

HARMUTH
CNC-FRÄSTECHNIK



Instruction manual
Penta-Tec V3
for F+series/Profi series

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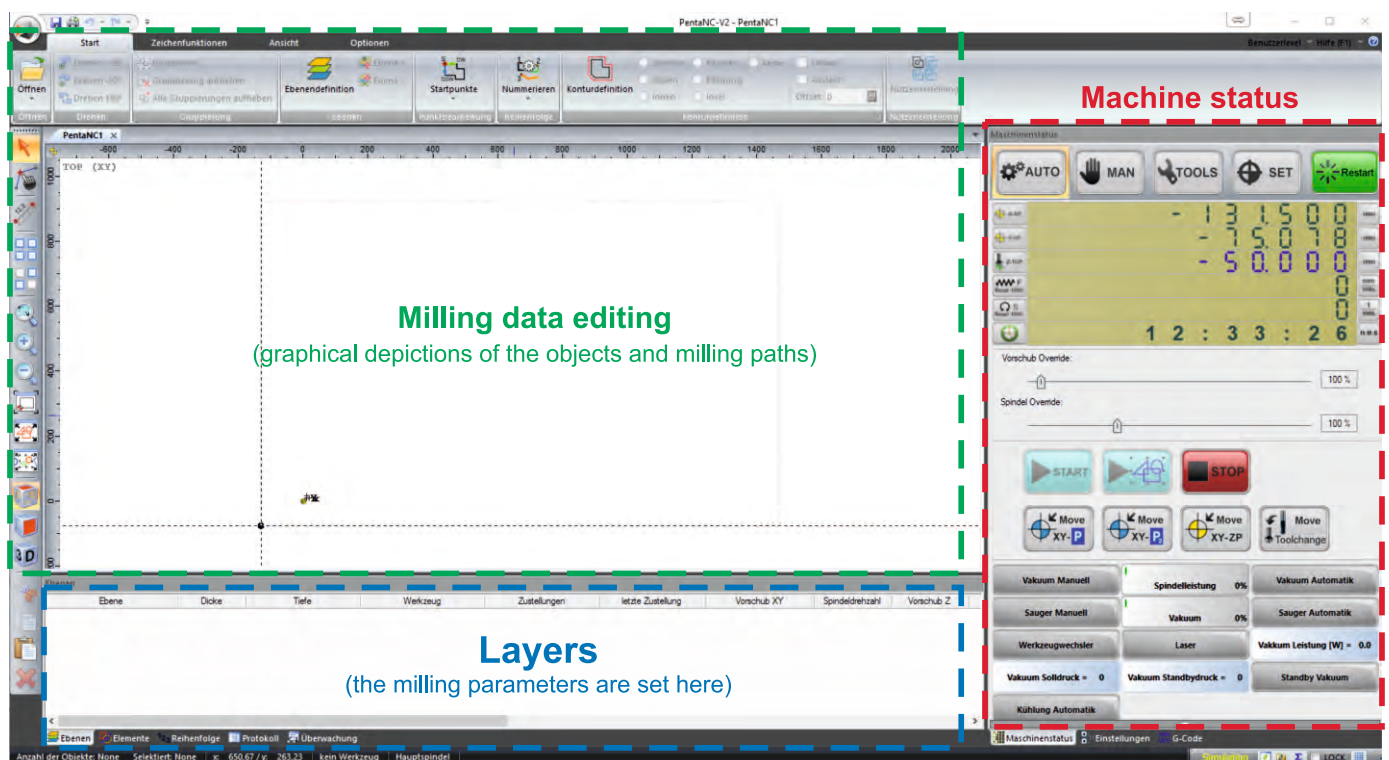
We explain the software in 3 steps, which we have listed again for you here.

Step 1: Machine status

Approach positions (**AUTO**), set positions (**SET**), moving manually (**MAN**)

Step 2: Create tools and material data (in options)

Step 3: First milling tasks



Assignment of keys:

ESC = Stop the machine

Ctrl + K = Recalculate contour

P = Show object points (on or off)

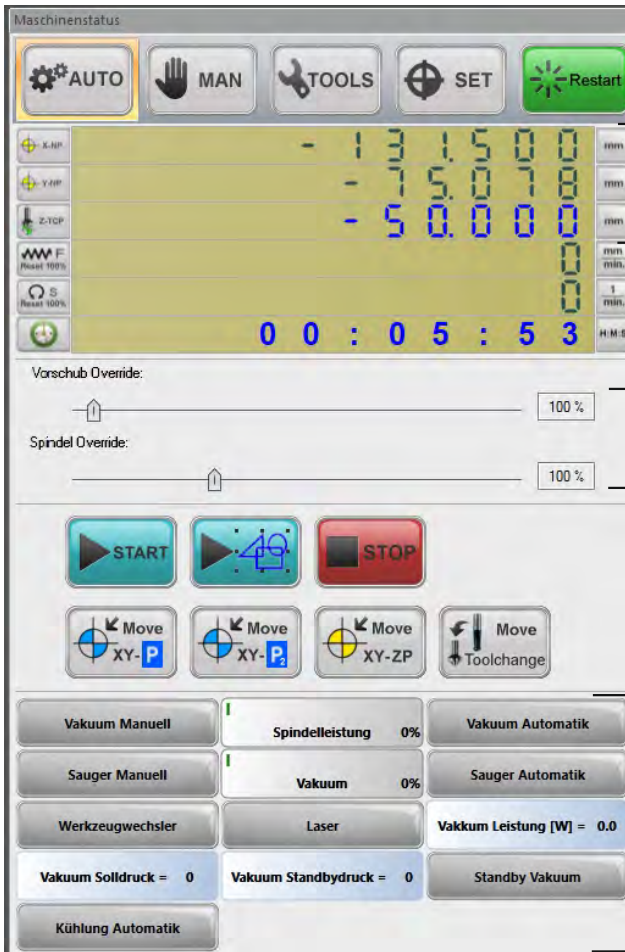
K = Show contour points (on or off)

A = View all objects

V = View vacuum fields on or off (only for automatic vacuum fields)

M = Show or hide machine mechanics

Machine status (AUTO)



Machine position (in mm)

Milling feed rate (in mm/min)

Spindle speed (in 1/min)

Regulate feed rate + spindle speed 0-300%

This area looks different depending on the machinery

- Control and monitor exits
- Set vacuum pressure manually

Pictogram explanations:

	Start milling all objects
	Mill selected objects
	Cancel machining
	Move to parking position 1 (shown with a blue dot in the working area)
	Move to parking position 2 (usually in the rear area, not shown)
	Move to zero-point XY (displayed with a yellow dot in the working area)
	Move to the tool change point (shown with a grey dot in the working area)

TIP:

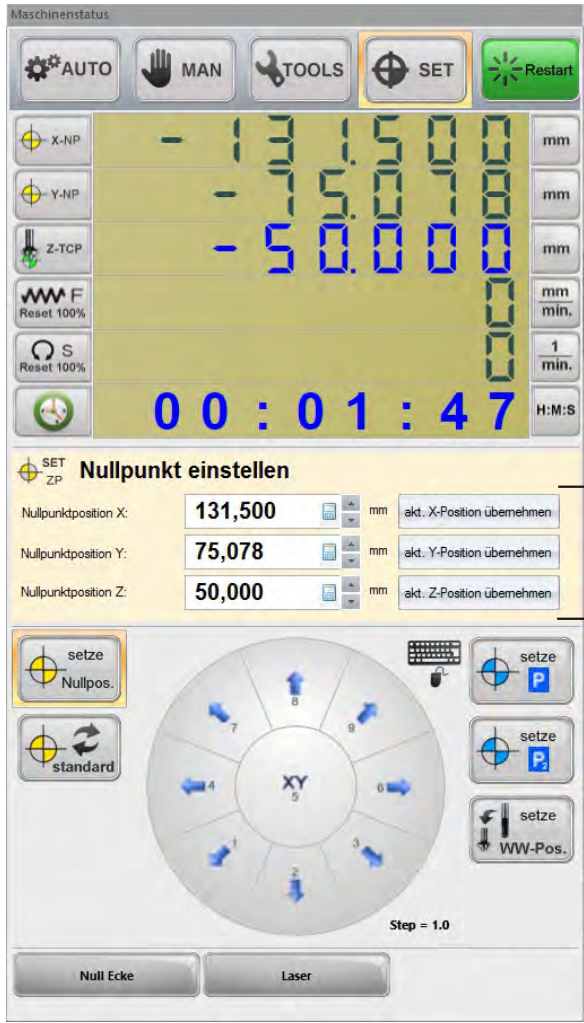
Click on the symbol with the mouse and press F1. The help opens.

INFO:

The positions are in

(next page)

Machine status (SET)



INFO:
If the numbers are displayed in red, the laser is switched on.

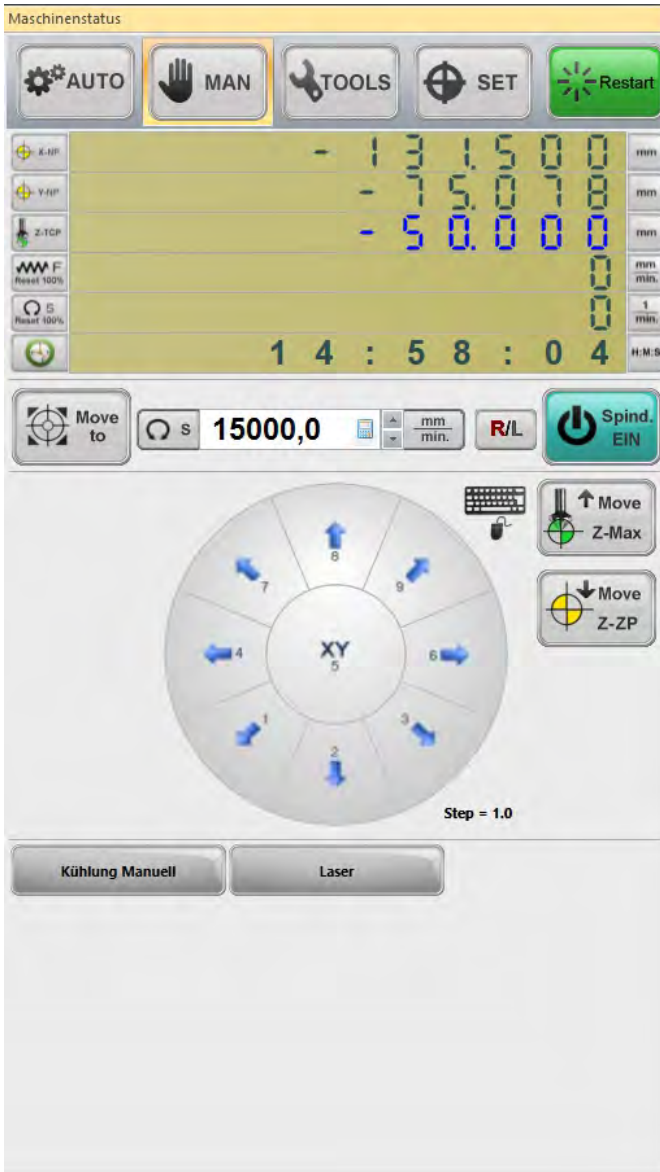
Enter positions manually or use the current position (not for Z, if the zero-point is on the table, it is measured automatically!)

Pictogram explanations:

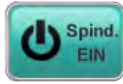


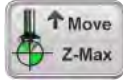
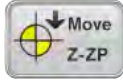
	Set zero-point
	Restore standard zero-point
	Set parking position 1
	Set parking position 2
	Set tool change point


	NZero-point corner is adopted (button turns green)
	Switch on laser point (button turns red) Attention!!! If the zero-point is approached with the laser, it is essential that it remains switched on, otherwise the zero-point of the respective tool position will be adopted!
	Move machine manually Via pictogram, keyboard or number field

Machine status (MAN)



Pictogram explanations:

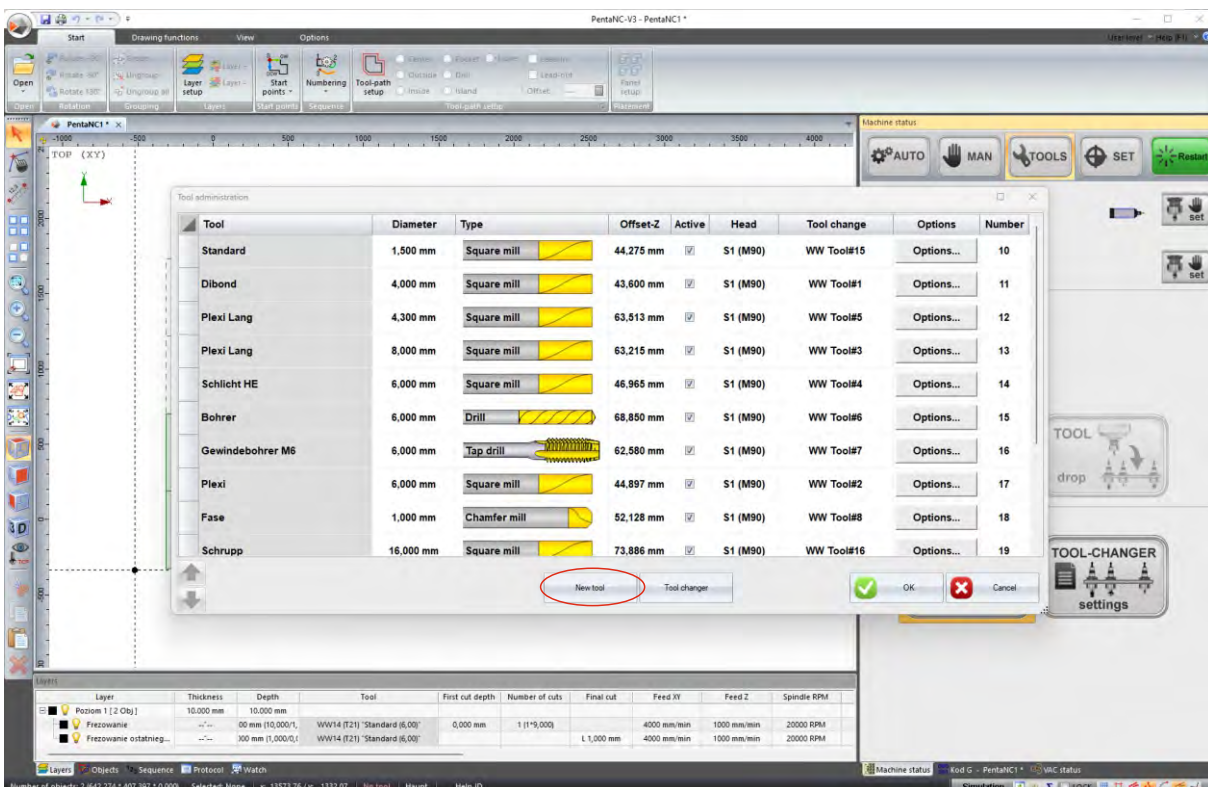
	Spindle (on/off)
	Spindle rotation (right - left) (Profi series only)
	Machine positioning with mouse (ideal for checking if the material size is sufficient.)
	Move to max. Z-parking
	Move to zero-point Z

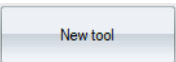
	Preset spindle speed
---	----------------------

Create a new tool and assign it in the tool changer "measuring" is not necessary

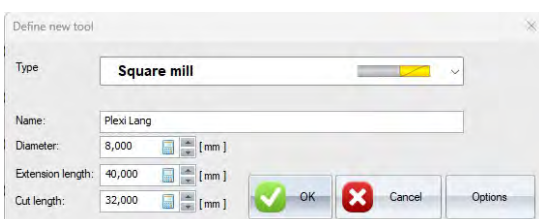


You can access this menu via the machine status (tool management).



