

Hylewicz CNC-Technik

Laser-engraving unit Operation description

www.cnc-step.de



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Pictures and graphics
Laser-engraving unit
Operation description



Short description

The case contains the complete electronics to place the laser module in service, as well as the complete laser engraving device, including appropriate high-quality safety glasses, which are necessary to use our laser engraving device. A High-Z portal machine with computer and appropriate CAM/CNC-control-software (WinPC NC, ConstruCам-3D, etc.) is necessary to put the machine into service. This manual describes the installation, start-up and service of our laser engraving device.

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1 General

The engraving device was designed on the basis of the strict observance of standard regulations and guidelines and has been tested insensitively and carefully. However, we provide no guarantee of fault-free operation. The manufacturer ensures that the engraving device in connection with the most suitable mechanical components, used within the meaning of the description and user manual are suitable for their designated use. The possibility is excluded of any liability whatsoever being assumed for damages, claims or costs, indirect and direct consequential damage or other damage, from lost profit, operational disruptions and stoppages, loss of business information and so on. The engraving device is an application, which only works in conjunction with a portal unit and appropriate software. It is no self-contained machine or handheld device. In view of the fact that, despite intensive endeavours, errors can never be completely avoided, we are thankful at all times for tips and suggestions for improvement.

1.1 Description of symbols



HINT: Special instructions relating to the effective use of the equipment



ATTENTION!: General and additional information or instructions and prohibitions for avoiding damage.



Instructions or restrictions designed for the protection of personnel and safety of the device



Not to be used by persons with pacemakers

This sign stands for activities involving a high risk for persons with pacemakers.



Warning of hazardous electrical voltage

This sign stands for activities involving system components carrying live voltage.



Warning of hot surface

This sign stands for activities where hot items need to be handled.



Laser Radiation Warning - Avoid irradiation of eyes and skin by beam- or scattered radiation.

This sign stands for activities where special protection measures are required.

2 Required version and contents of ConstruCAM -3D

- Version ConstruCAM-3D Ver. 7.041.3



In above mentioned version these buttons should be available (if this is not the case, please contact us!).



Hint: The current version of ConstruCAM is found on our homepage www.cnc-step.de under service / downloads. You will receive an activation code via email.

3 Opportunities for quality improvement in advance

Selected picture can be optimized in an image-processing program in advance.

The picture should be edited in a Photostyler (for example Corel PHOTO-PAINT) and saved as greyscale image (8Bit/Pixel – not in color, exception: JPG).

Pictures in .JPG – format can be saved as color pictures (24Bit). While importing, these are converted into greyscale images.

Advice: over-sharpen the black/white picture (greyscale image).

The final result of the laser processing is much softer than the original template. By over-sharpening the template (picture/image) fuzziness resulting from this processing technology (laser) is largely neutralized.

Note: The picture-quality significantly affects the quality of the final result. (laser engraving)

4 Generation of a laser- processing file with pictures

ConstruCAM-3D can import Bitmap-files (256 greyscales = 8Bit greyscales = 1 Byte/Pixel) into following formats:

- BMP - Windows Bitmap
- GIF - CompuServ Bitmap
- JPG - JPEG Bitmap (auch 24 Bit Farbformate)
- PCX - Paintbrush Bitmap

