Program start	Click on *Routing start*
Program end	End of the mill process on reaching the tool change position.
Routing start	Start of the mill process.
Routing end	End of the mill process.
Motor on	Switching on the spindle
Motor on (after run-up period)	Switching on the spindle - the *Start delay* (See "Layer milling parameter" Page 116) still has to occur.
Motor off	Switching off the spindle
Lower Z axis start	Start of the lowering to the positioning height
Lower Z axis end	Positioning height reached
Morticing down start (PEN DOWN)	Start of the lowering of the positioning height to the first mortice
Morticing down end	End of the lowering of the positioning height to the first mortice

Action	Time
Morticing up start (PEN UP)	Start of the lifting of the mortice to the positioning height
Morticing up end	Positioning height reached
Upper Z axis start	Start of the lifting from the positioning height to the tool change position
Upper Z axis end	Tool change position reached
Mill pause (halt) start	Start of the halt function
Behaviour on emergency stop	**shows the switch status in the event of an EMERGENCY STOP.**

VZ1, VZ2

Delay period 1 is the period **before** the action is set at the output.

Delay period 2 is the period **after** the action has passed the output.

For example, five seconds should elapse after the spindle has been turned off and before the Z axis is positioned.

This means that: *VZ1* takes five seconds for the action: Lower Z axis start; *VZ2* takes five seconds for the action: Motor off.

H-/L-Pulsewidth

Limits the pulse width to the value entered in milliseconds.

Export

Saves the settings made as a relay configuration.

Import

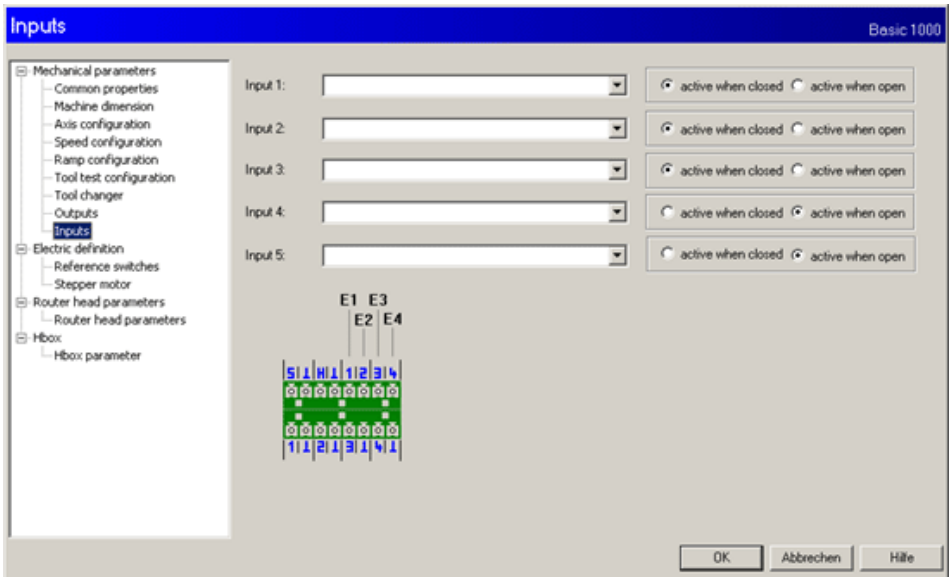
Opens a relay configuration with action output settings.

Reset all outputs

Resets all settings made to the action outputs.

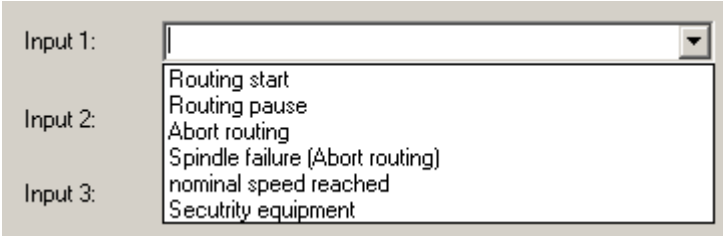
Inputs

Inputs trigger actions (e.g. abort routing, routing pause, routing start etc.). All inputs can be individually defined.



➢ ***Set input action***

- Click on the arrow to open the selection menu.

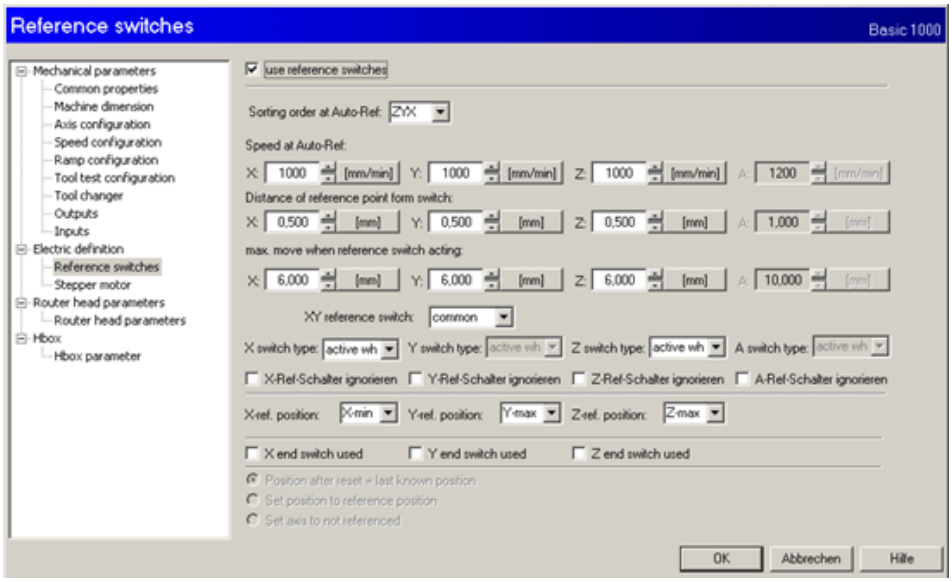


- Select the desired option.
- Select switch type (active when closed/active when open).