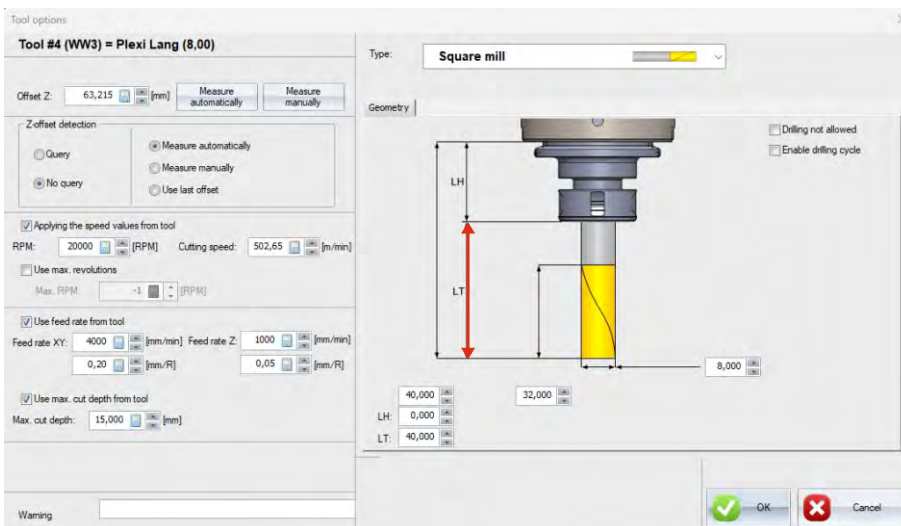
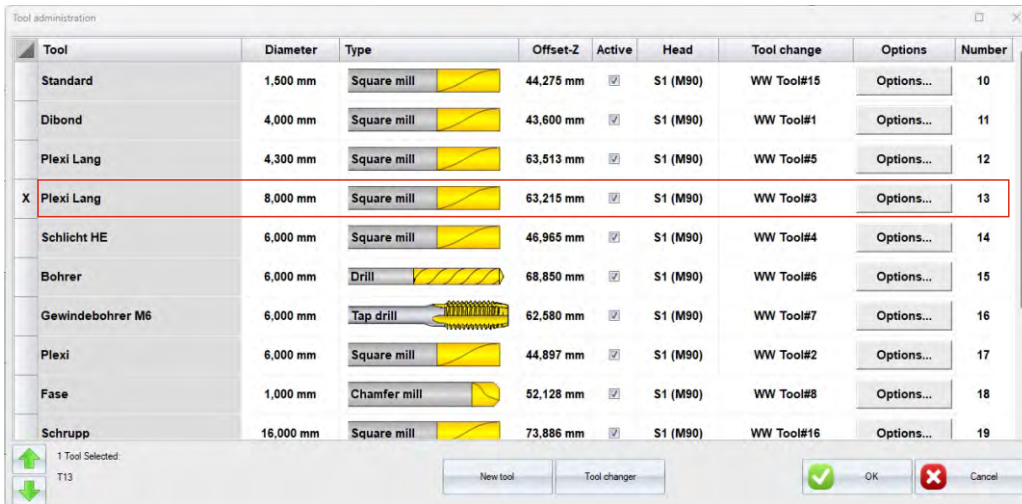
Click on the button  to open an additional window.

Here you can name your tool and enter the diameter.



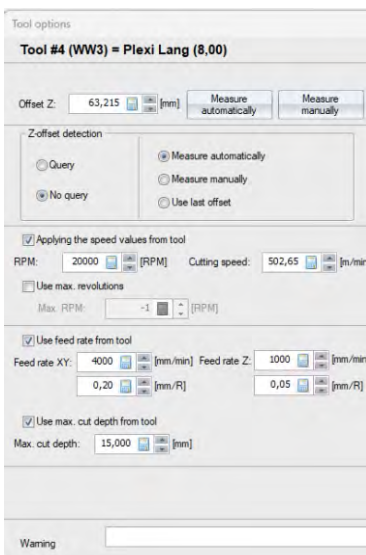
Confirm with OK.

After you have created the milling cutter, you can set the parameters via **Options...**



IMPORTANT!

The length of the milling cutter from the lower edge of the clamping nut to the milling cutter tip must be entered here.



Single tooth milling cutter	Plastic / aluminum composite / wood		Acrylic (plexiglass)		Aluminium	
	feed rate mm / min	max. infeed $\varnothing \times 2$	feed rate mm / min	max. infeed $\varnothing \times 1,5$	Vorschub mm / min	max. infeed $\varnothing \times 0,5$
\varnothing 3mm	3000	6	2000	4	500	1,5
\varnothing 4mm	4000	8	3000	6	750	2
\varnothing 6mm	6000	12	4000	10	1000	3
\varnothing 8mm	8000	16	4000	12	1500	4

Here you can predefine the feed values and the max. infeed.

Tool locations and allocation

You reach this menu via
the machine status or in
the tool management.



Tool	Diameter	Type	Offset-Z	Active	Head	Tool change	Options	Number
Standard	1,500 mm	Square mill	44,275 mm	<input checked="" type="checkbox"/>	S1 (M90)	WW Tool#15	Options...	10
Dibond	4,000 mm	Square mill	43,600 mm	<input checked="" type="checkbox"/>	S1 (M90)	WW Tool#1	Options...	11
Plexi Lang	4,300 mm	Square mill	63,513 mm	<input checked="" type="checkbox"/>	S1 (M90)	WW Tool#5	Options...	12
Plexi Lang	8,000 mm	Square mill	63,215 mm	<input checked="" type="checkbox"/>	S1 (M90)	WW Tool#3	Options...	13
Schlicht HE	6,000 mm	Square mill	46,965 mm	<input checked="" type="checkbox"/>	S1 (M90)	WW Tool#4	Options...	14
Bohrer	6,000 mm	Drill	68,850 mm	<input checked="" type="checkbox"/>	S1 (M90)	WW Tool#6	Options...	15
Gewindebohrer M6	6,000 mm	Tap drill	62,580 mm	<input checked="" type="checkbox"/>	S1 (M90)	WW Tool#7	Options...	16
Plexi	6,000 mm	Square mill	44,897 mm	<input checked="" type="checkbox"/>	S1 (M90)	WW Tool#2	Options...	17
Fase	1,000 mm	Chamfer mill	52,128 mm	<input checked="" type="checkbox"/>	S1 (M90)	WW Tool#8	Options...	18
Schrupp	16,000 mm	Square mill	73,886 mm	<input checked="" type="checkbox"/>	S1 (M90)	WW Tool#16	Options...	19

Select a position in the tool changer and click in the tool field.
An arrow appears on the side (outlined in red) where you can select the new milling cutter.

Pos	Tool	Pos-X	Pos-Y	Pos-Z	Offset-Z	Measured	Sensor	Machine head	
1	Dibond (4,00)	T11	66,357	1663,000	82,348	43,600	No	No	S1 (M90)
2	Plexi (6,00)	T17	66,357	1558,111	82,672	44,897	No	No	S1 (M90)
3	Plexi Lang (8,00)	T13	66,357	1452,962	81,979	63,215	No	No	S1 (M90)
4	Schlicht HE (6,00)	T14	66,357	1347,827	83,069	46,965	No	No	S1 (M90)
5	Plexi Lang (4,30)	T12	66,357	1242,746	83,097	63,513	No	No	S1 (M90)
6	Bohrer (6,00)	T15	66,357	1137,683	82,754	68,850	No	No	S1 (M90)
7	Gewindebohrer M6 (6,00)	T16	66,546	1032,624	82,432	62,580	No	No	S1 (M90)
8	Fase (1,00)	T18	66,546	927,705	82,426	52,128	No	No	S1 (M90)
9	V-Nut (1,00)	T20	66,546	822,570	82,036	0,000	No	No	S1 (M90)
10	EMPTY		66,697	717,367	82,532				S1
11	EMPTY		66,697	612,347	81,981				S1
12	Leer				81,405				S1
13	EMPTY		67,079	402,421	81,625				S1
14	Standard (6,00)	T21	67,079	297,299	80,926	47,492	No	No	S1 (M90)
15	Standard (1,50)	T10	134,289	1663,168	81,221	44,275	No	No	S1 (M90)
16	Schrupp (16,00)	T19	134,657	1558,006	80,791	73,886	No	No	S1 (M90)
17	EMPTY		134,657	1453,166	81,142				S1
18	EMPTY		134,657	1348,298	80,332				S1
19	EMPTY		134,657	1243,229	80,037				S1
20	EMPTY		134,657	1137,984	81,060				S1
21	EMPTY		134,657	1033,269	80,950				S1
22	EMPTY		134,657	928,227	81,683				S1
23	EMPTY		134,657	823,009	81,569				S1

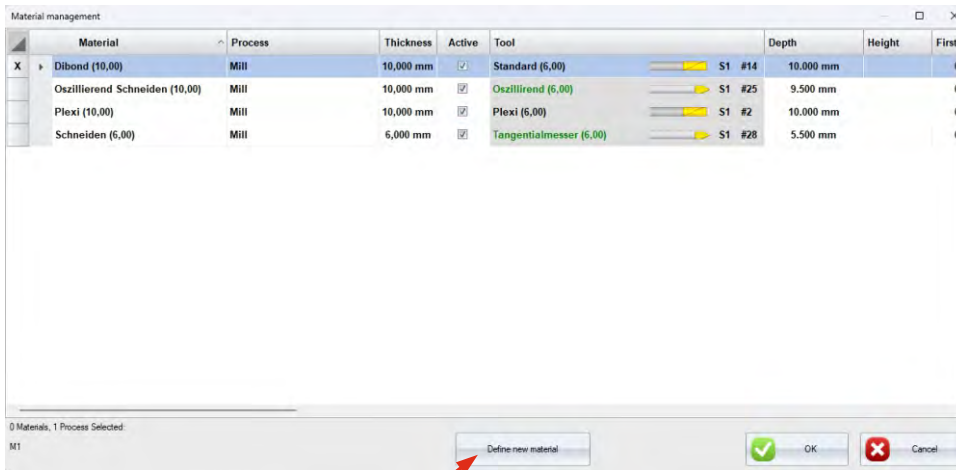
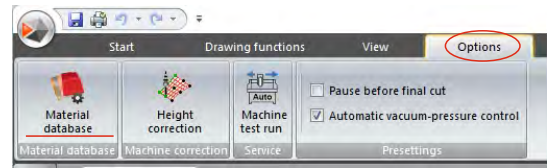
The status "Measuring" is automatically set to "No".

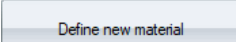
The tools can be measured here, but they do not have to be,
as the machines will automatically measure them when they are needed.

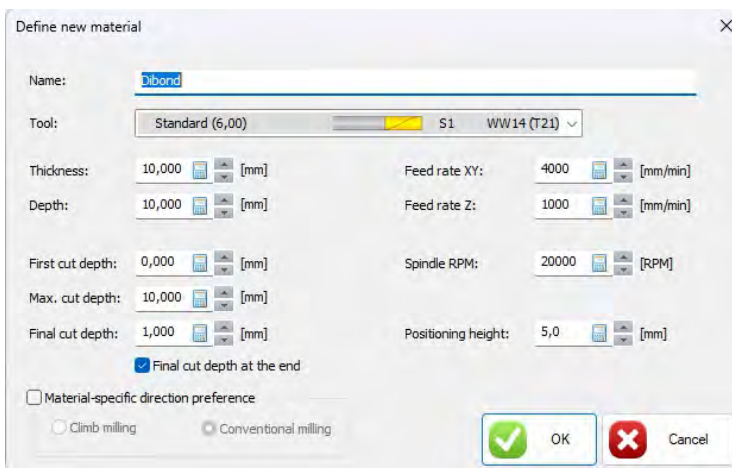
INFO:

For machines with a multi-spindle system,
the assigned milling spindle is displayed in the "Machine head" field.

You can access this menu via options - material database.

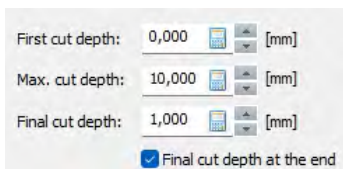


Click on the button  to open an additional window.

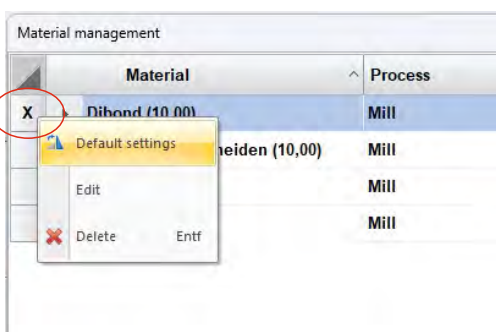


Enter the name of your material and select the tool.

If you have saved the feed values when creating the tool, they will be adopted automatically



For some materials it makes sense to mill in several infeeds. You can specify these values for the material here.

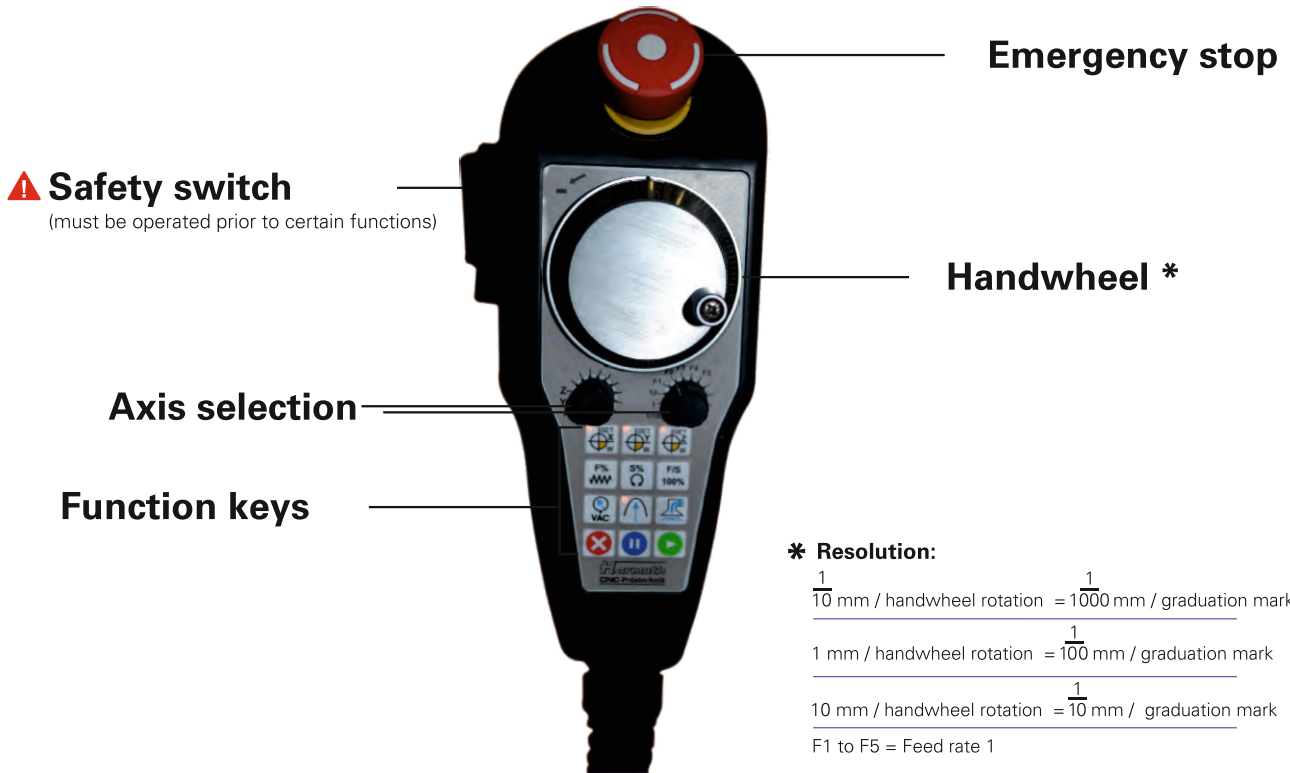


INFO:

If a material is processed a lot, you can save it as a preset.

Click with the right mouse button next to the material name (outlined in red) and select "default settings".

