User Manual

For Information

The beginning

BRM Lasers has been active in the CO2 laser machine sector since 2010 under the direction of Erik van Turnhout, former founder of Tuwi metal processing machines (**www.tuwi.nl**). Boasting more than 30 years of experience in building metal processing machines, we started looking for laser machines that can be used to also cut and engrave other materials such as acrylates and wood. The import from China caught our eye and we established contacts with an entirely new culture and world. The beginning of an adventure.
Thanks to our ample experience in machine building, we namely had our laser machines adjusted so that they meet the Dutch benchmarks in all aspects. Both from a qualitative point of view and from the angle of safety: It was for us the top priority to develop an apparatus that could be sold by BRM with pride and carefree. This has taken a few months but we can now say for quite some time that the BRM laser machines have an excellent price-quality ratio and have already been able to convince customers from all over Europe.

The development

Following our start as a small business sifting through the technology and giving demonstrations in a small rented building, we experienced enormous growth in the past four years. BRM has a very inquisitive team of mechanics working to support the hundreds of BRM-machines that are already in use in the meantime. Besides the growth of the organisation itself, we have built an enthusiastic team of resellers and partners in Europe. Our goal in the coming years is to further expand this network so that we can eventually serve all of Europe with our laser machines.

The most important cornerstones for continued BRM success will for us always be said price-quality ratio and service . These are the building blocks of our company and will be guaranteed with continuous innovations. We would like to think along with you and will gladly give you advice without any obligation about the possibilities of our laser machines for your desired application. Our technical service machine is also available 24/7 for you in case of support before, during and after the purchase and delivery of a BRM laser cutting machine.

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Foreword

Please read this User Manual carefully before transporting, installing and commissioning the machine.
This machine complies with the applicable European Guidelines regarding safety and health and is provided with the CE-mark.
The producer and supplier are not liable for unsafe situations, accidents and damage which are the result of:

- Ignoring warnings or regulations as shown on the machine and/or described in this user manual.
- The removal of the attached safety provisions.
- Insufficient maintenance
- Use for other applications than those describe in paragraph 1.2, 1.3 and 1.4
- **Changes made to the machine by third parties. This also includes the application of replacement parts other than those described and the changing of the operating programme.**

This user manual contains relevant information for installation, use, maintenance, repair. These instructions must be followed.

1.1 Intended use of the machine

The laser machine is intended to burn material by means of a focused light beam (laser beam). This can be accomplished at low output to result in engraving or at high output to cut through the material.

Other applications are not permitted

Damage and injury caused by applications other than those specified above and/or due to the bypassing of safety measures are entirely at the expense and responsibility of the user.

1.2 Use of laser radiation

Attention:

This laser machine contains a laser category 4 product.
Avoid exposure of eyes and skin to direct or indirect radiation.

Lasers produce a beam of highly concentrated light with a single frequency. This differs from the light that is emitted by a regular light source. The energy produced by the laser beam translates in the form of heat. That is why laser processing can also be regarded as a process of controlled heat.
The light of a laser is concentrated and remains in a thin beam even at a long distance while the light of a regular light source is divergent. Due to this small beam produced by the laser, the machine can be considered as an efficient and high-end apparatus for laser radiation.

Each form of strong light or heat can cause damage in several forms to the human eye or skin due to direct expose to the beam. That is why it is imperative to handle the apparatus and any reflecting materials carefully.

Laser processing
The laser beam has no effect on the touched material in 3 different situations:

1) Materials that can send laser energy without changing in nature. Air and certain crystals for example.
2) Materials that can reflect nearly all energy beamed on these materials. These materials can be used as optical lenses or reflectors.
3) Materials that absorb the laser energy.
   These are materials that absorb the beam but have thermal conductivity characteristics as a result of which it is not possible to cut through them.

Flammable materials
Flammable materials or gases will ignite directly after coming in contact with the laser beam, as a result of which toxic gases will be released. When heated, some materials (PVC for example) will also undergo chemical decomposition which can also result in the development of hazardous substances. **Please contact the manufacturer/importer to make sure that the material to be processed is suitable for the laser.**

1.3 Material possibilities supported by BRM Lasers

Legenda

- ☑ Zeer geschikt voor laserbewerking
- ! Beperkt geschikt voor laserbewerking
- ✖ Niet geschikt voor laserbewerking

Materiaal	Laser snijden	Laser graveren
Filt en foam	☑	!
Glas en spiegels	✖	☑
Hout	☑	☑
Karton en hardboard	☑	☑
Keramiek en porselein	✖	☑
Kurk	☑	☑
Leer	☑	☑
MDF	☑	☑
Multiplex	☑	☑
Natuursteen, graniet en marmer	✖	☑
Pakkingen	☑	!
Papier	☑	☑
Textiel	☑	☑
Trespa	✖	☑

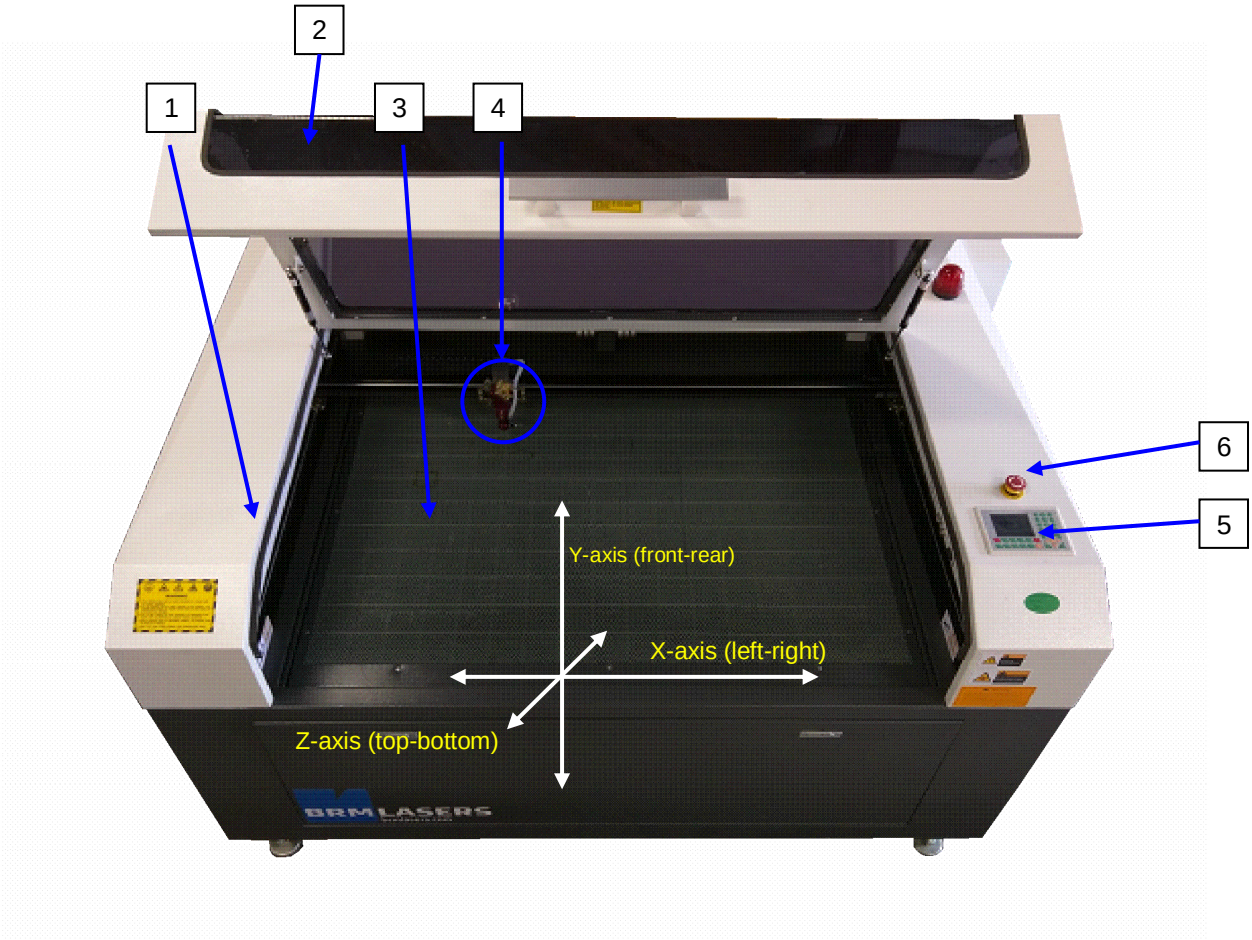
Materiaal - Kunststoffen	Laser snijden	Laser graveren
Acrylics, Plexiglas, PMMA	☑	☑
Vergelijkbare produkten Acrylic glass, Acrytuf®, Altuglas®, Astralon G®, Casocryl®, Degalan®, Deglas®, Dunova®, Friacryl®, Hesa-Glas®, Limacryl®, Lucite®, Lucryl®, Paraglas®, Perspex®, Plexiglas®, Polymethyl-methacrylat (PMMA), Primal®, Resarit®		
Aramide	☑	✖
Vergelijkbare produkten Aramide, Aramid fiber, Aramid tissue, Nomex®, Kevlar®, Teijinconex®, Twaron®, PTPA, Aromatic polyamide, Aramid fiber type, Aramid panels.		
PETG, VIVAK	☑	!
Polyamide (PA)	☑	!
Vergelijkbare produkten Dederon®, Grilon®, Nylon, Perlon®, Akulon®, Timbrelle®, Rilsan®, Ultramid®, Durethan®, Trogamid T®, Vestamid®, Stanyl®, Ertalon®, Ripstop Nylon.		
Polycarbonaat, Makrolon, Lexaan	!	✖
Vergelijkbare produkten Anjacom®, Anjaflam®, Anjalon®, Axxis®, Decarglass, Durolon®, Latilon®, Lexan®, Makrofol®, Makrolon®, Polycarbonate, Xantar®		
Polyester	☑	!
Vergelijkbare produkten Fleece®, PES, Polarguard®, Polyester, Thermolite®, Trevira®.		
Polyethylene, Hostalen,Vestolen, Lupolen	☑	!
Vergelijkbare produkten PE, Polyäthylen, Polyethen, Alathon®, Dyneema®, Hostalen®, Lupolen®, Polythen®, Spectra®, Trolen®, Vestolen®, Luflexen®, Baylon®.		
Polyimide, Kapton	☑	☑
Vergelijkbare produkten Polyimide, PI, Kapton®, Norton® TH polyimide film.		
Polyoxymethylene, POM	☑	!
Vergelijkbare produkten Polyaceta, Polyformaldehyd, Ultraform®, Delrin®, Hostaform®, Ertacetal®.		
Polypropylene	☑	☑
Vergelijkbare produkten PP, Inspire®, Nepol®, Xmod®, Bicor®, Hicor®, Vestolen P®, Polyfill®, Topilene®, Eltex®, Sequel®, Ontex®, Tatren®, Novolen®, Profax®.		
PUR	☑	☑
Vergelijkbare produkten Cellasto®, Elastocoat®, Elastoflex®, Elastofoam®, Elastolit®, Elastopal®, Elastopan®, Elastopor®, Lupranol®, Baydur®, Bayfill®, Bayflex®, Baylit®, Baymer®, Baytherm®, Desmodur®		
Styrene-acrylonitrile, SAN	☑	!
Vergelijkbare produkten SAN, Luran®, Tyril®, Kostil®, Vestyron®, Lustran®.		
Polystyrene	☑	✖
Vergelijkbare produkten Polystyrene, PS, Hostyren®, Vestyron®, Styropor®, Hostapor®, Vestypor®.		

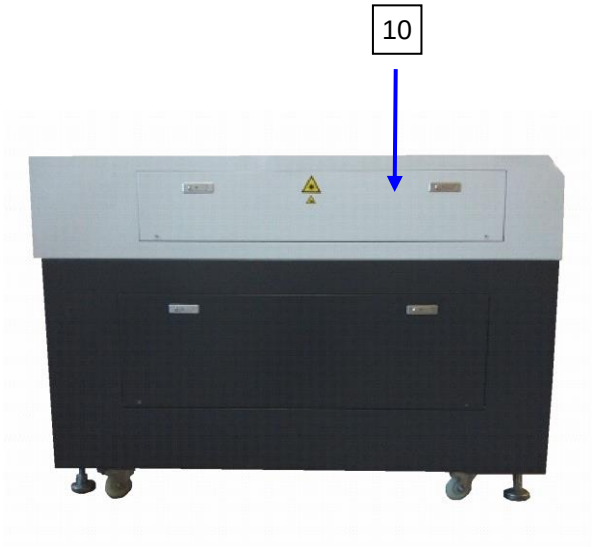
Materiaal - Metaal	Laser snijden	Laser graveren
Lasersnijden alleen mogelijk met de BRM Metaalsnijder tot op 1.2mm. Dit geldt ook alleen voor staal en RVS-types. Daarnaast gravures mogelijk met enerzijds de Fiberlaser of anderzijds de CO2 machines, waarbij bij laatsgenoemde Cermark spray nodig is voor een zichtbare markering.		
Aluminium	✖	☑
Edelmetalen Platina, Goud, Zilver, Rhodium, Osmium, Palladium, Iridium, Ruthenium	✖	☑
IJzer, Koper, Nikkel en Zink	✖	☑
Legeringen Alpaca, Brons, Constantaan, Invar, Mangaanstaal, Messing	✖	☑
Staal en RVS	!	☑

1.4 Overview of main components

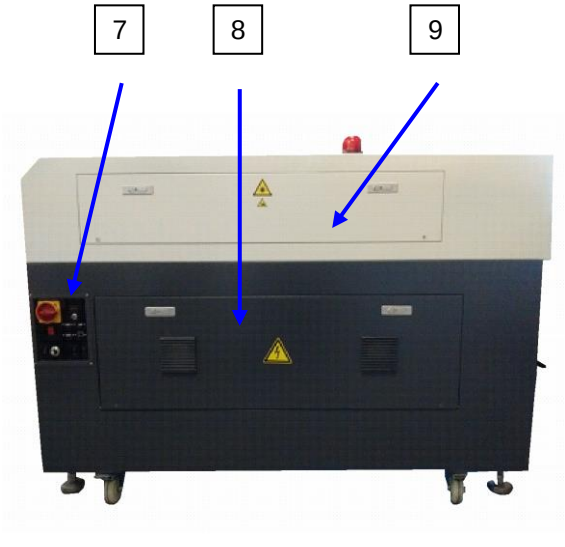
The laser machine contains the following main components

1. Machine casing
2. Laser area lid
3. Laser area
4. X-Y axis with laser
5. Control panel top
6. Emergency stop button
7. Master switch with various external connection options
8. Control cabinet
9. Service area right side
10. Service area left side
11. Laser resonator area
12. Laser power area
13. Cooling water connection panel
14. Extraction unit connection panel
15. Connection power panel power cord connection(grounded Euro plug) power 240V-60Hz/protective earth + 2 switched sockets 240V-60Hz/protected earth

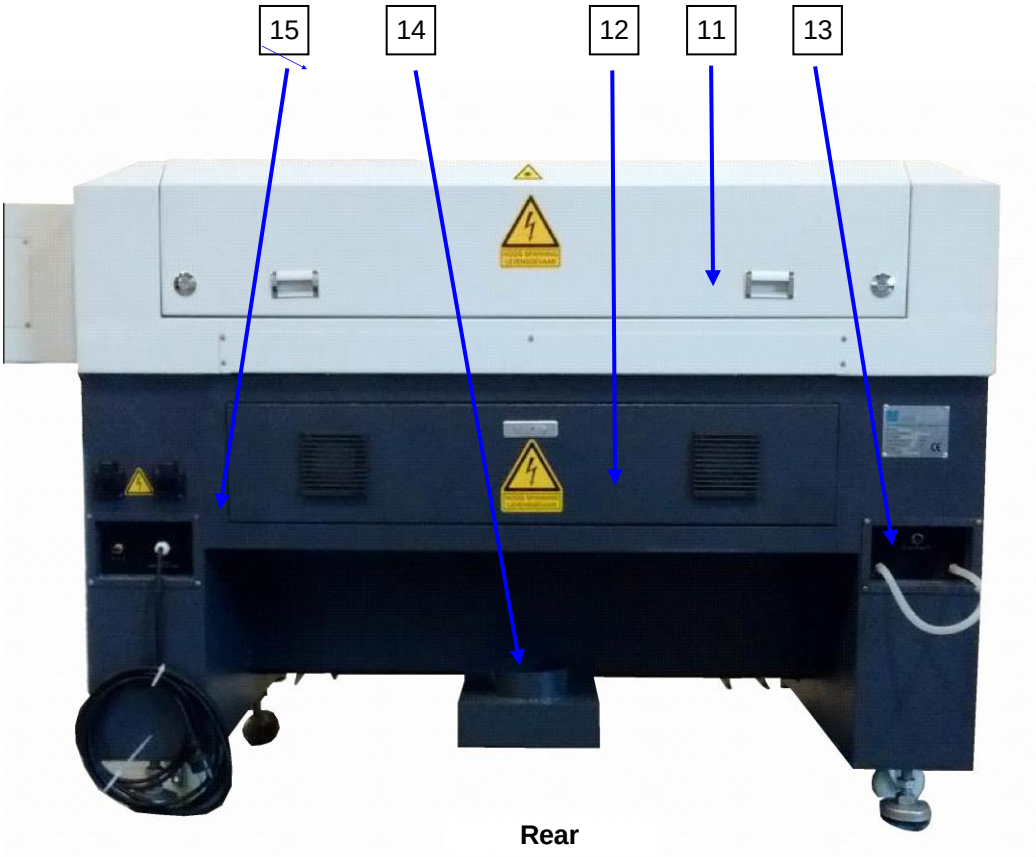




Left side



Right side



Rear

1.5 Explanation of main components and gen. description of the laser machine

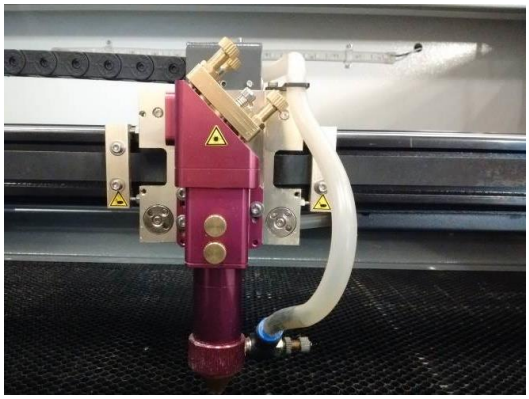
General (operation) description of the laser machine
The laser machine burns into or through material by means of a focused light beam (laser beam). This can be accomplished at low output to result in engraving or at high output to cut through the material. The laser beam is generated by means of a CO2-source and has a wavelength of 1064 nm. The wavelength can have a positive or negative effect on materials, which implies that some materials cannot be engraved or cut. This needs to be taken into account.
Given the fact that the laser beam has a burning effect, it is not permitted to bypass safety measures.

2 Transparent lid
The transparent lid is used to close off the laser area. After closing the lid, a magnetic contact is created and the machine can start up.
The apparatus stops abruptly when opening the lid.

3 Laser area
This is the (enclosed) area where the laser beam touches the material to make the desired product.

4 X-Y axis with laser
The laser beam is put in the right position by means of a mechanical construction that is controlled automatically by the software.
This construction is called a "XYZ Granty".

Laser head with conductors protruding on the left and right side

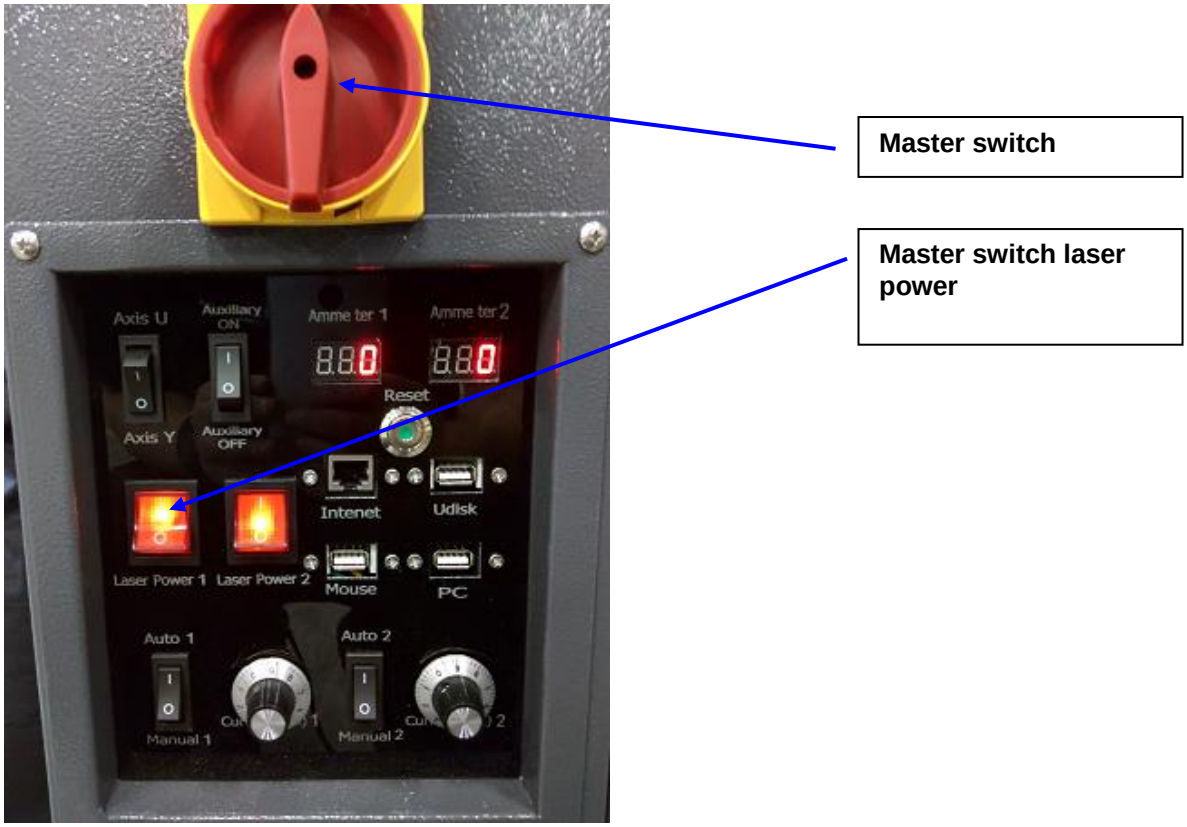


5 Control panel top
The control panel is used to prepare the production. After the product has been prepared on the computer and the programme has been downloaded to the machine, the production can be prepared, started and monitored with this panel. If necessary, fine corrections can be performed without the intervention of a computer.

6 Emergency stop button
The drives and laser source are completely turned off and disconnected when pressing the emergency stop button. The drives/conductors can be moved by hand.
Refer to paragraph 4.8 for the start-up after pressing the emergency stop button.

7 Master switch with various external connection options

Refer to paragraph 3.4 for the functions



2 Responsibilities and safety

2.1 Responsibilities

Please read the manual carefully before starting the installation, operation, maintenance of or service to the machine.
This manual contains information that is necessary for an optimal and safe operation of and service to the machine.

It is prohibited to make adjustments/changes to the machine without the consent of the manufacturer.
Adjustments and changes will make the CE-mark invalid and the safety can be seriously jeopardised.

The machine must only be operated by one person at a time.
Only trained employees must operate the machine.

Installation, maintenance and service work must only be performed by employees trained for this purpose.

2.2 Laser radiation

Attention:

This laser machine contains a laser category 4 product.
Avoid exposure of eyes and skin to direct or indirect radiation.
The laser source must only be replaced by a technician trained for that purpose.
When replacing the laser source, the apparatus needs to be turned off and the key switch needs to be locked. The power plug must also be disconnected from the socket.

Please take the following safety measures:

- Do not stare directly into the laser beam
- Avoid unnecessary reflections.
- Wear **safety goggles** when working with the laser

- Make sure that **fire extinguishers** are nearby.
- Turn off the laser when it is not being used.
- Distribute the units to be processed. Also pay attention to residual waste that can catch fire.
- Do not place paper or other flammable objects near the laser path.
- Do not use the machine during thunderstorms and lightning. In this case, turn off the power.

2.3 Safety provisions

Several measures have been taken to guarantee safe operation to avoid the risk of jamming, clamping or other hazard. The installed provisions must only be removed by a technician authorised to do so, for the purpose of maintenance or service and only when this is strictly necessary.

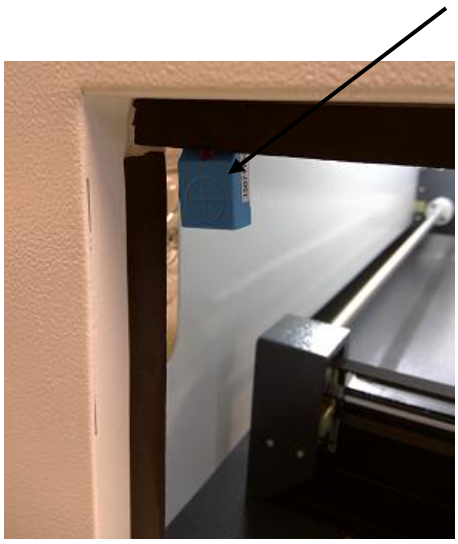
Check to make sure that the safety provisions are put back before turning on the master switch and commissioning the machine.

The following safety provisions have been installed on the machine:

- Various pictograms, refer to paragraph 2.3 and 2.4.
- The machine is equipped with a power cord with Euro plug and protective earth and needs to be connected to a socket appropriate for that purpose with a power voltage of 240V-50/60Hz/protective earth.

- The transparent lid protects the laser area during operation. By closing the lid, the apparatus is released for start-up by means of a magnetic switch.
  The apparatus stops abruptly when opening the lid.

- Magnetic switches have been installed on each access hatch/door around the apparatus.
  The apparatus stops abruptly when opening one of these hatches/doors.



- Signal lamp laser machine is operational

- Emergency stop button

- Various safety warnings

2.4 Applied pictograms

Danger warnings

Caution:
Danger of laser radiation

Caution: possible risk of clamping of fingers or hand.