NOTE: The event can be deleted from the field using the *Delete* key.

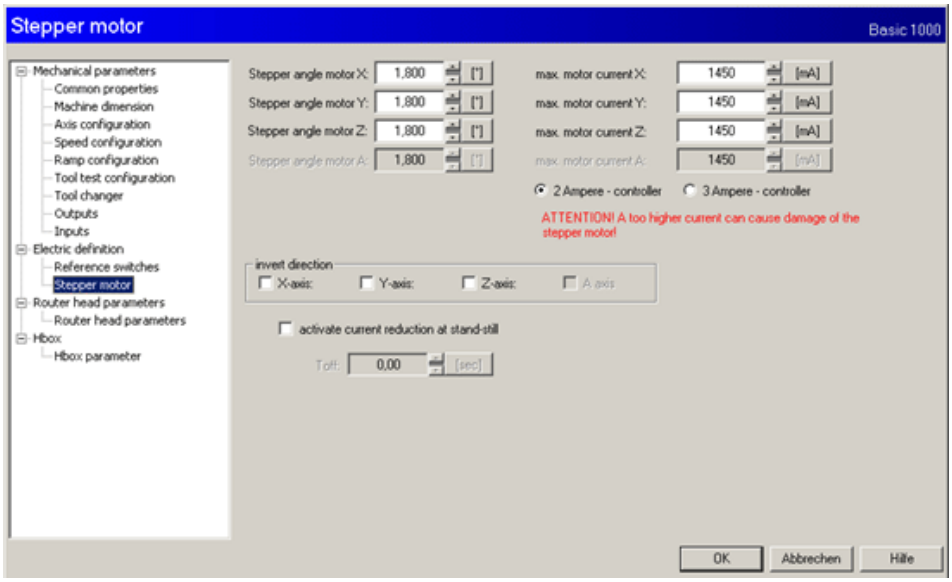
Reference switches

CAUTION! Do not amend these parameters! Parameters may only be amended on the instructions of the STEP-FOUR support team.



Stepper motor

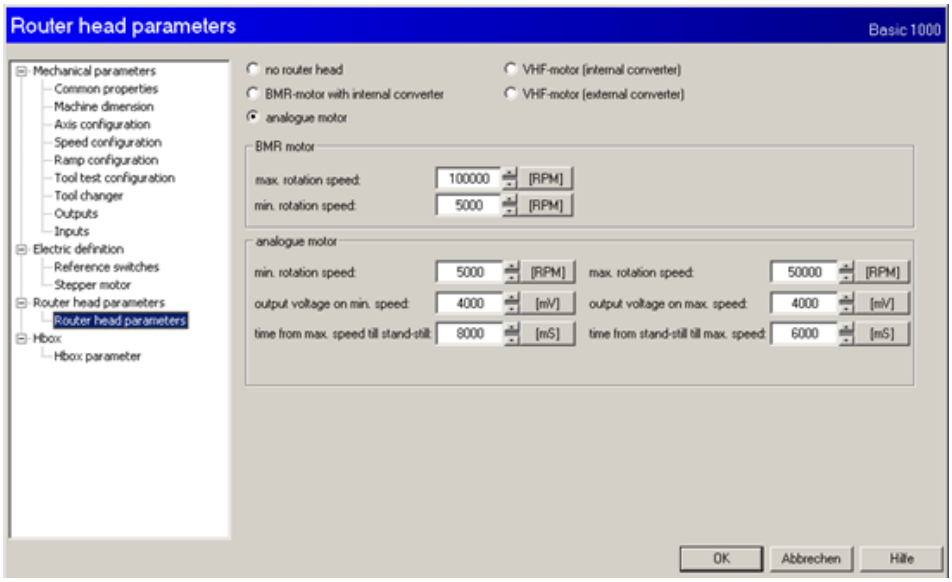
CAUTION! Do not amend these parameters! Parameters may only be amended on the instructions of the Step-FOUR support team.



Router head parameters

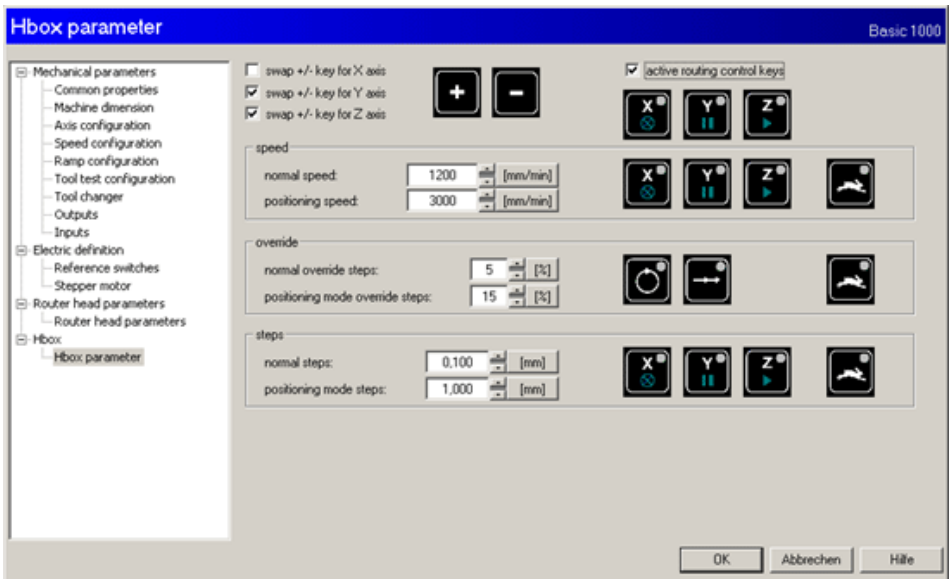
The parameters for the router head (milling motor) used are defined in this area.