Only for Profi series



*** Resolution:**

$$\frac{1}{10} \text{ mm / handwheel rotation} = \frac{1}{1000} \text{ mm / graduation mark}$$

$$1 \text{ mm / handwheel rotation} = \frac{1}{100} \text{ mm / graduation mark}$$

$$10 \text{ mm / handwheel rotation} = \frac{1}{10} \text{ mm / graduation mark}$$

F1 to F5 = Feed rate 1

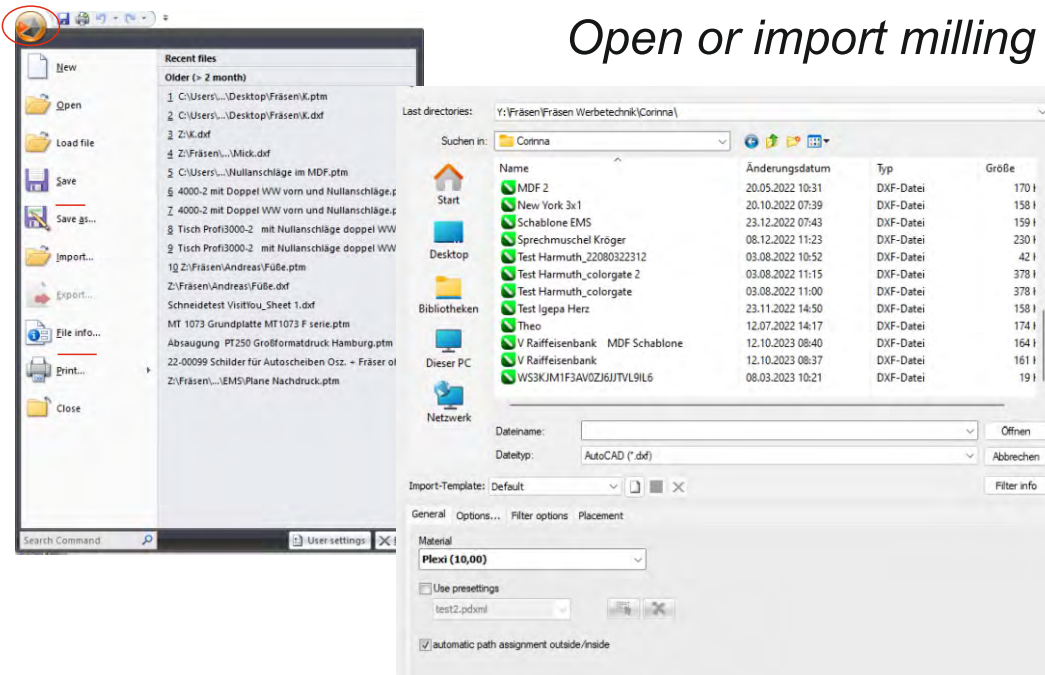
1 (slow) to 5 (fast)

Symbol	Function	Comment
	Save X zero-point	<ul style="list-style-type: none"> press to save lamp flashes slowly if flashing quickly, zero-point for this axis was adopted
	Save Y zero-point	<ul style="list-style-type: none"> press to save lamp flashes slowly if flashing quickly, zero-point for this axis was adopted
	Save Z zero-point	<ul style="list-style-type: none"> press to save lamp flashes slowly if flashing quickly, zero-point for this axis was adopted
	Set milling feed rate	<ul style="list-style-type: none"> Adjustable from 0-300 % via handwheel
	Set rotational speed	<ul style="list-style-type: none"> Adjustable from 0-300 % via handwheel
	Reset milling feed rate and speed	<ul style="list-style-type: none"> When pressed, the milling feed rate and speed are reset to 100 %.

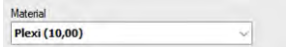
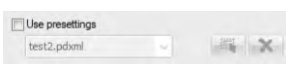
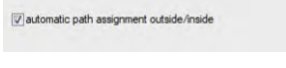
Symbol	Function
	Vacuum ON/OFF
	Cover OPEN/CLOSED
	Suction ON/OFF
	Milling termination
	Milling break
	Milling start

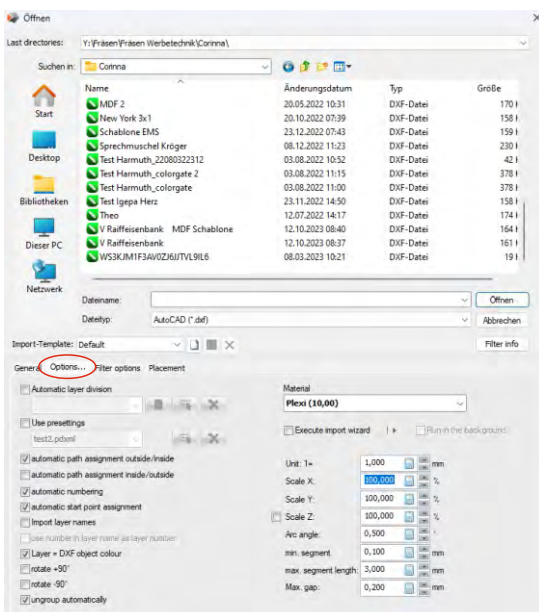
= operate safety switch before

Open or import milling data

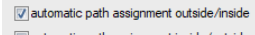
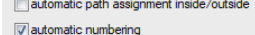
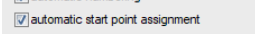

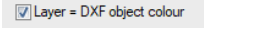



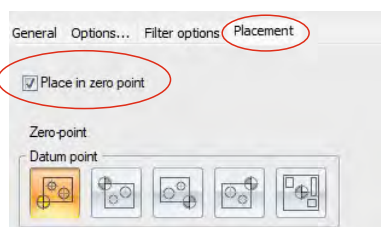
Explanations:

	Select material
	Serves to automate layers
	The contour assignment only works if the default setting in the material database is activated. Should always be activated!



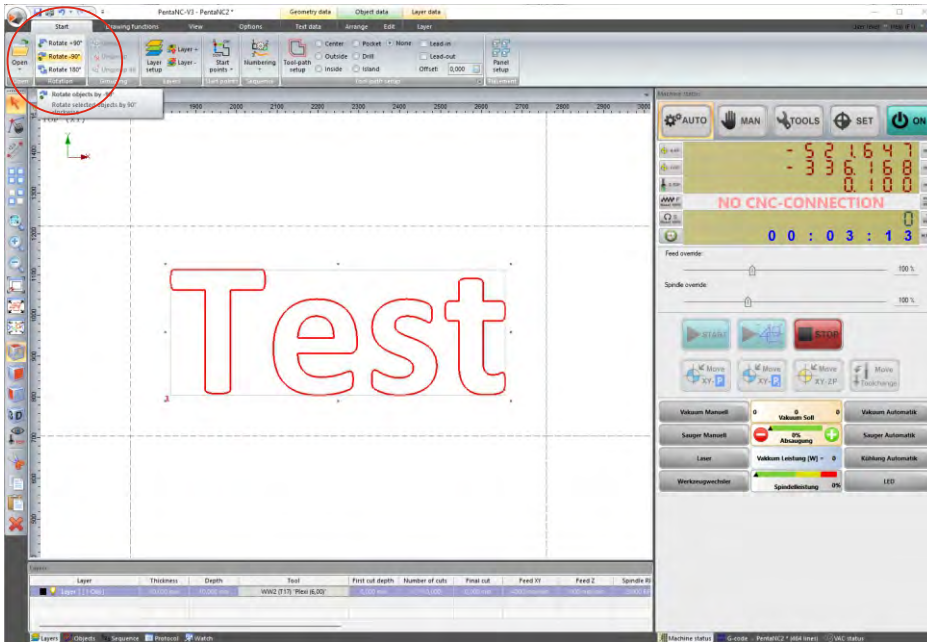
Explanations:

	Functions can be activated as desired.
	The contour assignment only works if the default setting in the material database is activated. Should always be activated!
	
	
	Only works with DXF files that are assigned line colours
	Serves to automate layers Depending on the object to be milled the smaller the object, the lower the resolution (fewer nodes) the larger the object, the higher the resolution (more nodes) resolution here in degrees



Should always be activated!

Rotation

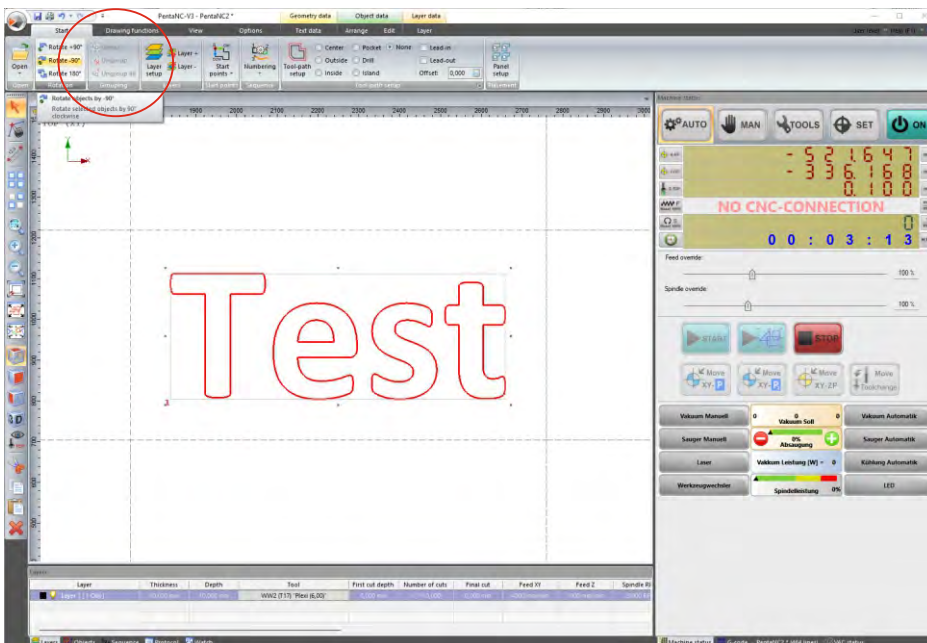


Comment

- Objects can be rotated as desired

When rotating, the object remains at the zero-point

Group

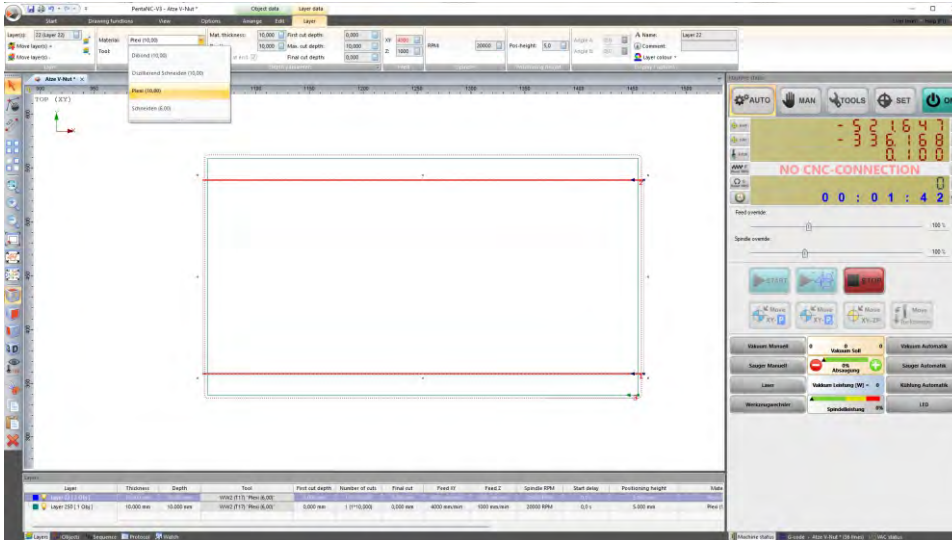


Comment

- Objects can be grouped

The different layers are needed to select different tools and milling depths!

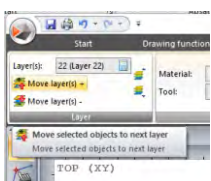
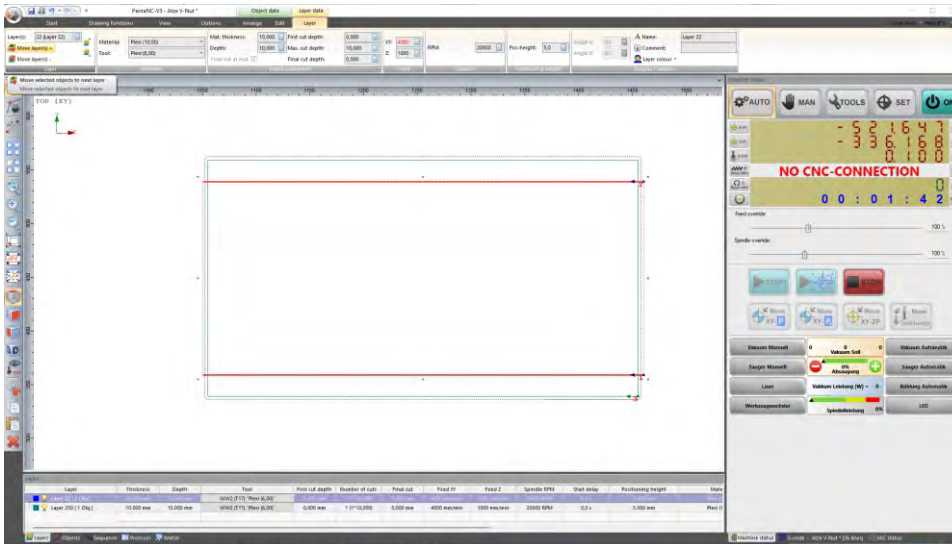
Layer definition



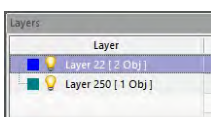
The layers can be defined more precisely (tool, material, material thickness, feed etc.) if it does not already correspond to the material database.

When you select a layer, you get to the settings (layer marked in blue).

Layer settings



By clicking on an object, it can be moved either one layer + or one layer -. Each layer can now be machined individually.



By moving the layer, you can determine which layer is milled first! (Hold the blue square with the mouse and move it)

Start point

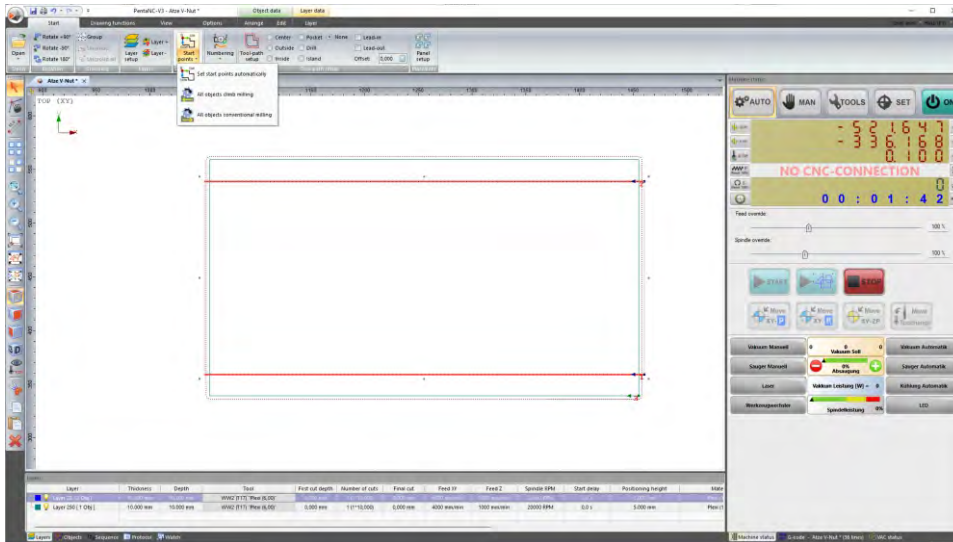
Select the milling graphic

Under Start you will find the button



Click on the small arrow at the bottom and a window opens.

Select Set start points automatically



INFO:

If you clicked on the function "Automatic start point assignment" when opening the file, the start point will already be set at the correct position when you open it.

Numbering

Select the milling graphic

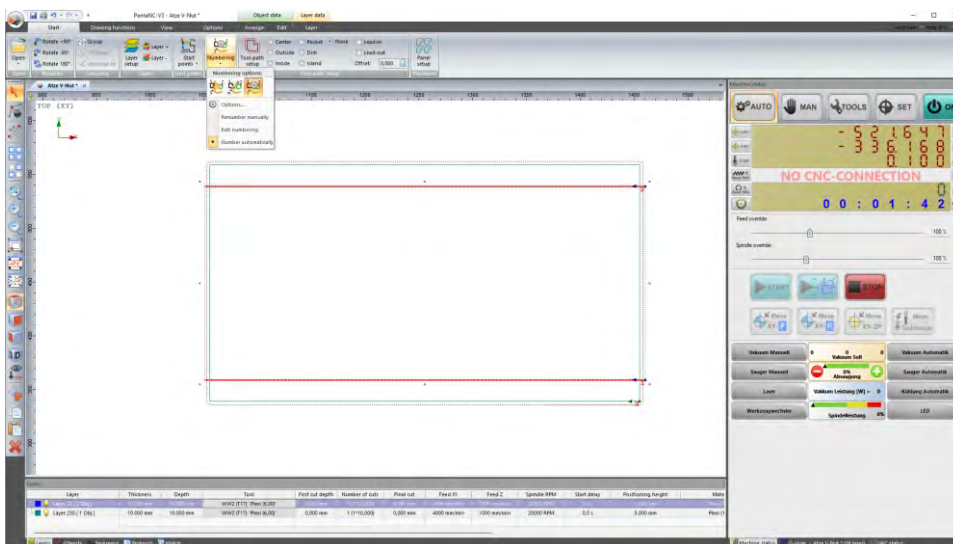
Under Start you will find the button



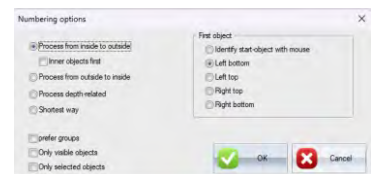
Click on the small arrow at the bottom and a window opens.