Caution: risk of fingers being pulled along

Caution: electrical voltage

Caution: High voltage (30,000-55,000V)

Caution: Fire hazard

Caution: General danger

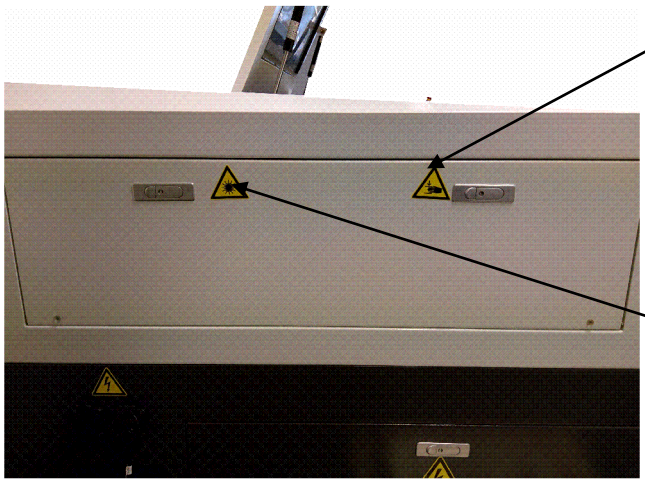
Prohibition warnings

Do not open while operational

2.5 Applied pictograms at location of possible danger on the machine

Pos. 01 Caution:
General danger during operation when performing service and maintenance.

Pos. 02 Caution:
laser radiation while laser is operational when performing service and maintenance.



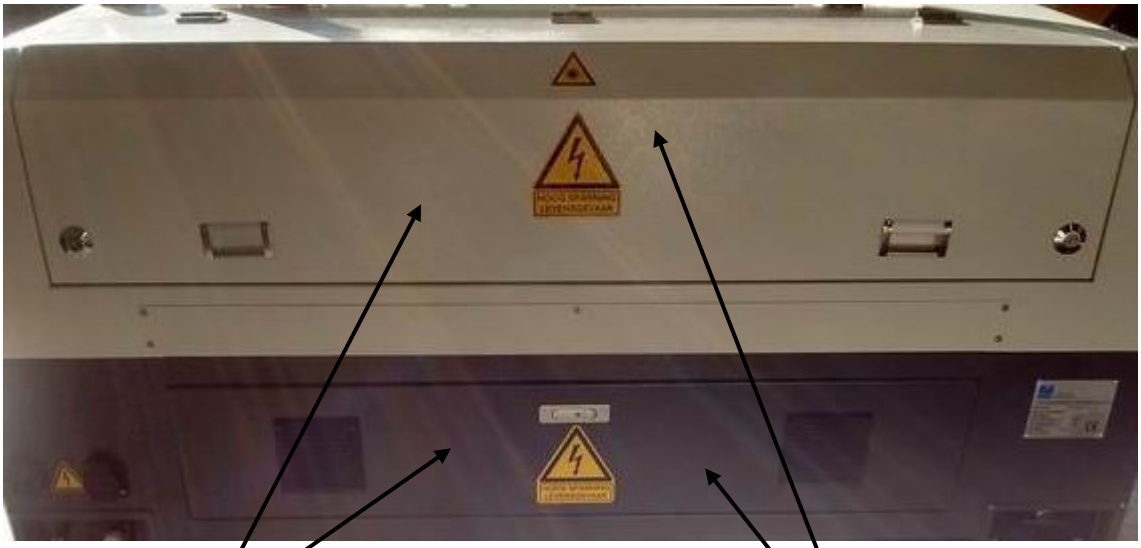
Pos. 03 Caution:
Risk of clamping of fingers and hand end stop x and y-axis during operation in left service hatch when performing service and maintenance.

Pos. 04 Caution:
laser radiation while laser is operational in left service hatch when performing service and maintenance.

Pos. 05 Caution:
Risk of clamping of fingers and hand end stop x and y-axis during operation in right service hatch when performing service and maintenance.

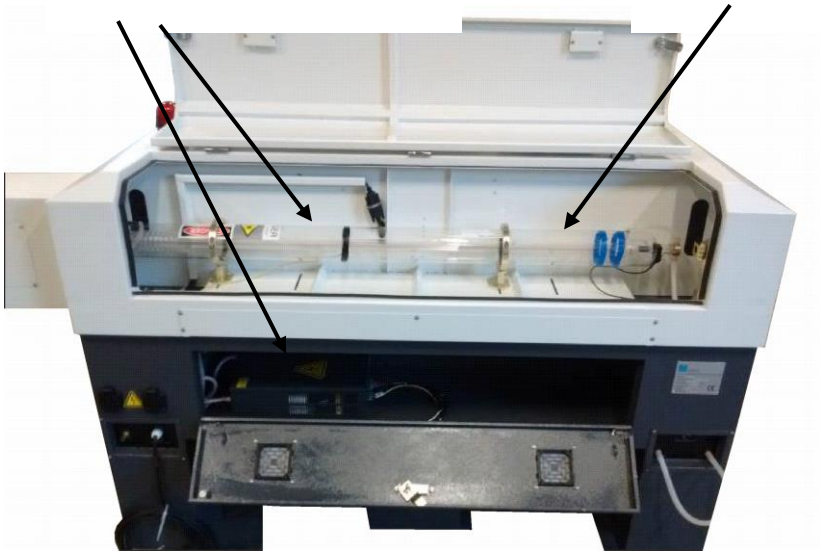
Pos. 06 Caution:
laser radiation while laser is operational in right service hatch when performing service and maintenance.

Pos. 07 Caution:
electrical voltage when machine is turned on when performing service and maintenance.

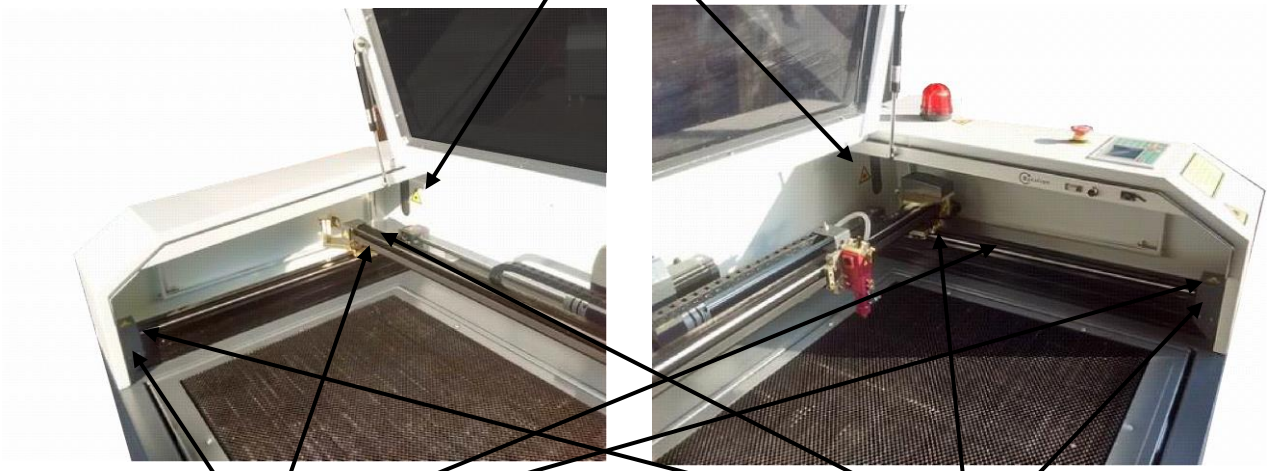


Pos. 8 + 9 Caution:
<u>High voltage</u> in laser resonator area and laser power area when machine is turned on when performing service and maintenance.

Pos. 10 Caution:
<u>Laser radiation</u> in laser resonator area when machine is turned on when performing service and maintenance.

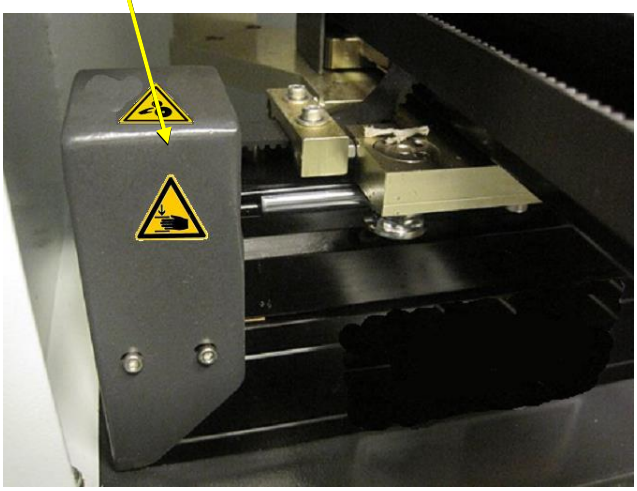


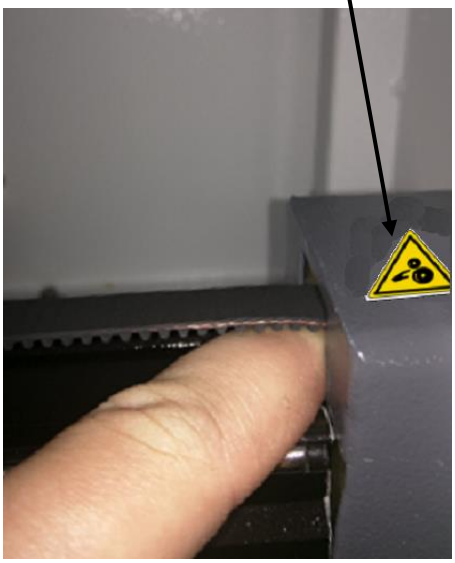
Pos. 10 Caution:
Laser radiation in laser resonator area when machine is turned on when performing service and maintenance.

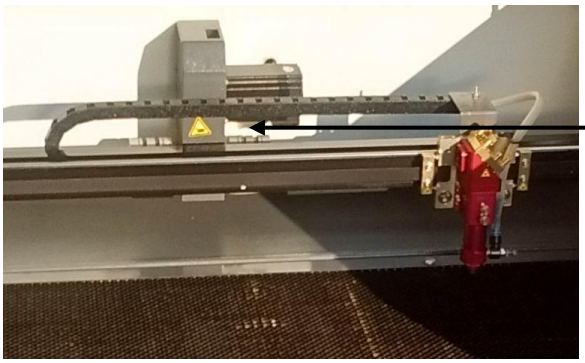


Pos. 11 to 14 Caution:
Risk of clamping of fingers and hand end stop **x and y-axis** on both sides during operation when performing service and maintenance.

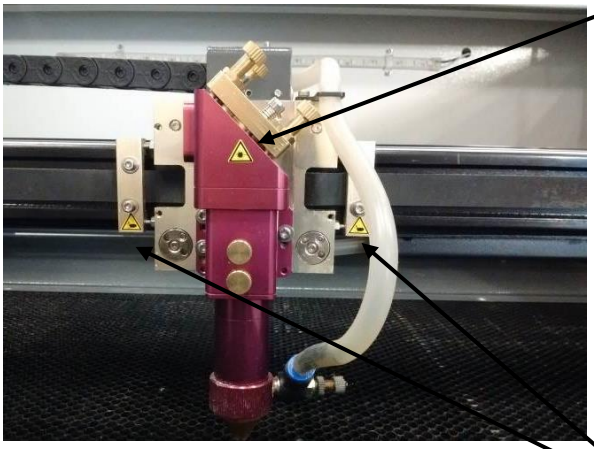
Pos. 15 to 18 Caution:
Risk of fingers and hand being pulled along toothed belt **x and y-axis** on both sides during operation when performing service and maintenance







Pos. 21 Caution:
Risk of clamping of fingers and hand rear position y-axis conductor during operation when performing service and maintenance.



Pos. 19 Caution:
laser radiation while laser is operational when performing service and maintenance.

Pos. 20 Caution:
Risk of clamping of fingers and hand end stop on the left and right side of laser holder during operation when performing service and maintenance.

3 Installation

Please take the following point into consideration.

- Check the machine and power cable for damage.
- Make sure that the cable is not pinched.
- Do not use the machine near water.
- Place the machine on a stable surface, workbench or table.
- All openings in and around the machine contribute to the ventilation of the machine.
- Make sure that all these openings remain unobstructed.
- Do not place the machine near a radiator or other heat source.
- Make sure that the environment is free from dust.
- The machine needs 1 separate group that is not shared with other apparatuses.

Any corrections/changes in the settings of the machine need to be made by or in consultation with BRM Lasers.

The laser has various connections for apparatuses that have to be connected to the machine. These include:

- cooler for the CO_2-tube
- air compressor
- extraction or Bofa to remove laser vapours

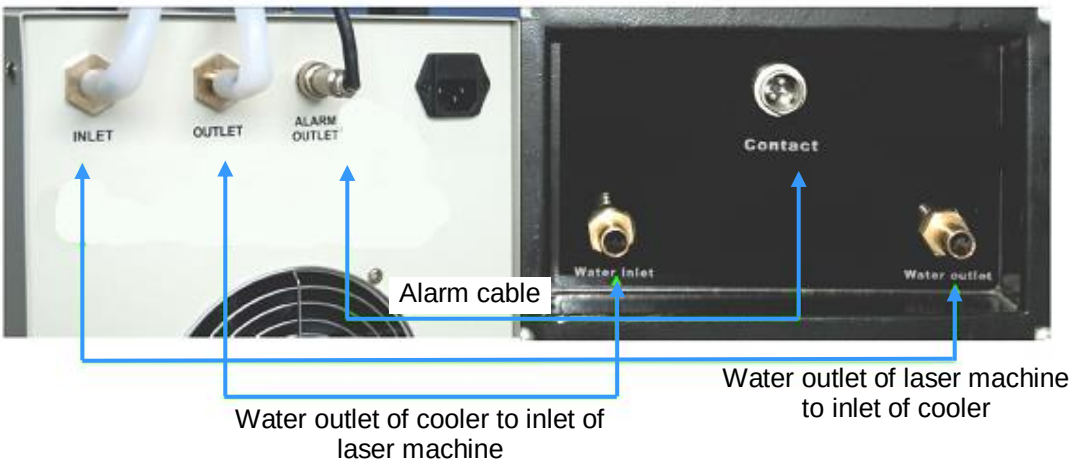
Additionally, there are also connections for:

- PC
- Ethernet
- mouse
- USB-stick

If you have a metal laser, the laser also comes with an O_2-connection for the oxygen bottle.

3.1 Connecting the cooler

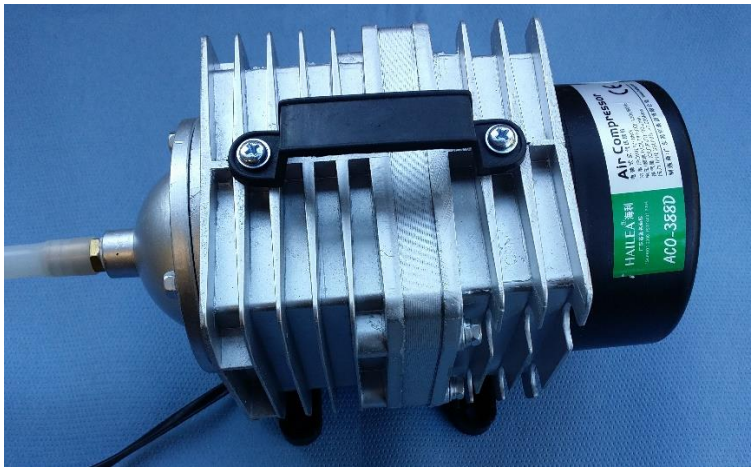
The cooler must be connected by means of 2 hoses and 1 alarm cable. The water outlet of the laser is connected to the water inlet of the cooler. The water outlet of the cooler is, in turn, connected to the water inlet of the laser. This creates a ring through which cooling water flows. The cooler will cool down the water and pump through the hose towards the laser tube. The water in the laser tube absorbs the heat of the tube so that the cool stays cool. Subsequently, the warm water will flow out of the tube and back to the cooler.



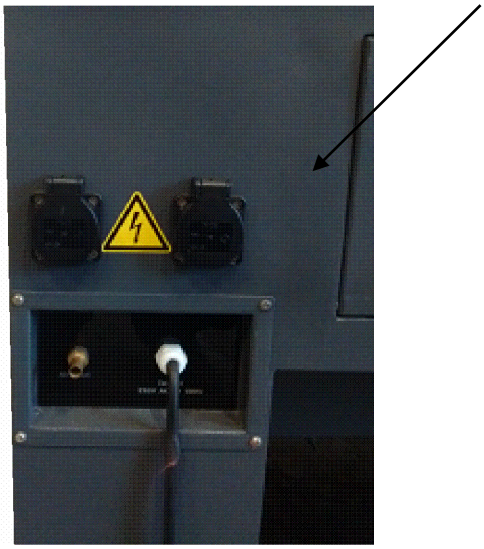
The alarm cable runs from the cooler to the laser to send a signal that the cooler is doing well. The signal will stop and the laser will not cut for safety reasons when the hose is pinched or the cooler cannot cool well for another reason.

3.2 Connecting the air pump

The air pump is used to create a constant airflow along the cutting line of the laser. This is important for multiple reasons. The airflow ensures that the laser gases do not stay at the head which will decrease the possibility of igniting the laser gases. The airflow will also cause less obscuration for the beam, as a result of which the laser will cut better. The airflow also offers enough cooling and the waste will be blown away.



The air pump receives its power from the socket at the rear of the laser machine.
The connection for the air supply can be found there as well. The air will be brought inside the machine towards the laser head when the compressor is connected to the socket and air supply. The laser head is equipped with a valve to adjust the quantity of air. Experience has shown that adjusting the setting of the valve produces a better result.

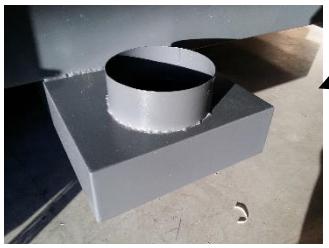


3.3 Connecting the extraction unit or Bofa

The laser machine needs to be connected to an air outlet to remove the laser gases from the laser area.
When using an extraction ventilator, it can be connected to a central extraction unit or the air can be guided directly to the outside.
If outward (central) extraction is not possible, it is advisable to connect a Bofa (independent air extraction and cleaning unit). Both use the same connections to the laser machine.

The extraction unit or Bofa can be connected to the laser via the air outlet in the centre/rear bottom of the machine by means of the included hose. The electrical supply for the extraction unit or Bofa is provided by a socket (EU 230/240V 50/Hz) in the rear of the machine.

Do not forget to turn on the on/off switch of the Bofa when it is being used.



air connection

3.4 Connecting the PC, USB-stick, mouse and network mouse

The side panel of the laser machine contains the secondary buttons and various connections.
There are 3 USB-connections. The PC-connection needs to be linked directly with the PC if programmes need to be sent directly from the PC to the machine. The U-disk port allows you to connect USB-sticks and programmes can be retrieved and run without having to connect a PC. A mouse can be connected to the mouse port that is used in the operating window. However, this is optional. The machine is completely usable without connecting a mouse. It may be more pleasant to operate the machine with a mouse.
However, the machine is completely usable without having to connect a mouse. The network connection is available to connect the machine to the PC via the network. Refer to **Chapter 5 Software** for information about how a connection is established with the Internet.

Machine master switch

Switch to turn the sockets in the rear on or off

Switch to alternate between the Y-axis and U-axis

Master switch for laser power 2

Master switch for laser power

Switch for automatic or manual power control

Milliampere gauge to check the power consumption

Milliampere gauge to check the power consumption tube 2

Reset button for the emergency stop

Connections for the network, USB-stick, mouse, PC

Potentiometer to manually control laser power tube 2

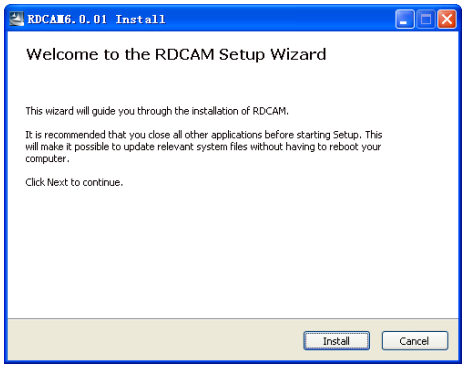
Potentiometer to manually control laser power

Switch for automatic or manual power control tube 2

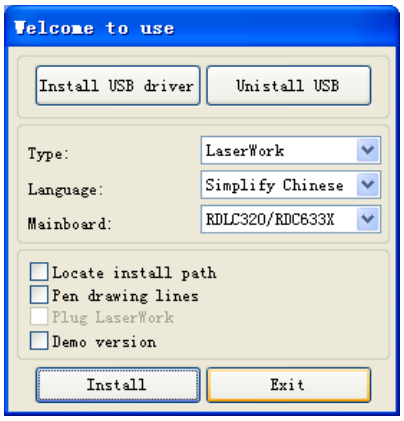
The machine can start up and be tuned when all necessary connections have been established. Refer to **Chapter 6 Tuning**

3.5 Installation software

In order to operate the laser, you need to install software that prepares drawings and images for the laser that you wish to have cut out or engraved.
This software is delivered with the machine for self-installation on an existing PC.



You will see the adjacent window when you start the installation programme. Press **install**
A loading bar will appear while the necessary files are being loaded. Once this is complete, a window will appear with several options to choose from.



Use the top 2 buttons to install or uninstall USB-drivers. These must be installed first before you are able to proceed. After this installation, you will notice a window with options to select the software.

Type
this is where you can select if you wish to install the software or a plug-in for another drawing programme. A plug-in allows you to use the other drawing programme to create laser files. The Coreldraw plug-in support Coreldraw 11 to x5 and the Autocad plug-in support version 2004 to 2010.

Language
You can select the language you wish to install from the options.

Main board
Is preset and does not need to be used.

Locate install path
This is to use another installation location. It is C:\ by default

Pen drawing lines
This is only necessary for a certain machine and will normally not need to be checked off. However, if this is the case, this will be announced by BRM.

Plug-in laser work
This installs special plug-ins to be able to use advanced functions with the software. This could be a nice addition if you are very familiar with the software.

Demo version installation

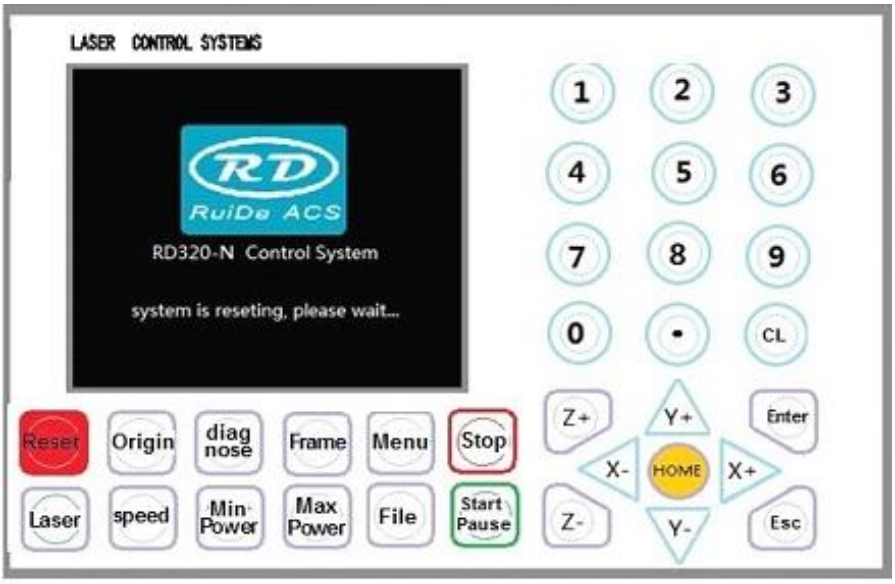
This is used to install a demo version. This version works without having to connect a laser and is thus handy to look around and familiarise yourself with the software. However, a programme cannot be stored or sent to the machine.
When all choices have been made, press **install** and the current configuration will be installed. Once this is complete, you will be welcomed with an **install finish** window!
The installation option window does not close automatically so that another installation can be configured. If, for example, you want to install the Autocad plug-in and laser work yourself, you can run the installation 2x with the different options.
Once all installations have been completed, click on **Exit** and the software will have been installed successfully.

4 Operating instructions(operation)

Only trained employees are allowed to operate the machine.

Check to make sure that no dirt and/or foreign objects are in/on the machine before using the machine.