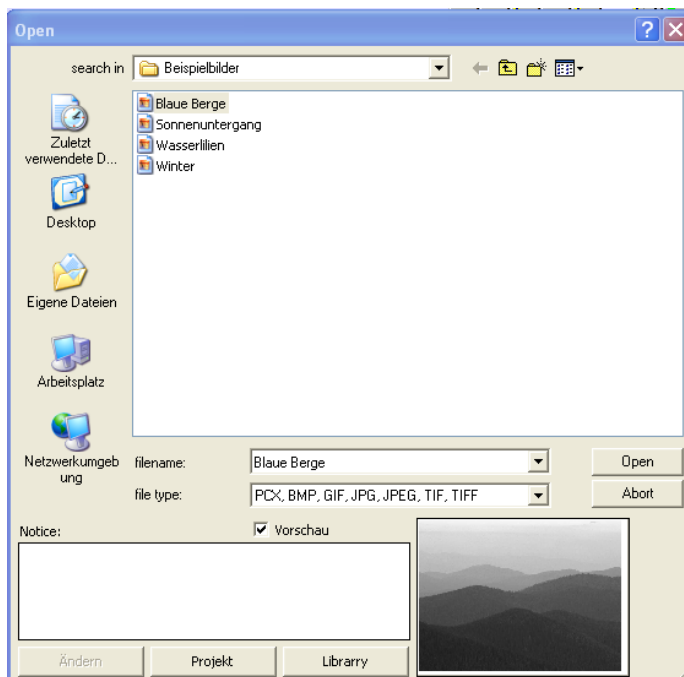
Importing a greyscale-image and adapt size (dimensions).

Open ConstruCAM-3D

1. In ConstruCAM-3D
Press icon „Laser“ with mouse
(small yellow triangle on the right-hand side just below File>Extras)

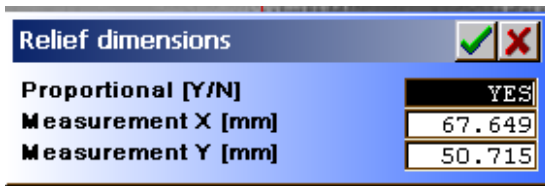


2. Select desired file from opened window.
For example. Blaue Berge.jpg



3. By pressing the button „open“ this file is imported into ConstruCAM-3D.
This process may take several minutes.

4. After successful import the relief-dimensions window will open.



Determine the desired picture size.
The box is chosen via mouse, input is made via keypad.

Die Abfrage in der ersten Zeile:

Proportional: YES = X and Y proportions are kept.

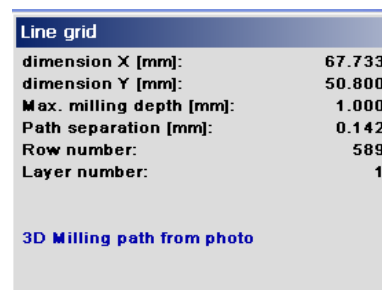
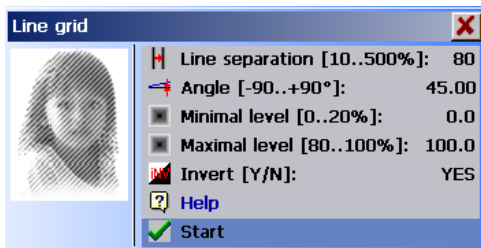
Proportional: NO = X and Y both values can be set separate from each other.

With the „green tick“ all setting values are confirmed.

After confirmation the file is adapted accordingly.

The „red X“ serves to stop the action.

5. Processing parameters in window line raster



The parameters of the laser-processing can be adjusted here.

Line spacing [10..500%]

With the line spacing, the path distances to each other are defined. A larger line spacing means a larger path distance and consequential a brighter/darker (regarding Invers [Y/N]) picture.

Reference value for the laser about 80%.

Angle [-90..+90°]

Setting of Angle of the milling lines, „0“ results in horizontal lines. The „angle“ is only used for in-line processes.

Reference value laser about 45°

Minimum level [0..20%] and maximum level [80..100%]

Limit of the lower and upper grey values. Herewith barely perceptible grey values can be avoided. The lower level can be limited from 0..20% and the upper level from 80..100% . 0% or 100% result in no limit.

Inverse [Y/N]:

Yes: The brightness levels are inverted.

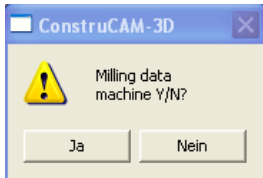
Bright areas are interpreted dark, dark areas bright.