Select Number automatically

Manual numbering with the mouse (left key +/right key -)



By clicking on options, you can define the numbering more precisely



INFO:

If you clicked on the function "Automatic numbering" when opening the file, the numbering will already be calculated when opening the file.

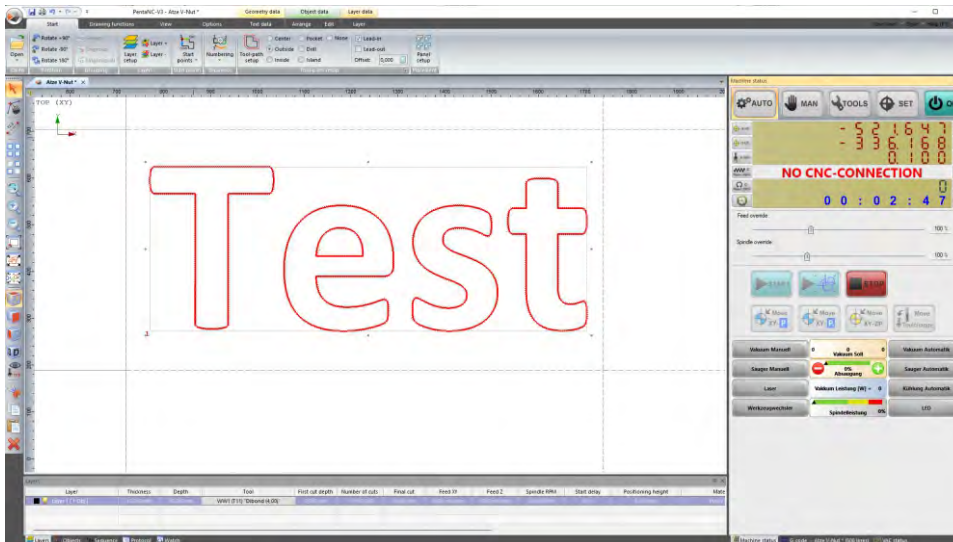
Contour definition

Select the milling graphic

Move the mouse arrow on the red milling contour and click with the right mouse button.

An additional field opens.

Select "Automatic contour assignment outside / inside".

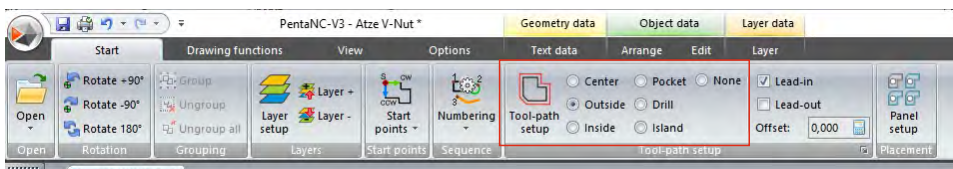


INFO:

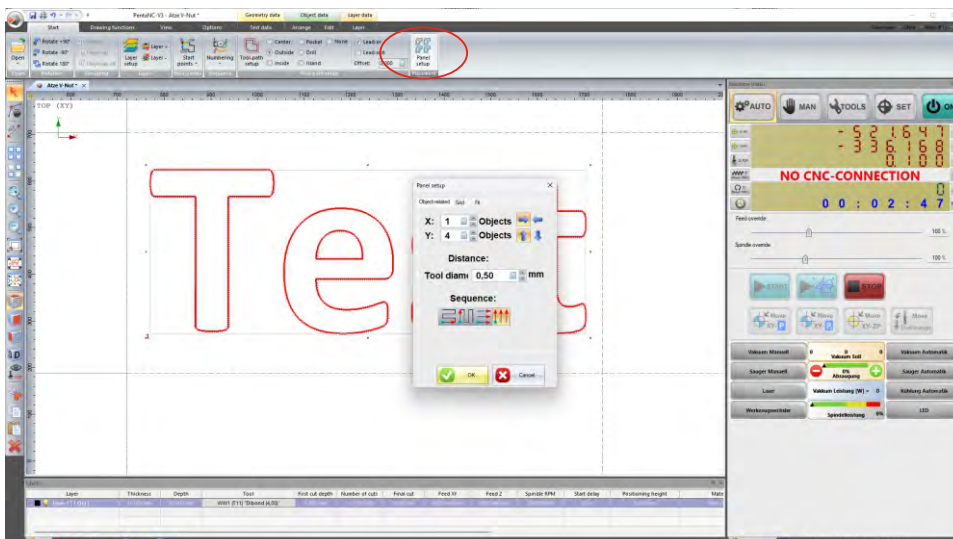
If you clicked on the function "Automatic contour assignment" when opening the file, the contour will already be calculated when opening the file.

If you select a different milling cutter after the contour calculation, the contour will be recalculated

Manual setting of the contour calculations can be found under Start.

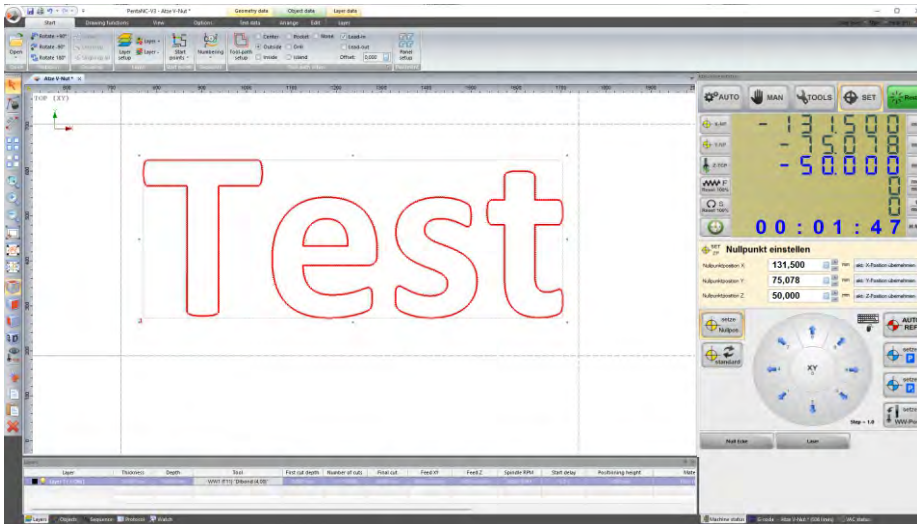


Creating a panel



- In order to duplicate objects, use the option "Create panel"
- The objects can be duplicated by manual input in X or Y direction (grid)
- The distance between the objects/duplicates can be changed with the function "Milling cutter +" (object-related).

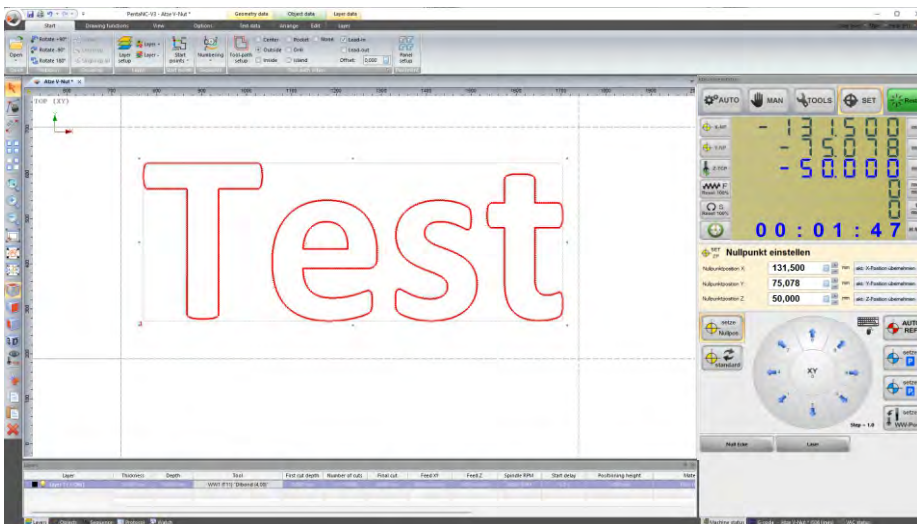
Arrange



When objects are selected they can be

- moved
abs. = Absolute from zero-point
Absolute from zero-point
Note: (set reference point)
Rel. = Relative around the component then move or copy
- moved or copied to another layer
- scaled, enter dimension and press scale
Note: (Set reference point)
- rotated
- aligned
Note: At least 2 objects must be selected here

Editing functions



Editing functions

- Cut, Copy, Delete, Paste
- Grouping
- Reduce object points
- Milling sequence
- Boolean functions



-If nothing is activated here, the fields can be activated manually.

-Automatically activate fields only the fields where milling takes place are activated

-Deactivate fields automatically

Where the machine is finished, the fields are switched off. This keeps the vacuum at a high level.



Division for serial parts

When the division is activated, it can be set as desired depending on the table.

The start buttons on the machine are then active. (front and rear in the frame)

When the start button is pressed at the front, the software marks all parts in the front area and mills there.

The vacuum at the back is then off, so that the components can already be removed here.

When the start button at the back is pressed, the machine mills at the back and the components in the front area can be removed.

The vacuum then switches back and forth automatically

Simple milling task with one layer

Export files

In a graphics programme of your choice, draw your milling object and export it as **DXF in 1:1**.

Mill file

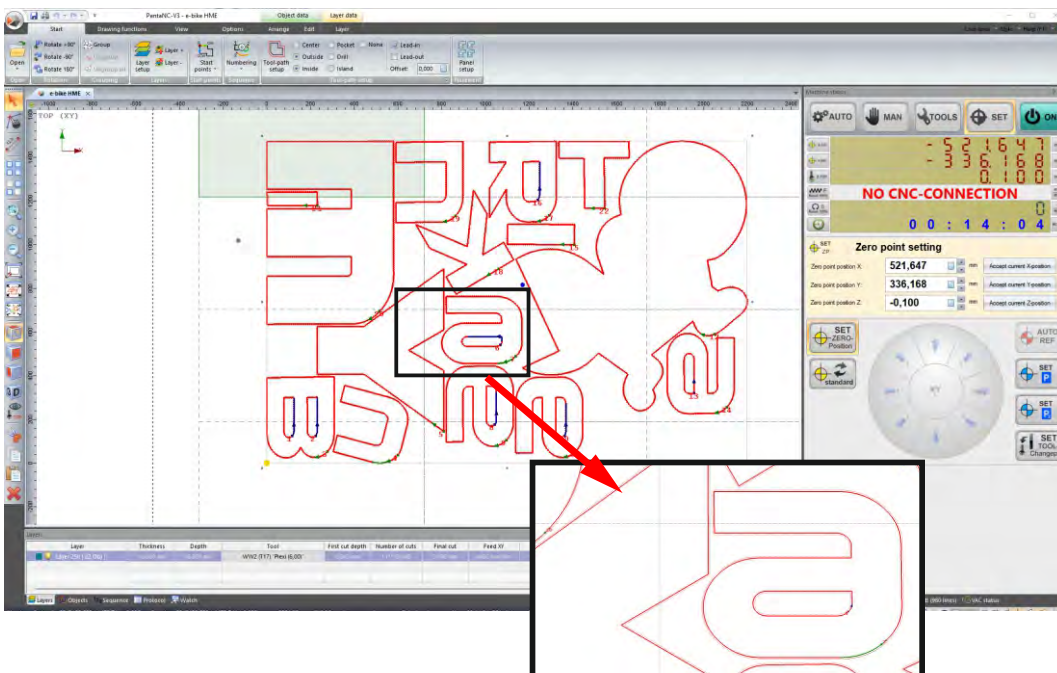
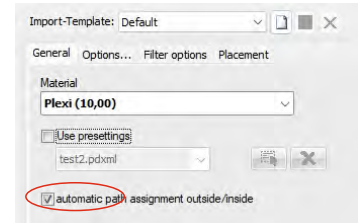
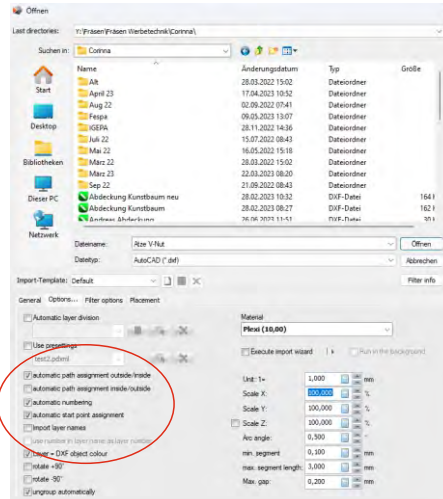
Open your file in PentaTec with:

- automatic contour assignment
- automatic numbering
- automatic start point assignment

All points once selected remain the same when opened the next time

IMPORTANT!

"Place in zero-point" should always be activated!



Automatic calculation

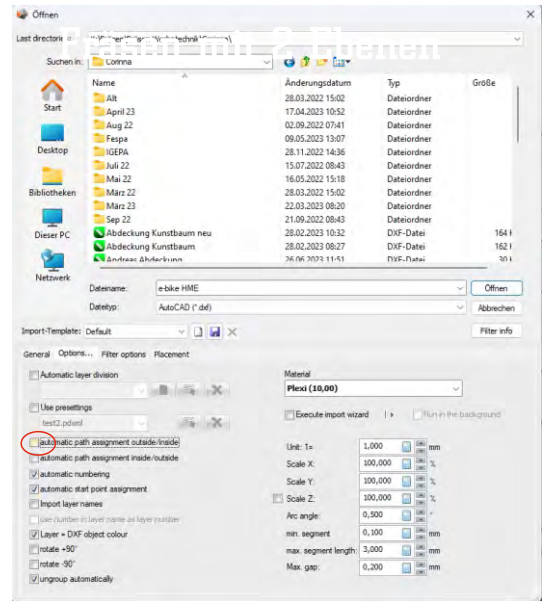
Contours and machining from inside to outside are calculated, and the starting point is at the bottom right. (important because otherwise the parts can come loose on the vacuum)

Move to zero-point (if not already set) and start milling

Milling with two layers

1.

Open your file **without** "automatic contour assignment" but with "place in zero-point".

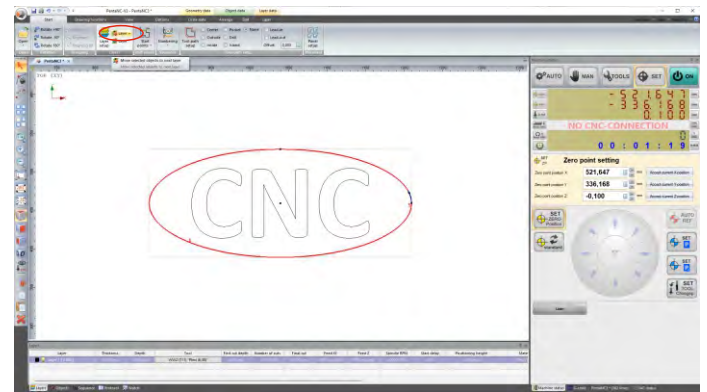
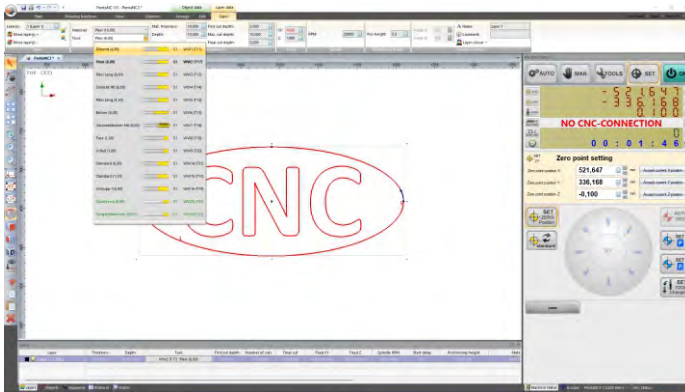


2.

Select the material and the milling cutter.

3.

Select the outer contour and move the graphic to a new layer.