4.1 Control panel



4.2 Control keys

"Reset" key 

:repair the whole system and start the reference;

"Origin" key 

:sets the current location as working zero point;

"Laser" key 

:shooting with the laser;

"Frame" key 

:follow the outer frame of the selected programme to check if it is positioned well;

"File" key 

:to management of files and programmes;

"Speed" key 

:Set the speed for the motion keys and the currently selected Layer;

“Max Power” key 

:set the power of the laser key and maximum power of the currently selected layer;

“Min Power” key 

:set the minimum power of the currently selected layer;

“Stop” key 

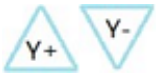
:stop the current process;

“Start/Pause” key 

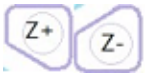
:start or pause the current process;

“X+/-” key 

:left-right side in the menu or move x-axis;

“Y+/-” key 

: up-down in the menu or move y-axis;

“Z+/-” key 

: move z-axis or leaf through pages in the menu;

“HOME” key 

: start the open menu for reference;

“Menu” key 

:go to settings menu;

“Diagnose” key 

:diagnosis of the system such as the water cooler, etc..;

“Esc” key 

:to stop the work or to close an open menu;

“Enter” key 

: accept the created adjustment;

“Numeral” key 

: to fill in input windows;

“Dot” key 

to put a dot after the input field;

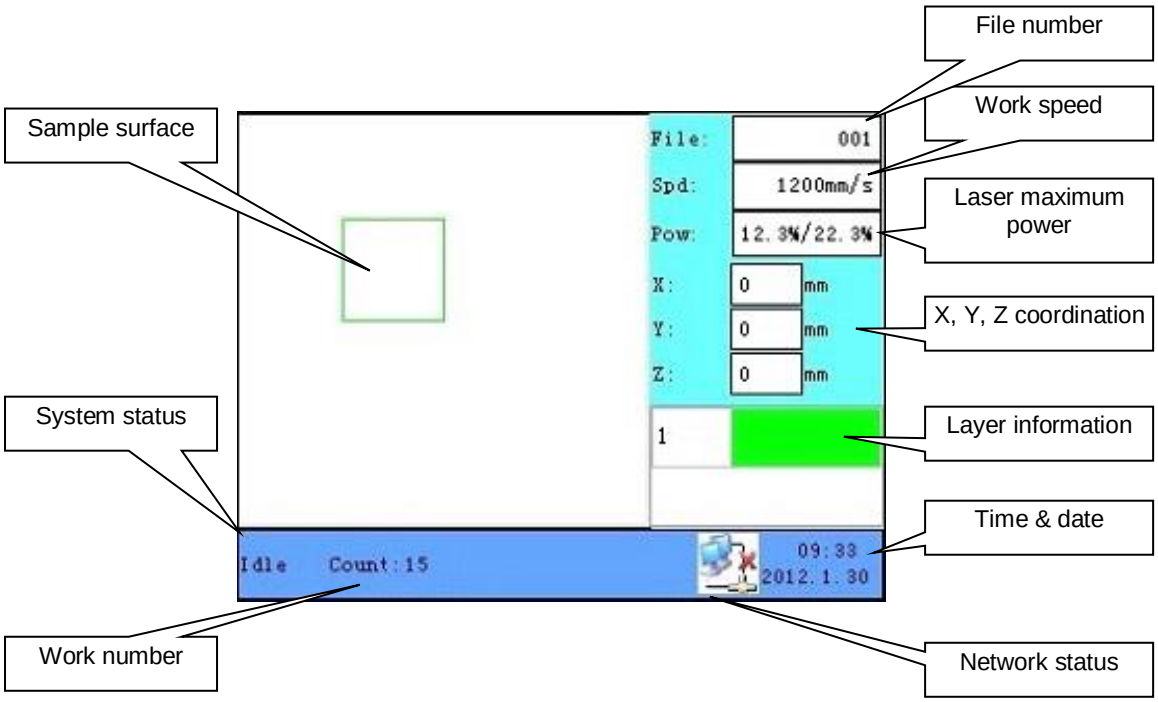
“CL” key 

: empty entered field;

4.3 Interface

4.3.1 Main menu

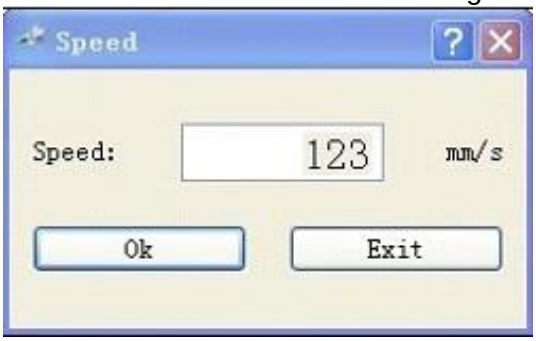
When the machine starts up and the reference is started, the screen below will be shown:



- Sample surface
  This is where a visual example is given of the loaded programme
- System status
  Representation of the current status
- Work number
  How often the current programme has run
- Network status
  Representation of the Internet connectivity
- Time and date information
  Time and date representation
- Layer information
  Representation as to which layers are in the order. Double-click on "Enter" to get to the layer settings and make adjustments to the speed and power.
- X-Y-Z coordinates
  Show the current location of the head to an accuracy of 0.1 mm
- Laser maximum power
  The power laser key is shown here in '**idle**' mode. In running/pause mode, the power of the current layer is shown
- Work speed
  The set speed for manual operation is shown in '**idle**' mode. In running/pause mode, the current layer is represented here
- File number
  The file number in the file management

4.3.2 Changing the speed

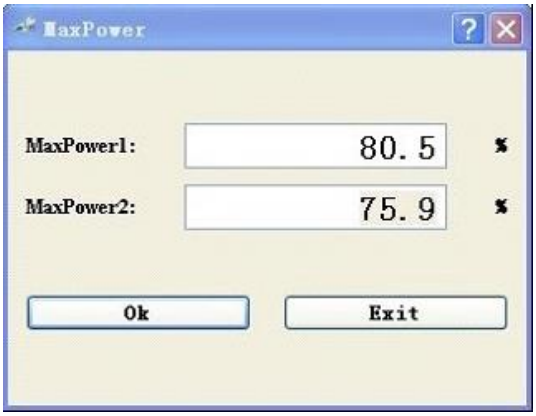
Press "Speed" when you are on the main screen. The following screen will appear:



Press the "+/-" key to shift the cursor to the left and right side. Press "CL" to remove the old value and press the "Numeral" to change the value to the value of your choice. Press the "Enter" key to save the change. Press the "Esc" key not to save the change.

4.3.3 Changing the max/min power

Press the "Max Power" or "Min Power" key when you are on the main screen. The following screen will appear:



The changing method is the same as changing the speed.

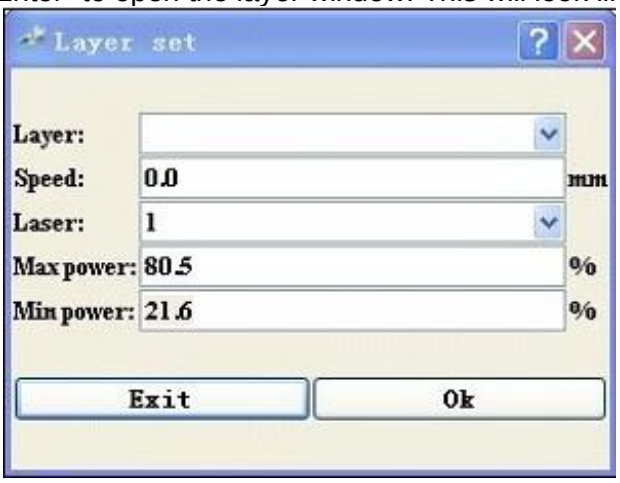
4.3.4 Starting the reference

Press the "Home" key when you are on the main screen. The following screen will appear:

Press the "X+/-" keys to move the cursor. Press the "Enter" key to start the selected axis reference. The screen gives a notification when the reference is starting.

4.3.5 Adjusting the layer settings

After a programme has been selected, you can use the "Enter" key to select the first layer. Afterwards, you can use the "Z+/-" keys to select another layer. When the desired layers has been selected, press "Enter" to open the layer window. This will look like the screen below:



Press the "Z+/-" keys to navigate to the desired parameter. When the parameter is selected, the changing method is the same as changing the speed and min/max power.
The z-axis cannot be moved during the selection of the correct layer. Do you want to continue moving the z-axis, first use the "cl" key.

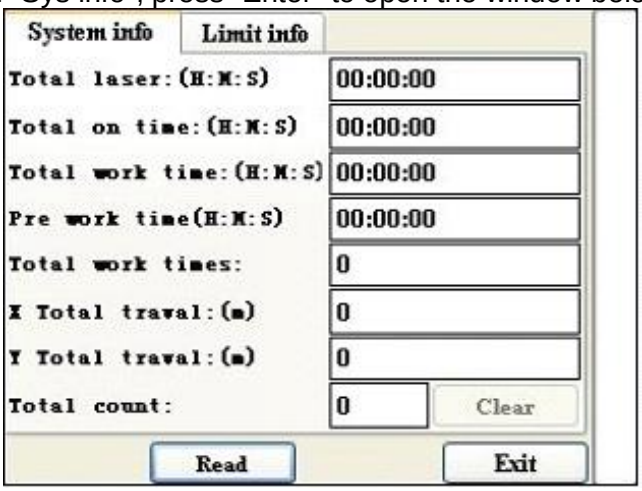
4.4 Menus

Press the "Menu" key when you are on the main screen. The following screen will appear:

Press the "Y+/-" keys to move the cursor. Press the "Enter" key to open the selected submenu.

4.4.1 Sys info

When the cursor is on "Sys info", press "Enter" to open the window below:



By default, the cursor is on the "Read" button. Press "Enter" to load all system info and limit info. "Z+/-" can be used to navigate between the information and when the tab "System info" is selected, you can use the "Y+/-" key to alternate between "System info" and "Limit info". Press "Exit" to close the menu.

4.4.2 Sys config

When the cursor is on "Sys config", press "Enter" to open the window below:

By default, the cursor is on the "Read" button. Press "Enter" to retrieve the information. The "Z+/-" keys can be used to alternate between the information. Information that has changed can be stored by selecting "Write" and pressing "Enter". "Lcd type" cannot be changed. You can press "Ethernet"/"USB" in the section "Com" to open the selection window between connections. This screen needs a password to get in and can be provided by BRM.

4.4.3

4.4.3 Function sub menu

When the cursor is on "Func" and the "Enter" key is pressed, the following screen will open:

You can change the status when the cursor is on "origin x enable" and "Enter" is pressed. Red is on and green is off in these fields.
Multiple Origin Enable: this can be turned on or off. 1 origin will be used when you turn this off. You can press the origin button on the key field and only that origin will be used. When you turn it on, the multi-origin logic will be applied and the origin key on the key field will be deactivated. In that case, each origin must be set separately. This happens as follows:

Origin X Enable: if multi-origin is activated, 4 set origins can be activated or deactivated individually.

Set Origin 1/2/3/4: if the multiple origin is activated, the cursor can be put on the set origin and "Set as Origin 1/2/3/4" can be selected. Afterwards, press on "Enter" and the current coordinates will be stored in origin 1/2/3/4.

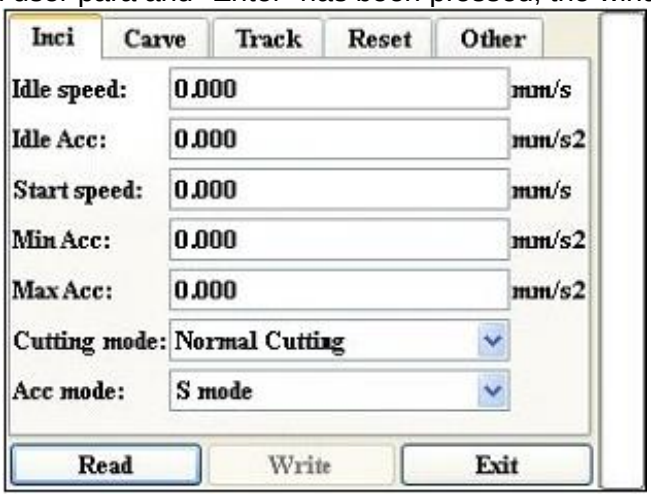
Next Origin: there are 5 possibilities from 0 to 4. Origin 0 means that the origin key on the keyboard is used. 1 to 4 are used for determined origins. Next origin can be selected between 1 and 4 and then its takes the origin in question for the next product. (only if the origin in question is turned on). Origin 0 cannot be selected here.

When the Multi Origin is turned on and the next origin is on 1 and all 4 origins are on, and the programme has been selected, "take the Original origin as current origin" so that the programme will grab the next origin every time it starts up: 1->2->3->4->1->2.....

Origin location: this is where a selection can be made where your origin point is in your frame. Top left, top right, bottom right or bottom left.
Set Para/ Recover Para: this is for the supplier only

4.4.4 User Para

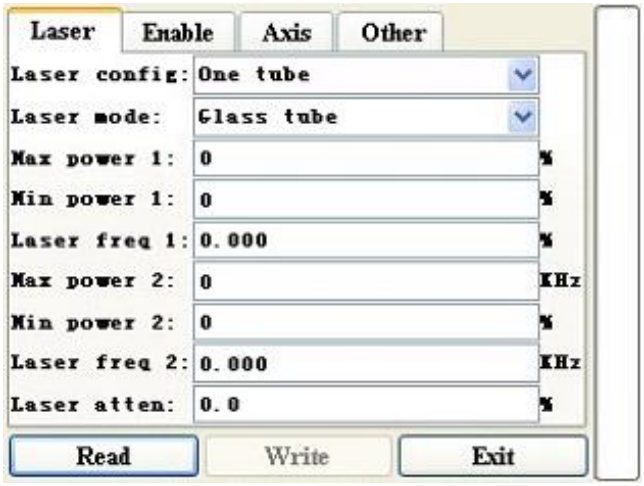
When the cursor is on user para and "Enter" has been pressed, the window below will open.



By default, the cursor is on the "Read" button. Press "Enter" to read and display all user parameters. When parameters have been adjusted, these can be stored with the "Write" button. The "Write" button can only be used when the "Read" button has been pressed once.

4.4.5 Machine para

When the cursor is on machine para and "Enter" has been pressed, the window below will open.

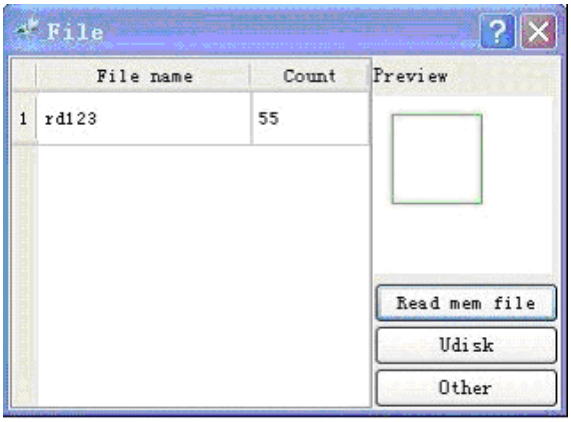


By default, the cursor is on the "Read" button. Press "Enter" to read and display all machine parameters. When parameters have been adjusted, these can be stored with the "Write" button. The "Write" button can only be used when the "Read" button has been pressed once.

4.5 File functions

4.5.1 Memory file

On the main screen when the "File" key is pressed. The window below will open when pressing "Enter".



- when this screen is shown, the information can be retrieved first with "Read mem file". The list of programmes in the machine will be displayed on the left side. The right side has an example of the currently selected programme. The "Y+/-" keys can be used to navigate between the programmes. The "Z+/-" keys can be used to navigate between the buttons. When a file has been selected, press the "Enter" key and the programme will be loaded for cutting.

The following window will be shown if the "home" key is pressed when a file is selected.

Run: to start the selected programme
Track: to let the frame of the selected programme run
Work time: to give an indication how long the programme will run
Clear count: to set the production counter back to 0
Delete: to remove the selected programme
Copy to U-disk: to copy the selected programme to a USB-stick

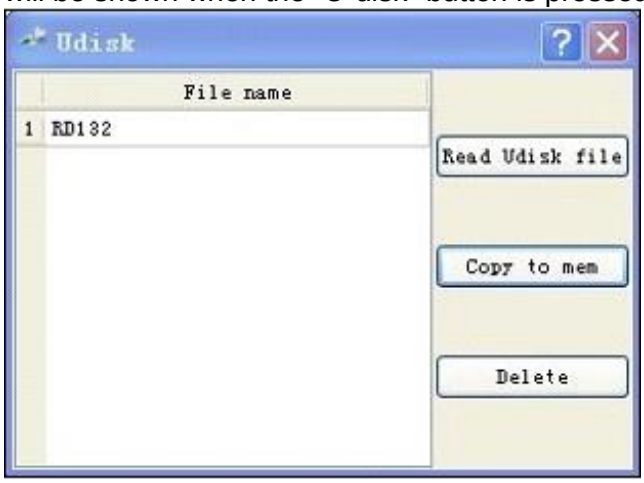
The window below will be shown when "other" is opened in the "file" window.

Curr work time to give an indication how long the programme will run

Clear all mem file count: to set all counters of each programme to 0.
Del all mem file: removing all files
Format memory: formatting the memory. This removes all files and wipes the memory clean. This can repair errors and slowness of the machine.

4.5.2 U-disk file

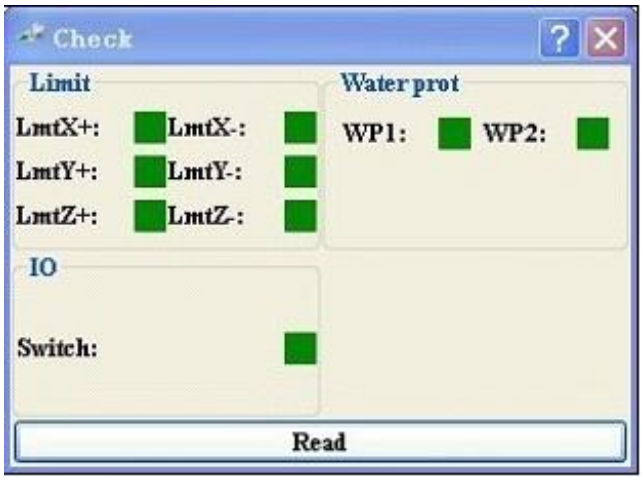
The following window will be shown when the "U-disk" button is pressed in the "file" window.



The system now show all the files on the USB-stick when it's connected. The USB-stick must be FAT32 formatted and not be larger than 4 GB. The programmes must not be in folders on the stick. When copying from the machine to the stick, it will also be copied to this location.

4.6 Diagnostics function

The following screen opens when the "diag" key is operated on the control panel.



This screen shows whether certain important circuits are operated. Red means active.

4.7 Alarm information

When there are problems, these can be shared with the user by means of alarm information. The machine does this automatically by means of the window below:

4.8 Emergency stop procedure

When the emergency stop has been activated, all movements of the machine are stopped and the brakes are triggered. An alarm message will also appear in the operating screen. As soon as the movements have stopped, the laser source and drive will be turned off and the brakes will be unblocked. As a result, the axes are to be moved by hand.

Prior to undoing the emergency stop, the causes of the emergency stop need to be removed and the machine must be in a safe position.

Unblock the emergency stop button by turning it clockwise by a quarter turn. This will make the button move up. Subsequently, the emergency stop can be reset by means of pressing the reset button (on the right side on the control panel). The laser source and drives will be under tension again. The defect message on the operating screen can be removed by pressing the "Enter" key. When the axles have shifted, it is advisable to start the reference again. You can do this by pressing the "home key" and by navigating to x-y-zero (4x Y-key) with the cursor keys. Subsequently, accept by means of the "Enter key". The production can start again as soon as the reference has been started.

4.9 Technical support

BRM Lasers
Technical Director Eric Slotboom
Service@brmlasers.com
+31 544 350 320
Website: http://www.brmlasers.nl

5 Software

5.1 Software compatibility

5.1.1 Software-supported file formats

- Vector format: dxf, ai, plt, dst, dsb…etc.
- Bitmap format :bmp, jpg,gif, png, mng,…etc.

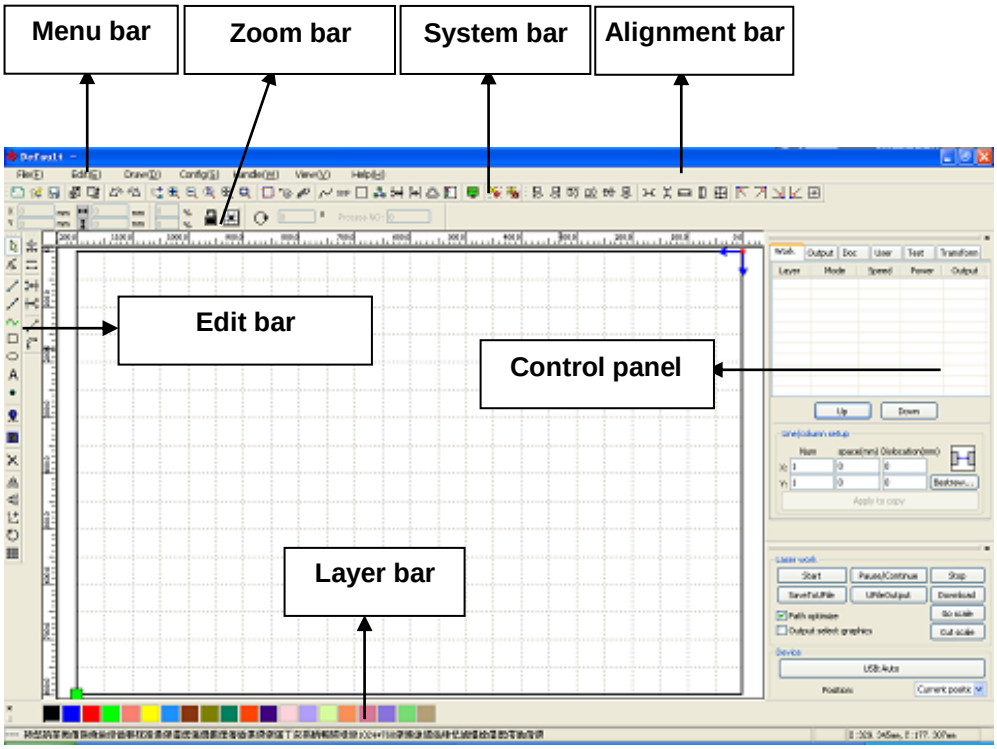
5.1.2 System requirements (environmental requirements)

- Windows XP or higher, Windows 8 is recommended
- Higher than CPU586, higher than Pentium III or Pentium IV is recommended.
- Memory, more than 1 GB is recommended.

5.2 Software basic functions

5.2.1 Main screen

The window below will appear when the software starts up.



5.2.1.1 Menu bar

The most important function of this software is available via the execution of the menu bar. Executing in the command menu is the most fundamental method of operation. Menu bar, including: Document, edit, draw, set, processing, view and help.

5.2.1.2 System bar

A number of the commands used the most can be found in the system bar.

5.2.1.3 Zoom bar

The zoom bar characteristic is the fundamental characteristic of the graphic activities, including the graphic location, size, scale, quantity processing.

5.2.1.4 Edit bar

The edit bar is by default on the left side of the work area. The edit bar includes commonly used instruments to make working more flexible and easier.

5.2.1.5 Alignment bar

Alignment of the selected objects.

5.2.1.6 Layer bar

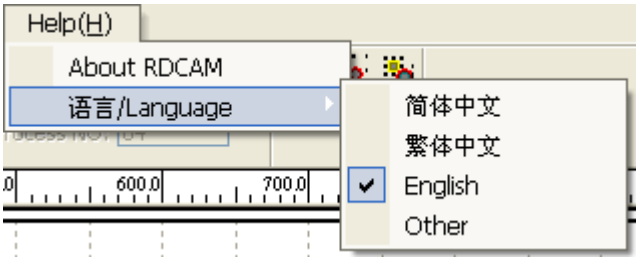
Change the layer of the selected objects.

5.2.1.7 CONTROL PANEL

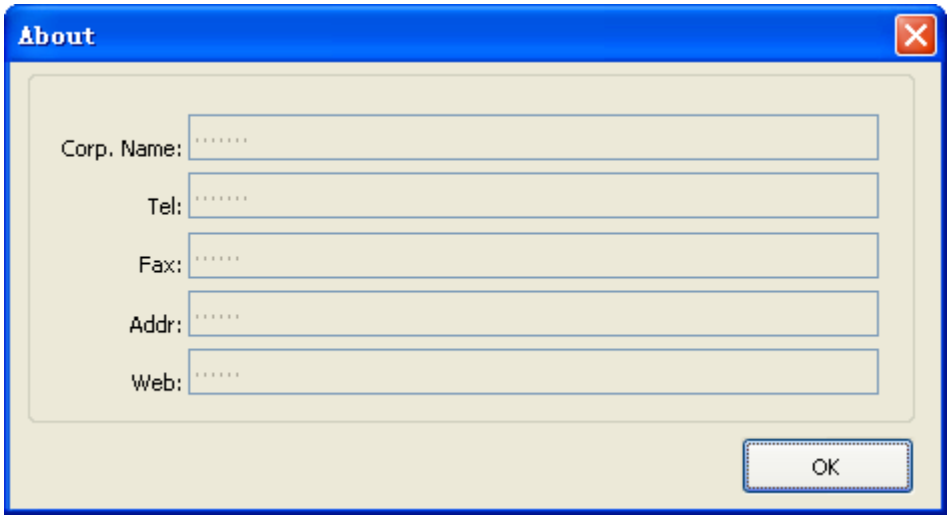
The control panel for laser settings, axis control, layer settings, etc.

5.2.2 Language settings and manufacturer information

In addition to choosing the language in the installation, you can also select in the software in which language the system must be displayed.
Click in the menu bar on Help】->【 语言/Language】and select the desired language.

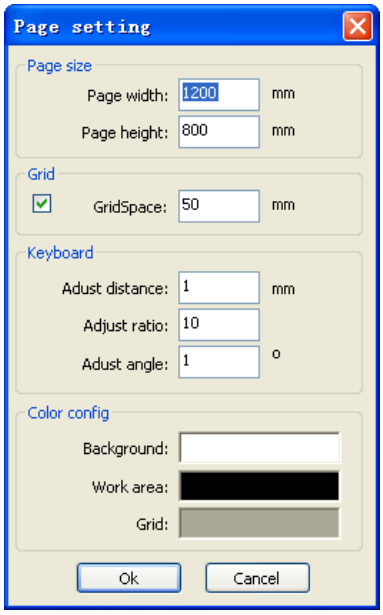


In order to obtain manufacturer information when you want to retrieve more information or help, select Help】->【 About RDCAM】



5.2.3 Page Setting

Click in the menu bar on Config】->【 Page setting】and the following dialogue window will appear:
【 Page width】: the width of the table. This is where you can set the x-dimension of the machine.
【 Page height】 :the height of the table. This is where you can set the y-dimension of the machine.



Under normal circumstances, the software will automatically adjust the table dimensions when you connect the machine to the PC. When no machine is connected, you can personally select a dimension if you wish to adjust the page size to the plate dimensions to facilitate the processing.

5.2.3.1 【Grid】
Turning on a drawing grid and adjusting the dimensions to help measure and align your project.

5.2.3.2 【Keyboard】
The keyboard can be used to perform accurate shifts with the selected objects. You can set here in which type of steps the keys must move the object.

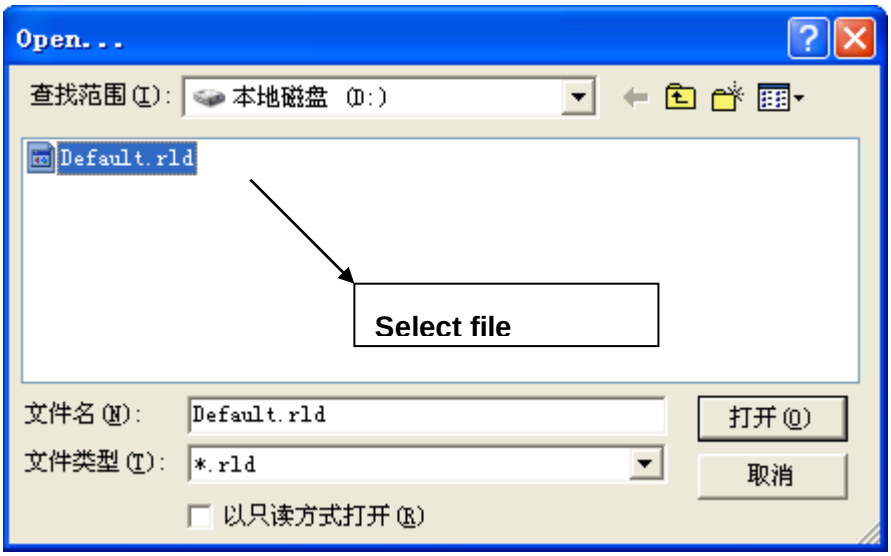
5.2.3.3 【Color config】
Select the colours of the editable field.

5.2.4 File Open and Save

The software uses .rld-files to save the edited drawing with laser information and layer information, etc.