After pressing „start“ the generation of the processing file is started.
This can possibly take a few minutes.

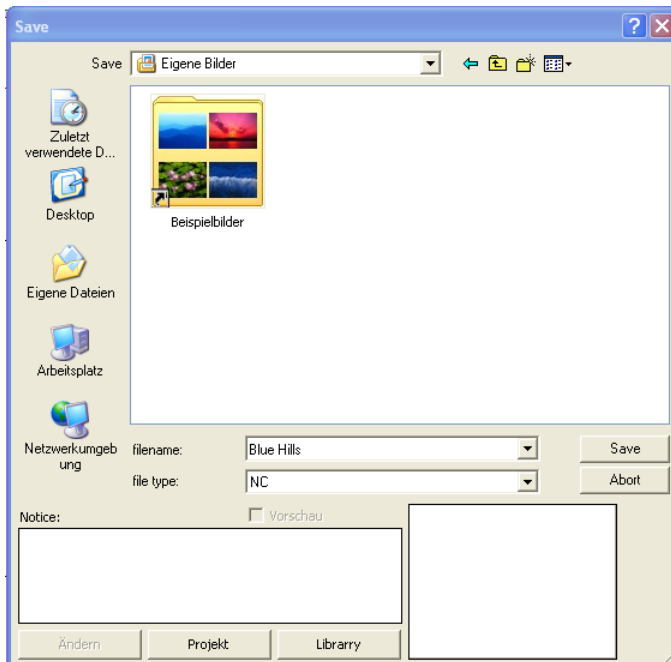


Please, no operations during waiting period!

6. After successfully generating the laser processing-file, please save the created milling files.



Confirm with „Yes“.



7. Save with desired name and in desired folder.

A picture-file is transformed into a laser processing-file.

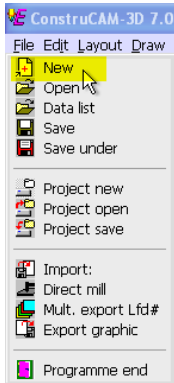
After saving, the laser processing-file, it can be called up and edited at any time in WinPC-NC.

5 Generating a laser processing-file with graphic

Open ConstruCAM-3D

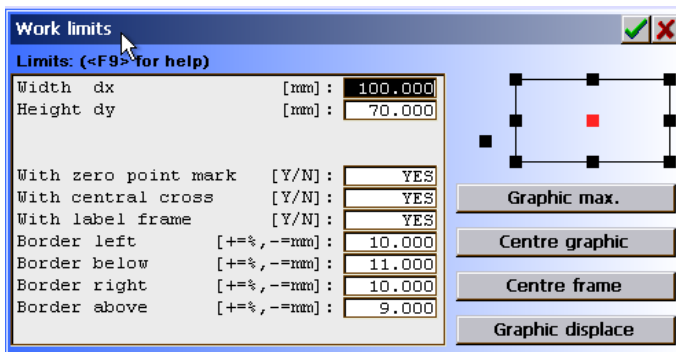
In ConstruCAM-3D

1. Press button „new“ to create a new file.



2. Select width, height and zero point position in following window.

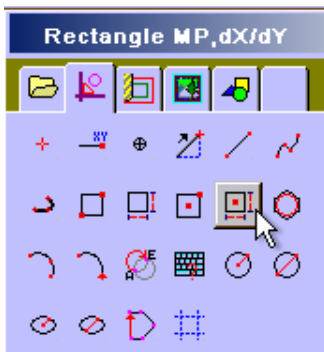
Example: dx=100 dy=70, zero point position is selected in the center.



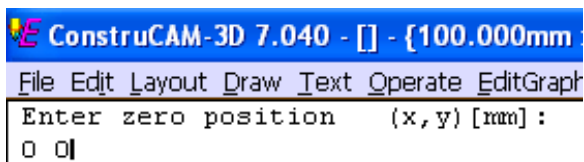
With the „green tick“ all adjustment-values are confirmed.

