

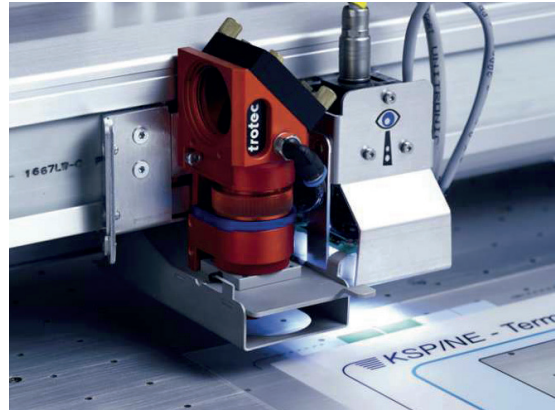
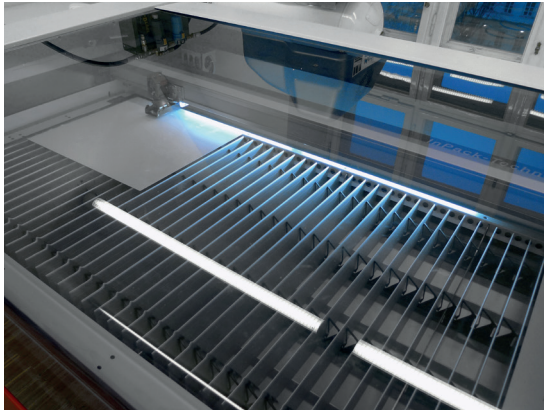
Laser User Manual

Part 1 |

Basics and Preparation

Laser Cutter Trotec Speedy 500

1. Basics



In 1960, Theodore Maiman built the first apparatus that used the principle of „Light Amplification by Stimulated Emission of Radiation.“ This principle allows for the generation of light with power densities billions of times higher than the maximum power or energy densities conventionally achievable.

With the laser, various materials with low thicknesses can be cut, or drawings can be etched or engraved into the surface.

Materials

Maximum thickness, see material list:

Plastics, e.g.:

- Acrylic glass GS
- Polystyrene
- Polyester sheets (Vivak)

Wood and wood-based materials, e.g.:

- Poplar plywood
- Aircraft plywood
- Linden wood

Cardboard, e.g.:

- Greyboard
- Finnboard
- Bristol board

The following materials CANNOT be used:

PVC films (release toxic chlorine gas)
MDF (clogs the laser), stone, metal

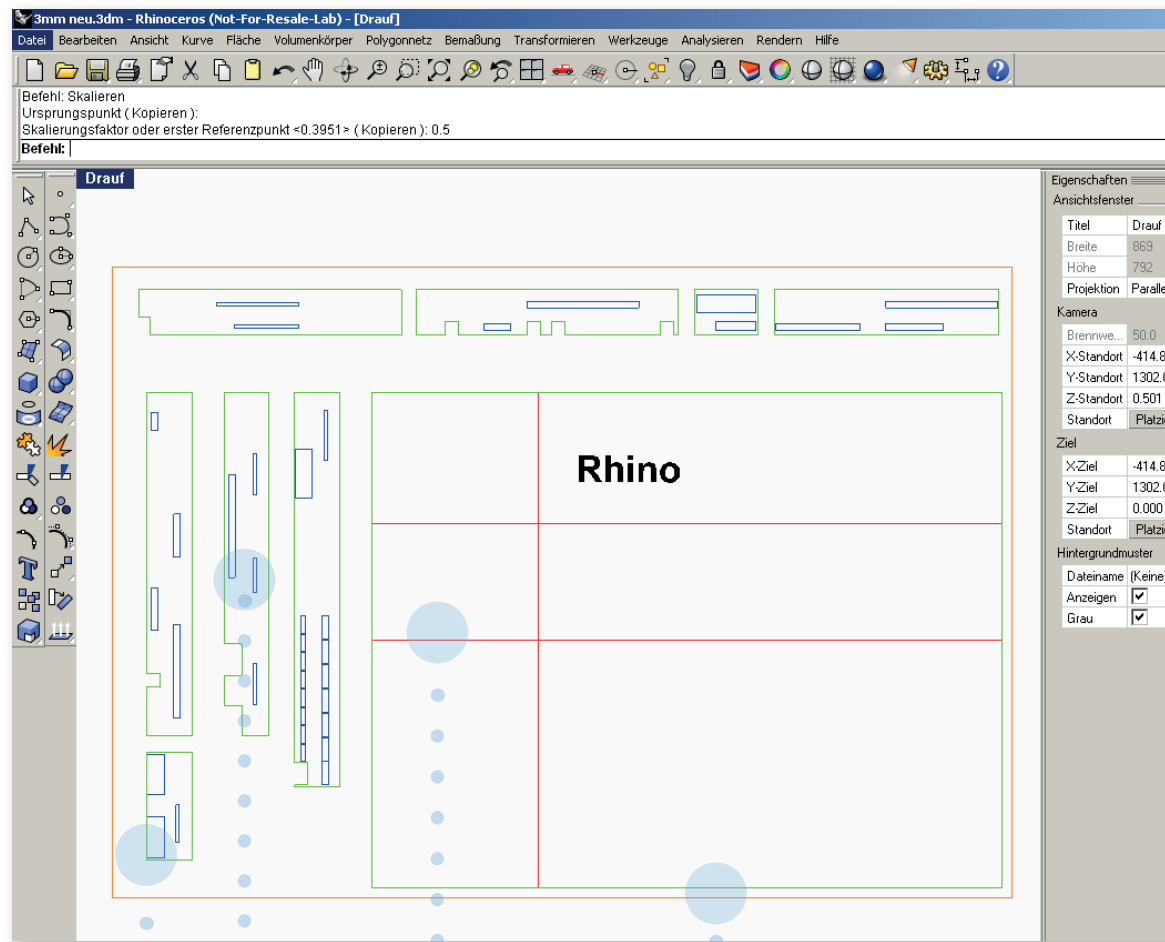
Work Area of the Laser Table

1240 x 710 mm
(= maximum working area)

File Format

- CAD drawings (Rhino/AutoCAD/...)

2. Drawing preparation



- 1. Etching (Red)
- 2. Cutting Inside (Blue)
- 3. Cutting Outside (Green)
- Frame (Color of Your Choice)

Prepare the drawing (e.g., RHINO)

- Draw the design in mm (to the correct scale)
- Draw a frame (the size of the material used) and place the parts to be cut within the frame.
- No duplicate lines (clean drawing)
- Connect lines (max. 3000 lines)
- Clean up the drawing (only include parts to be lasered)
- Save the drawing in formats that can be opened by Rhino (dwg, dxf, etc.)
- Do not use line width (only hairline)
- Display lines in the layer color (print color)

Work Area of the Laser Table:
B=1240mm T=710mm

Layers and Colors

The laser receives its information through the print job, so specific colors must be used. Each color is assigned a specific cutting power (according to the material cutting list) for either etching or cutting, and the tasks are processed in the following order.

Order (Etching and Cutting)

	R	G	B
1. Red	255	0	0
2. Blue	0	0	255
3. Cyan	0	255	255
4. Green	0	255	0
5. Magenta	255	0	255
6. Yellow	255	255	0