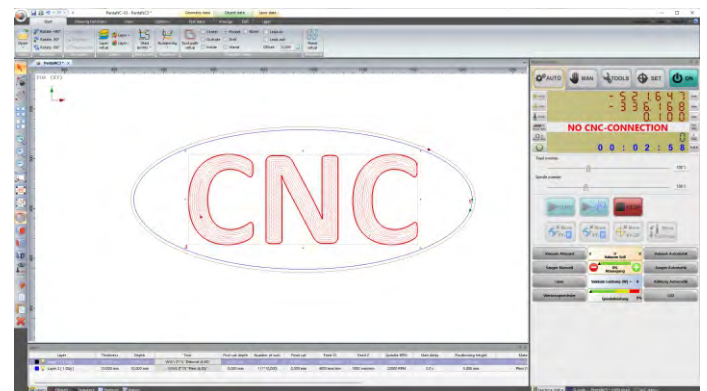
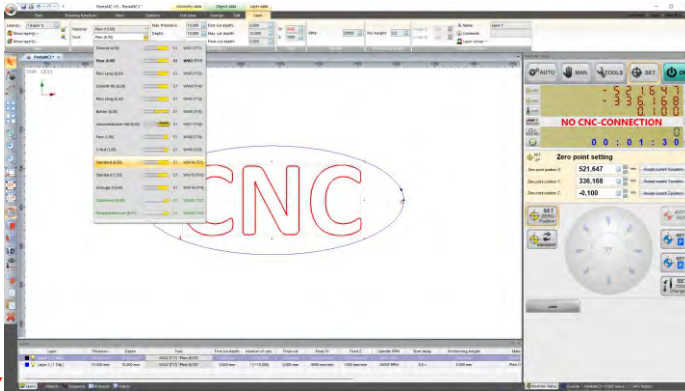
4.

Edit the 2nd layer
(material / tool / milling depth)

Mat. thickness:	10,000	First cut depth:	0,000
Depth:	10,000	Max. cut depth:	10,000
Final cut at end:	<input checked="" type="checkbox"/>	Final cut depth:	0,000

5.

Contour calculation
Oval = outer contour / CNC= broaching



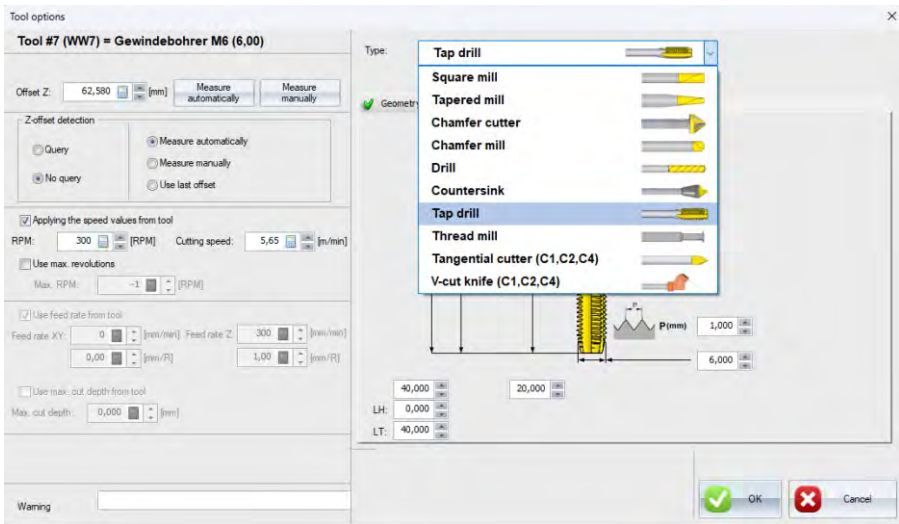
By moving the layer, the work sequence can be determined.

Move to zero-point and start milling

Advanced functions

Screw tap	page 20
Bevel cutter	page 21
Layer preset	page 22 + 23
Right mouse button on component	page 24
Machining direction	page 25
Set bridges page	page 26
Check contour page	page 27
Bevels page	page 28
Residual material machining	page 29
Move layer	page 30
Register marks	page 31
Pointing out	page 32
Table height correction	page 33 + 34
Levelling height correction	page 35
Application levelling	page 36
Drawing functions	page 37
Teach-IN	page 38

Via machine status   you access this menu (tool management).

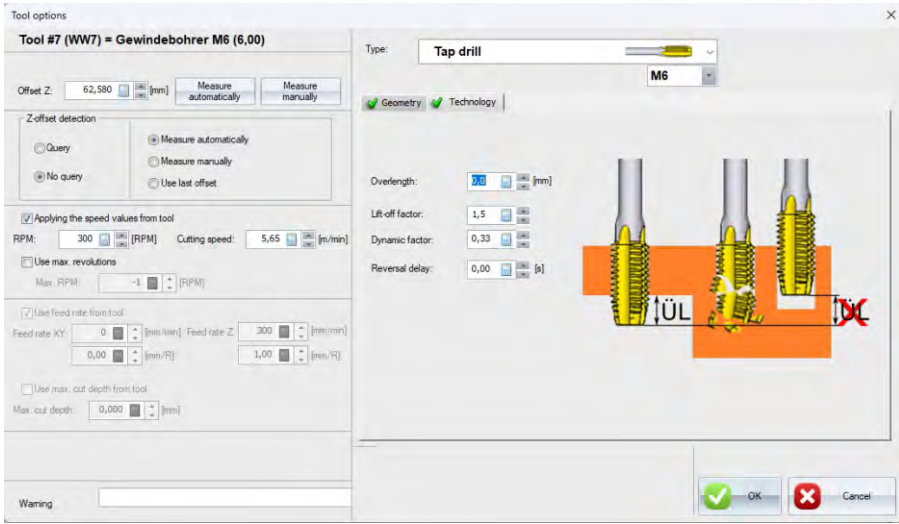


Select the type in the tool options.



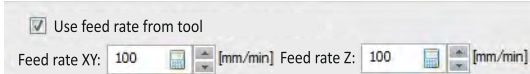
Enter geometry

- 1.Length of thread
- 2.Length of tool

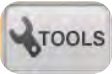


Enter technology

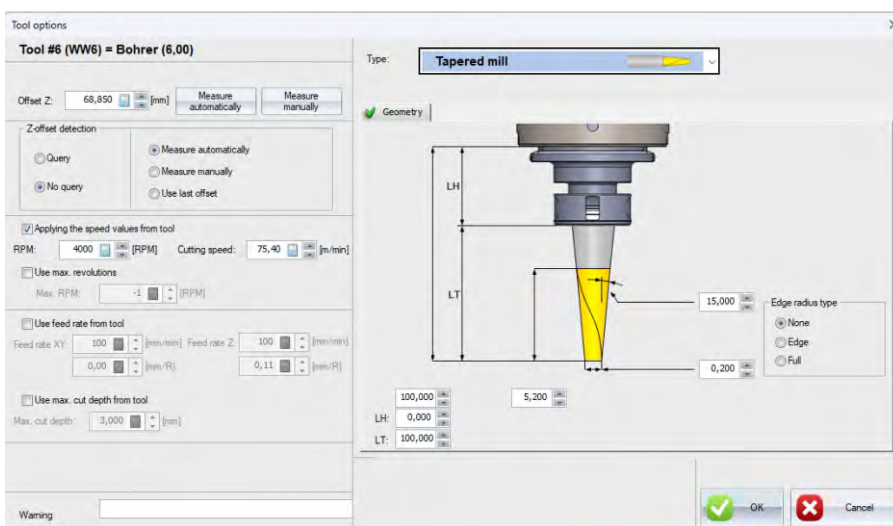
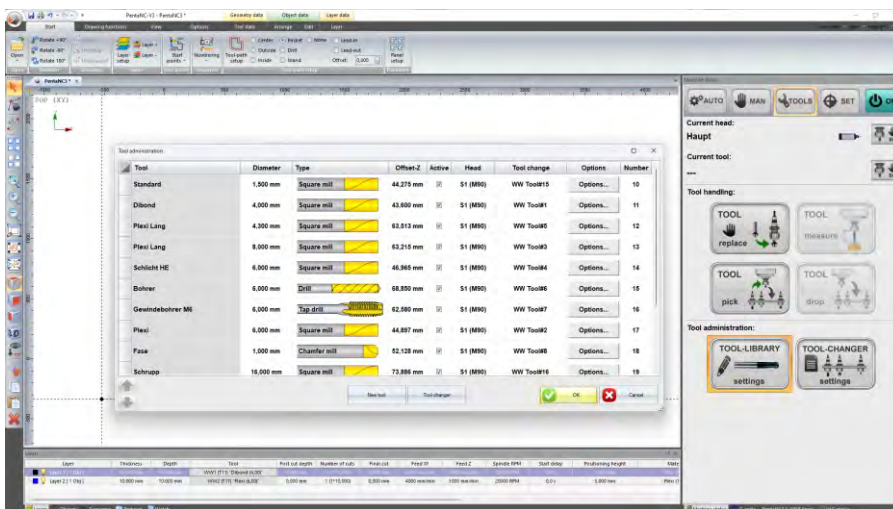
1. Incline
2. Extension factor (speed during extension)
3. Reversing delay (must be set to 0)



Feed values **can** be predefined here.

Via machine status   you access this menu (tool management).

Select the new tool.
Example: Bevel cutter

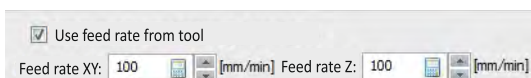


Select the type in the tool options.



Enter geometry:

1. Diameter
2. Length Thread
3. Tool length



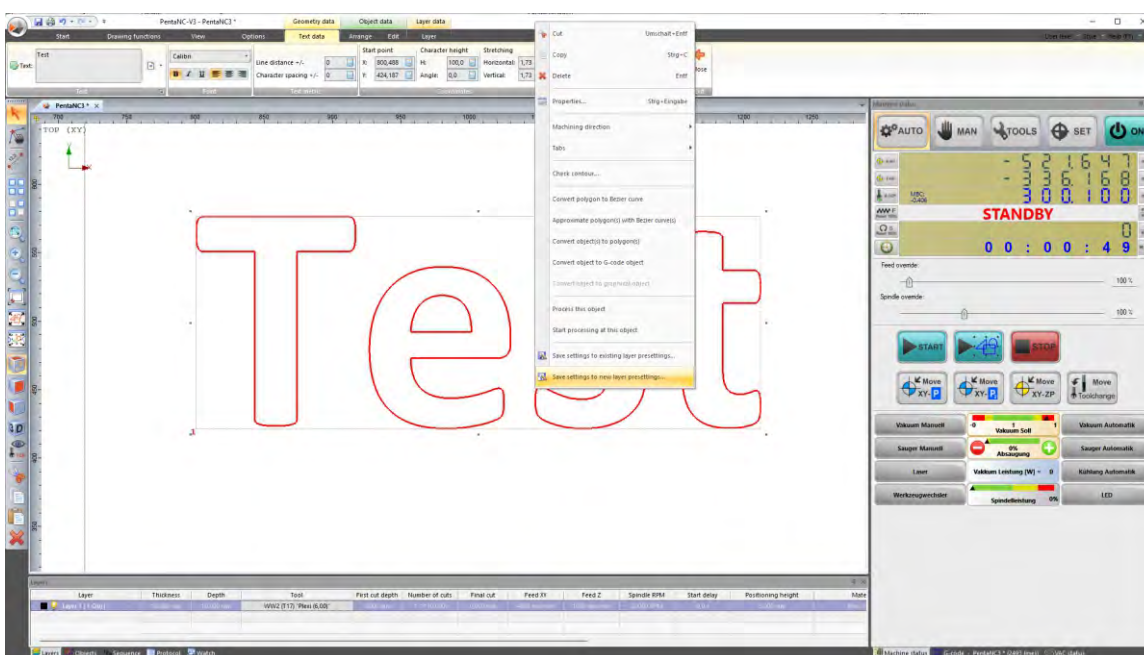
Feed values can be predefined here.

Layer preset (automate layers)

Example: : Different engraving plates are to be milled. Each time they are opened, the layers must be redefined and set. By saving a preset, these steps can be automated.

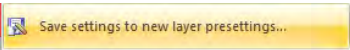
IMPORTANT: The layers must always be created in the same way in the graphics program as layers or line colours and must also be exported.

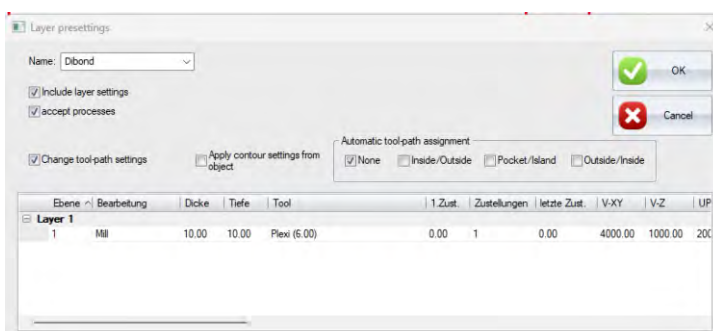
Otherwise, the preset will NOT work!



Define all necessary settings in the layers and contours.

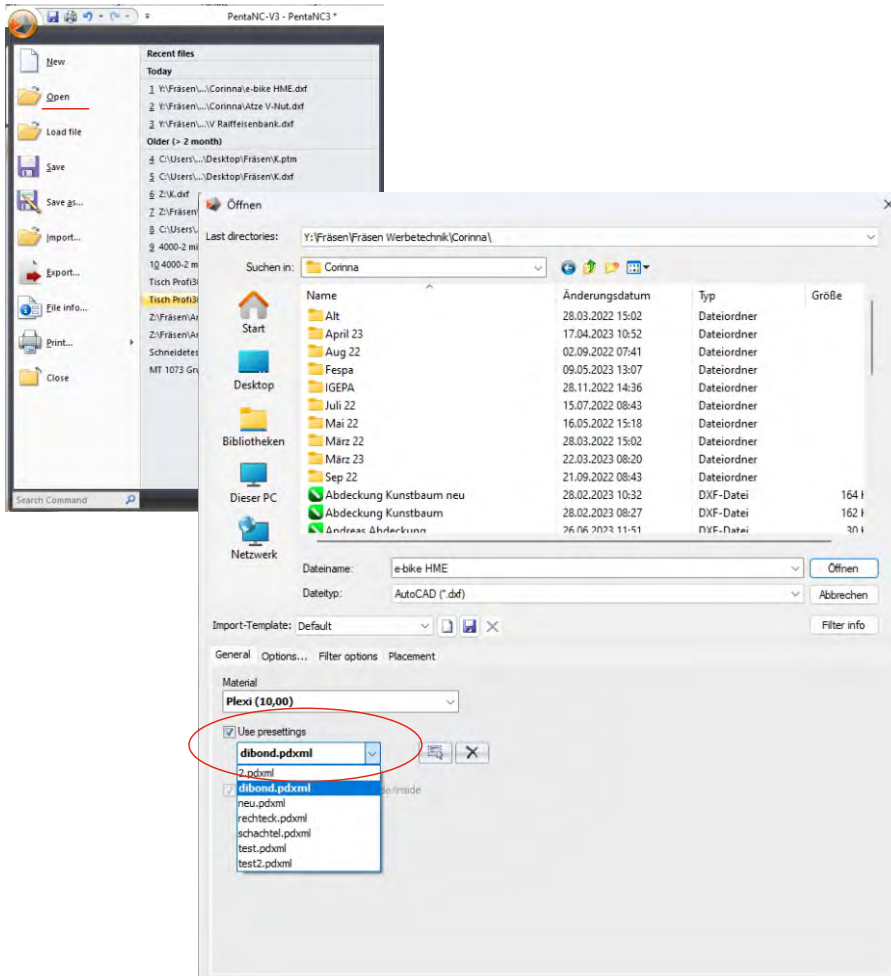
1. Click on each layer with the right mouse button on the part contour. Click on register marks in the layer settings.

2. "Save settings in a new layer preset" 



3. Assign a name, set the option and confirm with OK.

Opening a file with layer preset



Select the preset when opening a file.

INFO: Layer = DXF object colour

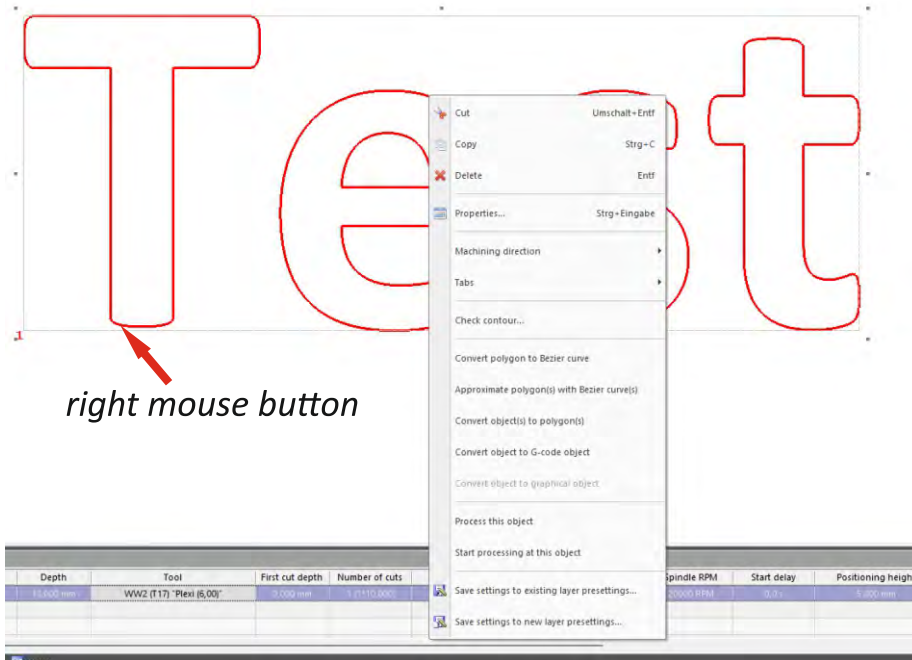
You can also create your export data with different line colours and the milling software can adopt these as well. .