The valid values can be found in the **Spindle Handbook**!



Hbox parameters

The Hbox is defined.



Swap +/- key for X, Y or Z axis

The positioning of an axis is inverted using the Hbox. This means, for example, that a movement to the right along the X axis takes place with - instead of with +.

Speed

Shows the speed of the axes while positioning with the Hbox. The *normal speed* and the *positioning speed* are shown separately.

Override

Shows a percentage for the spindle override  or feed rate override  during a mill process.

By clicking on the  button or the  button, the spindle override and/or the feed rate override are activated. After activation, you can use the +/- keys to change the desired value of the spindle RPM and/or the mill feed rate to the percentage entered. The *normal override steps* and the *positioning mode override steps* are shown separately.

Steps

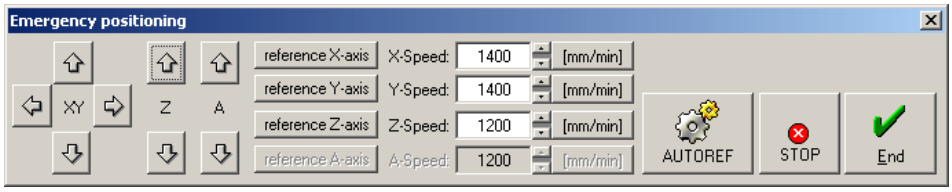
Provides the step widths when positioned as *Normal steps* or *Positioning mode steps*.

Active routing control keys

Operating the X,Y or Z keys activate abort routing, routing pause and routing start/continue (highlighted in blue) when **no** manual positioning window is open.

Emergency positioning

If a reference run is not possible following a collision, you can use the *Emergency positioning* function to relieve the machine.



General views

General views rotates the work area view in all directions. The animation shows the rotation direction using arrows and is controlled by the mouse. Click to rotate the work area.

Connect

Max. gap

Shows the maximum distance between lines to be recognised as individual objects. Lines with a small distance between them are connected to one object.

Ignore layers

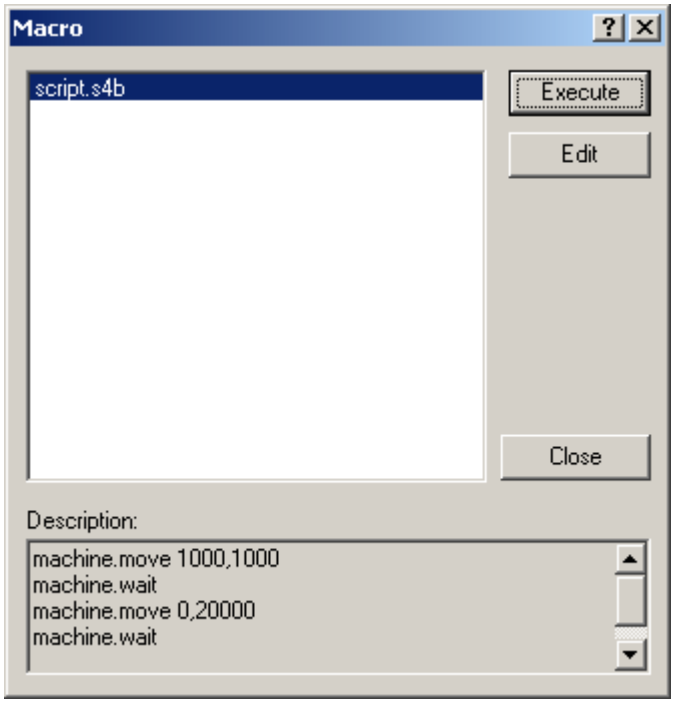
Layers are ignored when elements are connected.

Selected elements only

Only selected elements are connected.

Execute macro

You can start macros (subprograms) which have already been created in this subwindow.



➢ ***Start macro***

- Select desired macro from the selection list.
- Click *Execute* to start the macro.

Edit: Opens the selected macro in the *Macro editor* where it can be edited.

CAUTION! Changes to macros may cause failures. On request, adjustments can be carried out by STEP-FOUR.

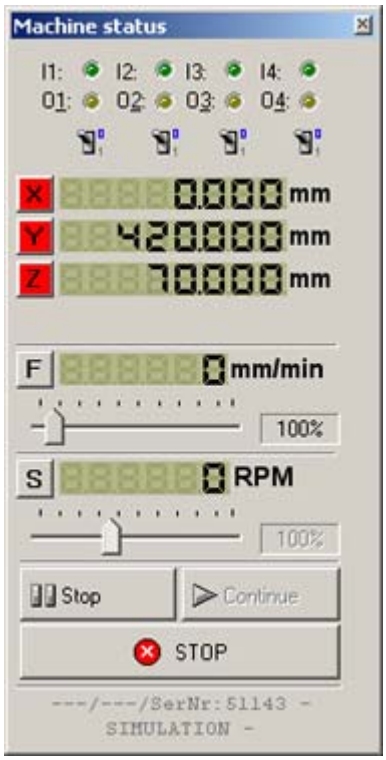
CHAPTER 9

Docker window

In this chapter

Window Machine status

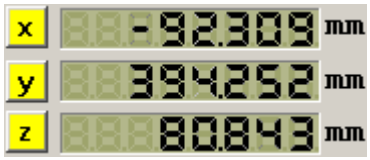
Shows the current values of the machine. You can amend the outputs, speed and RPM during processing using the switches and sliders.