Laser User Manual

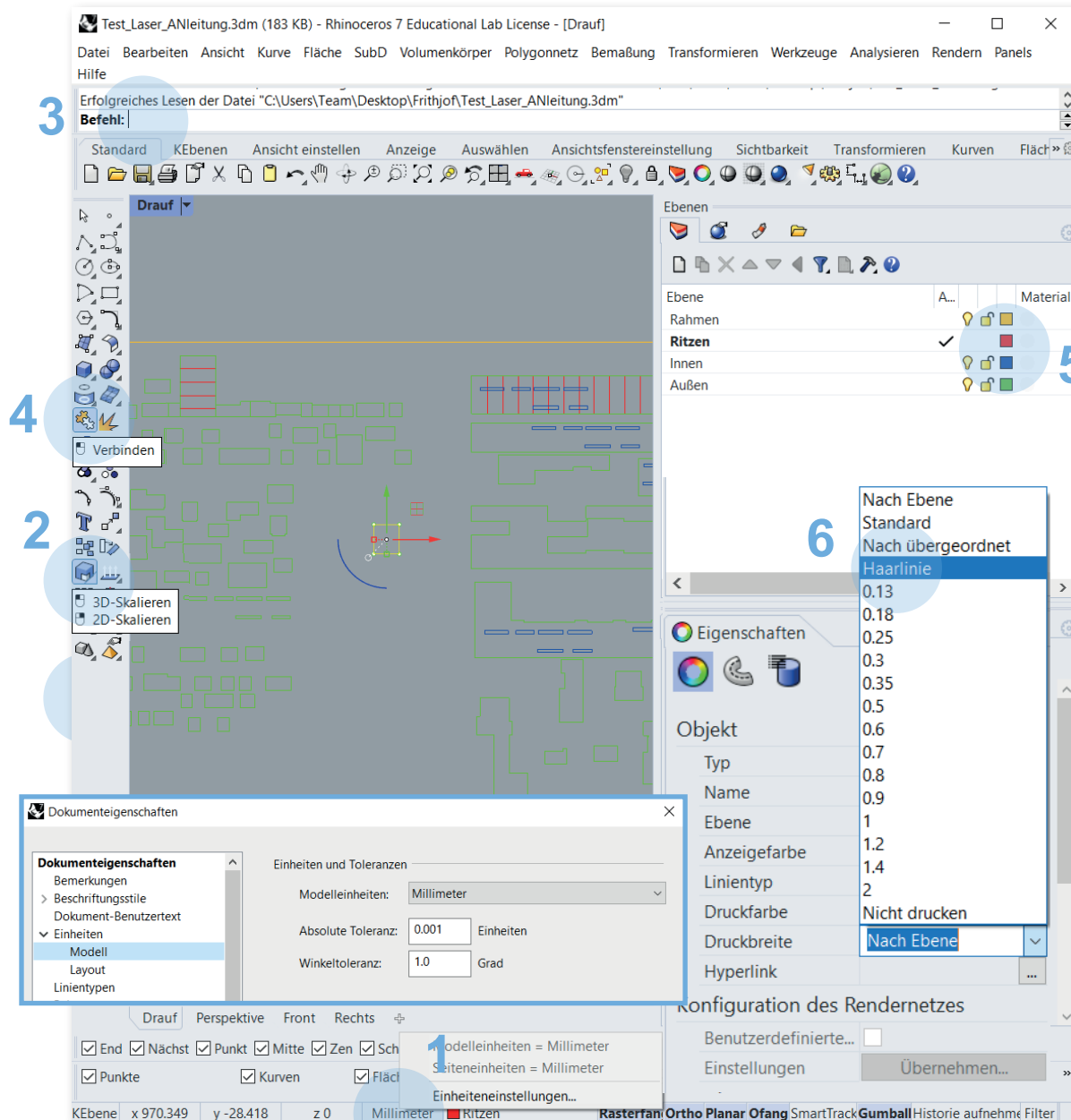
Part 2 |

Operation of the Laser Cutter

Trotec Speedy 500