IMPORTANT!

Remove the tick again after the milling work.

Options with right mouse button

Some functions are stored here, e.g.



- Cut
- Copy
- Delete

- Properties

- Machining direction (see next page)

- Set bridges (described below)

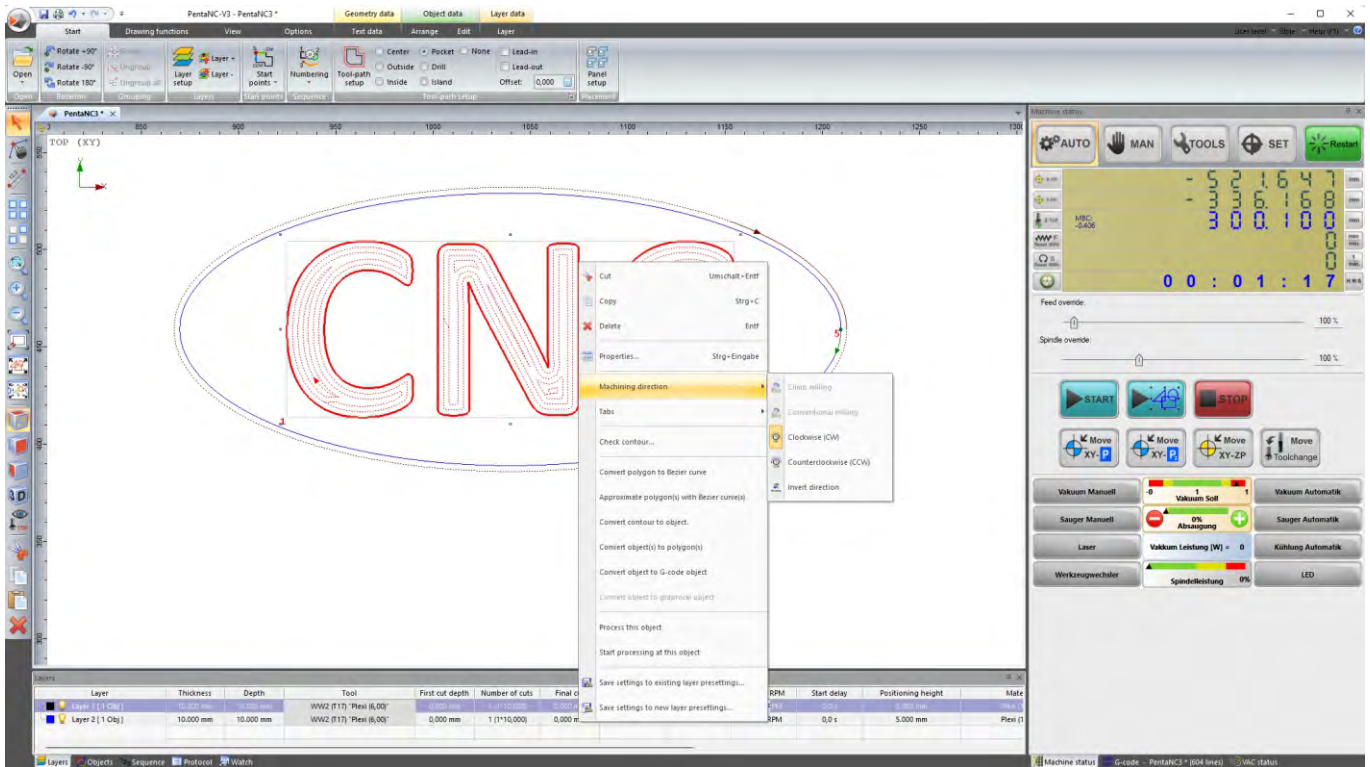
- Check contour (described below)

- Convert

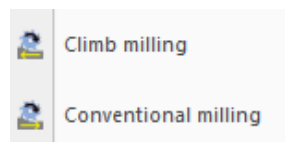
- Milling options
 1. Machine this object only
 2. Start from this object
This makes sense if, for example, the milling cutter broke off.

- Save settings in the layers (was described before)

To change the machining direction (milling direction), select the layer and click with the right mouse button



Select "climb milling or up-cut milling".



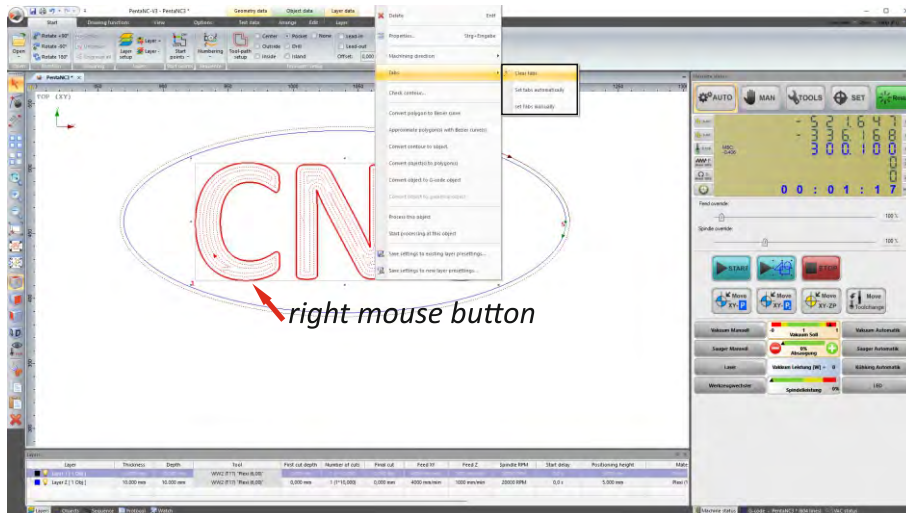
INFO:

If the edge of the component looks worse than that of the waste, the milling direction is wrong!

Experience:

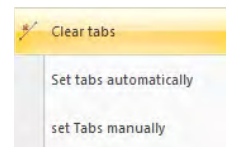
- Soft materials such as forex, foam, PP etc. = up-cut milling
- Hard materials such as Plexi, aluminium etc. = climb milling

Create or delete tabs



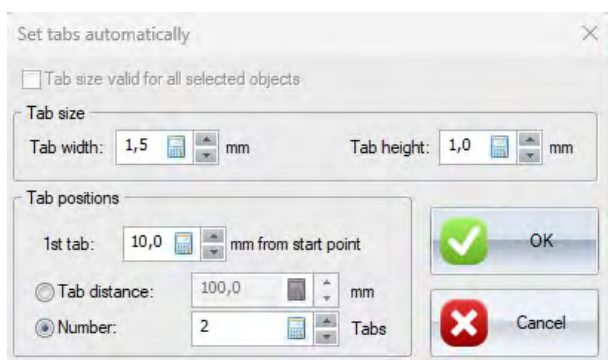
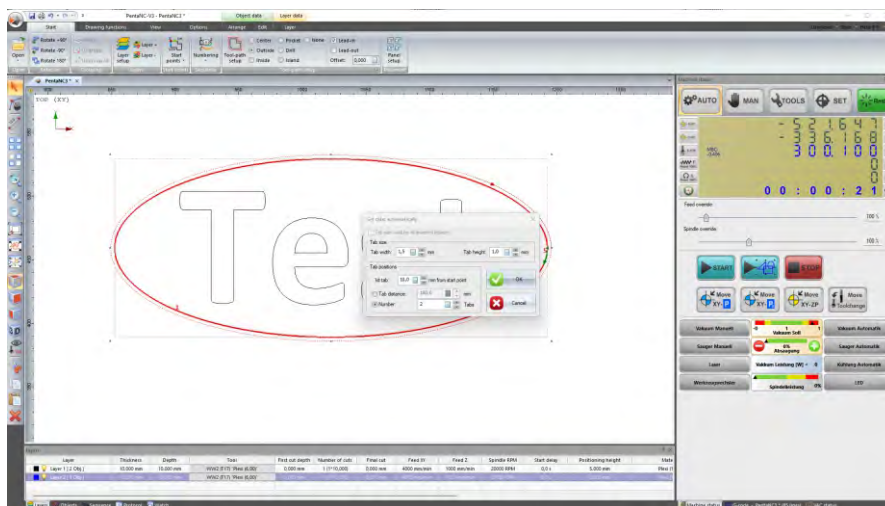
Right-click on the edge of the component. The menu opens, here on, "Tabs"

- Here you can select
- Clear tabs
 - Set tabs automatically
 - Set tabs manually

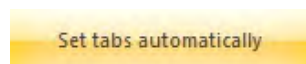


Note: Set bridges manually via point editing.

Set tabs automatically

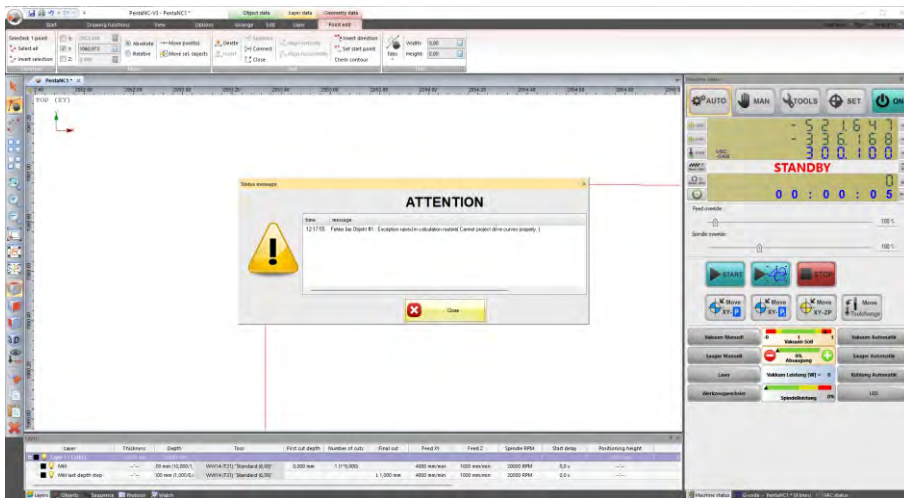


Select

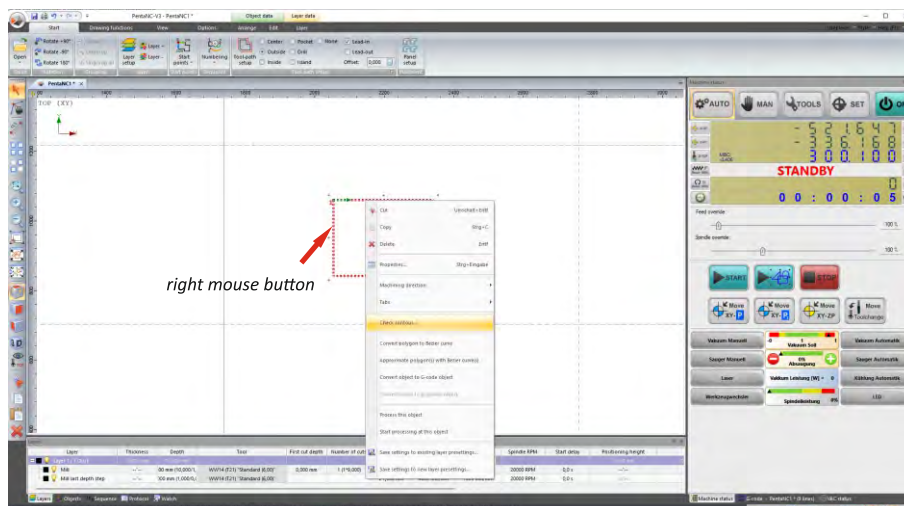


Enter the tabs width and tabs height and confirm with OK:

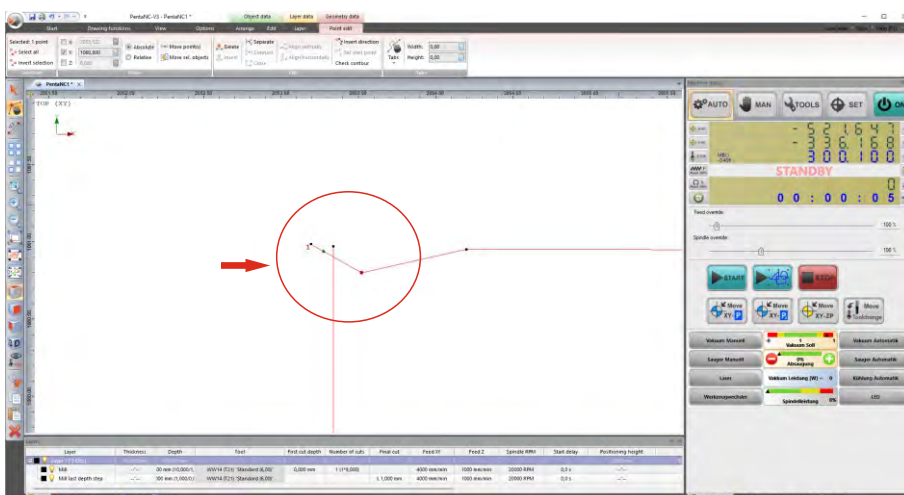
Check contour



If you receive this message, there is an error in the contour.

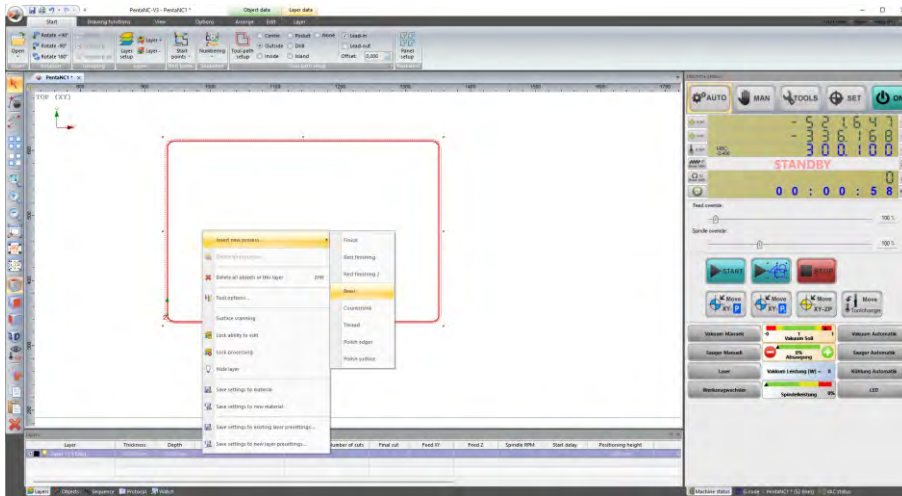


“Right-click” on the component edge and the menu appears, then click "Check contour".