5.2.4.1 Open File

(1) Click in the menu on【 File】->【 Open】,or click on the icon, and the following dialogue

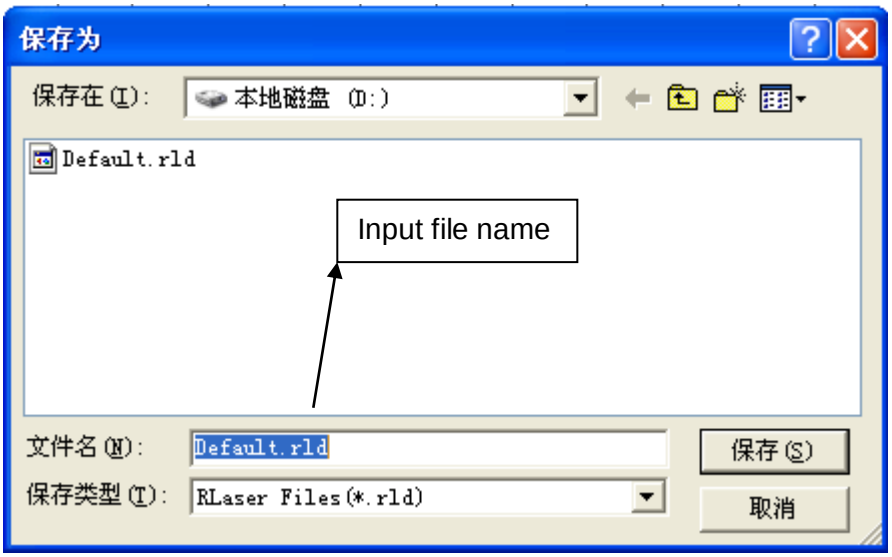


will appear:

(2) Select file (e.g. Default.rld), click on【 Open】.

5.2.4.2 Save File

(1) Click in the menu on【 File】->【 Save】,or click on the icon, and the following dialogue will appear:



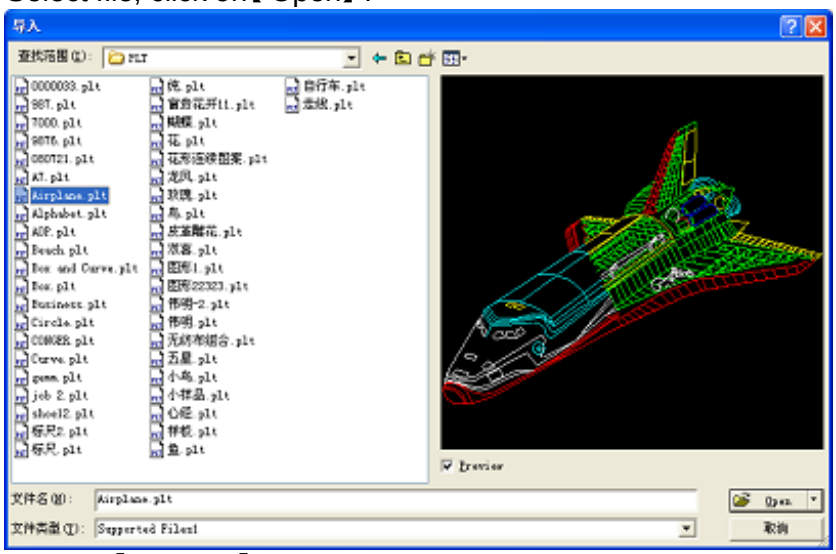
（2）type the name that the file must have, click on【 Save】。

5.2.5 Importing, exporting files

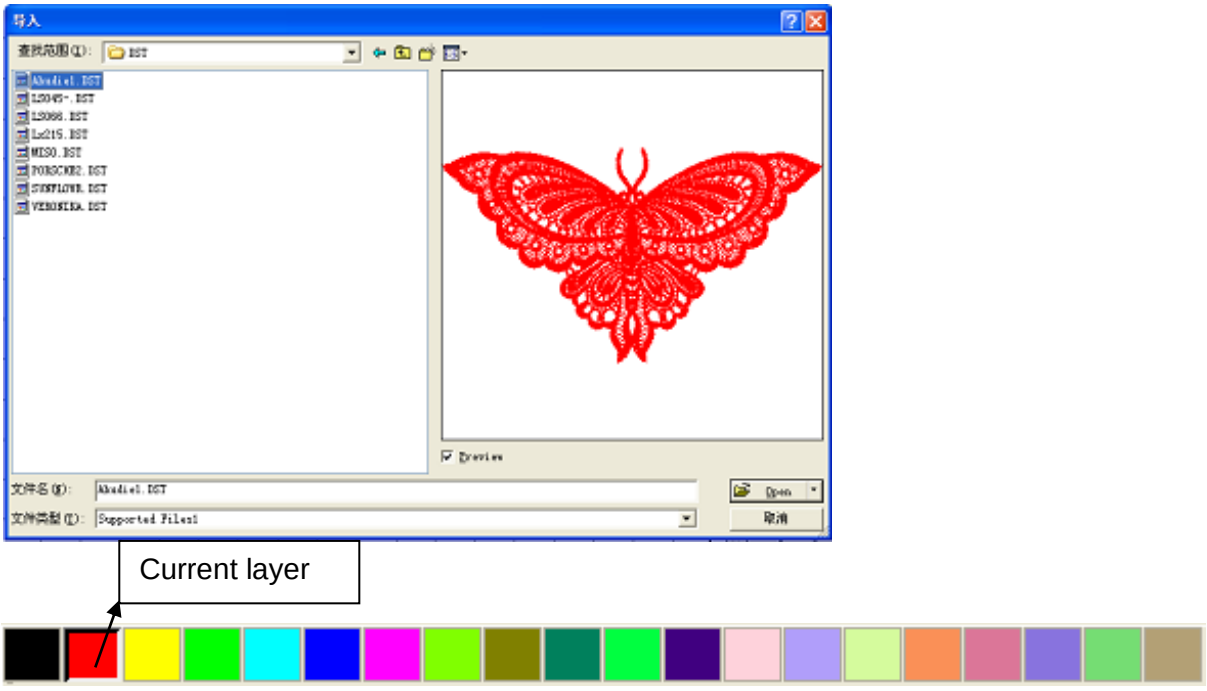
Due to the fact that the programme works with .rdl-files, you can get other types of files in the programme by importing them.
Supported file formats for import: dxf, ai, plt, dst, dsb...etc.
Support file formats for export: plt

5.2.6 File Import

Click in the menu on【File】->【Import】,or click on the icon  , and the following dialogue will appear:
Select file, click on【Open】.



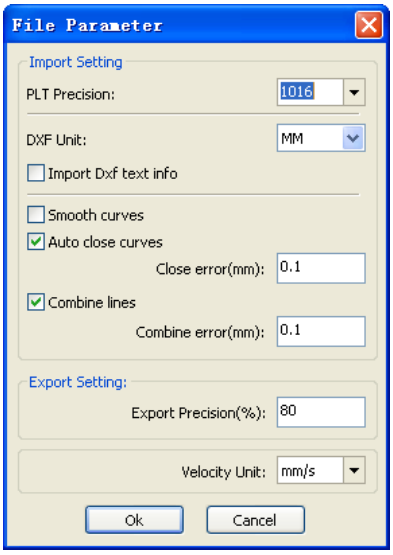
◆ select【Preview】 ,the selected file will give an example to see if you selected the correct file.
Vector files maintain their layer settings when these are processed in the file.
For other files, the currently selected layer will be used.



5.2.7 File export

Click in the menu on【File】->【Export】,or click on the icon  , and the following dialogue will appear:
type the name that the file must have, click on【Save】。

5.2.8 File parameters setting



5.2.8.1 PLT Precision
Setting according to the original plt precision format. if this cannot be set in the programme where you get it from, you can use whatever is filled in for you.

5.2.8.2 Smooth curves
When it relates to a vector file, you can make all curves here smoother. Caution: this adjusts your drawing and is not recommended if the drawing has been prepared in another programme.

5.2.8.3 Auto close curves
Close all open lines automatically if open lines are present.

5.2.8.4 Combine lines
Combine lines automatically to 1 line when they are within a combinable error distance

5.2.8.5 Color map automatically switch to grayscale
The laser uses grayscale to see what it must process. If it is a coloured image, the image can be converted to grayscale.

5.2.8.6 Import Dxf text message
Select this option if you want to keep the integrated documentation of the dxf-file.

5.2.8.7 EXPORT precision
Export precision

5.2.8.8 Velocity unit
What kind of velocity does the unit have to use. In general, mm/s is selected and this is the easiest way if you also want information via BRM. It is also possible to opt for m/min

5.2.9 Basic graphics creation

5.2.9.1 Line

Click in the menu on【Draw】->【Line】 ,or click in the editing bar  , drag the mouse on the screens. This will make you create a straight line. When keeping Ctrl pressed, you can draw horizontal or vertical lines.

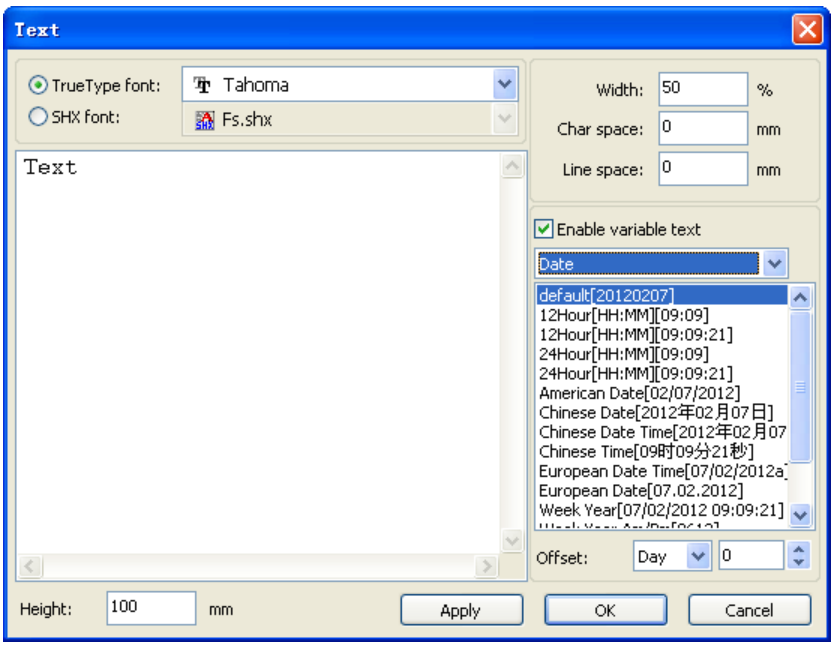
5.2.9.2 Polyline

Click in the menu on【Draw】->【Polyline】 ,or click in the editing bar  , drag the mouse on the screen to create a polyline.

5.2.9.3 Rectangle

Click in the menu on【Draw】->【Rectangle】, or click in the editing bar  , drag the mouse on the screen to draw a rectangle. Keep Ctrl pressed to create a square.

5.2.9.4 Ellipse



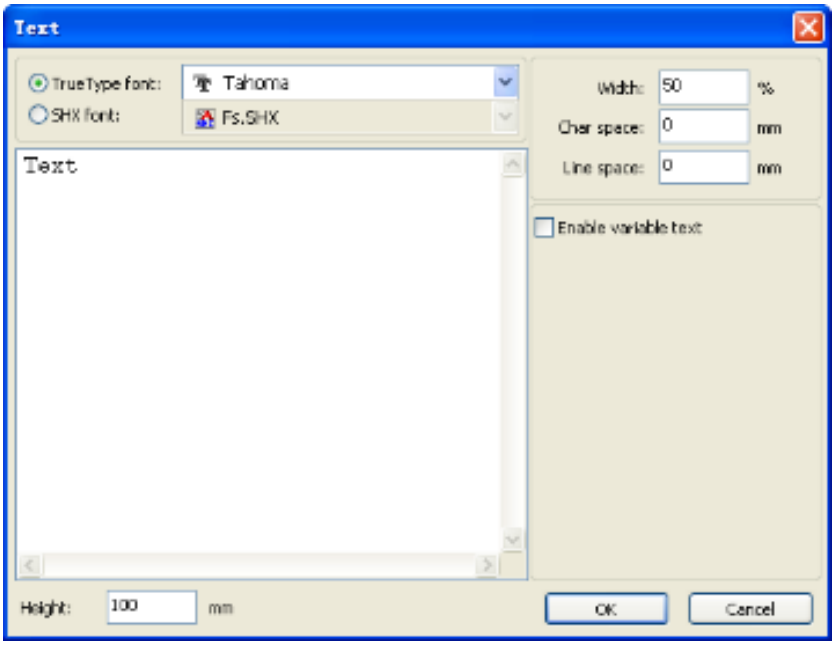
Click in the menu on【Draw】->【Ellipse】, or click in the editing bar  , drag the mouse on the screen to create an ellipse. Keep Ctrl pressed to create a circle

5.2.9.5 Point

Click in the menu on【Draw】->【Ellipse】, or click in the editing bar  , drag the mouse on the screen to put a point.

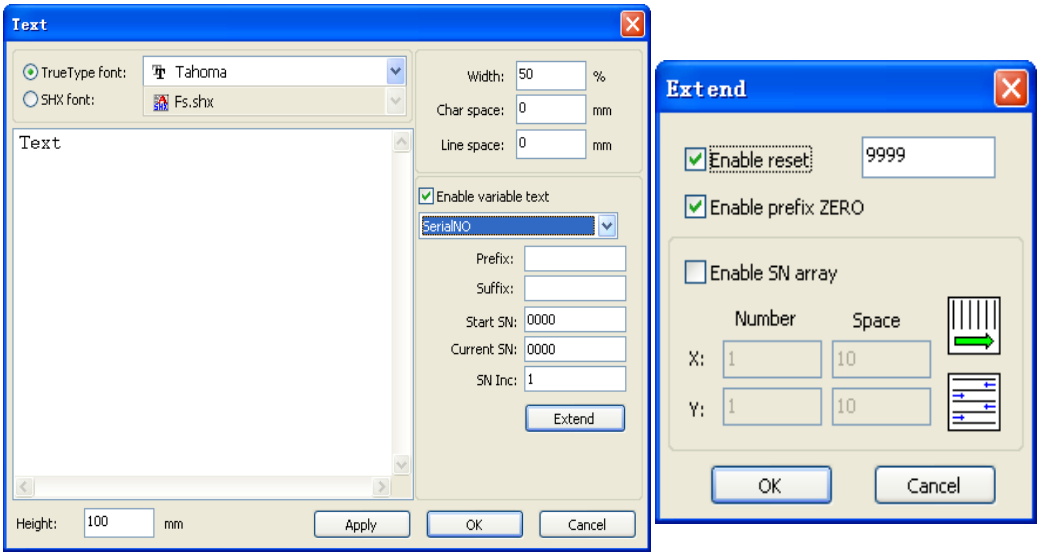
5.2.9.6 Text

Click in the menu on【Draw】->【Text】, or click in the editing bar  , afterwards you place a text box on the screen.
Choose the font that you want and set the width, interspace and line space. Afterwards, click on【OK】.



The software also supports variable text. Check off **Enable variable text** and an option window will appear. This is where you can choose which variable text must be engraved/cut. This can be time/date/unit in series, etc.

This can for example be used when each product must have a unique serial number or date of production.



As for the choice of serial numbers, there are certain options that make it possible to create automatically generated serials, e.g. : ABC0001DEF, ABC0002DEF, ABC0003DEF, etc.

5.2.9.6.1 【Prefix】
a fixed text block at the beginning of the serial number. E.g. ABC.

5.2.9.6.2 【Suffix】
a fixed text block behind the serial number. E.g. DEF.

5.2.9.6.3 【Start SN】
the first number where the serial automation must start.

5.2.9.6.4 【Current SN】
the current number of where to start. If a batch has already been created, it is possible to proceed with it by entering the following number.

5.2.9.6.5 【SN Inc】
by how much does the serial number need to be increased.

5.2.9.6.6 【 Enable reset】
Or the serial number must fall back if the end is reached. E.g. if the serial numbers go from 0001 to 9999 and 9999 has been reached, then the serial number generation falls back to 0001.

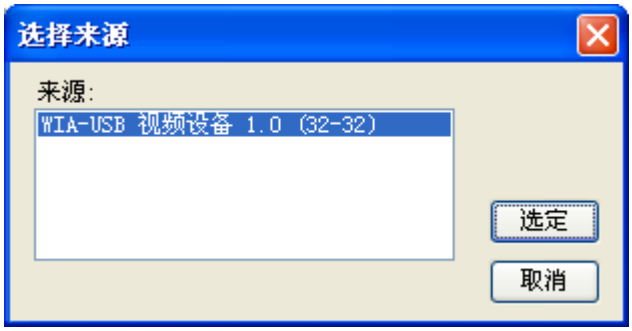
5.2.9.6.7 【 Enable prefix ZERO】
Or all zeroes must be left out for the numbering of the serial numbers.

5.2.9.6.8 【 Enable SN array 】
To jump to a one-time other serial number for special production. This can be used to make periodic test products with other serial numbers (every 100 for instance)
Example:

0001 0002 0003	jump after this batch to	0015 0014 0013
0006 0005 0004	jump directly to the group of	0007 0008 0009
0016 0017 0018		0016 0017 0018

5.2.9.7 Capture

Click in the menu on【Draw】->【Capture】 ,or click in the edit bar on 



This function can be used to create an image via a camera (webcam).

5.2.10 Object selection

You will have to select several objects while drawing to be able to achieve the desired result. When an object has been selected, the middle will be marked with an X and outer frame will be surrounded with 8 points.

Click in the menu on【Draw】->【Select】 ,or click on the Edit bar  and change to the status “Select”. You can select objects under this status. There are 5 ways to select an object.

- Click in the menu on【Edit】->【Select All】(shortcut Ctrl+A, select all objects
- Click with the mouse on the screen to select a single object

- select with a selection box.

Press the left mouse button and drag a square around the selection.
Afterwards, release the left mouse button.

- adding an extra object to the selection.

Adding to the selection: press the "Shift" key and click or box the desired object.
Excluding from the selection: press the "Shift" key and click or box the desired object.

- select all objects in one layer.

Click with the right mouse button on the layer that you want to select.

5.2.11 Object colour

When you have selected an object, you can give it a different colour. This colour will then be linked to a new layer so that the selection can use other cutting/engraving settings.

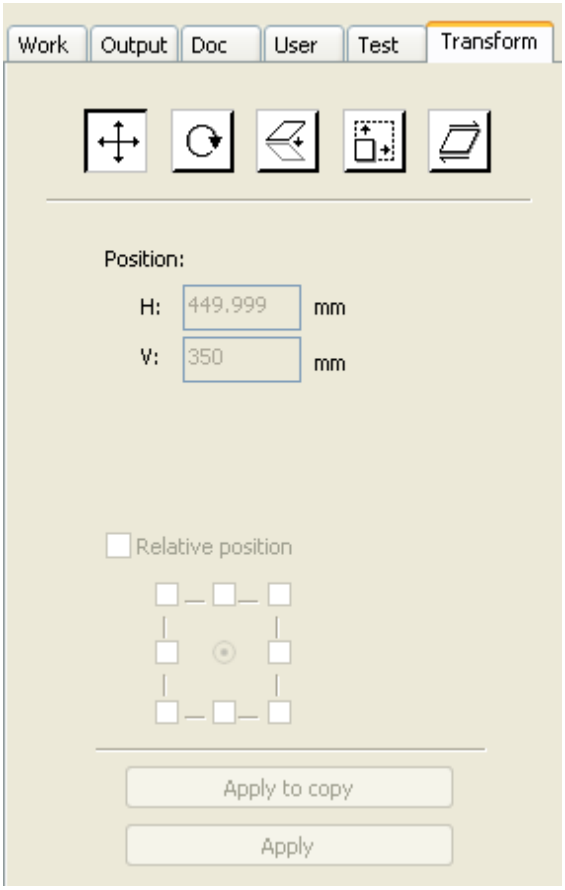
5.2.12 Object transformation

Transformation is adjusting the object without adjusting the actual object. Think of scaling, rotating on the screen

Transformation is made possible with the user bar  This is where the object can be mirrored, turned and rasterized.

The object settings bar can be used as well.

A third possibility is the transformation bar on the right side of the screen

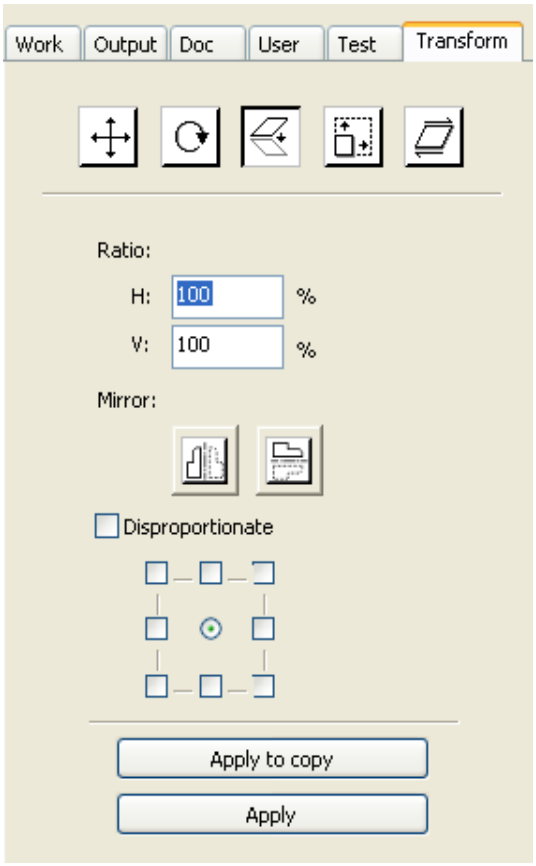


5.2.12.1 Mirroring the object

The object can be mirrored over the horizontal and vertical axis.

Click on the Edit bar to mirror horizontally.

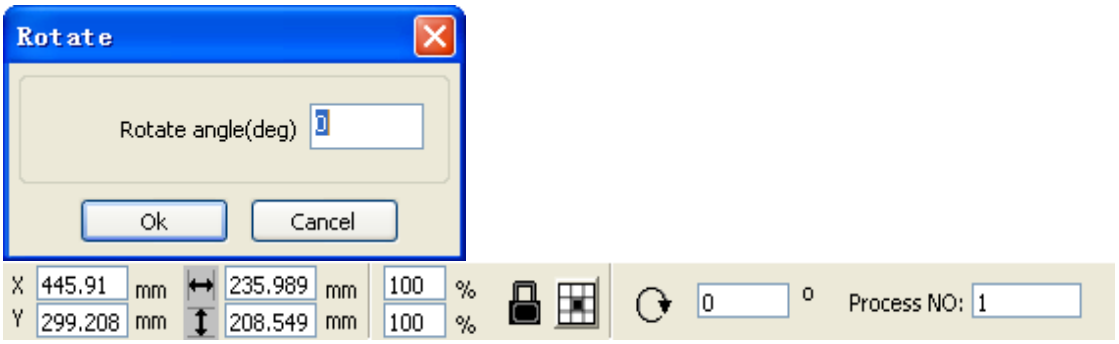
Click on the Edit bar to mirror vertically.



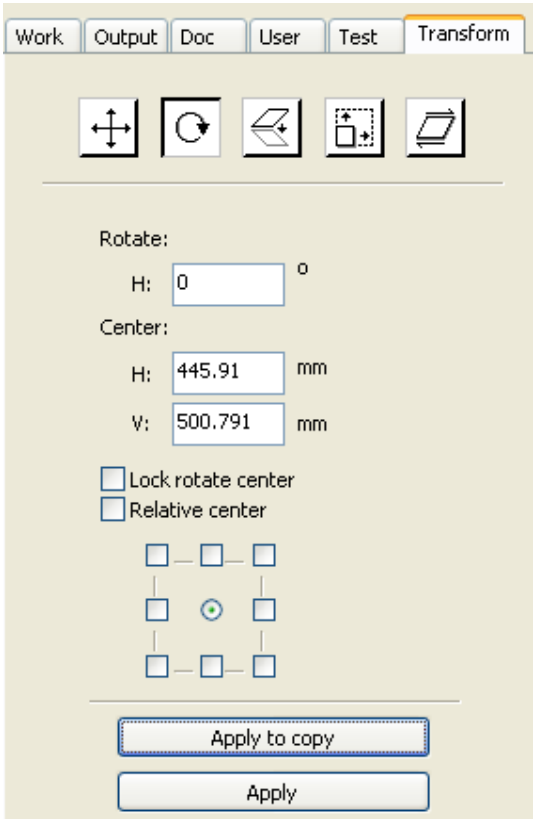
or by copying, rotating or mirroring the transformation tools

5.2.12.2 Object rotation

Click on the Edit bar . A pop-up window will appear where you enter the new angle and accept it with the【OK】button.



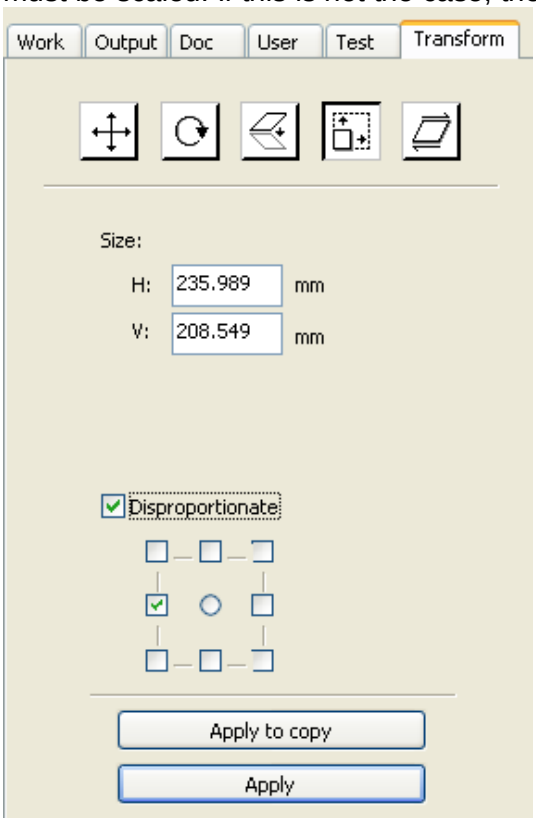
Or enter the rotation in the object bar.



It is also possible to adjust the rotation in the transformation tab.