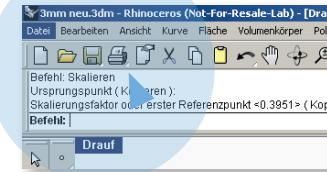
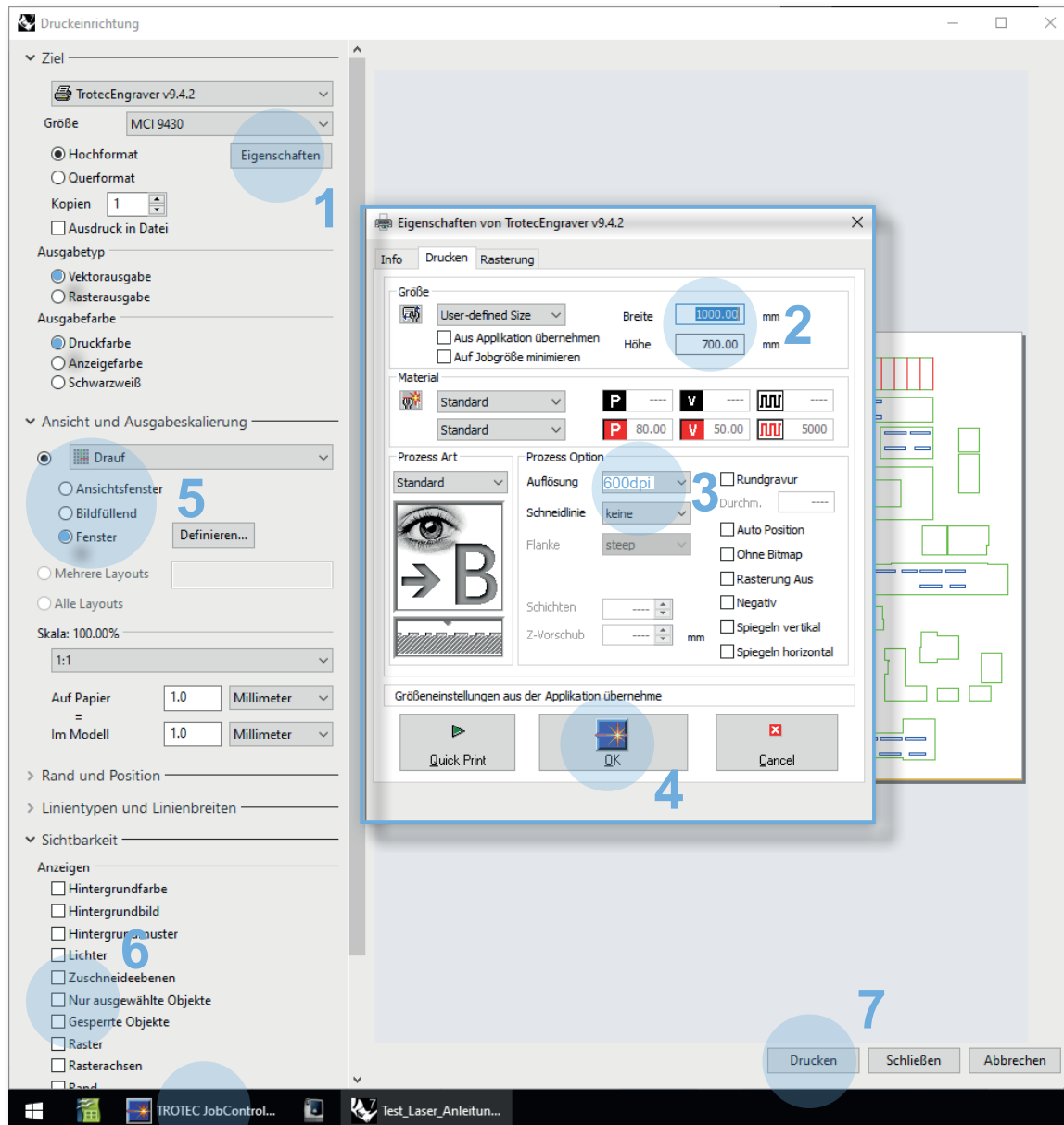
1. Check units and scale