The „red X“ cancels the action.

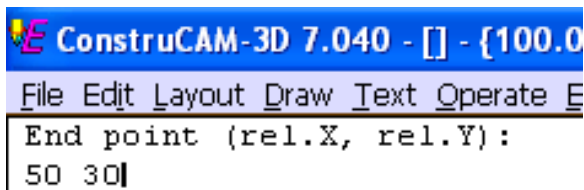
3. Creation of a contour
Example: rectangle (x=50, y=30) dimensioned via center (x=0, y=0).



Enter zero point with „0“tab-key„0“and press “enter”.

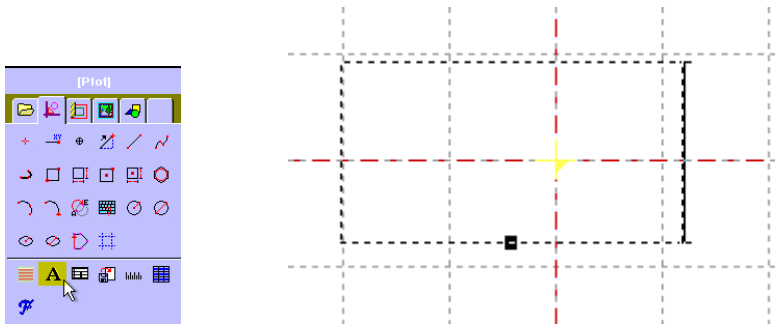


Enter „50“tab-key„30“and press “enter”.



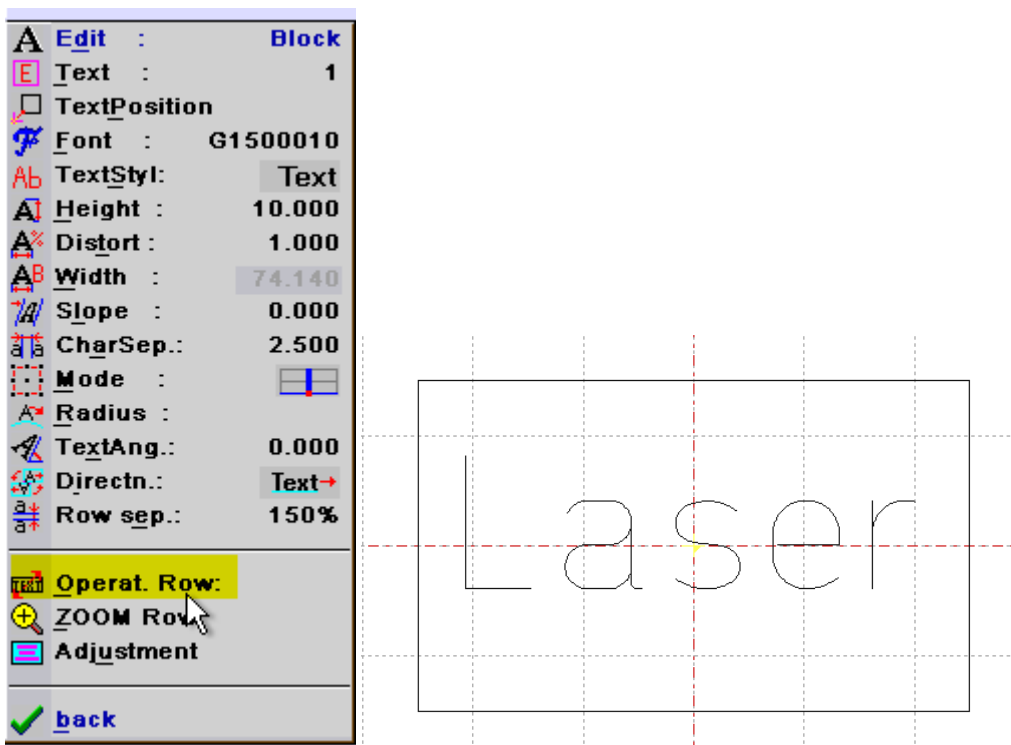
The rectangle lays centred on the drawing surface.