The error is in the middle of the red marked lines, here is an overlap, you can remove this in the editing options.
Then recalculate the contour

Options Bevels

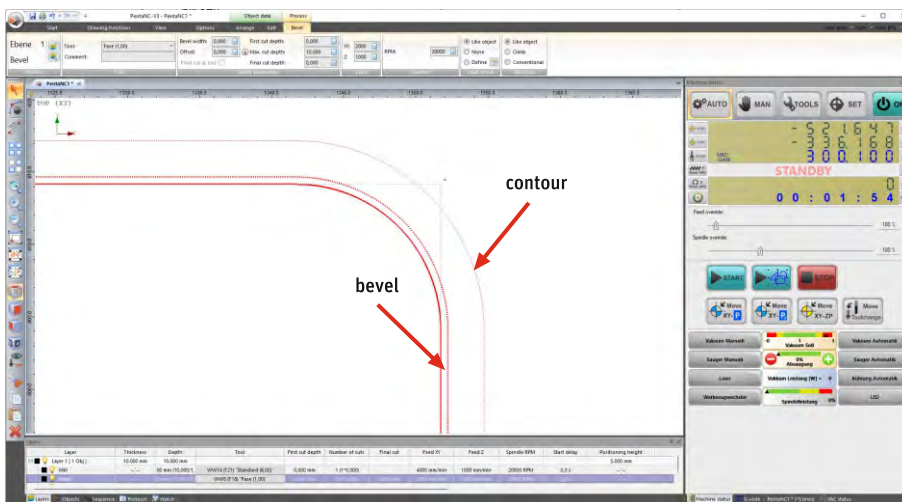
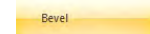


1. Click on the layer with the **right mouse button**

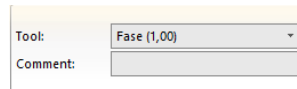
2. Insert new machining



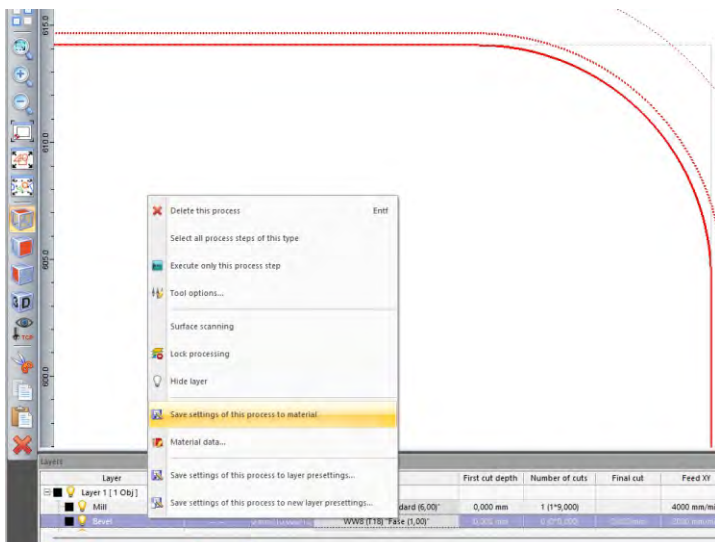
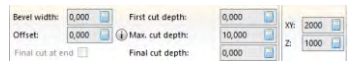
3. Bevel



4. Select tool



5. Set parameters (depth, infeed, feed)



INFO:

The parameter settings can be stored in the material database.

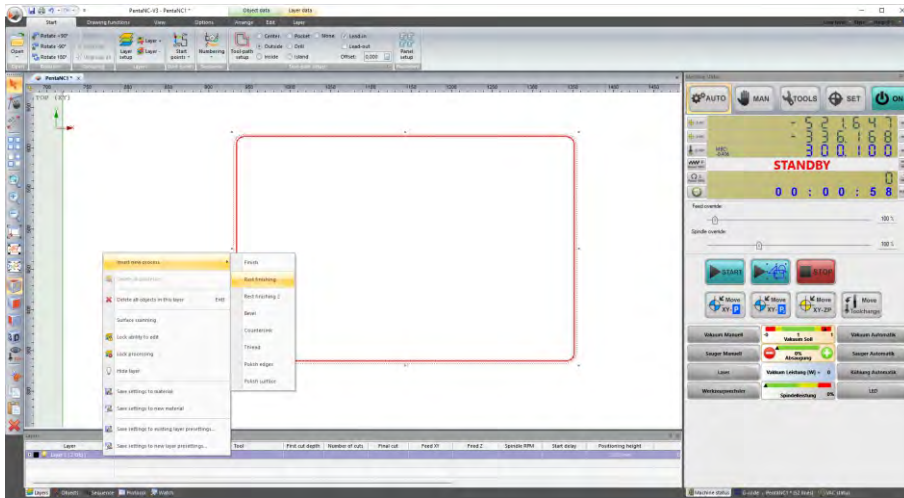
They are automatically adopted for the next projects.

Click with the **right mouse button** on the respective layer and select: **Save settings of this operation in material**

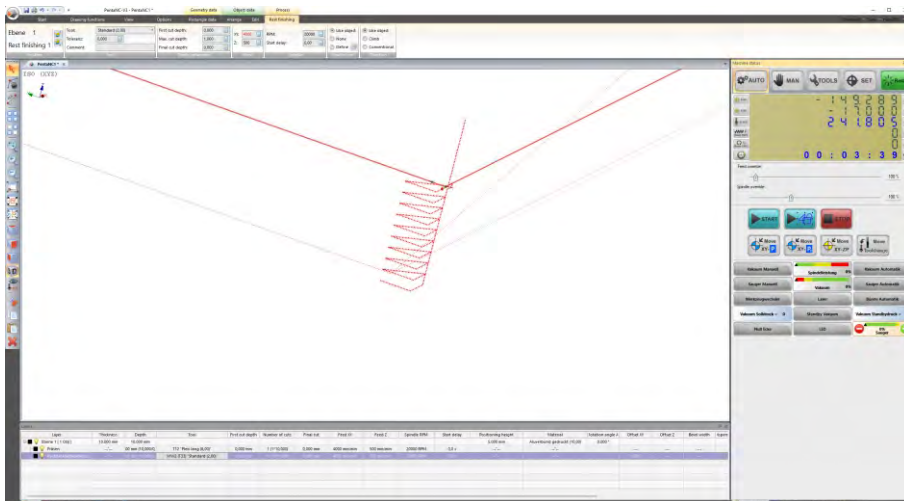
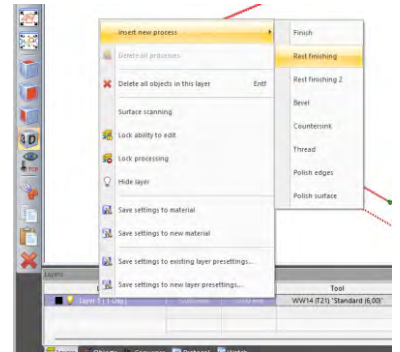
If they are to be changed, the file can be overwritten.

The machining options are taken over into the material database and can also be deleted or edited there.

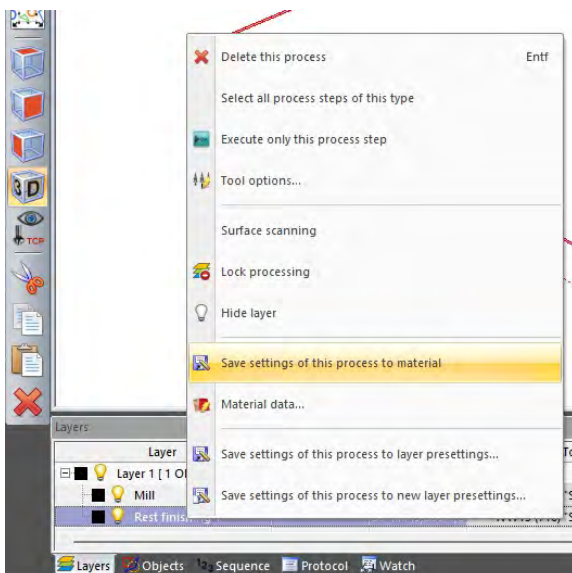
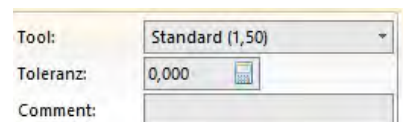
Options Residual Material Machining



1. Click on the layer with the **right mouse button**
2. Insert new machining
3. Residual material machining



4. Select tool



INFO:

The parameter settings can be stored in the material database.

They are automatically adopted for the next projects.

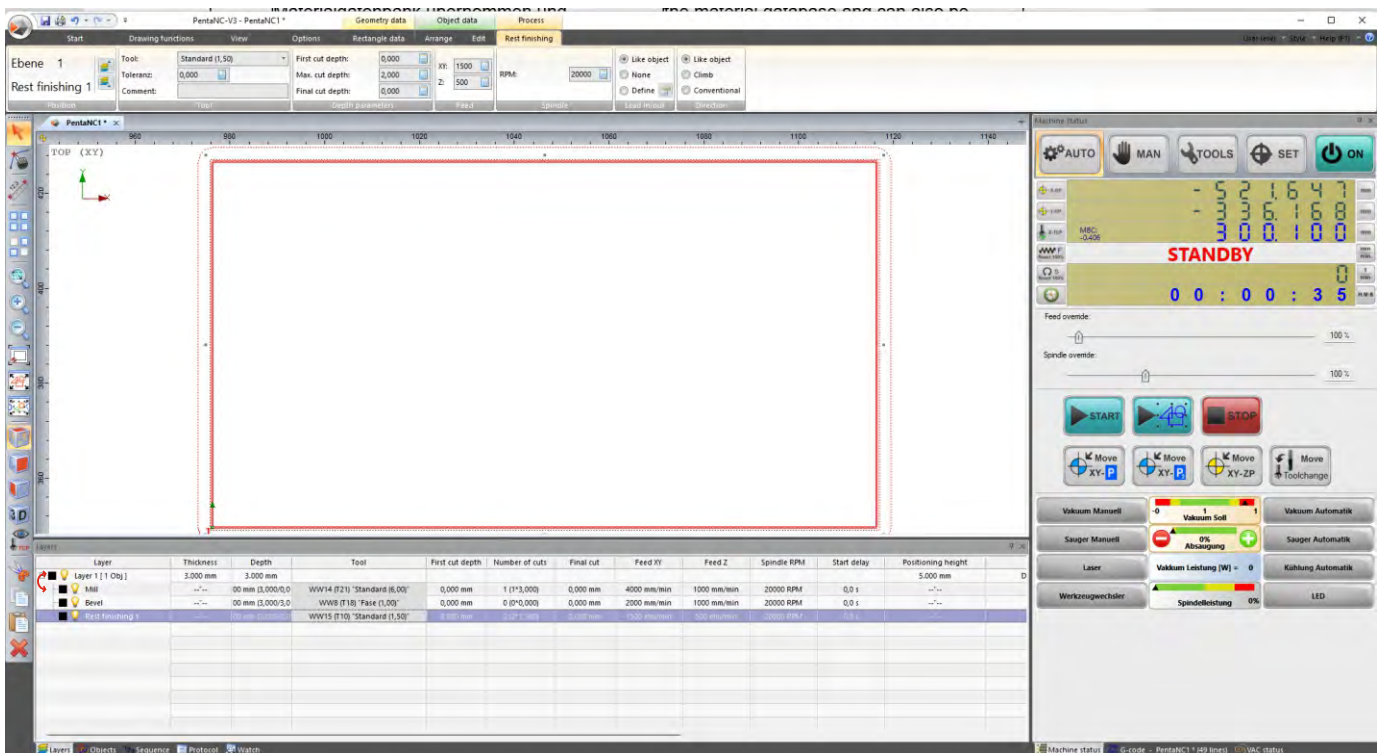
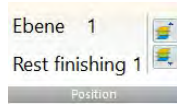
Click with the **right mouse button** on the respective layer and select: **Save settings of this machining in material**

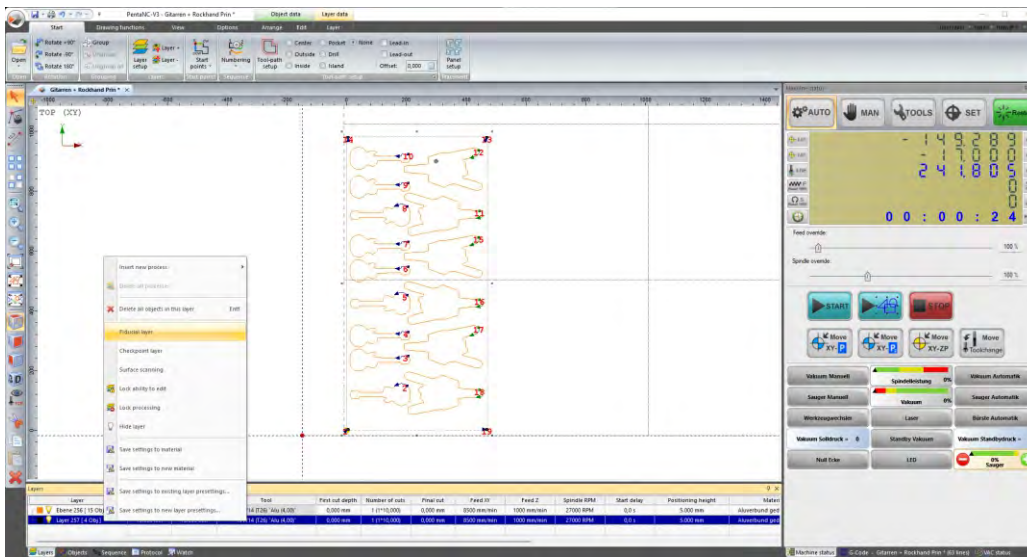
If they are to be changed, the file can be overwritten.

The editing options are taken over into the material database and can be also be deleted or edited there

The layers of the additional machining options (bevel / residual material etc.) cannot simply be moved as usual.

They can only be rearranged via the **Rest finishing 1** button.





Click the layer of the register mark with the **right mouse button** and select **Fiducial layer** from the list.

You can set as many register marks as you like, inside or outside the object. These should consist of one or two objects.

Note:

After register marks have been selected, click "Automatically number" again. This does not have to be done if the register marks come from the "Layer preset".

The register marks could look like this. Please pay attention to the size.

12 x 12 mm



5 x 5 mm



5 x 5 mm

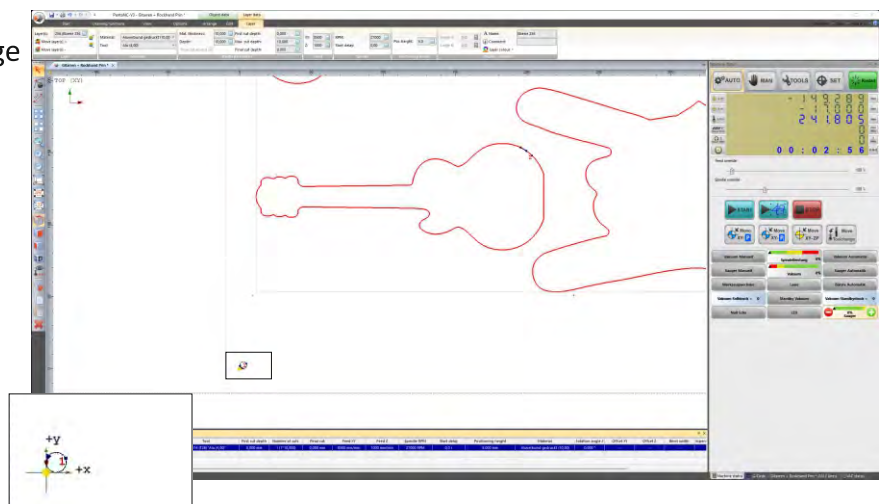


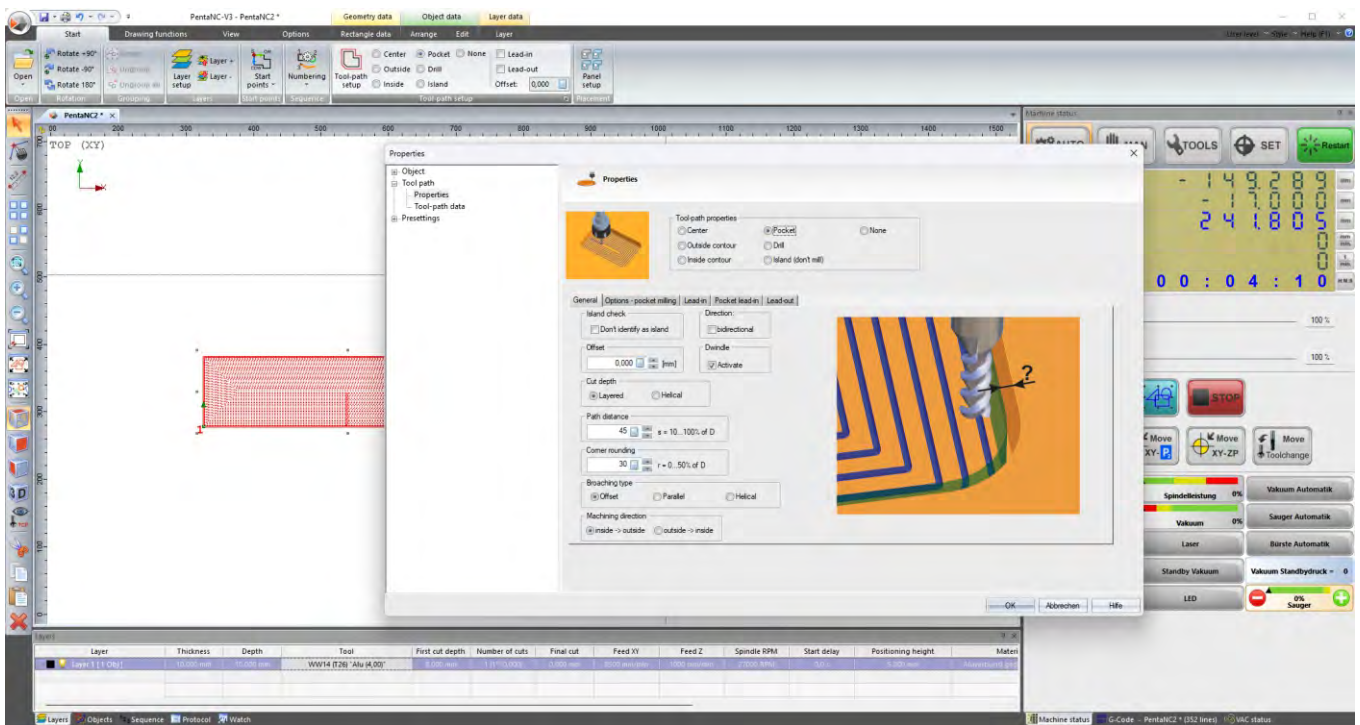
INFO:

If the first register mark is not in the range of the zero-point, move the zero-point or mark everything with Ctrl + a and move the register mark exactly to the cross of the zero-point.