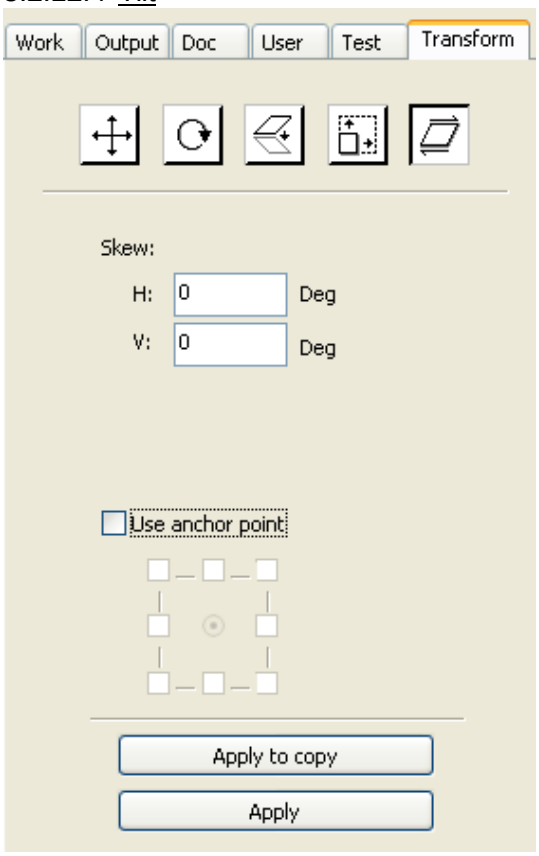
5.2.12.3 Object size

You can adjust the size and position of the object. The lock must be closed when the other axis must be scaled. If this is not the case, the object will be taken out of proportion.



This is also possible in the transformation tab

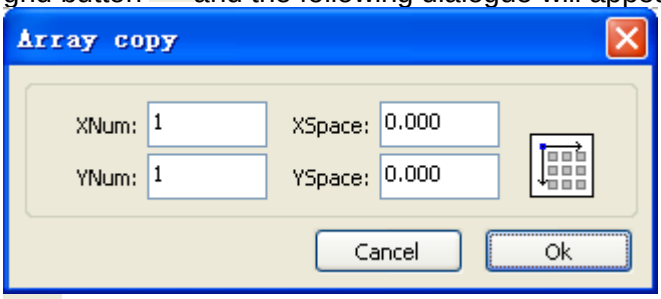
5.2.12.4 Tilt

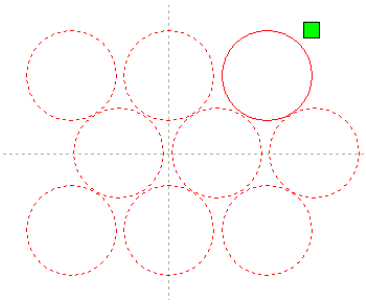


The transformation bar also supports the tilt function. This takes the image out of proportion.

5.2.12.5 Copying object grid

Click on the Edit bar . Select the objects that you wish to copy. Subsequently, press the grid button and the following dialogue will appear:





width of a single object (mm) height of a single object (mm)
You can adjust the number of copies by means of xnum and ynum.
After having selected the quantity and interspace, click on the【Apply】button and you will now see the result on the screen.

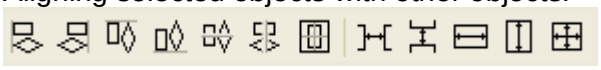
5.2.12.6 Align object to origin
Several tools are to be used to orientate an object to a certain location:

, the selected object in the middle will be moved to the middle of the table.

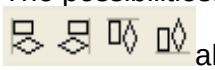
, the selected object will be put in a corner of the table. Bottom left, bottom right, top left, top right.

5.2.13 Aligning the object

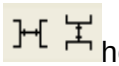
Aligning selected objects with other objects:



The possibilities:


align left, align right, align top, align bottom.


align vertical centre, align horizontal centre, align centre.


horizontal equal distance, vertical equal distance.


same width, same height, same size.

5.2.14 Viewing the object

Moving the image: click in the menu on【Edit】->【Move】or click on  。afterwards drag the mouse to move.

Zooming out: click in the menu on【Edit】->【ZoomOut】or click on  。each click zooms out the screen a little bit

Zooming in: click in the menu on【Edit】->【ZoomIn】or click on  。each click zooms in the screen a little bit

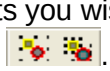
Viewing the selection: click in the menu on【Edit】->【View Select】or click on  。afterwards drag a frame with pressed left mouse button where you want a zoomed in image. The image will zoom in as soon as you release the left mouse button.

Viewing the page: click in the menu on【Edit】->【View Page Frame】or click on  。the image focuses on the entire table size.

Viewing data: click in the menu on【Edit】->【View Data Frame】or click on  。the screen zooms out so that all objects are visible.

5.3 Advanced software functions

5.3.1 Grouping and ungrouping

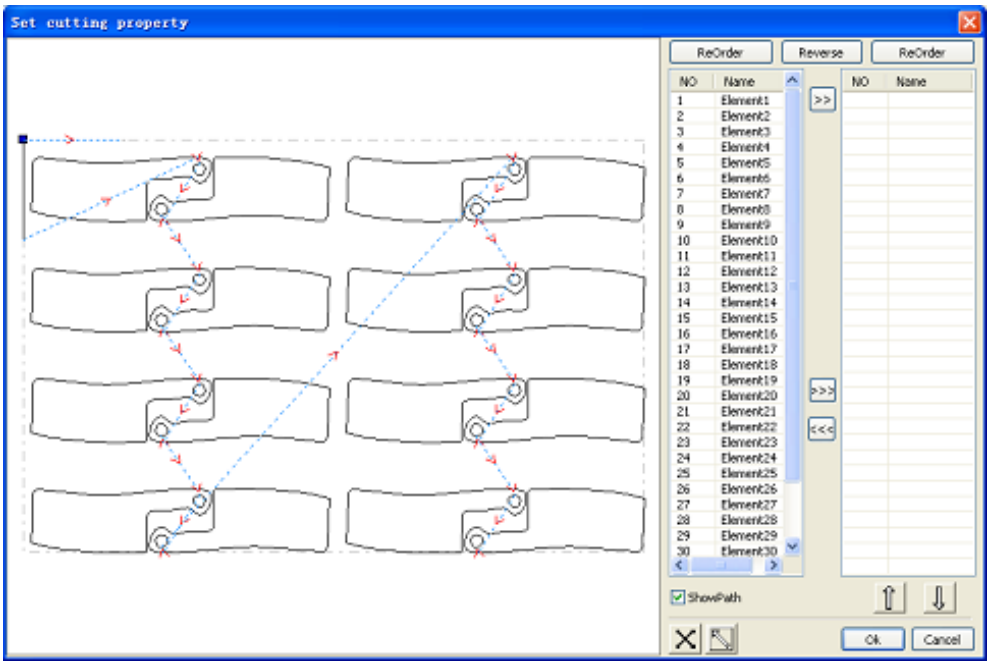
If it is necessary to edit several objects as 1 joint object (as in a text block), you can group these objects.
Select the objects you wish to group, then go to:【Edit】/【Group】(【UnGroup】), or directly from the tool bar  .

5.3.2 Important tools

These are different options to make it possible to cut optimally and efficiently.

5.3.2.1 Manual sorting and selecting the cutting order

【Edit】->【Set cutting property】The order of the different objects can be chosen manually in this window.

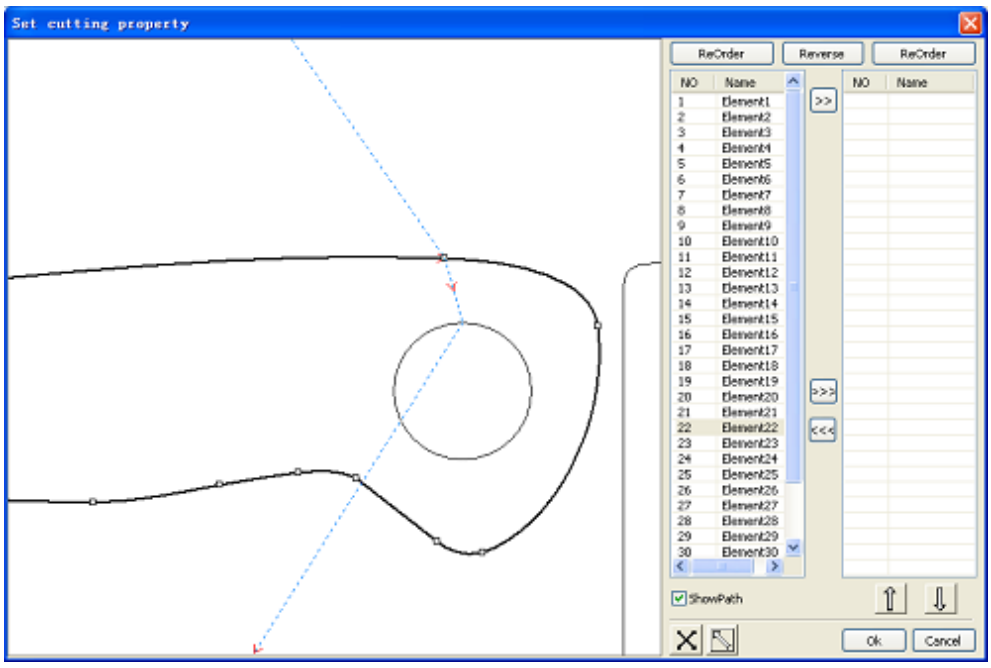


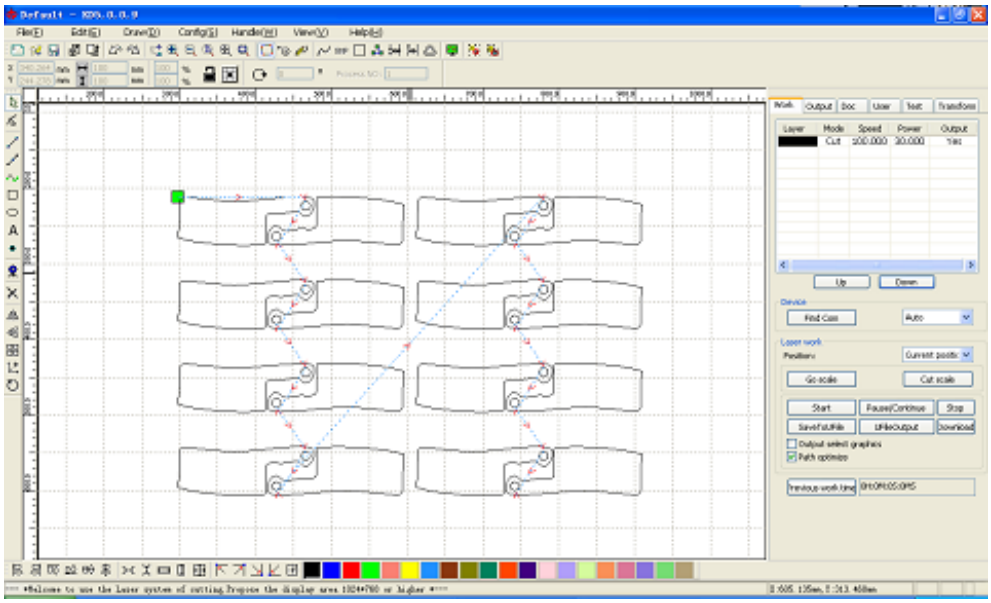
5.3.2.1.1 Show path

When “show path” is turned on, the movement orders will be shown to make it clear which route the laser head will take. Select  . This button sets the cutting order manually. Afterwards, you can choose manually in which order the cutting should take place.

Selecting an element and  clicking in it will move this element to the list on the right side. The machine will finish the list on the right side from top to bottom.

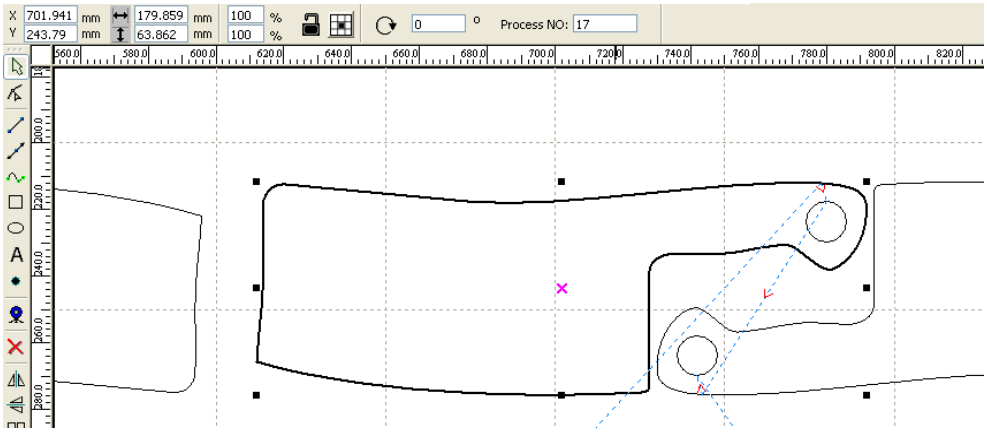
You can click on  if you wish to cut the entire list back to front.





5.3.2.1.2 Manual sorting

Select the object that you wish to change in the order. Subsequently, you change the number that is in the entry box of "Process NO". Accept the new value by pressing "Enter".



5.3.2.2 Change the cutting direction of a contour

Click on【Edit】->【Set cut direction】. Subsequently, double-click on the object that must get a different cutting direction. The red arrow will then change direction. For the purpose of clarifying this process, it is recommended to turn on the "show Path" button.

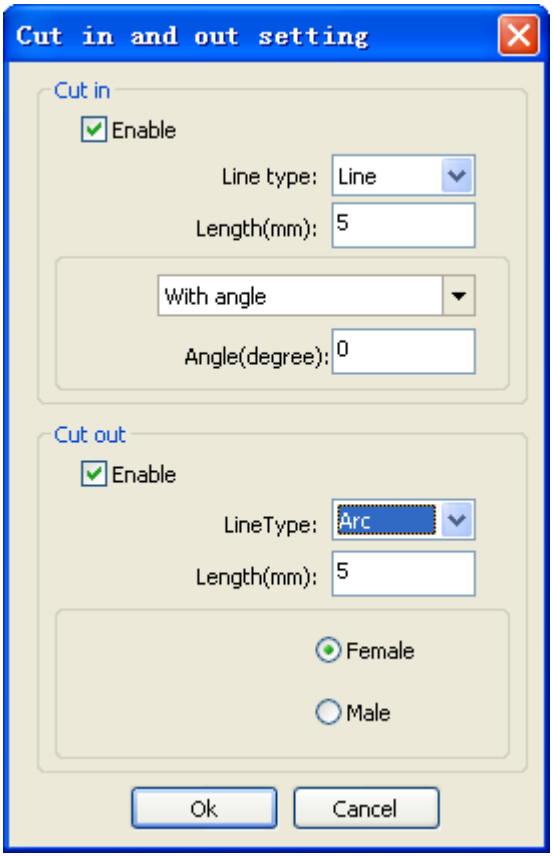
5.3.2.3 Change the starting point of the contour to be cut

Click on【Edit】->【Set cut point】and double-click on one of the white squares of the object where the change needs to be made. The starting point is now moved to the point you selected. For the purpose of clarifying this process, it is recommended to turn on the "show Path" button.

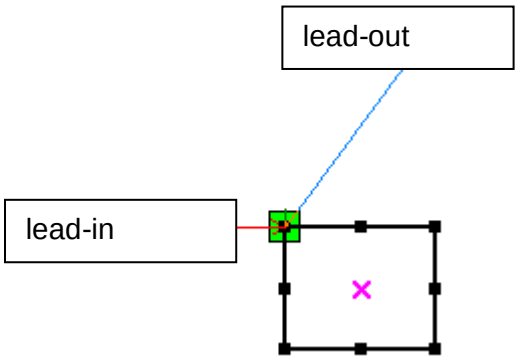
5.3.3 Setting the lead-in lead-out

If you wish to add lead-in or lead-out lines to keep the initial combustion out of your product, you can do so as follows:

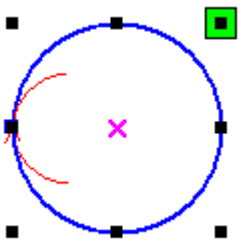
Select the object and press:【Edit】->【Edit cut in property】or click on  . The following dialogue appears.

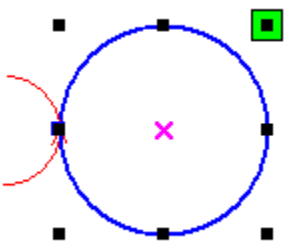


First check off "enable" to use lead-in/lead-out.
There are 2 types, line or arch
You can chose the angle and length when opting for line. It is also possible to choose to start from the middle.



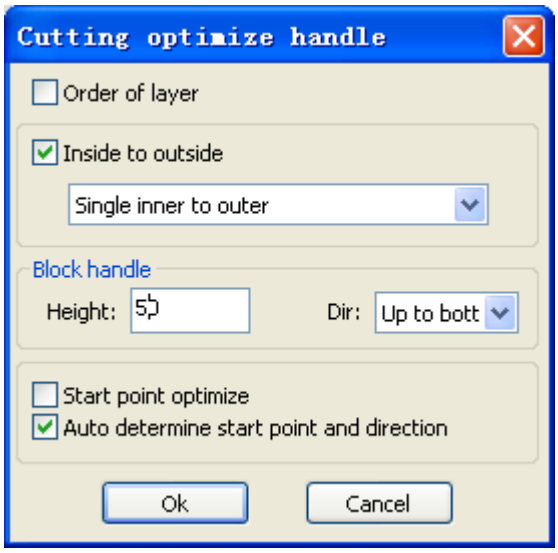
Arch has the same settings, however, it is possible to choose to start inside or outside.


Female

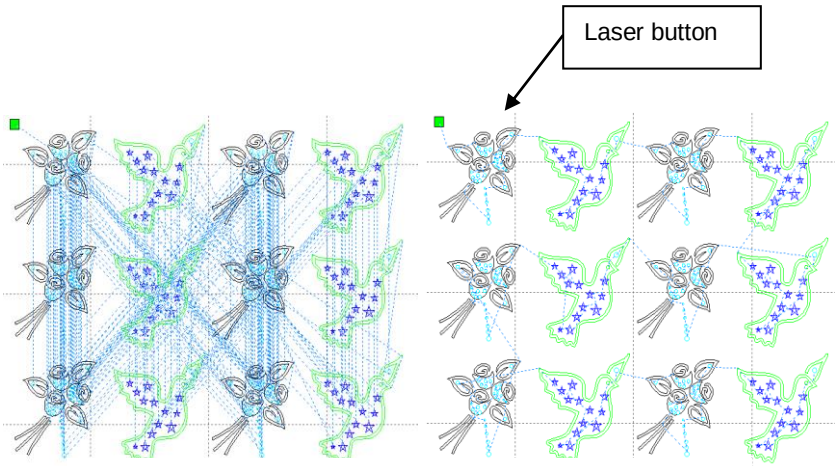

Male

5.3.4 Route optimisation

Click in the menu on【Handle】->【Cut optimize】or click on . The following dialogue will appear.



Click in the menu on【Edit】->【Show Path】or click on to show the route on the path.



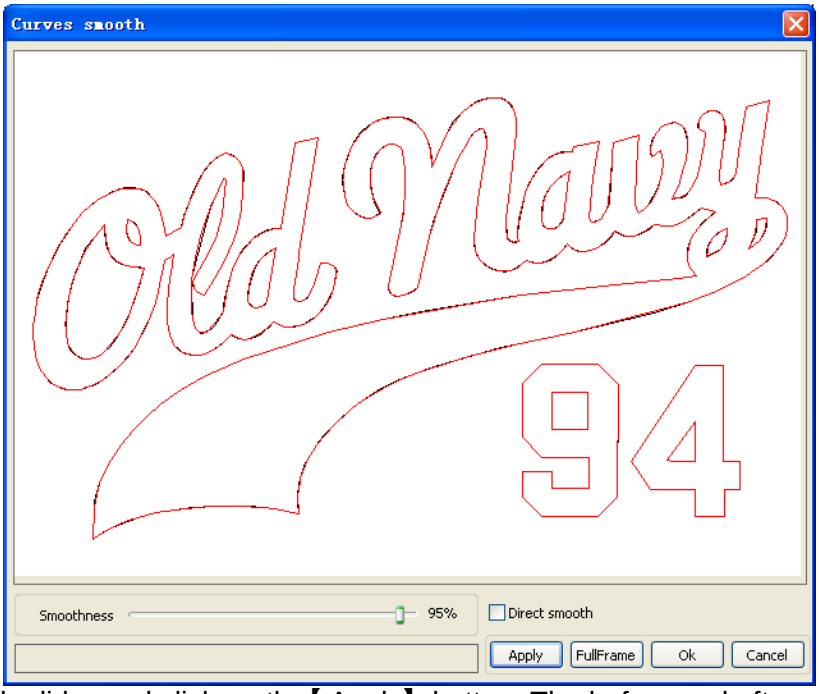
before editing after editing

The path always starts from the laser head.

5.3.5 Making curvatures smoother

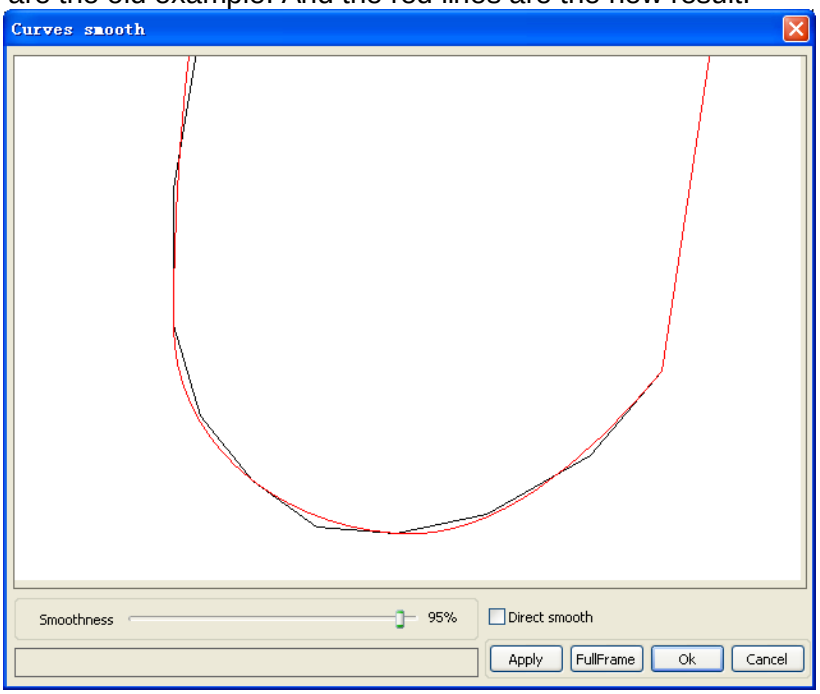
As for some less flexible curvatures of the object, you can make these smoother by means of the software. This helps the end result and the cutting.

Click in the menu on【Handle】->【Curve Smooth】or click on . The following dialogue will appear.



drag the smooth slider and click on the【Apply】 button. The before and after are shown in the dialogue.

The black lines are the old example. And the red lines are the new result.



Dragging the mouse and scrolling with the mouse wheel allows you to look around and zoom in/out to check if the result is proper.

Click on the【FullFrame】button to display the entire object.

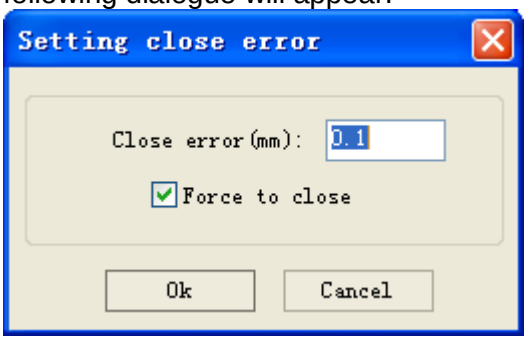
When the desired effect has been reached, click on the【Apply】button and the object will be adjusted to the new values.

Select "Direct smooth" to use another method

The choice depends on the actual and desired result.

5.3.6 Checking closed contours

Click in the menu on【Handle】->【Curve auto close】or click on the System Bar . The following dialogue will appear.



5.3.6.1 Close error:

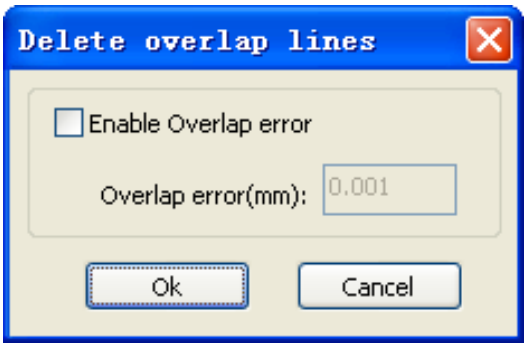
When the 2 open points are at a shorter distance than entered here, it will be combined to 1 contour.

5.3.6.2 Force to close:

force the closing of the contour even if the software thinks it's not desirable.

5.3.7 Deleting the overlap

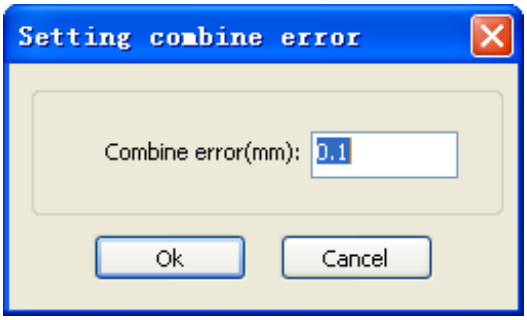
Click in the menu on【Handle】->【Delete overlap】or click on . The following dialogue will appear.



This function is used to delete and shorten overlapping lines until they just touch one another. Use "enable overlap error" only if the desired result is not reached. Do not set the overlap error too high to counter the wrong deletion.

5.3.8 Combining curves

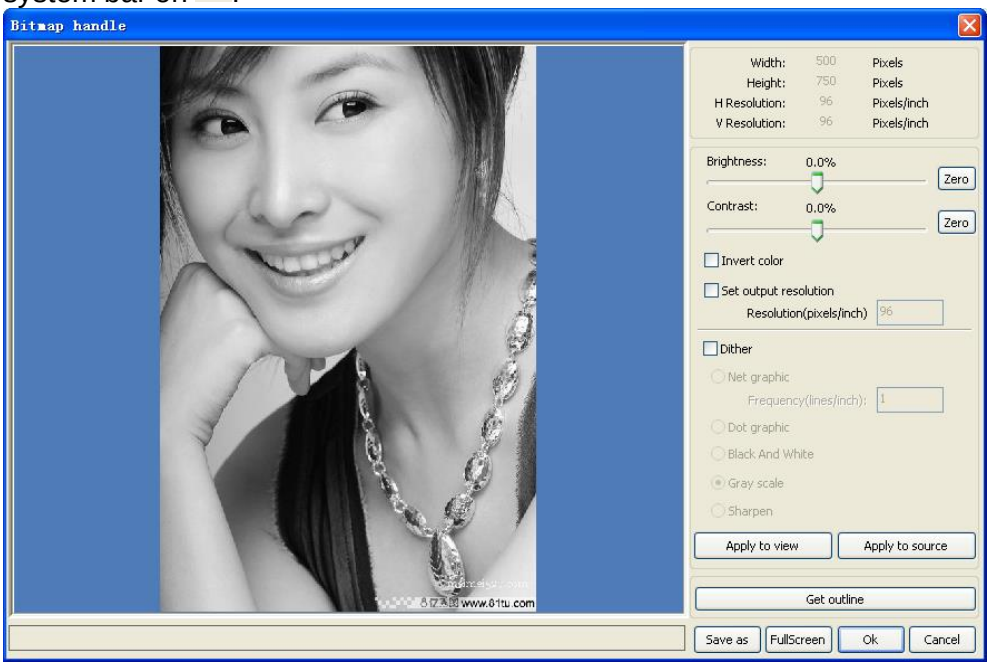
Click in the menu on【Handle】->【Combine Curve】or click on . The following dialogue will appear.