4. Activating „text box“ with button (see picture)

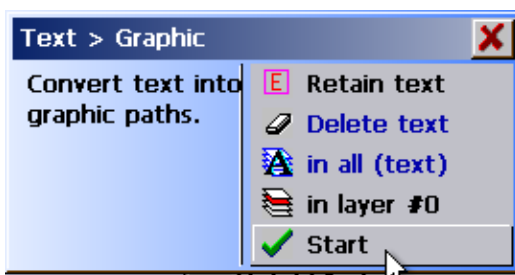


Insert text box into drawing surface and position.

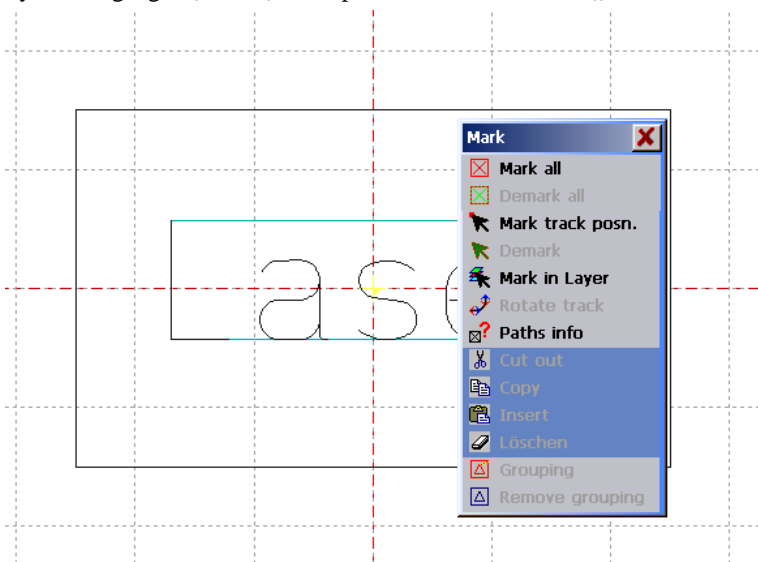
Example: Drop lettering „Laser“ with following text formatting centered into the rectangle.



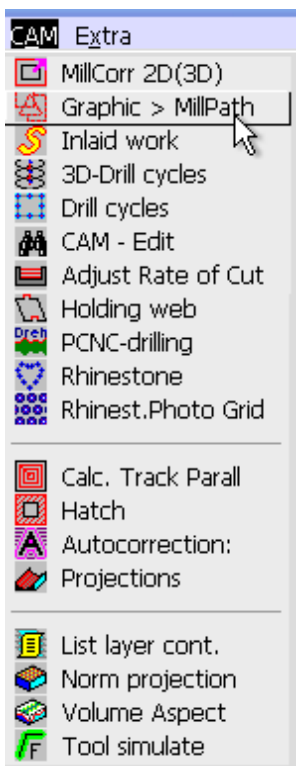
5. Transform lettering into a graphic under „operat. Zeile:“. Press button „start“ in following window to confirm transformation.



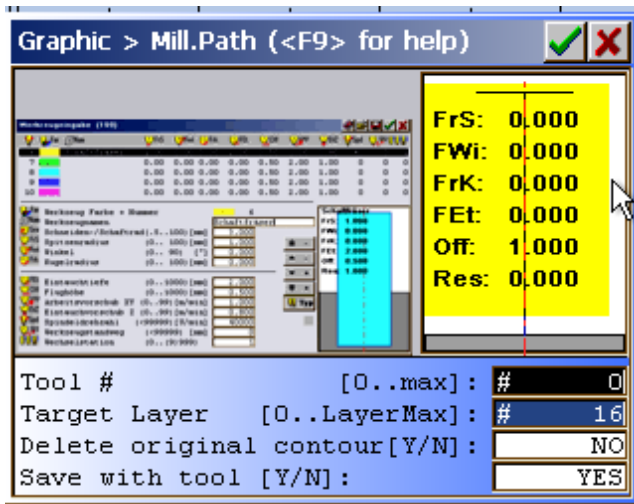
6. By clicking right (mouse) call up the menu and choose „select all“.