The drawing must be properly structured and configured

1. Set to Millimeters: Right-click on Millimeters > Unit Settings... > switch to Millimeters
If a scaling prompt window appears, confirm with No
2. To Scale: Scale > then follow the instructions in the command line
3. Delete All Duplicate Lines: In the command line:
German: "DuplikatAuswählen"
English: "seldup"
4. Join Lines Together: Select all and then choose: Join
5. Double-click on the Colors > switch to RGB values
6. Laser Without Line Width (always preset). If there is a line width, select the object > Properties (Line Width) > Hairline

2. Printer settings

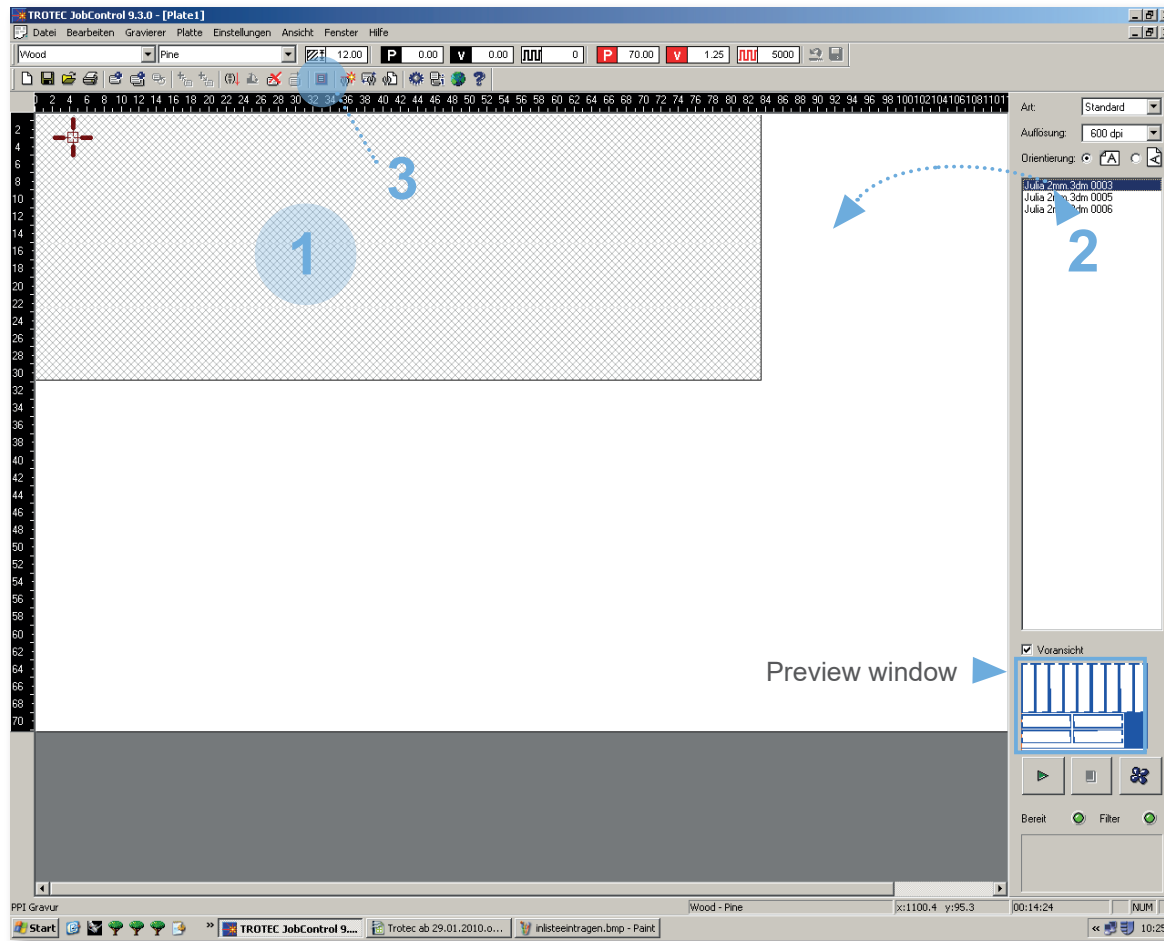


Once the drawing is fully prepared, the printer settings can be accessed.

Printer settings - Follow the order:

1. Access Properties
2. Enter the width and height of the material to be cut, e.g., 1000 x 700 mm
(1240 x 710 mm = maximum working area)
3. Set resolution to 600 dpi (standard)
4. Click OK
5. Select vector output and print color
6. Activate the Window and press "SET...". Then, first click on "Move" in the Rhino command line and then drag the print area over the drawing (if you don't click "Move" first, you will change the previously set dimensions of the working area)
When scaling, use "Scale 100%" to ensure it is printed at a 1:1 scale (as long as the drawing is in mm and correctly scaled)
7. Select visibility and uncheck "Only Selected Objects."
8. PRINT
9. After clicking Print, switch to the TROTEC Jobcontrol window