The software will automatically close all curves in the bends and let the bends transition fluently.

5.3.9 Handling the bitmap

Click on  and select the bitmap, click on【Handle】->【Bitmap handle】or click in the system bar on .



Information about the bitmap is shown in the top right corner.
Make sure that these data change as a result of the treatments in this function.

5.3.9.1 【Apply to view】:
the changes are only applied to the example. This can be used to see if the changes are desirable.

5.3.9.2 【Apply to source】:
the changes are adjusted to the bitmap. This can no longer be undone.

5.3.9.3 【Save as】:
save the file outside laser work【Apply to view】

5.3.9.4 【Gray scale】
this allows you to convert a coloured bitmap to a 256 bit gray scale. This is to let the laser work better because a laser only works in black/white and all gray scales in between.

Adjust

Before Processing

After Processing

Invert

Before Processing

After Processing

Sharp:

Before Processing

After Processing

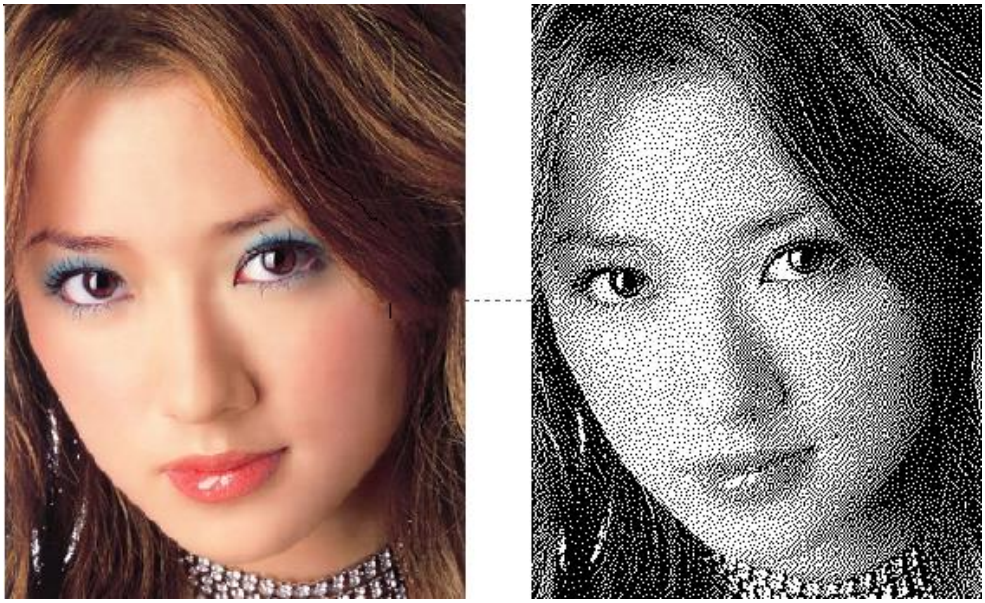
There are 3 variants of pixelation conversion. This conversion is necessary to laser pictures on an object beautifully.

5.3.9.5 Net graphic

Net graphic is good for low-resolution plates such as wood, acrylic.
By default, a resolution of 500-1000 and a net size of 30-40 is a good setting. However, experience shows us that it must be checked what offers the desired result per material and laser type.

5.3.9.6 Dot graphic

Dot graphic has a good gray scale and suitable for high-resolution plates such as stone, steel.

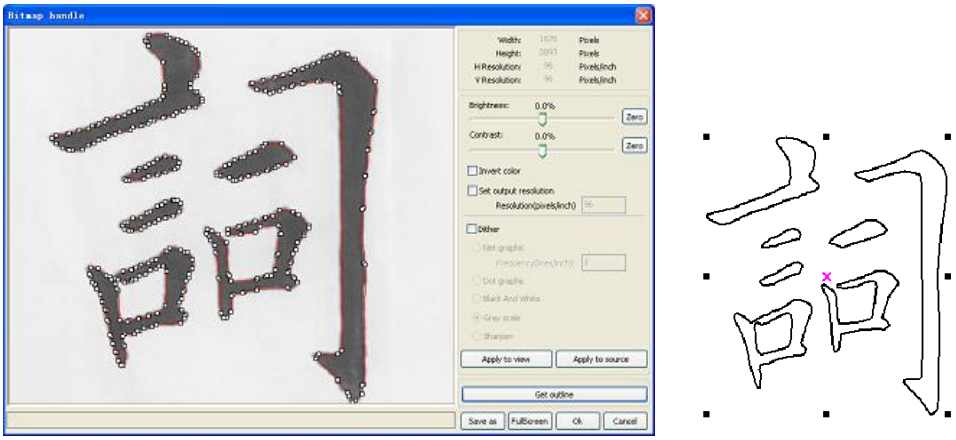


The higher the resolution, the better the result. However, too high of a resolution gives the wrong branding and very large files that may be too big for the machine. A resolution of 2500-5000 is a good standard. However, experience shows us that it must be checked what offers the desired result per material and laser type.

5.3.9.7 Black and white

It is possible to opt for black and white for abstract images. This gives extra tight edges and places the abstraction on the material well.

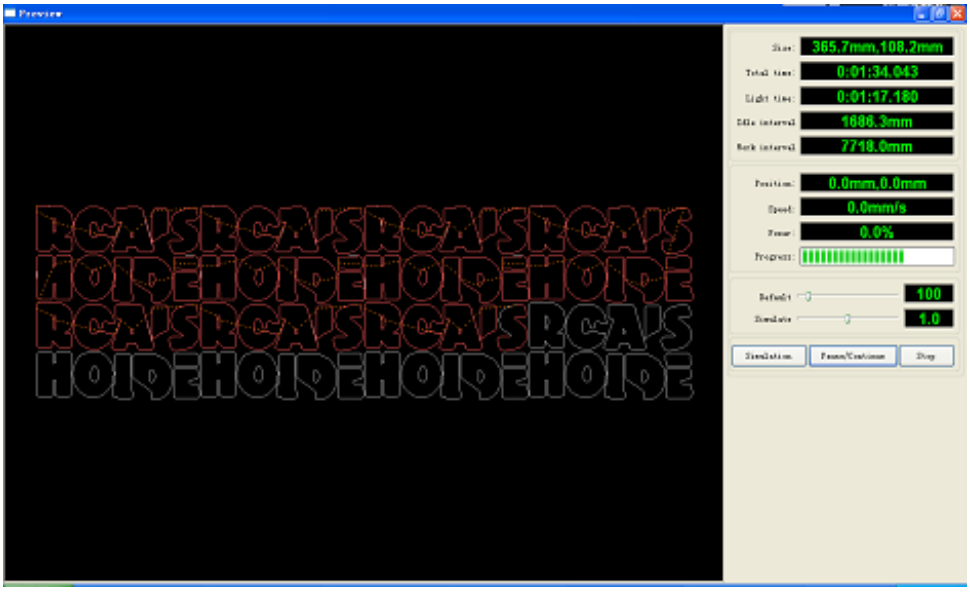
5.3.9.8 Get outline:



Get outline can be used to convert an abstract bitmap to cutting lines.

5.3.10 Sample demo

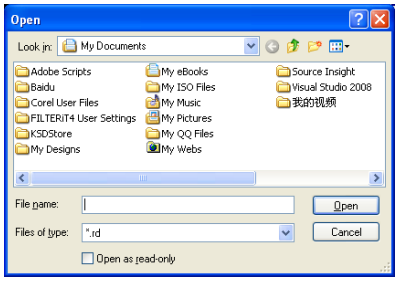
Click in the menu on【Edit】->【Preview】or click on the System Bar  .



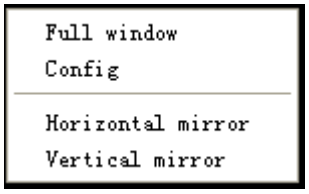
The software has the possibility of giving an example to see if the desired result can be reached without using up the actual material.

5.3.10.1 Demo rd file:

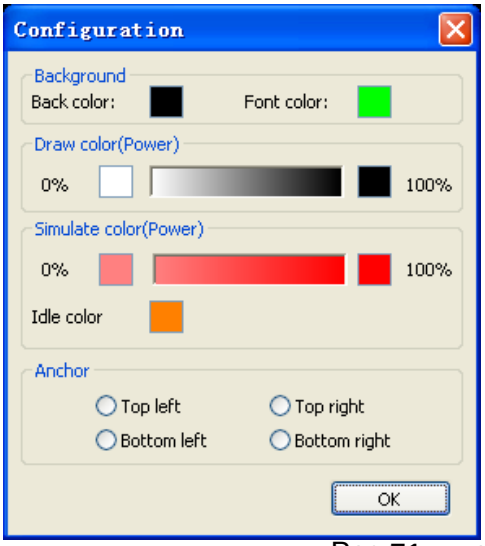
Double-click with the left mouse button on the sample screen to open an opening window. This makes it possible to demo each .rd-file without having to open it first in laser work.



The software also has the option of colouring the demo and adjusting colours per power.
Click with the right mouse button on the demo image and a menu will appear.
Select "Config" and you will see the following dialogue.

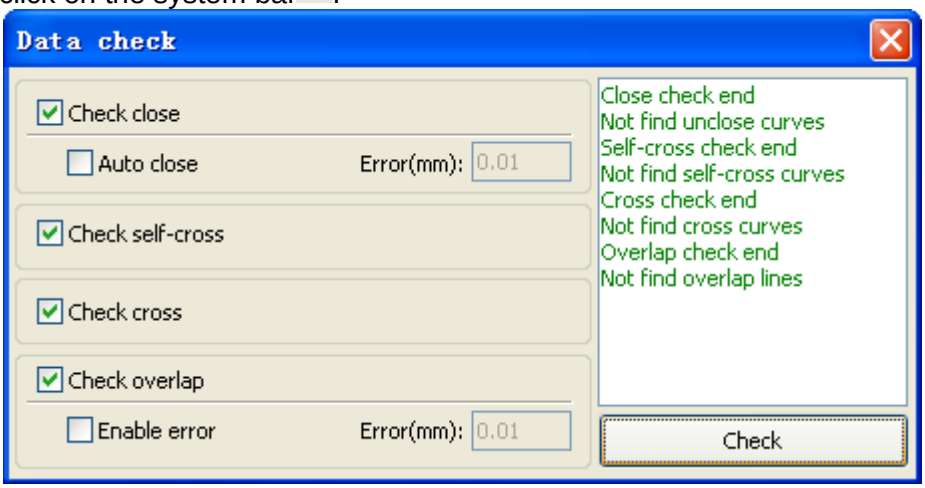


This is where you can adjust the colours to your liking.



5.3.11 Data Check

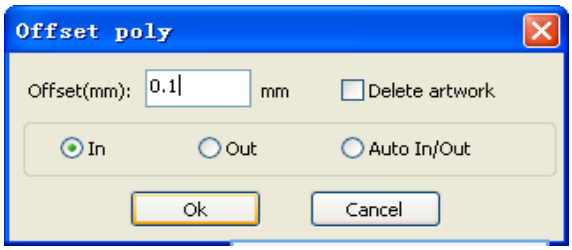
Select all objects that have to be checked and click in the command bar on【Handle】/【data check】or click on the system bar .

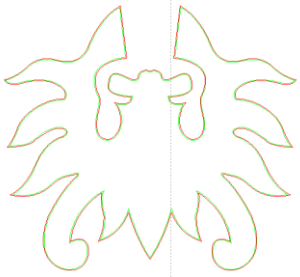


This is where you can check or uncheck several controls that have to be checked. When everything is selected that has to be checked, you can click on "check". Afterwards, it will display how many errors the drawing contains.

5.3.12 Generating a parallel lineation

Select the objects that must have parallel lineation and to go in the command bar to【Handle】/【Offset poly】or click on the system bar .

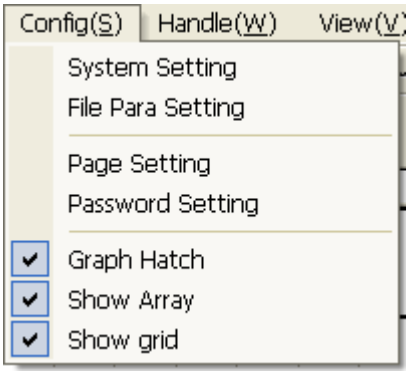




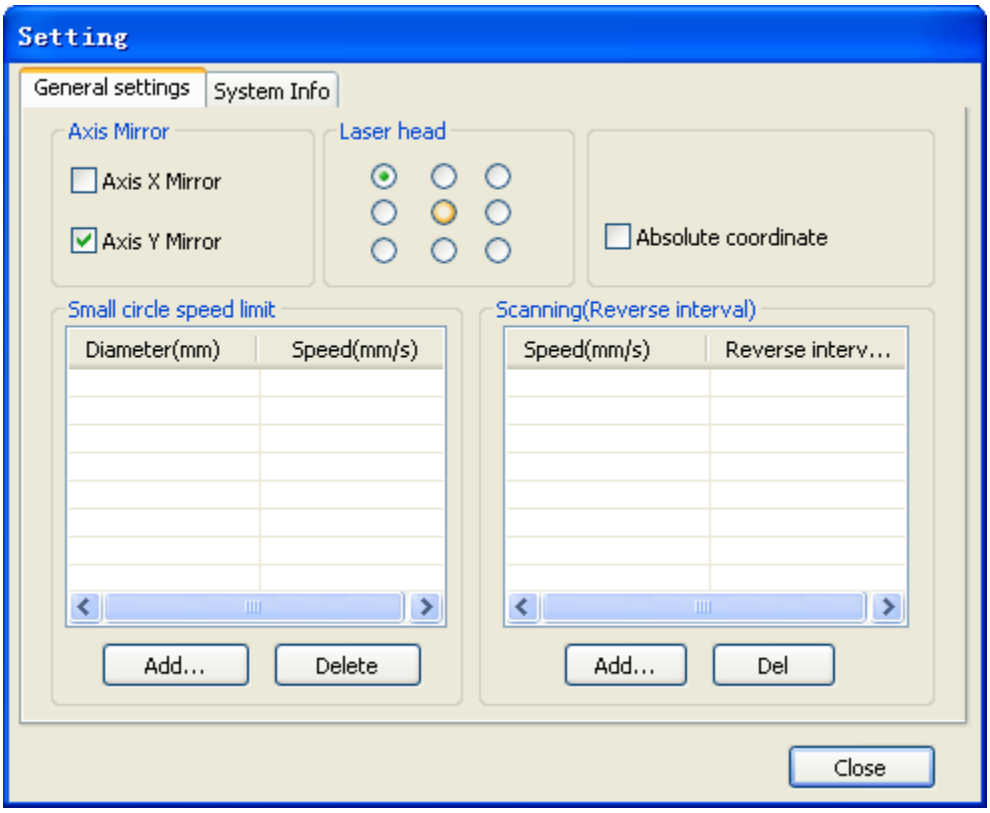
The red line is the original and the green line is the parallel line.

5.3.13 System settings

Before you start to cut, it is recommended to go through the system settings Config】->【System Setting】

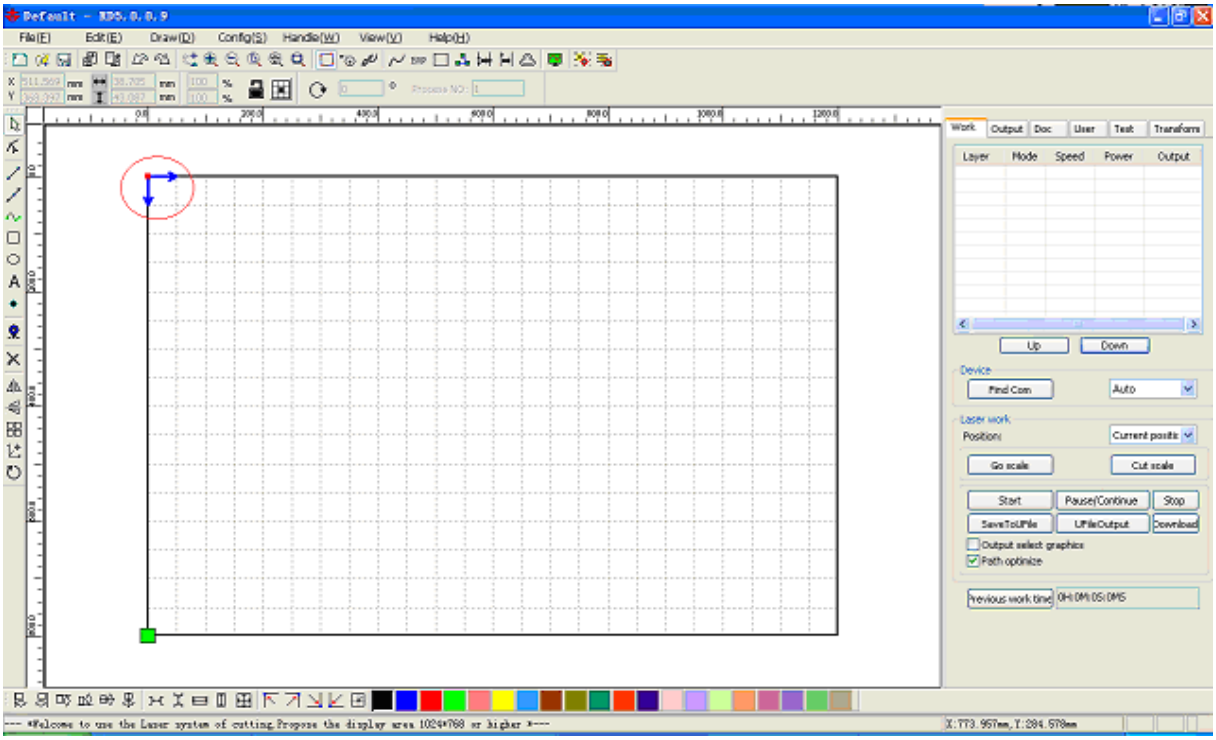


5.3.13.1 General settings



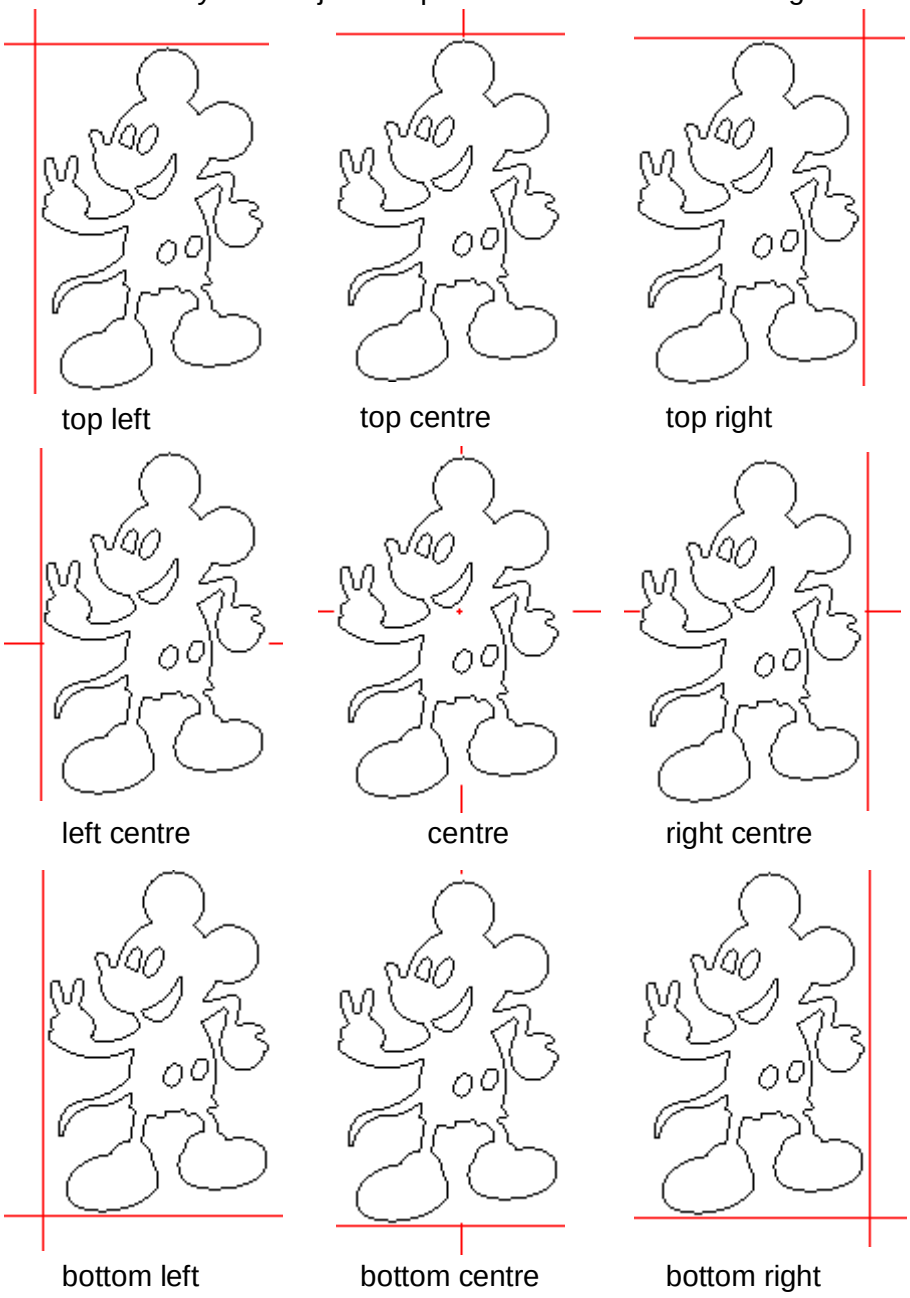
5.3.13.1.1.1 Axis Mirror

This is set by BRM and is only important if the machine is going in the wrong direction with reference running. This is what you use to turn the zero point to the other side.

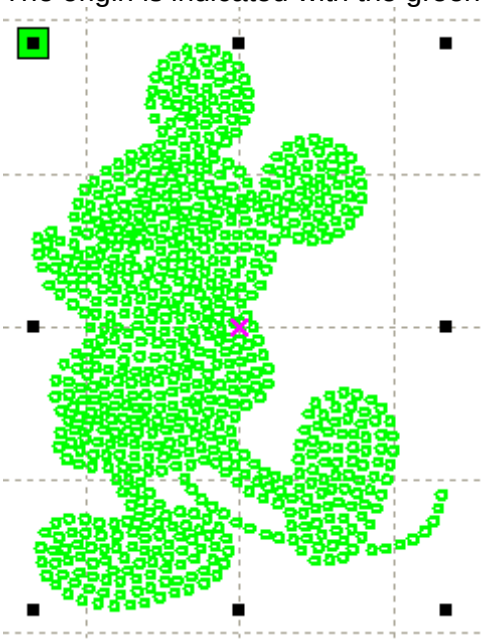


5.3.13.1.1.2 Laser button

This allows you to adjust the position of the laser head origin



The origin is indicated with the green dot on the main screen.



5.3.13.1.1.3 Absolute Coordinates

You can use a point on the drawing as an origin point thanks to absolute coordinates. This replaces the place of an origin on the frame.

5.3.13.1.1.4 Small Circle Speed Limit

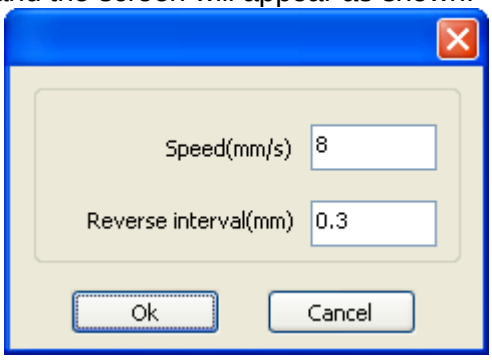
This is used to set a speed limit for small circles.【Add】,【Delete】,【Modify】If the circle is smaller than the set diameter, the speed will be limited to the set value. This is to optimise the roundness of the circle if it is not optimal.

5.3.13.1.1.5 Scan backlash

Scan backlash is used to optimise the straight lines in case of bidirectional scan engraving.

5.3.13.1.1.5.1 Add backlash

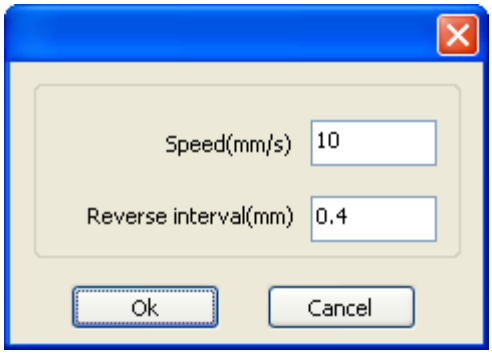
Click on the "Add" button and the screen will appear as shown.



Set the backlash and speed to the values that give the best result.

5.3.13.1.1.5.2 Adjust backlash

Double-click with the left mouse button on scanning (reverse gap). The following screen will appear.