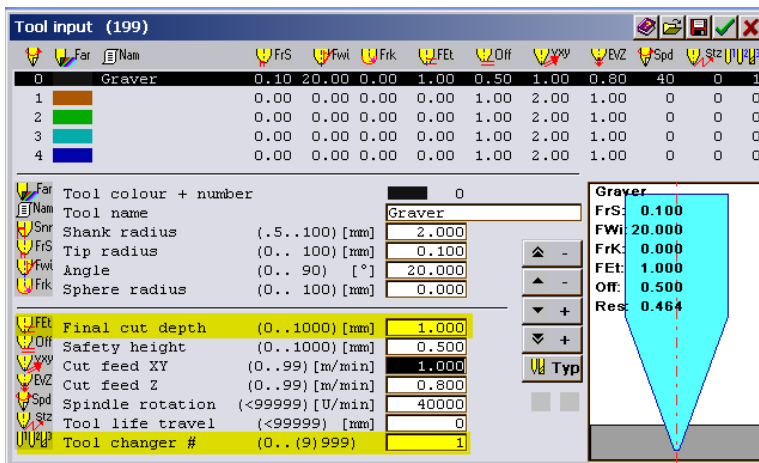
7. Select the line „Graphic > milling path“ in the file tab „CAM“



Click with the mouse onto the right-hand sided yellow box in following window.



Select an engraver in the tool-window under „Type“ (for example 0,1mm)



For processing by using the laser-engraving unit, only two settings are important!

1. Immersion depth

The immersion depth serves to set the maximum speed in the G-Code . In the script „Settings in WinPC-NC“ a maximum speed-limit of 15000 is described. Consequential, by using the immersion depth you need a value of 1.000mm, in order to import a speed of S15000 into a G-Code.

2. Change station

As default setting change station „1“ can be used.

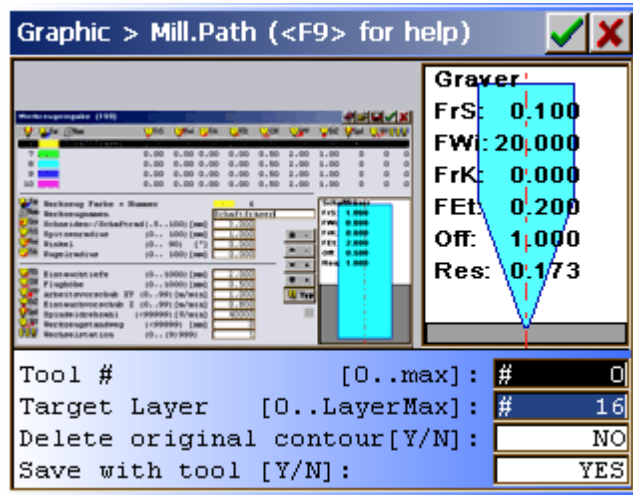
One advantage of using several graphics in one laser-engraving file, which are separated by switching-stations, is that these graphics can be switched active or inactive independently of one another in WinPC-NC.

With the „green tick“ all setting values are confirmed.

The “red x” cancels the action.

Determine „destination layer“in the previous window.

In example destination layer „16“.



With the „green tick“ all adjustment values are confirmed.

The “red X”cancels the action.

- Press icon „Vekt.>GrantioGraf“.
(Right-hand side next to the laser Symbol under File>Extras on the right-hand side)



- Attention this symbol is assigned twice in ConstruCam 3D! For processing by laser only the downright button is responsible (File>Extras>Vekt.>GranitoGraf !!!)