Machine coordinates

During the mill process, the coordinate display shows the current position of the milling cutter in values of X, Y and Z. Red X, Y and Z buttons shows the absolute values of the axes.

X, Y and Z buttons highlighted in yellow show the relative values of the axes based on the currently defined zero point.



Switching between absolute and relative values is done separately for each axis by clicking the button.

RPM, Feed rate

The current spindle RPM is shown in the *S* field. The feed rate in the *v* field.

Amend RPM during process

If the default RPM is too high or too low, you can amend it during the mill process. The *RPM* slider offers a band width of **10%** to **255%** of the default RPM.

Amend feed rate during process

If the default feed rate is too high or too low, you can amend it during the mill process. The *Speed* slider offers a band width of **25%** to **999%** of the default feed rate.

Stop, Pause, Continue

These functions offer you the option of pausing and continuing the mill process.

Stop

Routing is aborted, the milling cutter is lifted out of the material and the tool change position is approached.

You cannot continue the mill process.Pause

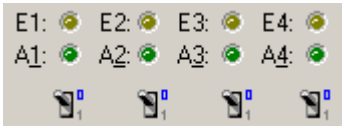
The mill process is stopped. The Z axis moves to the tool change position.

The mill process can be continued.Continue

Choose Continue to continue the mill process if you have paused it.

Output and Input monitoring/control

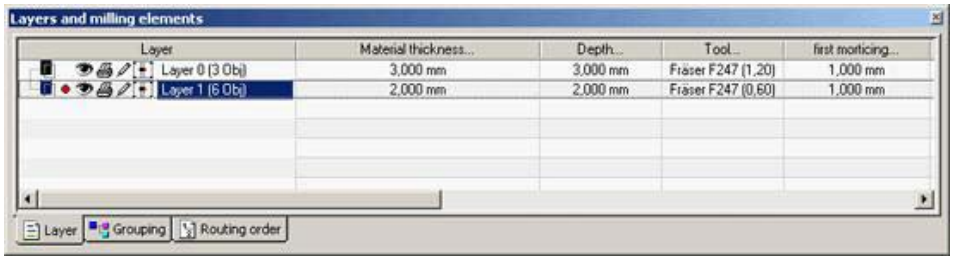
This area of the machine status window shows the inputs and outputs. *E1* to *E4* show the inputs, *A1* to *A4* the outputs.



Virtual 'lights' show whether an input or an output is activated. You can use the switches to switch on outputs manually.

Window - Layers and milling elements

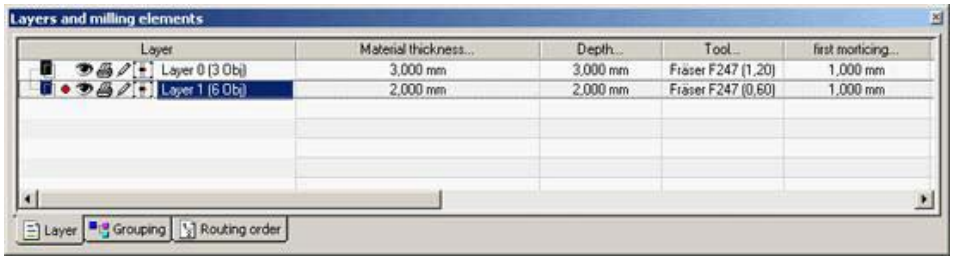
Maintenance of layers and their properties, as well as the grouping and the routing order of the elements.



Use the tab pages *Layers, grouping* and *routing order* to change to the individual areas.

Layers

The layer definitions specified in the settings are listed in a table in this window. Amendments to the settings can be made individually as well as, for selected layers, together.



➢ ***Change assignments***

- Select layer(s)
- Double-click on the table header (e.g. depth)

The entry window opens.

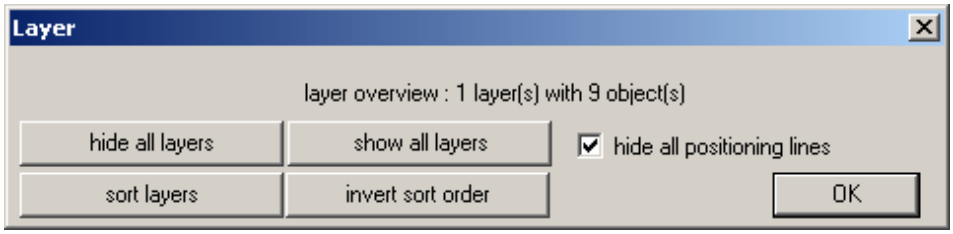
- Type or use the arrows to enter the desired value.
- Confirm your data by choosing *OK* .

The amendment will be carried out for **all selected layers**.

➢ ***Create layers and/or move objects to a different layer***

see ***Subwindow - Move*** (See "Move" Page 129).

Right-click in an empty cell of the table to open the *Layer overview*.



Show/hide all layers

Shows/hides the objects of all layers.

Sort layers

Sorts the layers alphabetically.