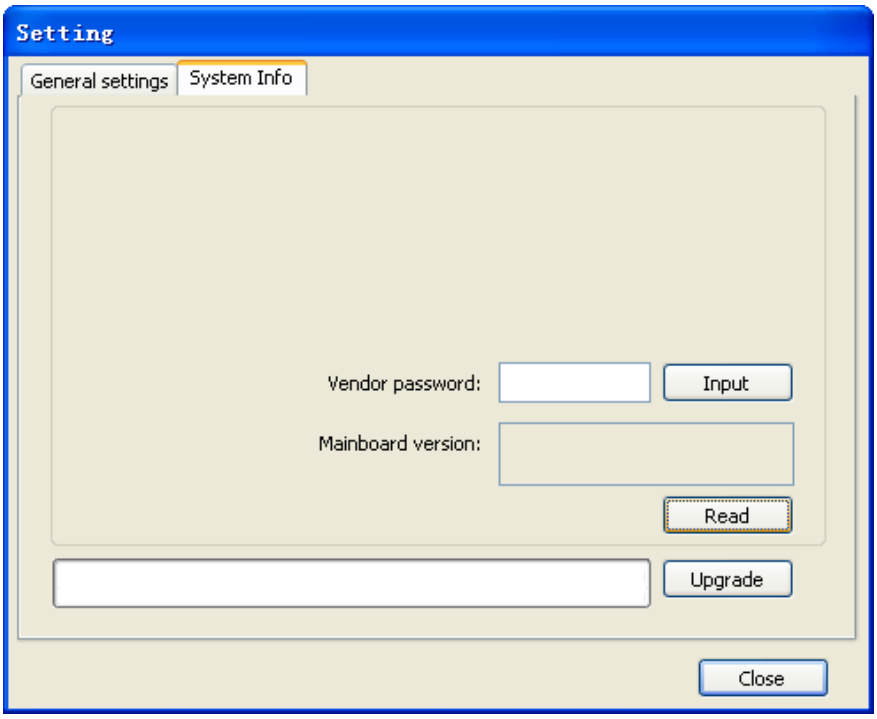


Set the backlash and speed to the values that give the best result.

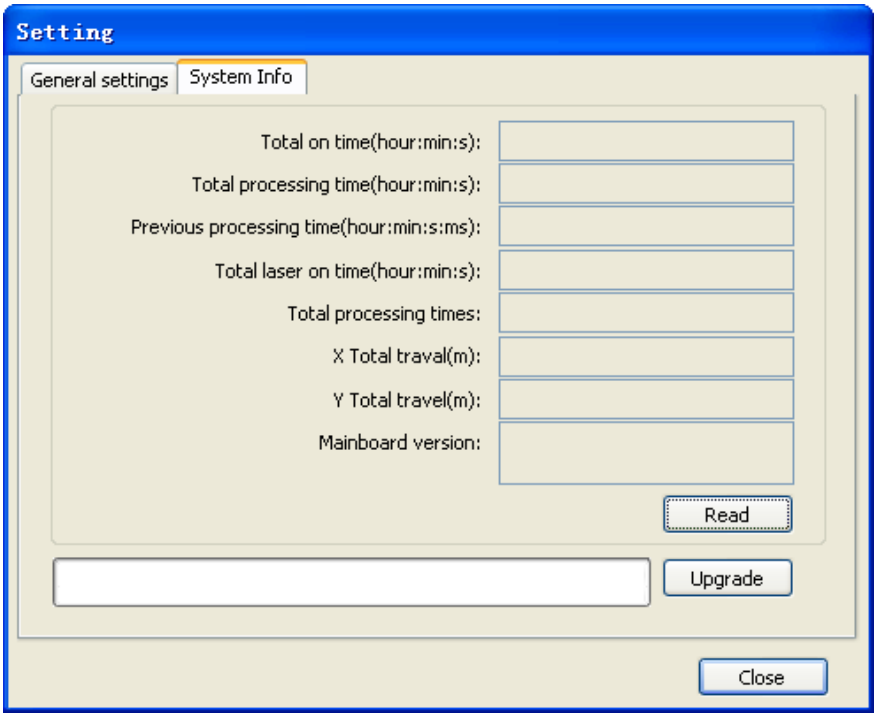
5.3.13.1.1.5.3 Delete backlash

Click with the right mouse button on the backlash that has to be deleted and press the Delete】button.

5.3.14 System info

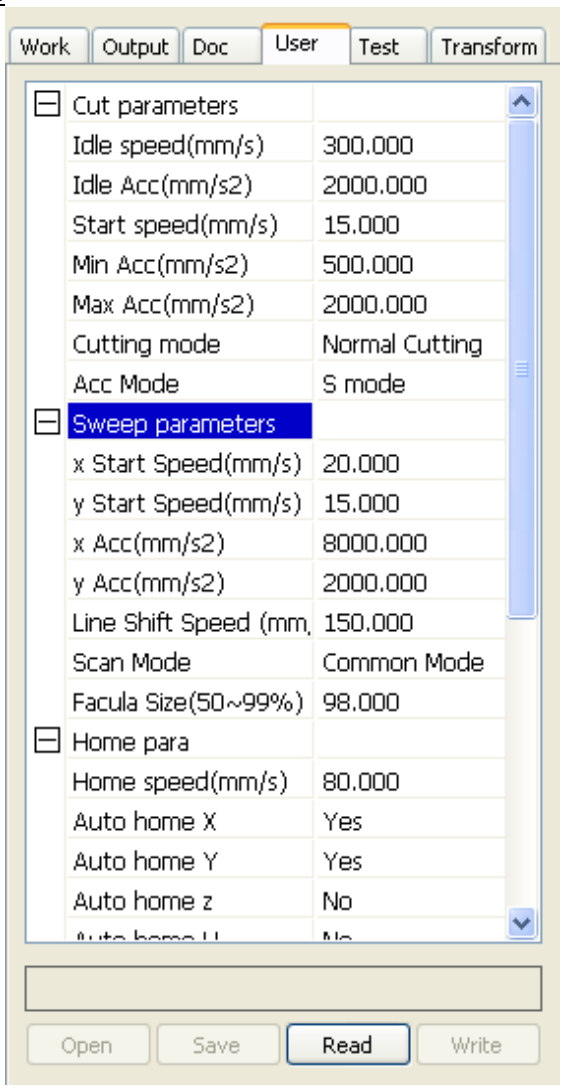


Information about the motherboard and manufacturer



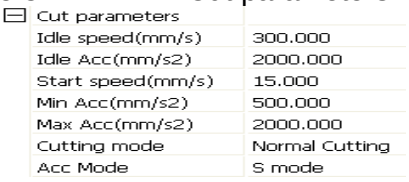
Total on time: the total time that the motherboard has been on
Total processing time: the total time that programmes have run
Previous processing time: the duration of the lastly run programme
Total laser on time: the total time that the laser tube has been on
Total processing times: the total number of completed programmes
X total travel: total distance that the x-axis has travelled
Y total travel: total distance that the y-axis has travelled
Motherboard version: the version of the motherboard

5.3.14.1 User parameters



It is necessary to read in parameters first before adjustments can be made.

5.3.14.1.1.1 Cut parameters



5.3.14.1.1.2 Idle speed:

this parameter indicates the speed between laser on movements. When it is adjusted up, the machine can produce faster but will also be subject to high wear and tear and a severely reduced service life.

5.3.14.1.1.3 Idle Acc:

The acceleration of the idle speed. The faster the acceleration, the faster it will reach maximum speed. However, too fast of an acceleration can severely overload the engines and cause defects. The rest of the drive line will also suffer damage if this value is too high.

5.3.14.1.1.4 Cutting Acc:

The acceleration of the cutting lines. Too low of an acceleration causes melting at the beginning and end of the cut. Too high of an acceleration causes the angles to be stuck.

5.3.14.1.1.5 Turning speed:
The corner speed to ensure that the machine does not go through the curve too fast.

5.3.14.1.1.6 Turning Acc:
this must be the same as the speed.

5.3.14.1.1.7 Cutting mode:
fast settings for tested values for certain types of cutting.

5.3.14.1.1.8 Acceleration mode:
the acceleration mode for the engines. S-mode is progressively flexible and T-mode is short and quick.

5.3.14.1.2 Sweep parameters

Sweep parameters	
x Start Speed(mm/s)	20.000
y Start Speed(mm/s)	15.000
x Acc(mm/s2)	8000.000
y Acc(mm/s2)	2000.000
Line Shift Speed (mm,	150.000
Scan Mode	Common Mode
Facula Size(50~99%)	98.000

5.3.14.1.2.1 X Start Speed, Y Start Speed:
The starting speed where the acceleration values are not yet applied.

5.3.14.1.2.2 x Acc, y Acc:
The acceleration of the head from the starting speed to the maximum set speed. Too high of an acceleration overloads the engines to a level where they can be damaged. Too low of a level can result in a longer duration of the task.

5.3.14.1.2.3 Line shift speed of scanning:
This is the speed of the axis that leads the scan to the next line. If you set this speed too high, the line to be engraved may shake. If the speed is too low, the order will take longer to produce.

5.3.14.1.2.4 Scan mode:
The scan mode has 2 options: common mode and special mode. Common mode means that the bean will be turned on normally when it is necessary to reach the engraving. Special mode will set the beam with the facula size.

5.3.14.1.2.5 Facula Size:
This option is ignored when the scan mode is in common mode. The special mode allows the start pulse of the beam to be set. This can prevent a deeper line in the beginning when a lower value is entered here.

5.3.14.1.3 Home parameters

Home para	
Home speed(mm/s)	80.000
Auto home X	Yes
Auto home Y	Yes
Auto home z	No
Auto home U	No

5.3.14.1.3.1 Home speed:
The speed at which the reference starts. Too high of a speed will generate an overshooting from which the wrong zero point may emerge. Too low of a speed will cause a longer start-up time of the machine.

5.3.14.1.3.2 X, Y, Z, U Auto home:
This is where you can turn on or off whether the axes must touch the zero point when the machine starts up.

5.3.14.1.4 Go Scale parameters

Go Scale para	
Go scale mode	Close laser
Go scale blank(mm)	0.000

5.3.14.1.4.1 Go scale mode:
Point of the light switch-off

5.3.14.1.4.2 Go scale blank:
This is where you can chose whether the frame to be tested becomes larger than the actual frame. This is to offer certainty that the object really fits on it.

5.3.14.1.5 Other parameters

Other parameters	
Array processing	Bi-dir Array
Return position	Absolute Origin
Delay before feed(s)	0.000
Dealy after feed(ms)	0.000
Focus depth(mm)	0.000
Backlash X(mm)	0.000
Backlash Y(mm)	0.000

5.3.14.1.5.1 Array mode:
This is where you can force engraving to a single array that engraves from 1 direction. If bidirectional is on in the programme, the machine will still engrave when this option is on.

5.3.14.1.5.2 Return position:
This is where the head will stop when a programme is completed.

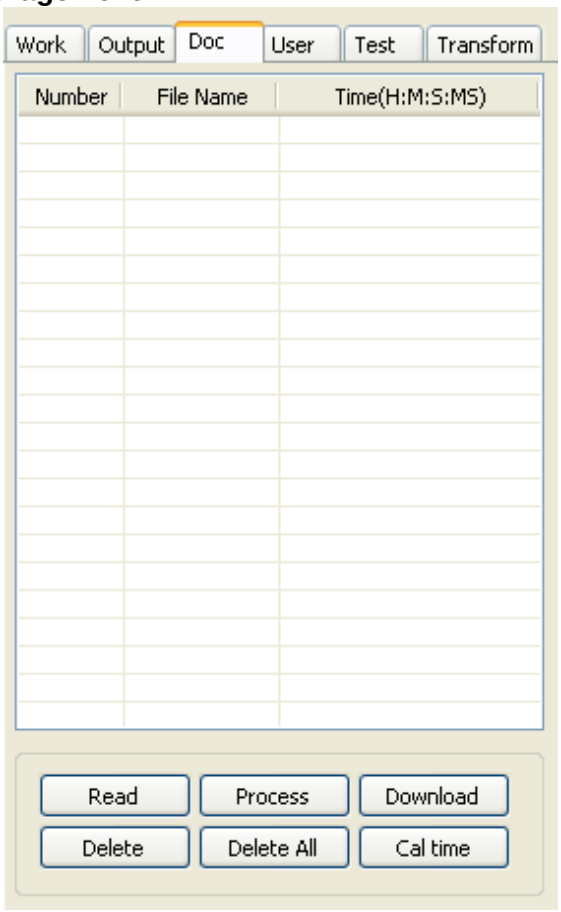
5.3.14.1.5.3 Delay before feed:
If a feeding apparatus is connected, a delay can be set after the processing before the feeding system is turned on.

5.3.14.1.5.4 Delay after feed:
If a feeding apparatus is connected, a delay can be set before the processing after the feeding system is turned on.

5.3.14.1.5.5 Focus depth:
The depth of the set auto focus.

5.3.14.1.5.6 Backlash X, Y:
This is where the backlash of the axes can be set.

5.3.14.1.6 Document Management



5.3.14.1.6.1 Read

Click on "read" and the software will retrieve and display a list of programmes loaded in the machine.

5.3.14.1.6.2 Download

This is where a programme that is on the hard drive can be loaded into the machine without loading the programme in the laser work.

5.3.14.1.6.3 Process

This will send a command to start the machine with the selected programme.

5.3.14.1.6.4 Delete

This can be used to delete the selected file from the machine.

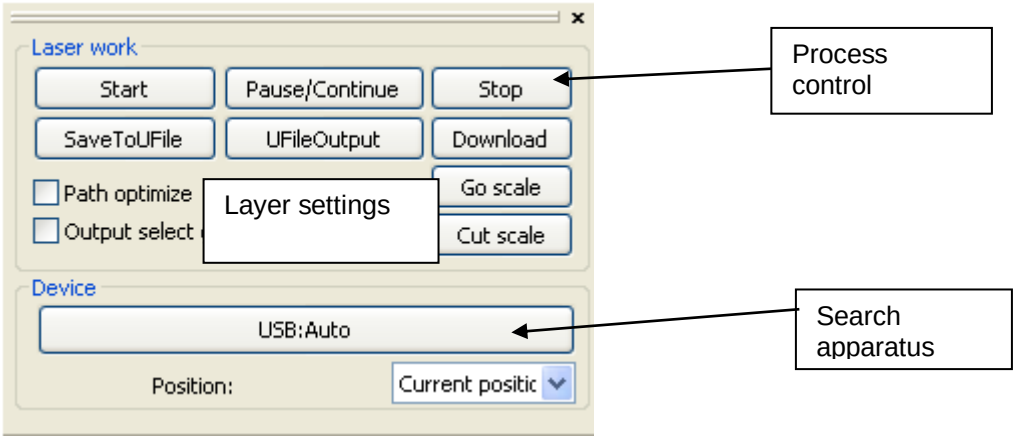
5.3.14.1.6.5 Delete All

This is used to delete all programmes in the machine.

5.3.14.1.6.6 Call time

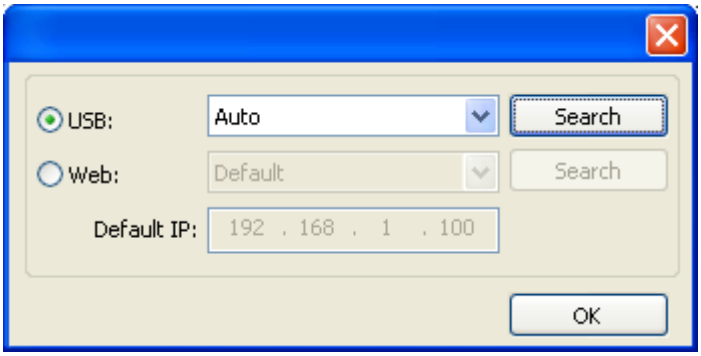
This is where the production time of the programmes is retrieved.

5.3.14.1.7 Chapter 4 Processing Output



5.3.14.1.8 Search apparatus

This is where you can search and choose the apparatus and type of connection. If multiple machines are connected to the machine, you can make a selection here too.



5.3.14.1.9 Position

Set the machine back to a post-processing position.

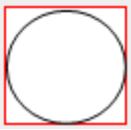
5.3.14.1.9.1 Current Position:
Back to the position before the production.

5.3.14.1.9.2 Original anchor:
Back to the set origin location.

5.3.14.1.9.3 Machine zero:
Back to the machine 0

5.3.14.1.10 Go Scale, Cut Scale

Check the frame to see if the machine is localised well



In case of cut scale, the machine will cut the frame to take the product out of the plate.

5.3.14.1.11 Start, Pause, Stop, SaveToUFile, UFileOutput, Download

5.3.14.1.11.1 Start:
start the machine with the loaded programme,

5.3.14.1.11.2 Pause\Continue:
pause or continue with the programme that is running.

5.3.14.1.11.3 Stop:
stop and cancel the programme.

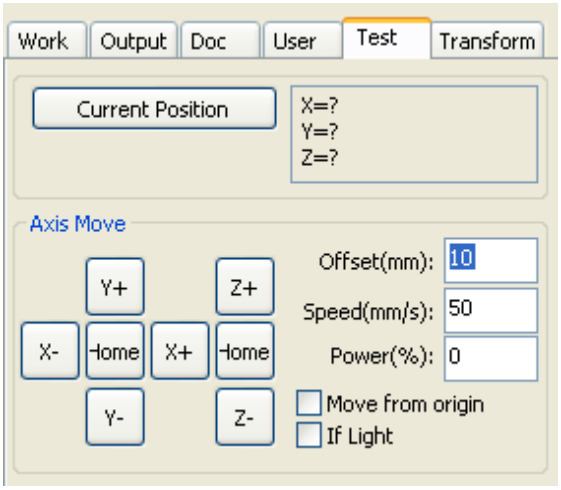
5.3.14.1.11.4 SaveToUFile:
save to a file format for later use or USB-sticks.

5.3.14.1.11.5 UFileOutput:
Start a saved Ufile file (.rd) without opening first.

5.3.14.1.11.6 Download:
Download the currently opened programme to the machine.

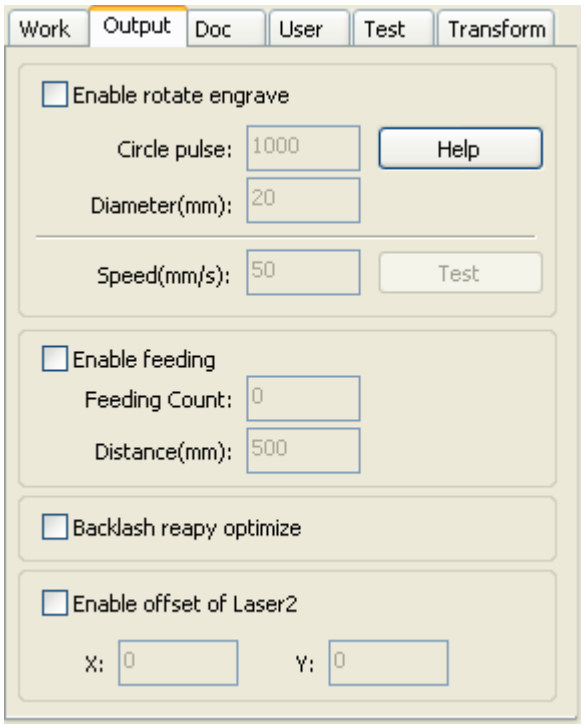
5.3.14.1.11.7 Output select graphics
Only the selected objects are sent to the programme.

5.3.14.1.12 Test



5.3.14.1.12.1 Axis move:
This is where you can operate the axes from the software. Only 1 axis can be in motion at any given moment. A step length can be set with offset. Clicking on the Y+ button 1 time will move it by 10 mm.
"Power' and 'if light' can be used to choose to have the beam on during movements to create a material cut-through line without creating a programme.
If move from origin is off, the offset will be taken from the current position. If move from origin is on, all offset dimensions will be taken from machine 0.

5.3.15 Output settings



5.3.15.1 Rotation system

5.3.15.1.1 Enable rotate engrave:
This is where the rotation is turned on and the diameter and pulse can be selected. The worksheet will also adjust to optimise the alignment of the drawing.

5.3.15.1.2 Diameter:
The diameter of the circular object. This is dividing the circumference or beam 2x by 3.1415.

5.3.15.1.3 Circle pulse:
The circle pulse of the machine. This needs to be at 1000 if you use the table. However, a setting of 9500 is necessary if yo use the rotation.

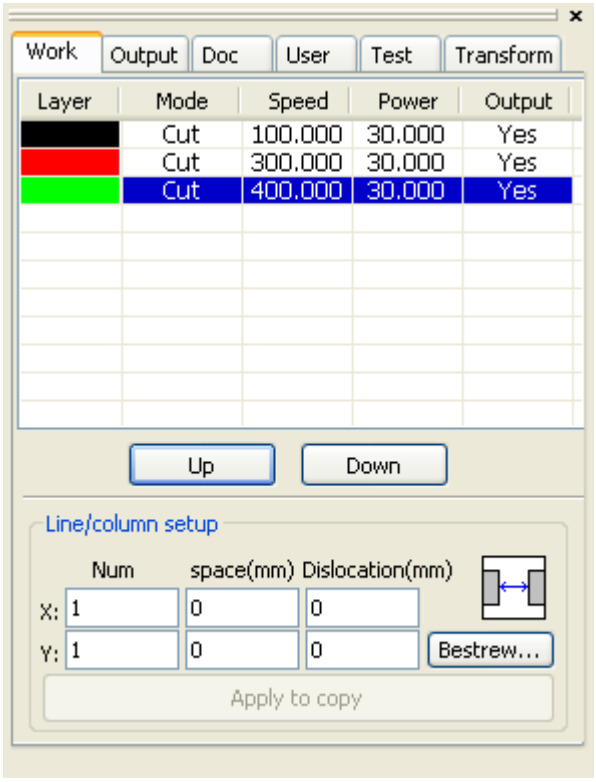
5.3.15.1.4 Speed:
This is where the rotation speed can be entered and tested. The best thing to do is to keep the setting low to avoid excess stress on the product. Think of stem of a wine glass that can break when the speed is too high.

5.3.15.2 Feed setting
In order to use a feed, it can be connected here and the movement can be set. This setting is only to be used if you have an optional feeding system.

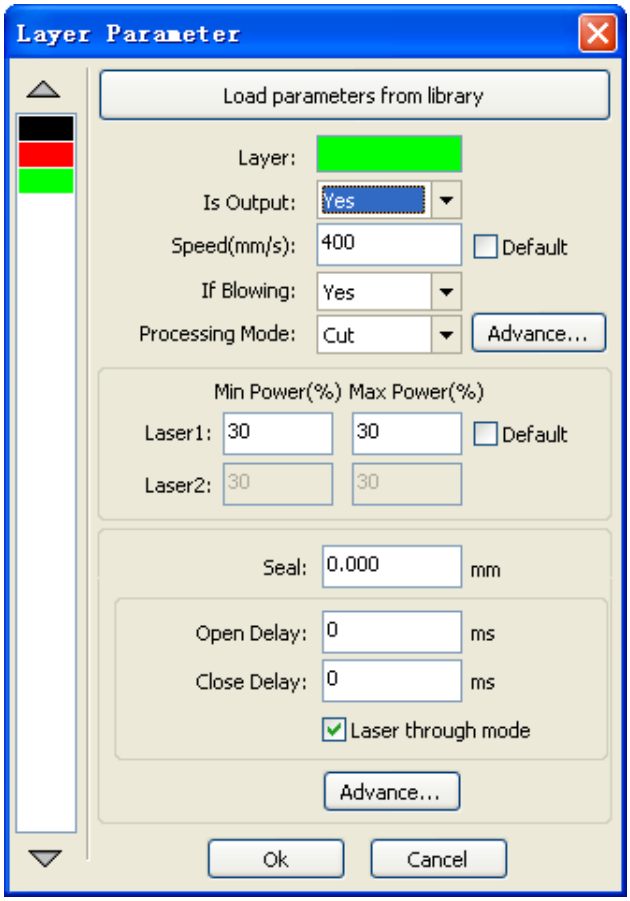
5.3.15.3 Optimisation of backlash compensation
This is used to turn on optimisation for the backlash. Experience has shown that this can produce a better cutting/engraving result.

5.3.15.4 Optical 2 migration
If the machine is designed with 2 laser tubes, the offset of the 2nd laser can be entered here. This can be used if the 2nd laser must follow the 1st one precisely as far as the dimensions are concerned.

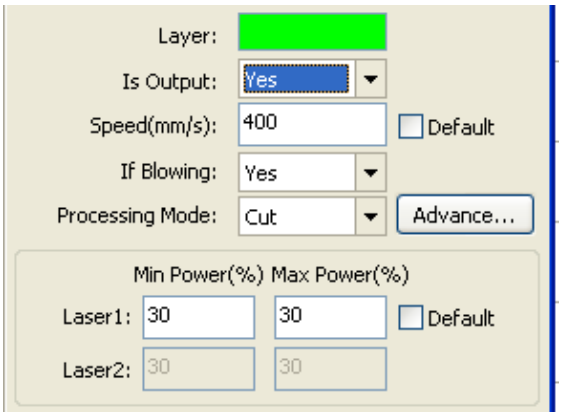
5.3.16 Layer Settings



The layer screen shows you an overview of which lasers are in order and you can also see a few important parameters. The layer screen opens when double-clicking with the left mouse button on a layer.



5.3.17 Engraving parameter settings



5.3.17.1 Layer:
This field shows the current layer colour.

5.3.17.2 Is Output:
This is where you can choose if the laser has to use this layer. If this option is on "no", the entire layer will not be cut/engraved. In other words, this can be used a drawing aid layer.

5.3.17.3 Speed:
This is where you can set the speed that must be used when cutting/engraving the layer. A lower cutting speed gives a nicer side view and overall a nicer product. As for engraving, the detail goes up at a lower speed. Engraving is also deeper at a lower speed when the power does not change.

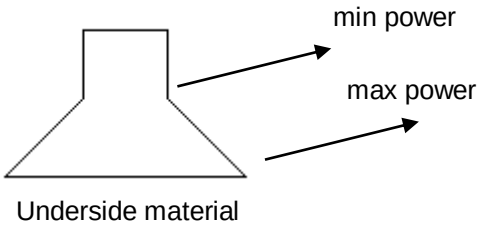
5.3.18 If Blowing:

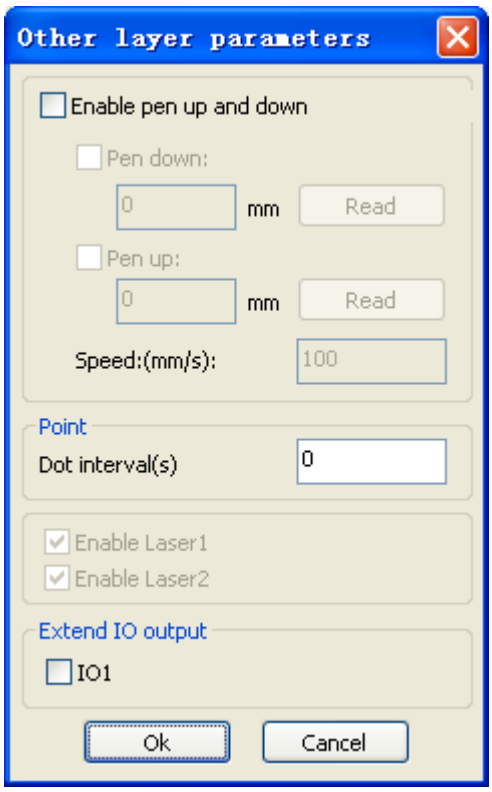
If the machine is equipped with a switch extraction unit, you can opt to turn it on at the layer. If the machine is not equipped with a switched extraction unit, this option will not make a difference between on and off.