3. TROTEC job control



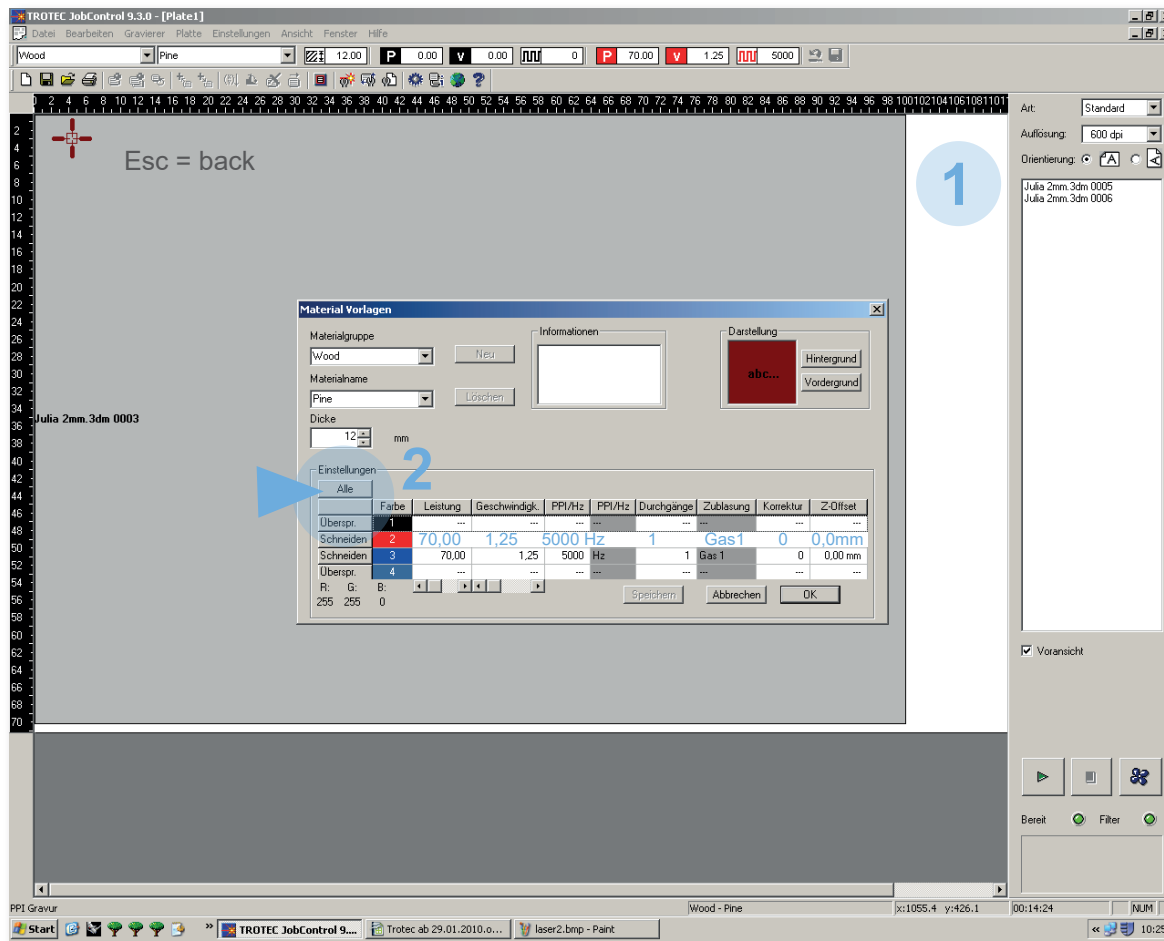
Program to start the job

The print job is sent to the program for the laser (TROTEC Engraver).

1. Click once on the old job (this changes the color), right-click, and select "Delete Job" to remove the old job.
2. Double-click on the desired laser file (you can identify the correct file in the small preview window). Double-clicking will automatically position the job in the upper left corner, provided the print area size was correctly set in Rhino.
3. Display the view for the positioned job.
4. If a job needs to be repeated with potentially different parameters, first change the parameters. Right-click in the gray window to open a list of various commands -> Job Reset -> Play.

The white area corresponds to the working area of the laser.

4. Set laser parameters



1. Double-clicking in the white area opens the window for the laser parameters.

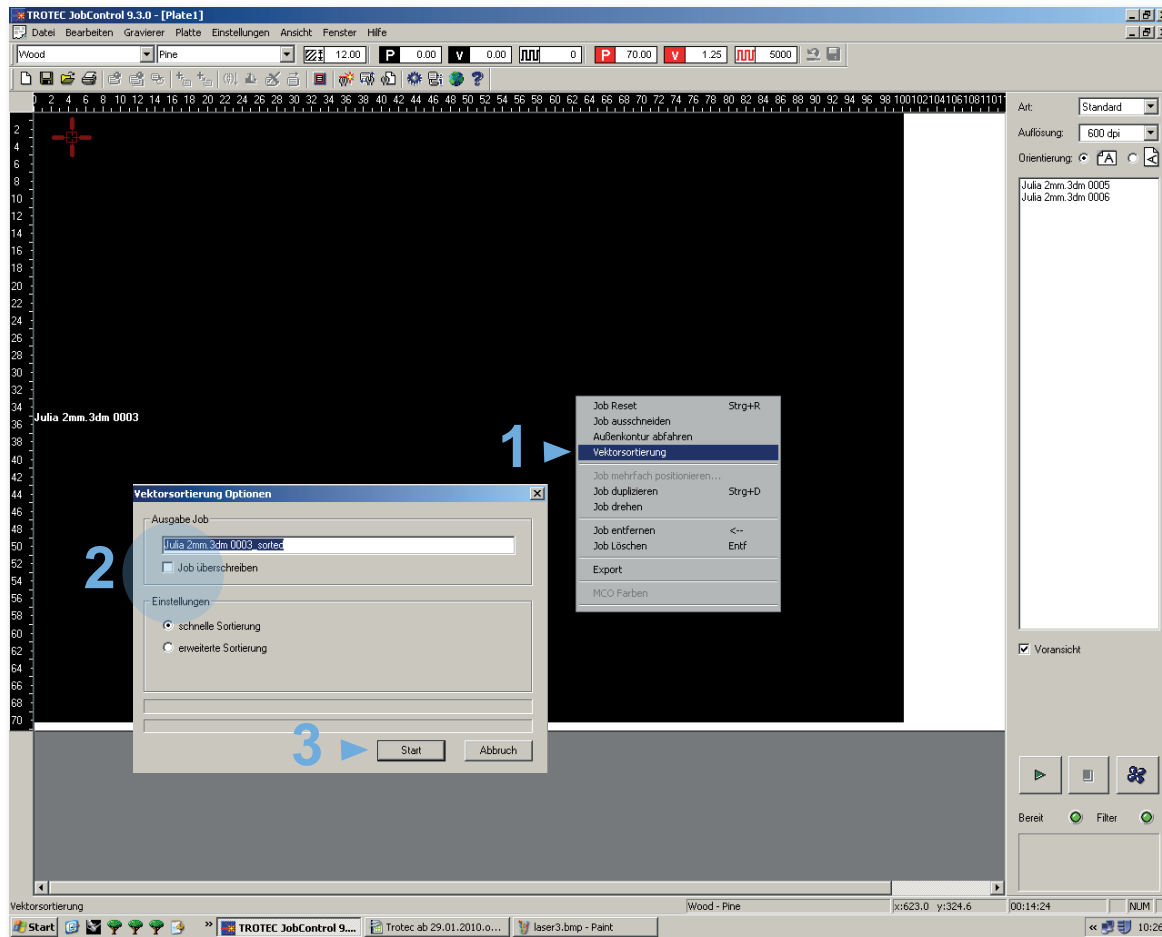
In this table, the respective values must be entered based on the material and material thickness (see material list).