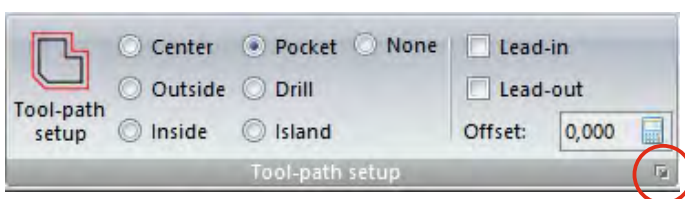
INFO move:

Hold down the shift key, hold the component with the mouse and move it.

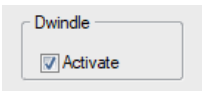





1. Pointing out with a **bevel cutter**
2. Clearing the contour definition
3. Click on the small tick



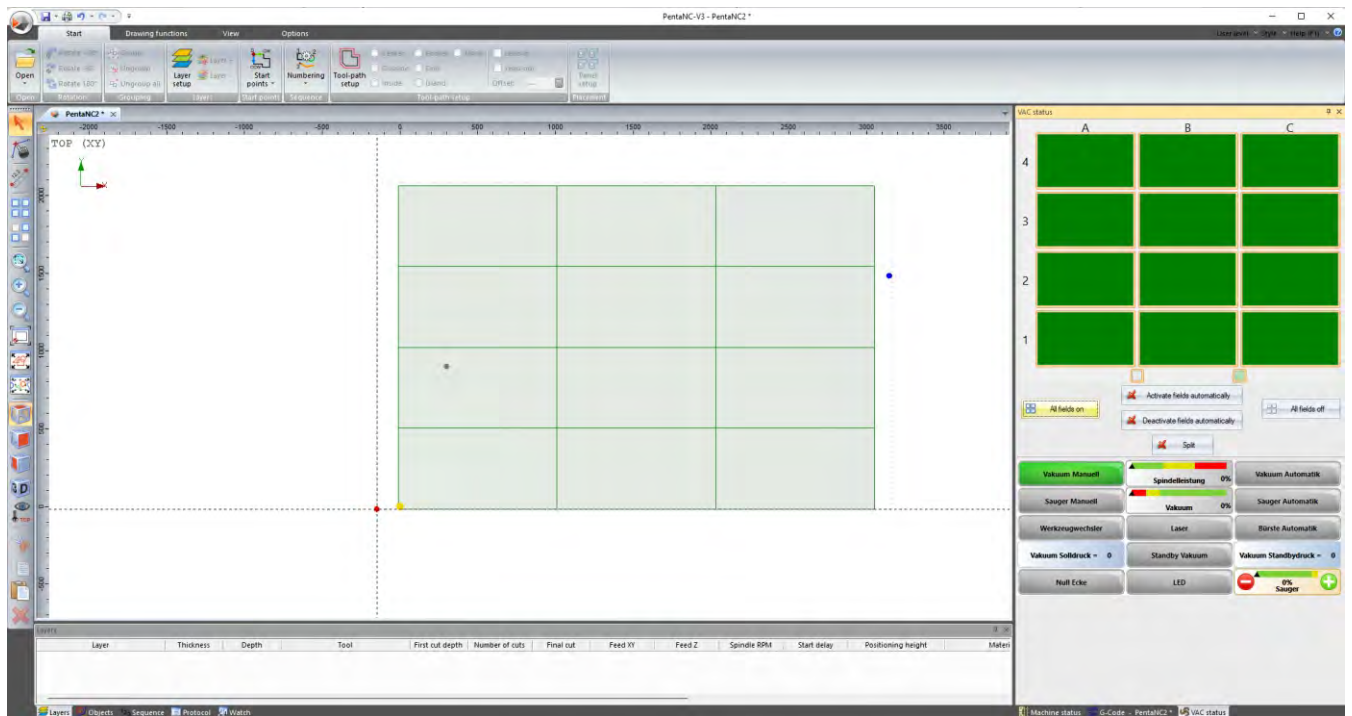
4. Properties field opens

"Pointing out"  must be activated in the properties

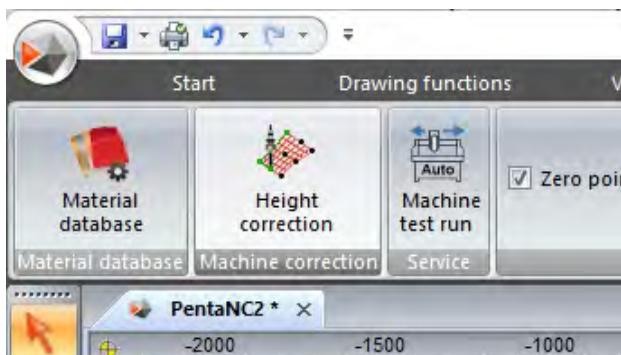
In addition, you can set the path distance and the corner rounding here.

Set the vacuum  and open all ball valves

(for automatic vacuum fields activate ).



Click on the button "Height correction" via options.



An additional window opens. (See next page)

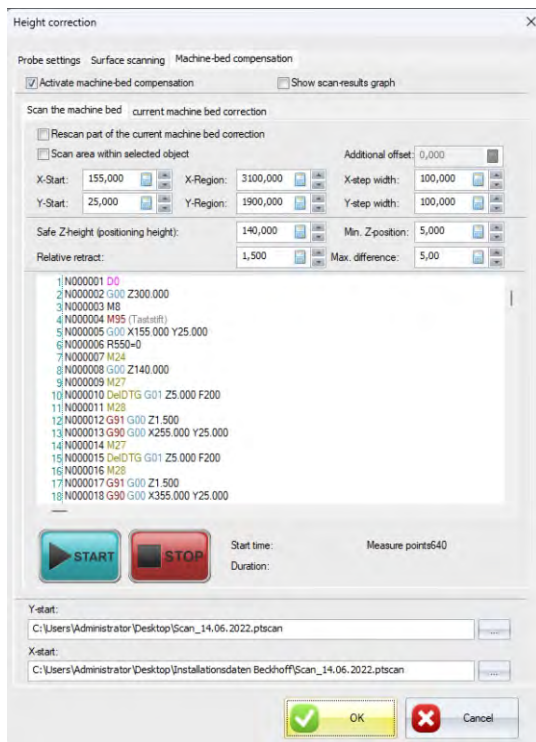


Table height correction

Here the starting point (normally already set up by the manufacturer) and the X- and Y- range of the worktop can be set.

A safe Z-height

The machine moves quickly to this point and makes the measuring travel (150mm) slowly.

The step size should be 100 mm.

After entering the values, confirm with OK. Otherwise, these values will not be accepted.

Procedure without automatic measuring probe

1. Clamp the measuring probe into the spindle and insert the plug into the socket (at the top of the Z-axis, rear side).
2. Check the above settings (they are normally set).
3. Switch on vacuum all areas
4. Start height correction

Machine must move over the whole table, when finished confirm with OK.

Procedure for machine with automatic probe

1. Check the above settings (are normally set)
2. Switch on vacuum all areas
3. Start height correction

Machine must move down the entire table, when finished confirm with OK.

Setting digital levelling, only for Profi series

Only for machines with the height levelling option.

When using the MDF board "Sacrificial board" for the first time, or if it has a different height, the correction value must be determined again once.

Click on the button "Height correction" via **Options**:



The table must be free to determine the "surface scanning".

Enter the parameters and start with OK.

The machine moves to the standard zero-point and scans the MDF board with the measuring probe. Done :-)

Remark

- Additional offset = offset to the tracer pin e.g., if you want to probe edges you could set minus 5mm there
- X and Y step size = scanning raster
- Safe height - until then the machine moves at pos. speed
- Relative retraction = from the last measuring point the machine retracts by this value.
- Maximum deviation

Example of use:

A Plexiglas is to be engraved.

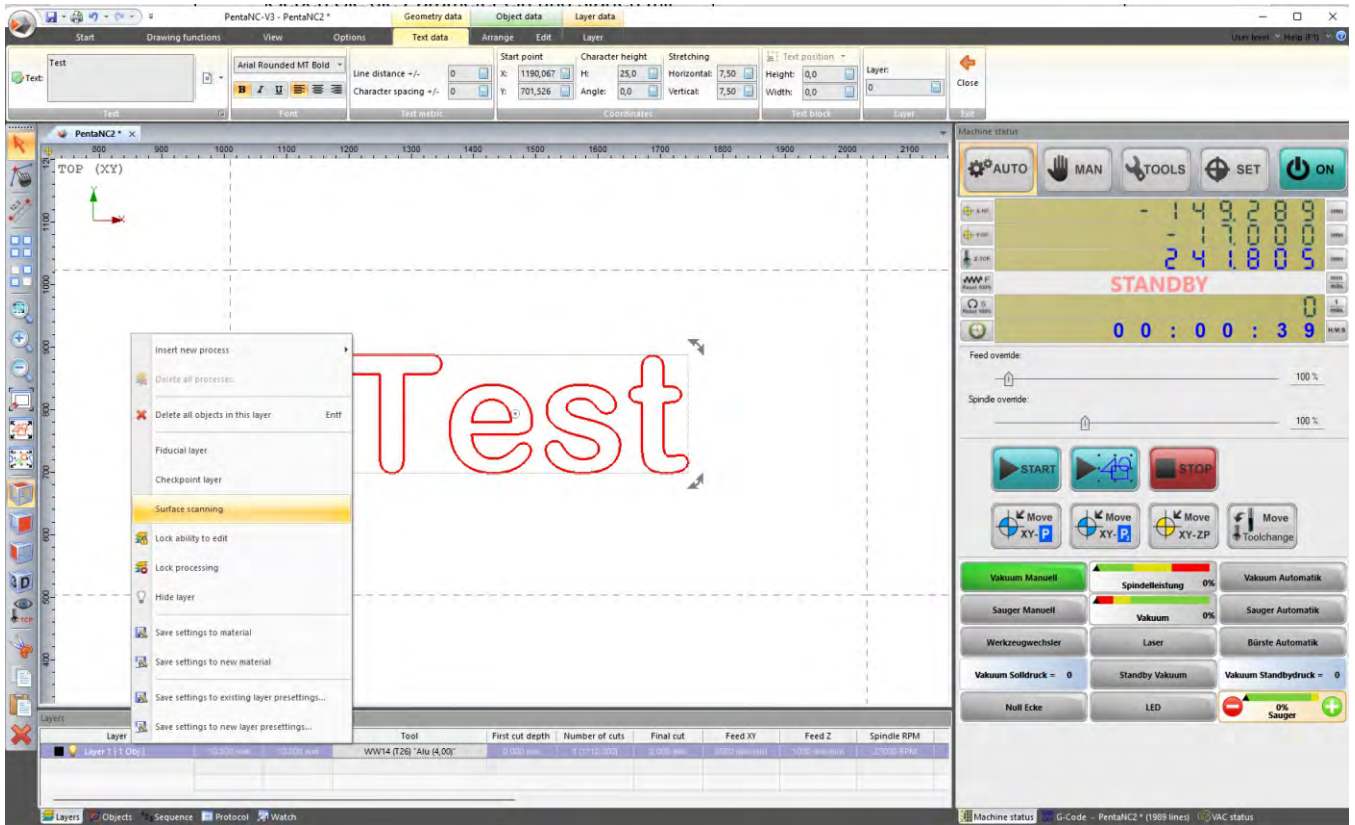
However, the surface of the Plexiglas is uneven.

The digital levelling takes this unevenness into account.

At the start, first the surface is scanned and then milled.

The engraving is levelled.

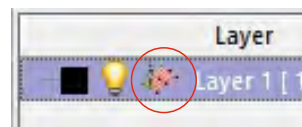
How to apply levelling



Right-click on the layer to be levelled.

Select **Surface scanning** from the menu.

The height correction symbol appears in the layer.



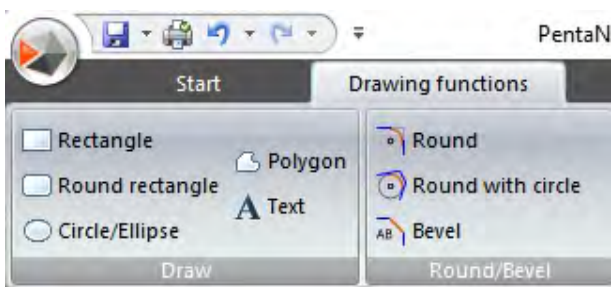
INFO:

When started, the tracer pin moves along the area of the layer.
If you stop the machine with "Stop" and take an intermediate measurement with correction, you can press "Start" with the right mouse button and start with existing levelling data.
The machine then starts again without levelling again!

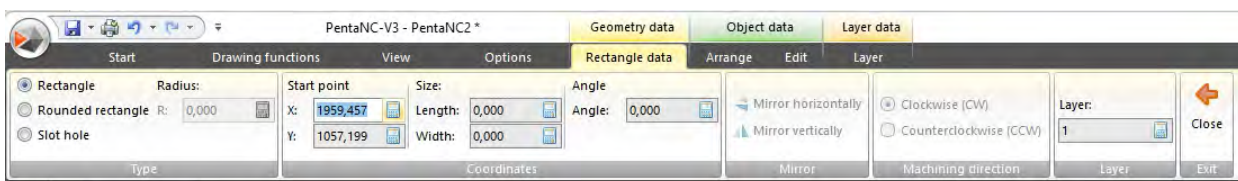
Drawing functions



You will find the drawing function at the top of the menu

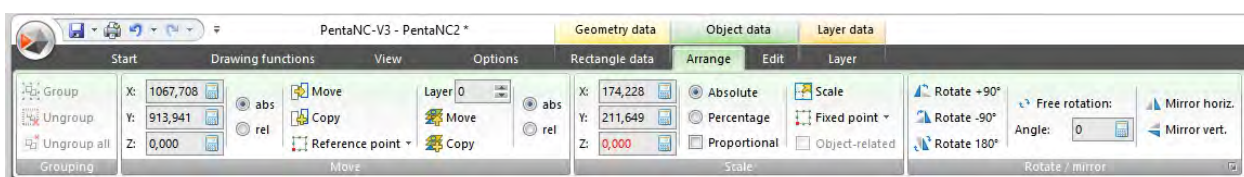


If you want to draw a rectangle, an option window opens where you can enter the values



If you want to change the size afterwards, click on Arrange in the menu at the top.

Change your XY values and click on Scale
(if you want to change the proportion, uncheck it).

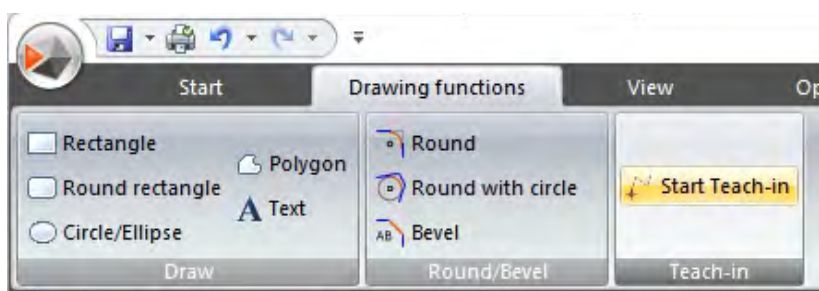


Example of use:

Existing plates that are damaged must be produced again.

With the teach-in function, the existing plate can be read in manually to maintain the shape.

Click on the button "Start Teach-IN" in the menu above **drawing functions**.



1. To start the read-in, move to the first point with the remote control or the keyboard and click on "start new polygon" in the options window



2. Move to the next point and confirm by pressing and holding the SET X NP button on the remote control (until it flashes quickly).
You can click the "New point" button and then set the other points in the same way.

INFO:

The data can be exported as DXF for further processing