Select files/layers for export in following window.

! Colored layers are preset!!

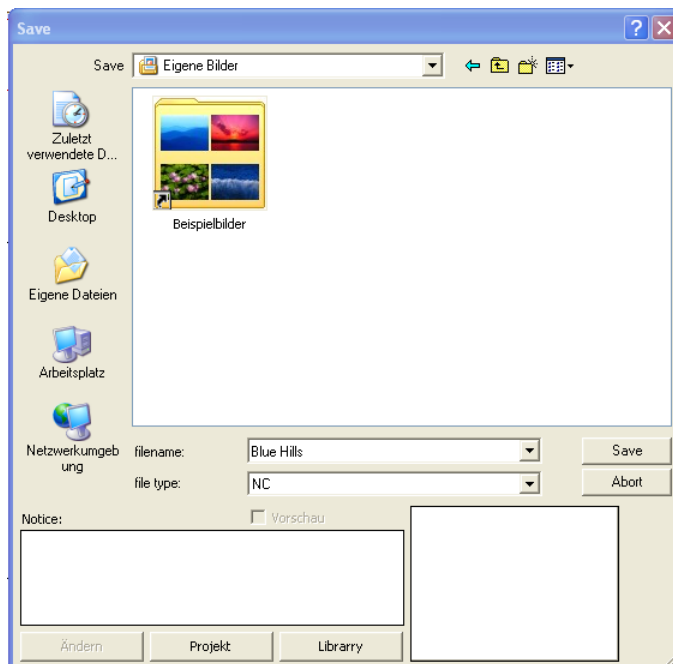
! Please whiten the layers, which shouldn't be transferred, by using the mouse!



Export the laser-processing file via button „Export“.

- Insert desired name and folder in window „Save“.

Then press „Save“ .



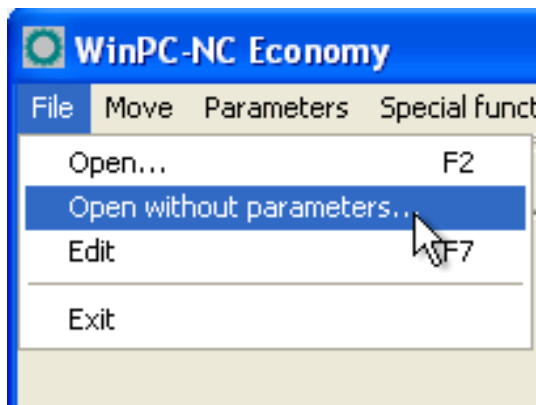
Your graphic-file has been transformed into a laser-processing file.

After saving, the laser- processing file can be called up and used in WinPC-NC at any time.

6 Opening laser- processing file in WinPC-NC

Open WinPC-NC

1. Load laser-processing file in „File“-tab „open without parameters“.



2. Select desired NC-file and open.
3. This process may take several minutes.

The laser-processing file is now loaded and ready to be used in WinPC-NC.



Please don't carry out further actions during waiting period!



See user manual WinPC-NC under point „ Open file without parameters“ (p.27).

7 Focusing laser-engraving unit

7.1 Machine reference run

Carry out reference run by pressing button via mouse.



Await reference run.

7.2 Positioning laser head above work piece

Bring laser head in starting position with x and y by pressing button „drive manual”.



Reduce or raise the laser head with button Z until there is a distance of about 80-120mm between the surface (work piece) and laser.

Save under button „save > starting position XYZ”.

7.3 Focusing laser



- **Laser radiation warning – Avoid irradiation of eyes and skin by direct and scattered radiation. Wear enclosed protection glasses to protect your eyes from the scattered radiation caused by laser beams.**



- **Attention: laser-protection glasses do not protect your eyes from the direct effect of laser beams!**



HINT: Please pay attention to safety regulations mentioned in the user manual!

!!!Laser is turned on during focussing process, WARNING: Risk of burning!!!