Invert sort order

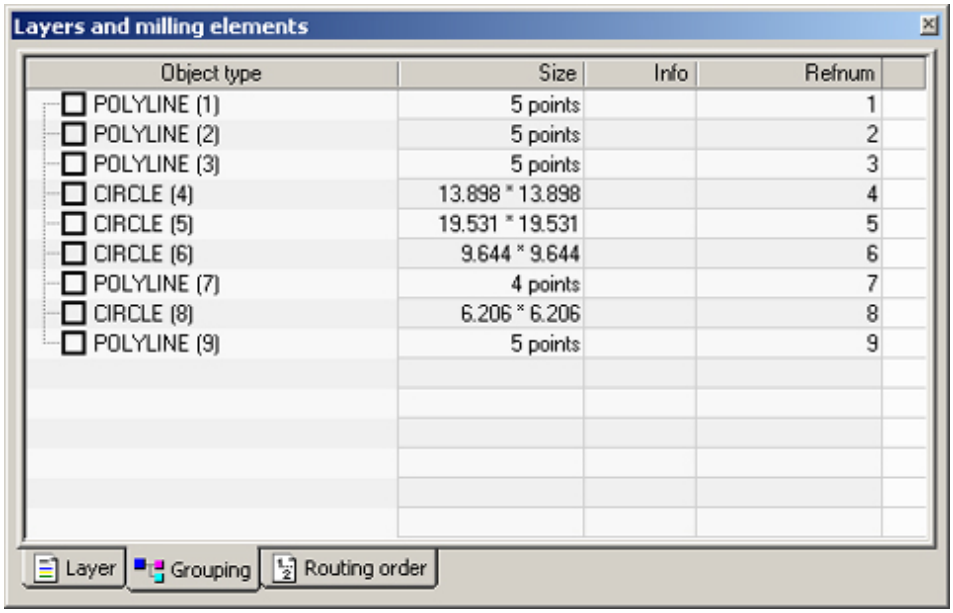
Inverts the sort order from *Sort layers*.

Hide all positioning lines

Shows/hides an auxiliary line which defines the positioning of the object.

Group

Objects and groups are listed in this view. Grouping can be ordered hierarchically. Double-click *Groups* and click +/- to show or hide contents of groups.



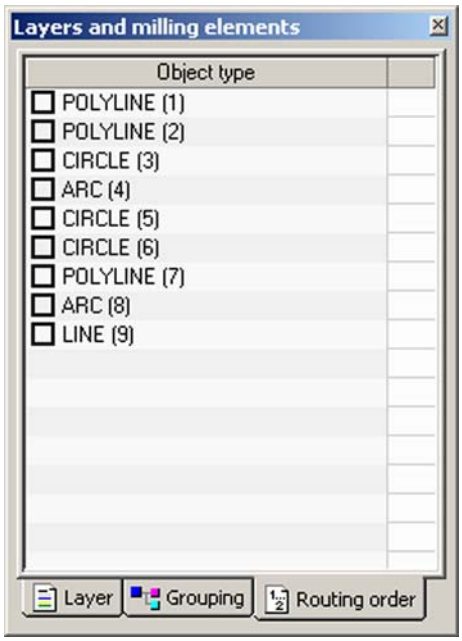
If an object is highlighted, the highlighting is also visible in the work area.

➢ ***Group and ungroup***

- Select desired objects
- Right-click to display the context menu.
- Select desired action.

Routing order

Shows the set routing order of the objects.



CHAPTER 10

Context menus

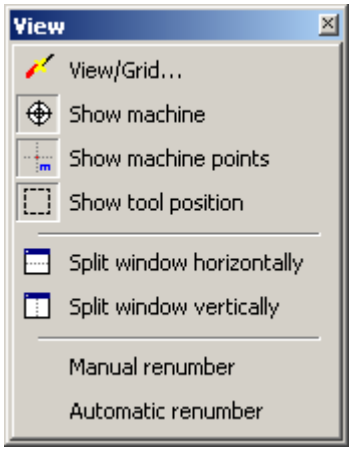
In this chapter

You can display context menus by right-clicking the mouse button. In many cases, context menus enhance tool functions or provide you with quick access to functions.

Which context menu is displayed depends on which tool is active and where you position your cursor when you right-click. The following lists indications for the positions in the software at which you can position your cursor to call up a context menu.

NOTE: Functions that are not available are also greyed out in the context menus and cannot be selected.

View



Active tool

- All

Cursor position

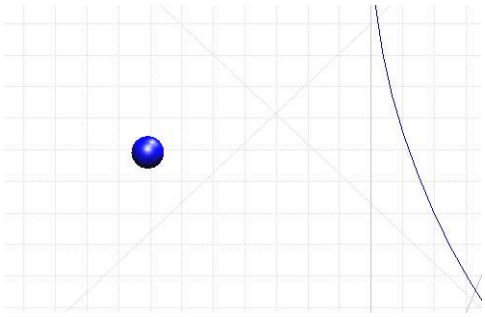
- Free space in the work area

View

Switches to the *Depiction subwindow.* (See "Depiction" Page 179)

Show tool position

Displays the milling cutter in the work area. The diameter of the display is to the scale of the selected milling cutter.



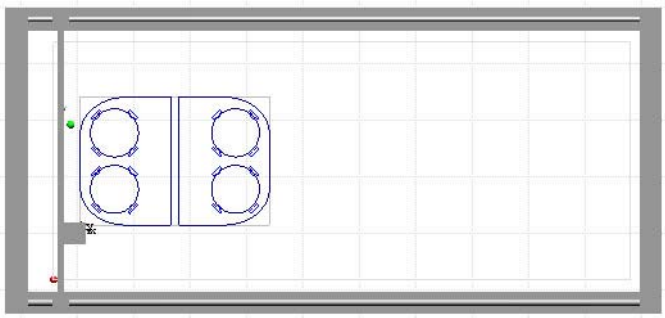
Show machine points

Displays

- Reference point
- Zero point
- Tool change point
- Tool test point

Show machine

Displays the mechanics in the work area.