2. When accessing the menu for "All," all 16 colors that can be set will be displayed. The laser processes the colors in the order from 1 to 16.

The values for cutting and etching must be taken from the list provided at the computers. Only the materials listed may be lasered.

Important: In the "Assist Gas" column, "Gas1" must be entered. The strength of the assist gas can be adjusted at the control panel (see chapter: "7. Positioning the material and adjusting the table height").

5. Vector sorting



For complex drawings (many lines and individual parts), vector sorting should be performed, meaning the lines will be processed in order rather than randomly.

1. Right-click in the job window
Vector Sorting > click
2. Click on „Overwrite Job“
3. Press start

Once the vector sorting is complete, click Close.

6. Turn on the Laser

„Rule of three“

Close the lid +

Insert a coin +

Turn on the power

↳ Then the laser will perform its reference run

Reference run
(=Homing)

The laser is moving to its reference points
Once the laser is connected, the software takes
a snapshot of the laser head's location

Order:

Z > The table goes down
Y > The head moves backward
X > The head moves to the left

Payment

To use the lasers, you need to put money into the coin machines first. There is one coin machine for each laser.

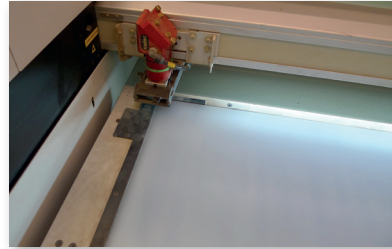
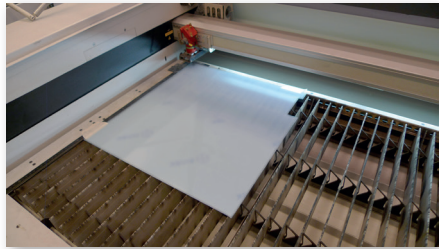
Put coins in the machine (The timer starts as soon as you put a coin in):

The minimum is 2 euros to play	=	12 minutes
Every extra 2 euros	=	12 minutes
therefore 5 x 2€ Münzen	=	60 minutes

When there are 3 minutes left, an orange light will flash. You can add more coins to keep going. After a power outage, you need to insert money again and press „Start“ (**Warning:** The laser will reset and cut all lines from the start).



7. Positioning the material and adjusting the table height



1. The material should preferably be placed in the upper left corner of the table.

Control Panel

To ensure the focal point of the laser beam is correct, the distance from the lens to the material must be adjusted (using a focusing foot). If the material thickness changes, this distance must be re-adjusted. (see photo on the left)

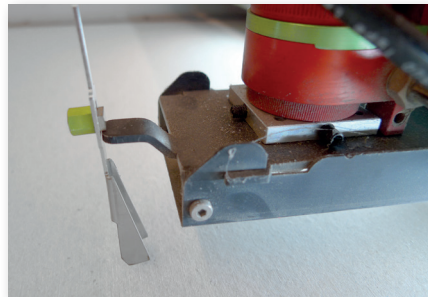
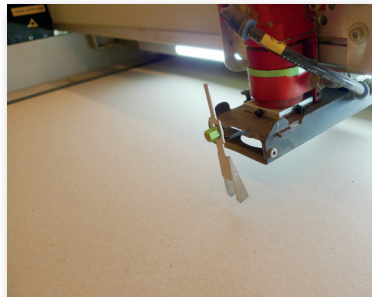


2. If the material is warped, the sides must be secured to the table with masking tape.

3. Using the control panel, position the laser head over the material (move it slightly forward into the center)



- 1 Pause
- 2 Table height:
Up
Down
- 3 Forward
Left -
Right
Back
- 4 Gas 1
button pushing for
compressed air
display (2bar)
- 5 Set Gas 1: Pull out
the Gas 1 knob, turn
it to the right number,
and push it back in.