In WinPC-NC

1. Please wear enclosed laser protection glasses.
2. Persons and animals not wearing laser protection glasses, please leave the danger area!
3. Open window „drive manually”.
4. Switch the power switch of laser box to position “ON”.
5. Turn the key-switch to position „1”.
6. Activate the spindle in menu „drive manually” via mouse/tick in the checkbox
7. The laser beam beams with 3% of its capacity onto the work piece surface (if set correctly).
Adjust the laser beam until the light spot is as small as possible by using the knurled nut by hand. (Do not touch the laser beam! Risk of burning!!)
8. After the position is found, turn the key –switch to position „0”to deactivate the laser.
9. Remove hook in checkbox for spindle under menu „drive manually”.
10. Switch the power-switch on laser box to “OFF”.

The laser has now been successfully focused!

Advice:

Laser should be focused on a supporting surface for work pieces.

Suitable materials for supporting surfaces should have following characteristics:

- Flame-proof
- Non-reflecting
- Lightproof
- Heat-resistant
- Smooth surface

For example stone (plate - tile), aluminium (matt), steel etc.

Then save as parking-position (regarding Z-value) then raise the Z-axis by the thickness of the material.

Save the new position of the Z-axis and „save“ „save Z-zero point“.

Example: Work piece 1 with 20mm thickness and work piece 2 with 10mm thickness.

Focusing on supporting surface and save position under „save parking position“.

Raise the Z-axis for work piece 1 by 20mm and save this position as zero point.

A program sequence is started.

For work piece 2 drive into parking position and then raise the z-axis by 10 mm and save as zero-point.

A program sequence follows.

Please repeat this procedure for every work piece.

8 Finding zero point XYZ with laser-engraving unit



- **Laser radiation warning – Avoid irradiation of eyes and skin by direct and scattered radiation. Wear enclosed protection glasses to protect your eyes from the scattered radiation caused by laser beams.**



- **Attention: laser-protection glasses do not protect your eyes from the direct effect of laser beams!**



HINT: Please pay attention to safety regulations mentioned in the user manual!

In WinPC-NC

1. Please wear enclosed laser protection glasses.
2. Persons and animals not wearing laser protection glasses, please leave the danger area!
3. Open window „drive manually“.
4. Switch the power switch of laser box to position “ON“.
5. Turn the key-switch to position „1“.
6. Activate the spindle in menu „drive manually“ via mouse/tick in the checkbox
7. The laser beam beams with 3% of its capacity onto the work piece surface (if set correctly).
8. Mit Button X und Y den Laserstrahl auf gewählter Nullpunktposition (Programmvorgabe) anfahren.
9. Save zero position by using „zero point XYZ“button.
10. After the position is found, turn the key –switch to position „0“to deactivate the laser.

11. Remove hook in checkbox for spindle under menu „drive manually“.
12. Switch the power-switch on laser box to “OFF“.

Zero point is now saved and the laser processing program can be started.

9 General program sequence with laser-engraving unit



- **Laser radiation warning – Avoid irradiation of eyes and skin by direct and scattered radiation. Wear enclosed protection glasses to protect your eyes from the scattered radiation caused by laser beams.**



- **Attention: laser-protection glasses do not protect your eyes from the direct effect of laser beams!**



HINT: Please pay attention to safety regulations mentioned in the user manual!

In WinPC-NC

1. Load a laser-processing file (see section 6).
2. Take safety measures for prevention of injuries (see user manual).
3. Place work piece in laser-processing area.
4. Set zero points on work piece and save (see section 7).
5. Activate laser head(via power-switch and key-switch)
6. Start program sequence with button Start (F3).
7. Program sequence can be stopped by pressing “Stop”
(Repeated start command opens a window with following options: Cancel, continue or restart).
8. Program sequence is successfully completed.
9. Deactivate laser unit (via power-switch and key-switch).
10. Work piece can now be removed.