Split window

You can split the window that is displayed into up to four different views.

- If you *split the window horizontally*, this creates **two** user-defined views.
- If you *split the window vertically*, this creates **two** user-defined views.
- If you choose both functions one after the other, this creates **four** user-defined views.

Manual renumber

You can set the **routing order** by selecting the individual objects.

➢ ***Renumber objects manually***

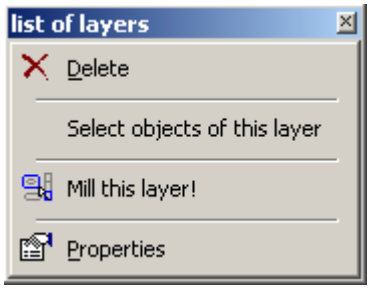
- Activate the *Sort order* (See "Sort order" Page 108) tool.
- Right-click in the work area.
- In the context menu, choose *View, Manual renumber*.
- The cursor changes to 1,2.
- Select objects in the required sort order.

If you include all objects in the routing order, the cursor changes again.

Automatic renumber

Switches to the *Sort automatically subwindow* (See "Sort automatically" Page 162).

List of layers



Active tool

- All

Cursor position

- *Layers and milling elements* window, *Layer* tab page - with the mouse, click the layer that you want to process.

Delete

 Delete

Deletes the selected element.

Select objects from this layer.

Selects all objects at the selected layer.

Mill this layer!

Starts the mill process for all elements at the selected layer.

Properties

Switches to the *Layer subwindow.* (See "Layers" Page 115)

Dot menu

Active tool

- Cross-object point editing

Cursor position

- Selected point

New

Inserts a point at the selected position.

Delete

 Delete

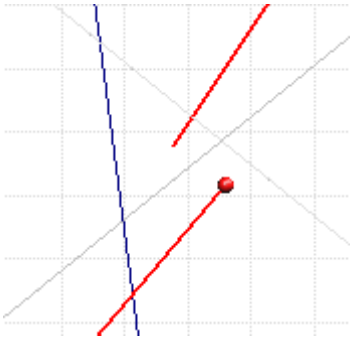
Deletes the selected element.

Connect

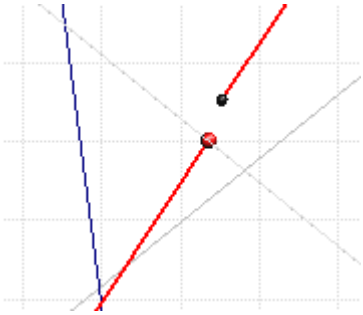
Connects the selected point to an end point.

➢ ***Connect points***

- Select the end point of an object.
- Call up the *Connect* context menu.
- The selected point is stopped and can be moved with the mouse.



- Move the stopped point to a free end point.



- Once the free end point is highlighted in blue, confirm the connection by clicking the mouse button.

Separate

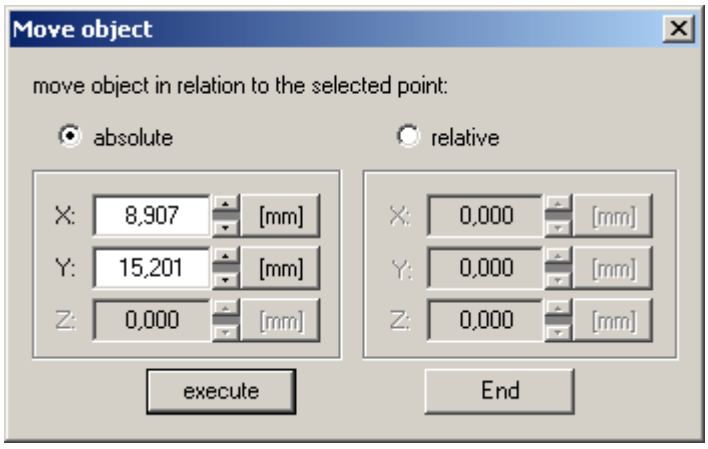
The selected object is separated at the selected point.

Move...

The object is moved *absolutely*

or

relatively in relation to a point.



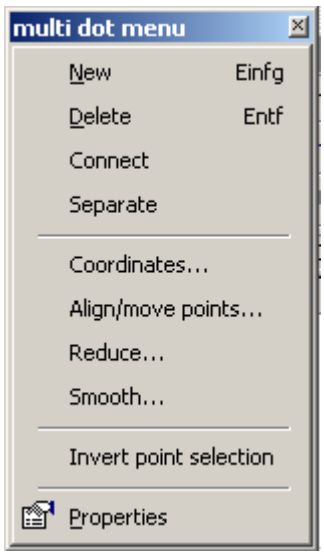
Coordinates...

Switches to the *Properties window subwindow.* (See "Geometry data" Page 121)

Properties

Switches to the *Properties window subwindow.* (See "Properties" Page 119)

Multi dot menu



Active tool

- Cross-object point editing

Cursor position

- Selected points

New

Inserts a point at the selected position.

Delete

 Delete

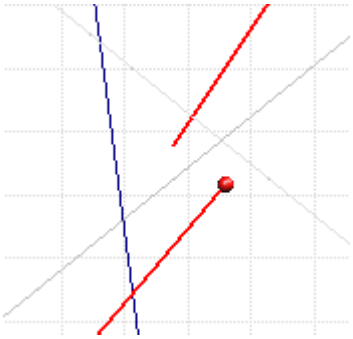
Deletes the selected element.