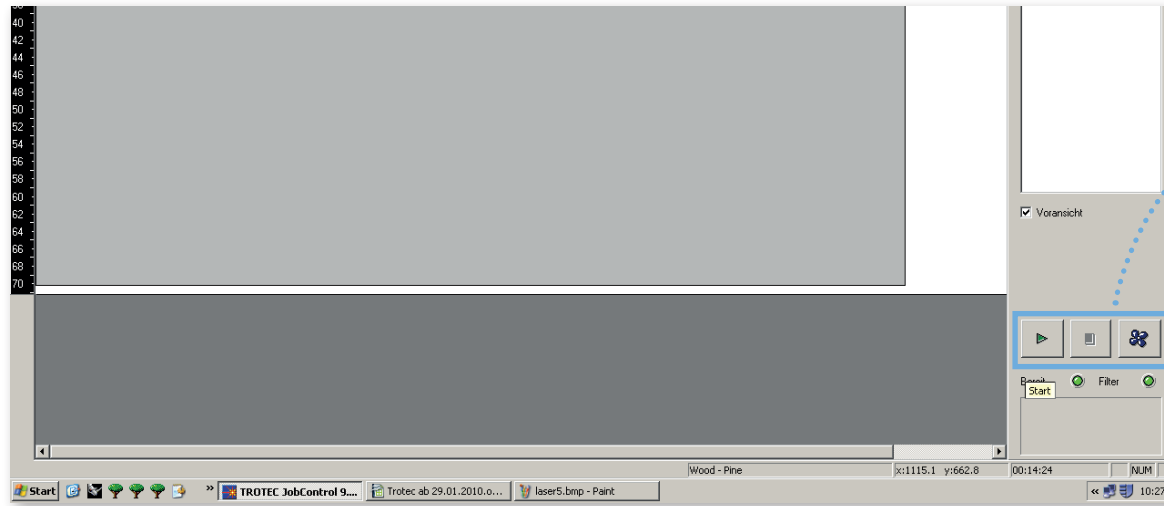


4. The „focusing foot“ must be hung on the projection of the carriage as shown in the image. Then, the table should be carefully moved upward in small increments until the focusing foot drops.

WARNING!

Raising the table too high will cause the machine to alarm and require a restart. Turn the key to start the machine again and wait for it to finish the homing.

8. To turn on a laser



After adjusting all settings, the laser can be turned on.



Control Panel



Pause

WARNING: Suction turns on automatically.

Dust extraction A & B

DO NOT ADJUST ANYTHING!!

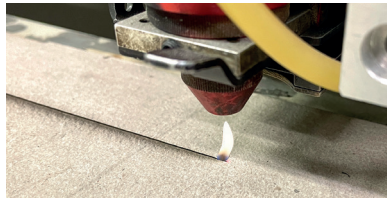
Water cooling



If you need to remove any parts, you can pause the process. Press the pause button, wait for the laser to stop, open the lid, remove the fallen parts, close the lid, and restart the laser with the pause button again.

The laser must be supervised at all times. Pause the process before leaving the room.

9. Behavior in case of smoke, fire, and accidents



A candle flame

1. Pause the laser
2. Open the lid
3. Blow out the flame

Fire (The material is on fire)

1. Emergency stop the laser operation
2. Manually push the entire axis with the laser head backwards
3. Drop the material onto the floor
4. Throw the fire blanket over the material
5. Call the workshop

Severe fire (Machine is on fire)

1. Emergency stop the process immediately
2. Activate the fire alarm and call the fire department at 122
3. Use the fire extinguisher to put out the fire
4. Exit the workshop
5. Call the workshop

First Aid

1. A first-aid kit and bandages can be found next to the front door
2. For serious injuries, call the emergency services at 144 and also dial the internal emergency number at the university

Smoke incident

1. Pause the laser
2. Do not open the lid
3. Wait for the smoke to clear
4. Check the settings and adjust if necessary
5. Call the workshop



IF THE EMERGENCY STOP WAS PRESSED

EMERGENCY STOP

To reset the emergency stop: Turn the knob in the direction indicated by the arrow until a green ring becomes visible.



RESET „humming noise“

If the emergency stop button was pressed, you need to turn this switch (on the right side of the laser) past the 9 o'clock position (it will make a humming noise) before you can turn it back to the 12 o'clock position (on).



ON