Connect

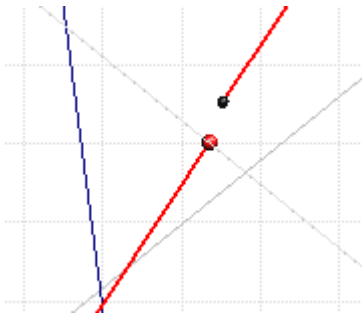
Connects the selected point to an end point.

➢ ***Connect points***

- Select the end point of an object.
- Call up the *Connect* context menu.
- The selected point is stopped and can be moved with the mouse.



- Move the stopped point to a free end point.



- Once the free end point is highlighted in blue, confirm the connection by clicking the mouse button.

Separate

The selected object is separated at the selected point.

Coordinates...

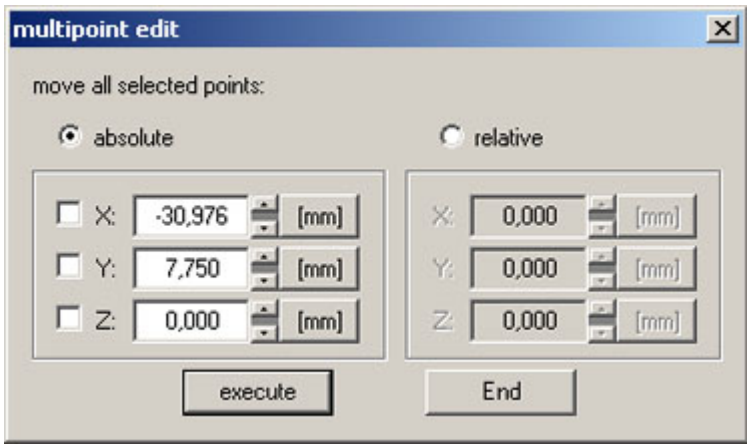
Switches to the *Properties window subwindow.* (See "Geometry data" Page 121)

Align/move points...

All selected points are moved *absolutely*

or

relatively.



Reduce...

Switches to the *Reduce subwindow.* (See "Reduce" Page 167)

Smooth...

Switches to the *Smooth subwindow.* (See "Smoothen" Page 168)

Invert point selection

All points of an object that are not selected are included in the selection; the points currently selected are removed from the selection.

From an object with 100 points, 10 points are currently selected. When you execute the *Invert point selection* command, 90 points are selected and the 10 points previously selected are no longer included in the selection.

Properties

Switches to the *Properties window subwindow.* (See "Properties" Page 119)

Object menu 1

Active tool

- All

Cursor position

- *Layers and milling elements* window, *Grouping* tab page - with the mouse, click an element.

Delete

 Delete

Deletes the selected element.

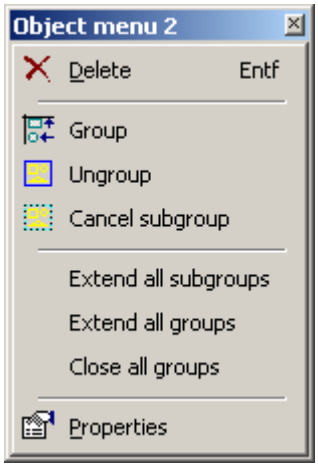
Group

If several objects are selected, these objects are combined into one group.

Properties

Switches to the *Properties window subwindow.* (See "Properties" Page 119)

Object menu 2



Active tool

- All

Cursor position

- *Layers and milling elements* window, *Grouping* tab page - with the mouse, click a *group*.

Delete

Delete

Deletes the selected element.

Group

If several objects are selected, these objects are combined into one group.

Ungroup

Existing groups are split up into their individual elements (objects).

Cancel subgroup

Subgroups of the selected group are dissolved.

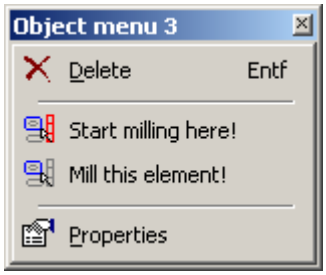
Extend all groups

All groups whose elements are not displayed are extended.

Properties

Switches to the *Properties window subwindow.* (See "Properties" Page 119)

Object menu 3



Active tool

- All

Cursor position

- *Layers and milling elements* window, *Routing order* tab page - with the mouse, click an *element*.

Delete

 Delete

Deletes the selected element.

Start milling here!

The mill process is started from the selected element.

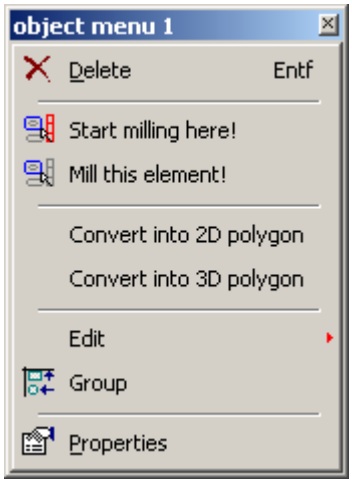
Mill this element!

The element selected is milled.

Properties

Switches to the *Properties window subwindow.* (See "Properties" Page 119)

Object menu 1



Active tool

- *Select, contour definition, define start point and direction, drawing tools.*

Cursor position

- Object in the work area

Delete

Delete

Deletes the selected element.

Start milling here!

The mill process is started from the selected element.

Mill this element!

The element selected is milled.

Convert into 2D polygon

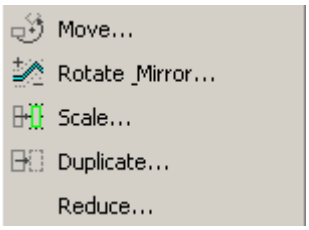
Splits objects (e.g. circle) up into a two-dimensional line (X and Y coordinates).

Convert into 3D polygon

Splits objects (e.g. circle) up into a three-dimensional line (X and Y coordinates).

Edit

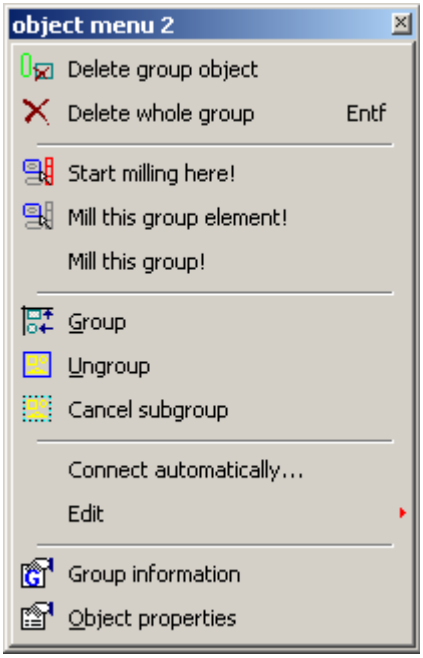
Opens the *Edit* submenu.



Properties

Switches to the *Properties window subwindow.* (See "Properties" Page 119)

Object menu 2



Active tool

- *Select, contour definition, define start point and direction, drawing tools.*

Cursor position

- Group in the work area

Delete group object

To delete an element of an existing group, right-click the element in question. This opens the context menu. Choose *Delete group object* to delete the element.

Delete whole group

 Delete

Deletes the entire selected group.

Start milling here!

The mill process is started from the selected element.

Mill this group element!

The mill process is started for the element of the selected group at which the cursor is positioned.

Mill this group!

The mill process is started for the selected group.

Group

If several objects are selected, these objects are combined into one group.

Ungroup

Existing groups are split up into their individual elements (objects).

Cancel subgroup

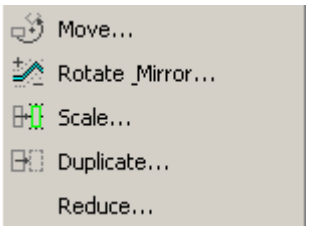
Subgroups of the selected group are dissolved.

Connect automatically...

Switches to the *Connect subwindow*. (See "Connect" Page 206)

Edit

Opens the *Edit* submenu.



Group information

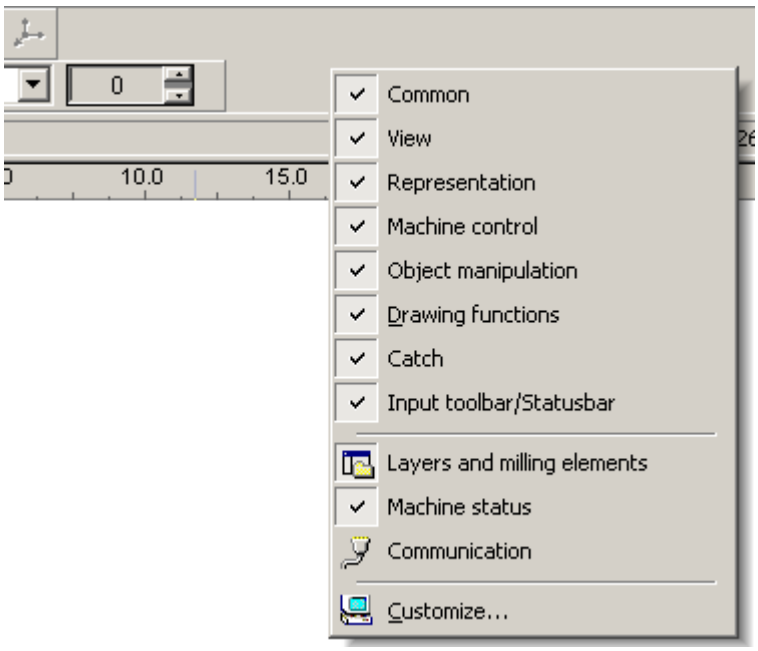
Switches to the *Properties window* subwindow.

The *number of elements* and the *size* of the group are displayed.

Object properties

Switches to the *Properties window subwindow.* (See "Properties" Page 119)

Toolbars



You can activate or deactivate the individual toolbars.

If you choose *Customize...*, the *Customize subwindow opens.* (See "Change (configuration)" Page 141)

CHAPTER 11

FAQ

In this chapter

Machine is in emergency stop mode because reference switches are not available

If no reference switches are available on the machine, "Use reference switches" may not be activated under ***Mechanical parameters - Reference switches*** (See "Reference switches" Page 203).

Choose ***Reset*** (Page 76) to cancel the emergency stop status and reset the controller.

Machine does not mill at the speed set

For 3D objects, a speed override must be specified as part of the geometry data.

This means that the SPEED column on the ***Geometry data*** (Page 121) tab page contains values that are not equal to zero. Instead of using the speed values in the layer definition, the machine mills with the values from the SPEED column.

Outputs do not switch using the assignments made as part of the machine definition

Under the menu option Options -> Customize -> Assignments, the "Load relay configuration from file" checkbox is activated.

This means that this configuration will take priority over the configuration set as part of the machine definition if the active milling project has saved a file-specific output configuration under File -> File information -> Output configuration.

The assignment of buttons in the toolbars was not retained

When a software upgrade is installed, the symbol assignment is undone. Choose Options -> Customize -> ***Toolbars*** (Page 142) and the "Reset All" button to reassign the symbols.

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