5.3.19 Processing Methods:

This is where you can choose what type of processing must be used. Cutting or engraving. Cutting is only possible for vector or line files. Plates will first need to be adjusted. Cutting at a high speed and lower power produces a line engraving effect.

5.3.19.1 Laser 1, laser 2:
This is where the power of the lasers can be entered. If the laser has only 1 laser head, laser 2 will have no effect.
The minimum and maximum power can be set separately. These are percentages of the power of the tube. In other words, a setting of 30 with a 100 W tube gives 30 W of power. A setting of 30 with a 40 W tube gives 12 W of power.
Depending on the set processing mode, the minimum and maximum power have a different setting result.
As for cutting, the minimum and maximum power depends on the speed. When the machine slows down for a curve, it will produce equally less power. The min. power is the setting of the take-off speed. This is mostly a speed of 15~20.
The min. power is a ramp effect for engraving. At the start of the beam, the machine will first run at min. power and then max. power. If no ramp effect is desired, min. and max. need to have the same power.





5.3.19.2 Pen up and down

This setting can be used if the machine has a height-adjustable table or head. Pen up is the free position and pen down is the plate focus position. Both positions can be set manually and then retrieved with the read button.

Examples of use:

1> a pen on the head to make a pen drawing.

2>to use another focus height for the desired layer.

3>to clear more height so that the laser head cannot touch anything during position shifts.

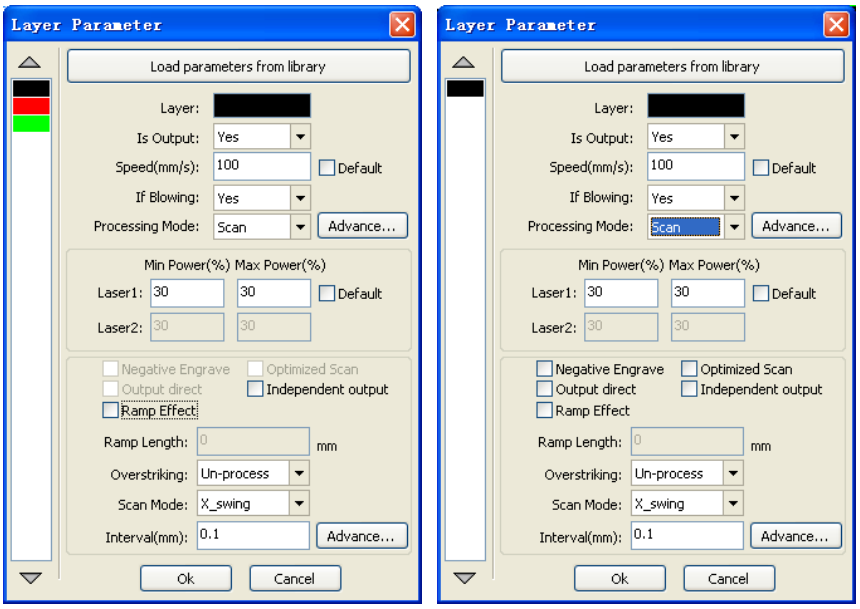
5.3.19.3 The laser Enable

This is where a 2-headed laser the can turn the laser heads on or off for the selected layer.

5.3.19.4 The joint IO output

When the machine has controlled outlets for optional extras, you can opt here if and which outlet must be activated if the layer is active.

5.3.20 Laser engraving settings



Engraving on the left side for vector and on the right side for image.

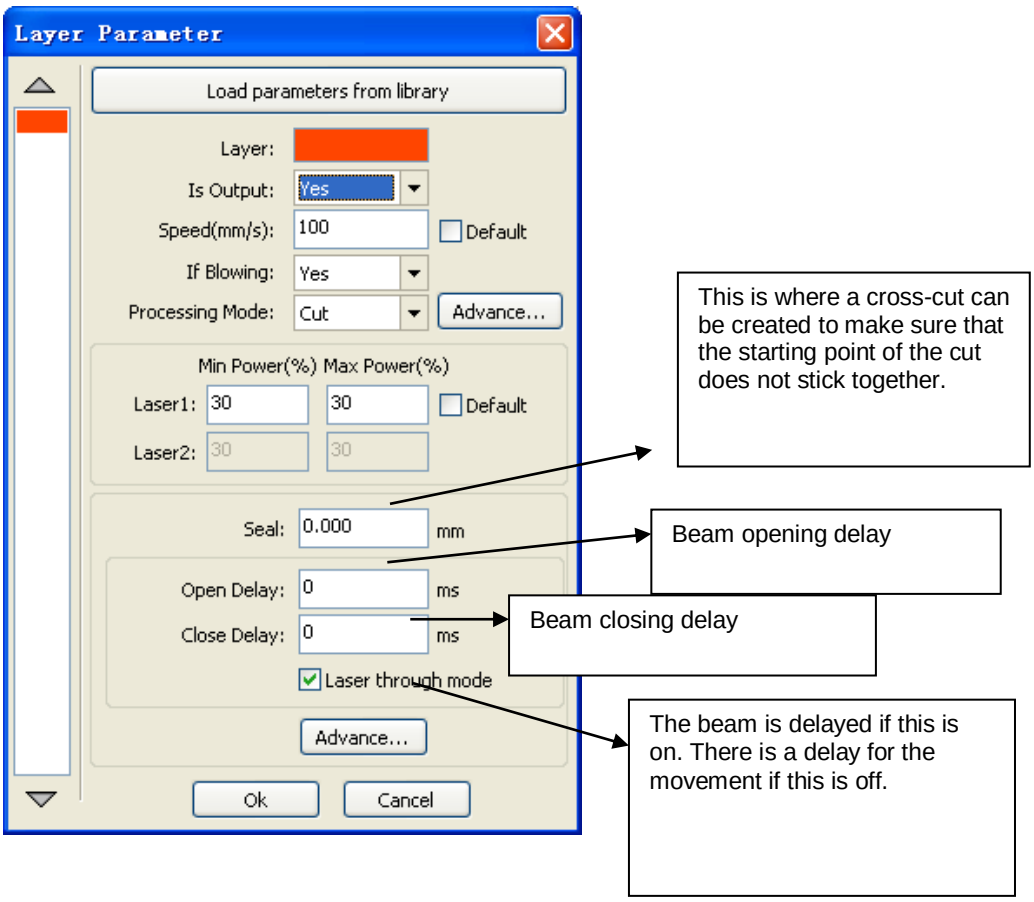
5.3.20.1 Optimal scanning:
This lets the machine automatically calculate the interval (scan gap) for the best result.

5.3.20.2 Direct output:
Use the gray scale to adjust the power of the laser. Light gray is minimum power and black is maximum power.

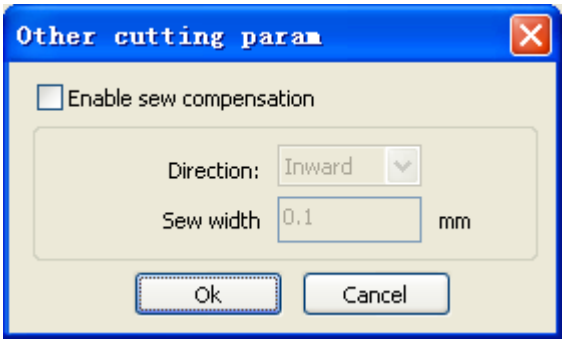
5.3.20.3 Ramp effect:
this is where edging is given to the engraving to create a light stereo effect.

5.3.20.4 Scanning mode:
This is where you can choose what type of engraving must be used. X-axis or y-axis from both directions but also from 1 direction. 1 direction gives a nicer result. However, 2 directions is faster.

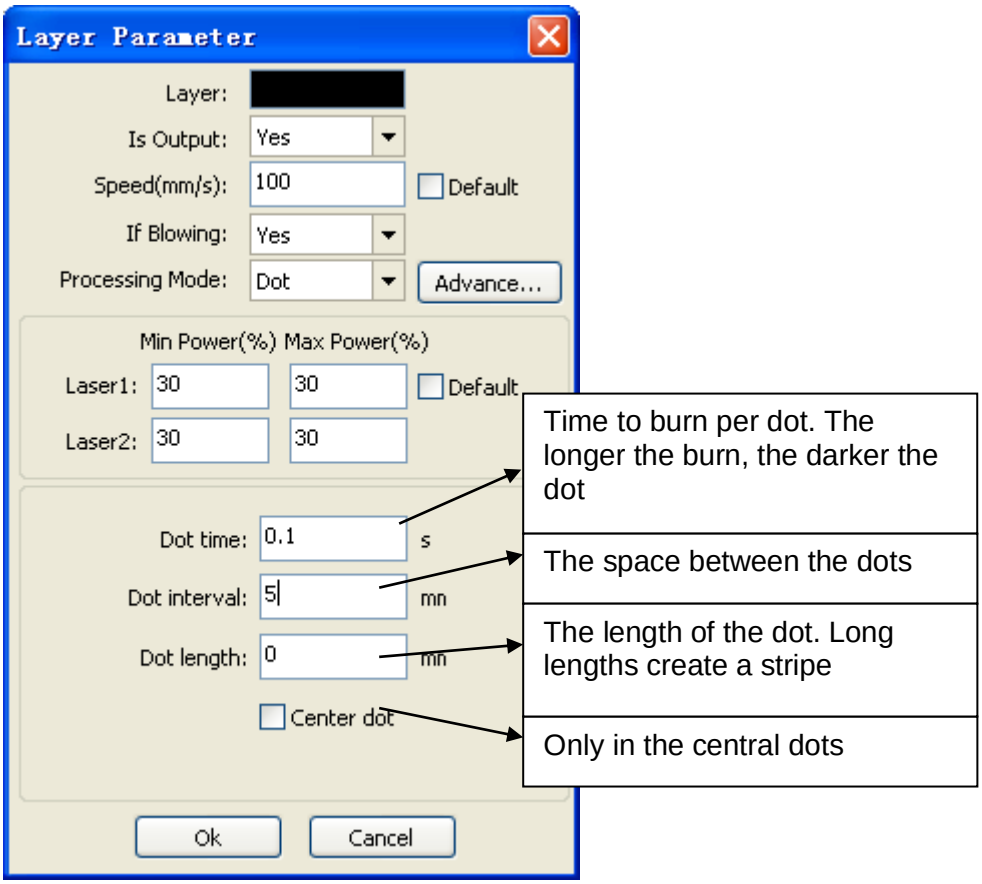
5.3.21 Laser cutting parameter settings



Normally, the laser will cut directly over the drawn line. If, however, it is necessary that the line is the product dimension, the cutting width and direction can be set here. The laser will then cut next to the line so that the product will have the dimensions of the line.



5.3.22 Laser Dot Parameters Setting

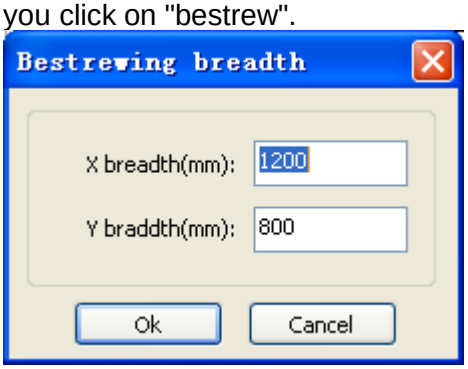


5.3.22.1 Line/column setup

This is where a grid can be set. Depending on the preferences, it can be opted whether the frame dimensions or the centre of the objects can be set as grid dimensions.

 frame dimensions.  centre dimensions.

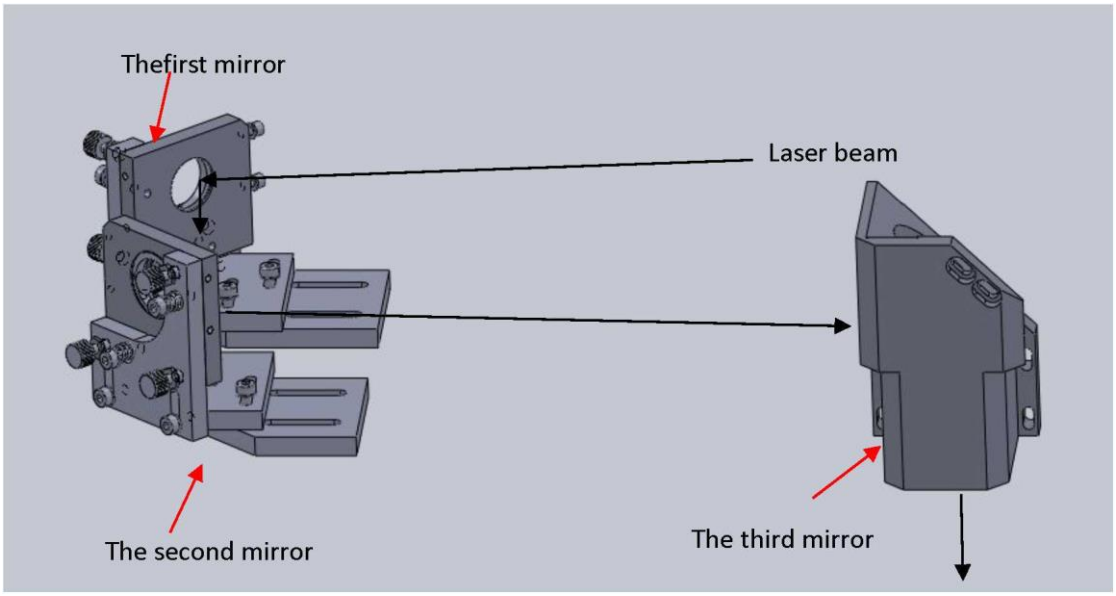
【Bestrewing breadth】:bestrew can be used to rasterize in a non-linear manner. This can in some circumstances get more product out of a plate. A pop-up window will appear when you click on "bestrew".

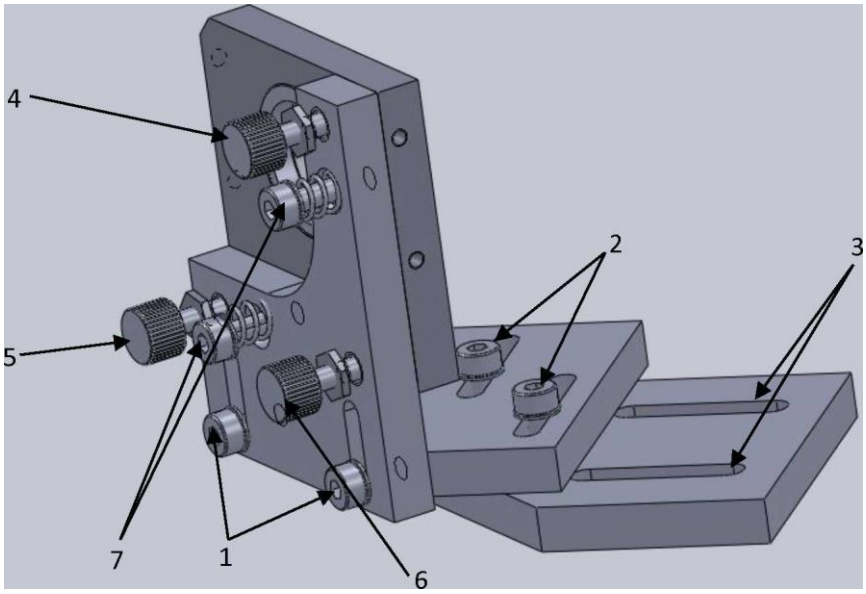


You can enter the plate dimensions and then the software will automatically nest as many products as can come out of the plate.

6 Setting and aligning the beam

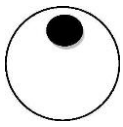
Proper alignment is crucial for a good cutting result. If this is the case, the delivered quality can deteriorate.
The alignment of the laser beam consists of multiple steps that must be performed consecutively and in the right order.
The machine must be turned on for the alignment:





1. Z-adjustment for the mirror
2. Y-adjustment for the mirror
3. X-adjustment for the mirror
4. beam alignment for the height
5. beam alignment for the horizontal line
6. correction screw for the beam alignment
7. springs for mirror stabilisation

If the beam is too high or too low compared to the beam opening. the beam can be moved up or down by means of setting screw 4.



If the beam is too far to the left or right compared to the beam opening. the beam can be moved up or down by means of setting screw 5.

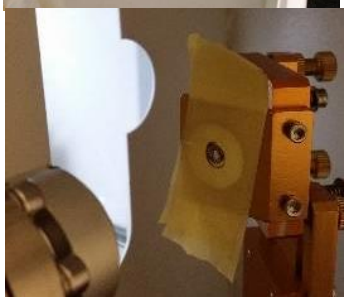
The machine must aligned and adjusted after the first installation and periodically.

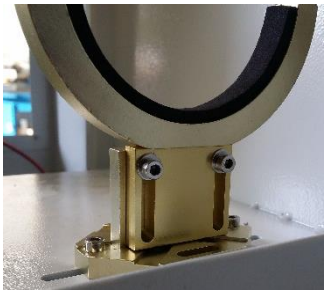
6.1 1st mirror

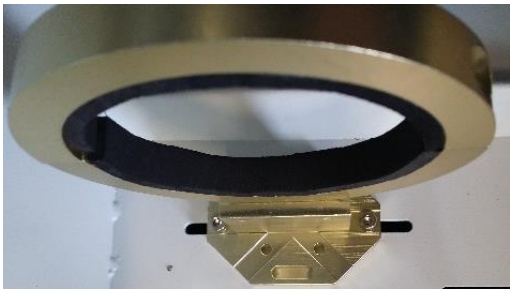
To adjust the 1st mirror, open the flap of the laser resonator area at the rear of the machine. You will notice the stand for the 1st mirror with the mounted laser tube.

The mirror holder contains a holder on which you can affix 2 layers of adhesive tape. Press this well so that the rounding is visible through the adhesive tape. Now close the laser flap. The laser is secured and will not activate the laser beam when 1 or more of the flaps is opened.
If the flap is closed, press the button (pulse) very briefly

. Afterwards, you can open the flap again and you will notice that there is a brown/black burn on the adhesive tape. Check well to make sure that this burn is in the middle of the circle.
If this is not the case, you can move the tube by means of the stands. Make small shifts each time and pulse each time again between the shifts to see if the beam is in the middle.
Please note that the tube must be as straight as possible in the direction of the mirror. If you adjust the left support, you also need to move the right support.



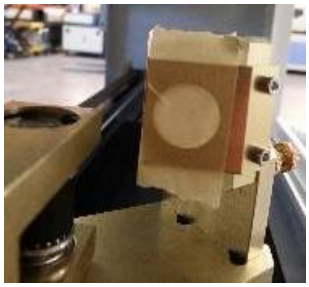




You can adjust the 2nd mirror if the the 1st mirror is in position.

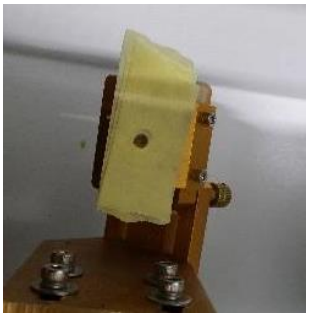
6.2 2nd mirror

The mirror sits on the granty on the side of the work area. You put 2 pieces of adhesive tape on the holder and close all flaps. Put the laser at the top by keeping the button  pressed until the granty is completely in the back (in the direction of the laser tube).



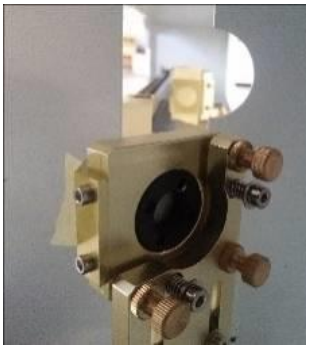
Afterwards, press  to mark a dot on the adhesive tape. Then attach another piece of adhesive tape on this adhesive tape and then run the granty in the front with the  button. Pulse again afterwards and check if both dots are on top of one another. The more they are on top of one another, the better your cutting result. When these do not overlap well, you need to adjust the 1st mirror with the 3 setting screws.

When you have aligned the 2nd mirror well, the 3rd mirror will come into play. The latter can be found in the laser head.

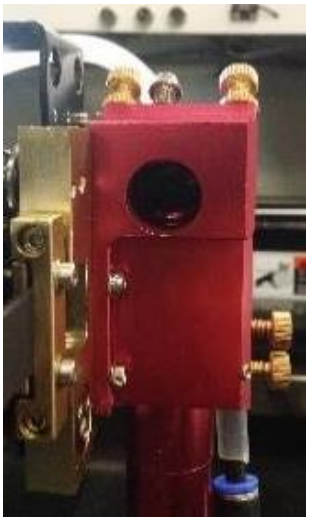


Adjusting the Y+ location of mirror 2

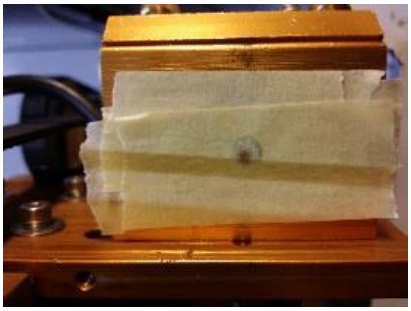
Adjusting the Y-location of mirror 2

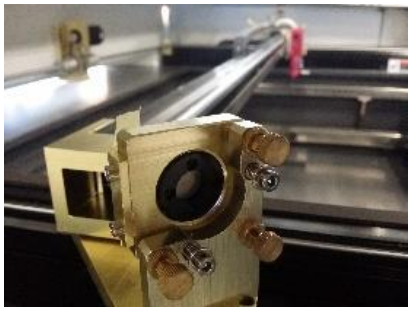


6.3 3rd mirror



Put 2 sheets of adhesive tape on the left side on top of the laser opening of laser head 2 and put the laser head in the top left corner with the buttons  and  then press  .
Attach another piece of adhesive tape and move the head to the top right corner with the button  . Pulse again. When both dots are on top of one another, this means that the 2nd mirror is in position. If this is not the case, the 2nd mirror must be adjusted by means of the setting screws. Check all 4 corners of the machine.
The lens adjustment can start when all the aforementioned is correctly set.





X+Y- location

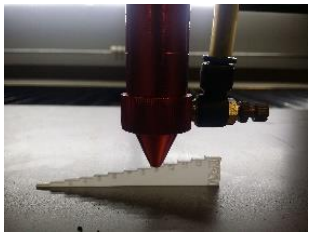
X-Y+ location

X-Y+ location

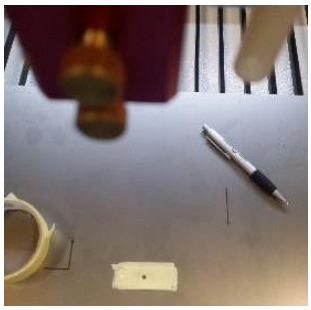
X+Y+ location

6.4 Lens adjustment

The lens adjustment is necessary to make sure that the beam falls in the middle and in a straight line through the lens resulting in a straight cut on all 4 sides.

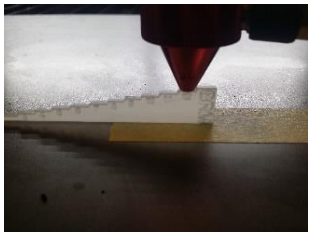


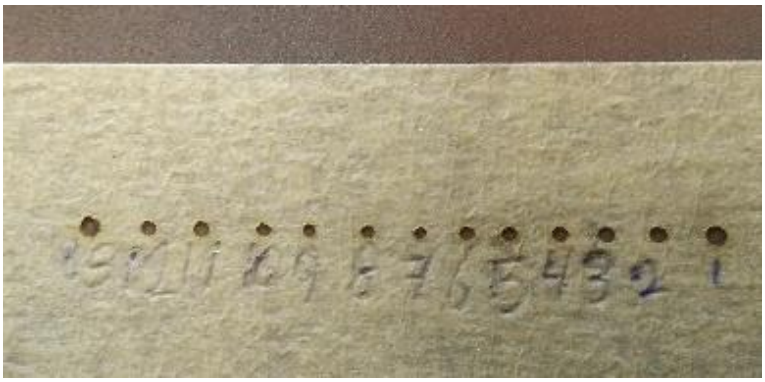
The heads needs to be run to the middle of the table. It does not matter if it is a few millimetres off. Overall, it is OK if it is in the middle by means of the jog buttons. You use the lens and nozzle to shoot a small hole at focus level in 2 adhesive tapes. Afterwards, you remove the lens holder and put in the z-axis. Now draw a cross on the adhesive tape and put a new piece of adhesive tap over it. Now pulse to put a dot. Subsequently, attach a piece of adhesive tape and put the z-axis at the bottom. Now shoot the 2nd dot. This dot must be on top of the 1st dot. If this is not the case, this must be aligned by means of the 3rd mirror. The beam must be in the middle of the cross when both dots are right on top of one another. This is accomplished by screwing all 3 setting screws of the mirrors in or out. The 2nd mirror is then positioned in front of the x-axis and the 3rd mirror in front of the y-axis. After this is completed, restart from paragraph 6.2 to guarantee that no deviation has occurred.



6.5 Searching the focus

The focal point must be found when everything is properly set. Each lens and machine has a different focal point and this point can also shift when a lens wears. You set the head at the highest focus position with the delivered focus tools. Shoot a small hole on a piece of adhesive tape. You do so with the following focus height next the point you just shot. Do this for all heights. Afterwards, check which height produces the smallest point. The example on the image shows it to be 7 mm. This is then the focal point for the current setup.





7 Troubleshooting

Double cutting lines
This the result of tuning the beam line incorrectly. Consequently, the beam deflects in the nozzle and you will notice the deflecting reflection on your product. For information about setting the focus, refer to chapter 6.

Oval focal dot
This the result of tuning the beam line incorrectly. Consequently, the beam deflects in the nozzle and you will notice the deflecting reflection on your product. For information about setting the focus, refer to chapter 6.

Foreign odours
This is the result of inadequate extraction. If you are in the possession of a BOFA, please set it to a higher revolution speed. When set to the original extraction, it is possible that the hose is pinched. Both extraction settings may also have the problem of too much laser residue on top of the extraction mouth.

Power loss
This the result of tuning the beam line incorrectly. Consequently, the beam deflects in the nozzle and you will notice the deflecting reflection on your product. For information about setting the focus, refer to chapter 6.
If this correct, it is also possible that the set power is too low or that the tube deteriorates.

Cooler beeps
This happens when the temperature is too high (higher than 35 degrees Celsius) or due to poor flow. If the temperature is too high, pause the production until the temperature has lowered again. If this is not the case, it is possible that a hose is pinched or a wad of dirt is clogging the pipe. This needs to be inspected before proceeding with the production

Wide cutting lines
This is the result of an inadequate focus. Refer to chapter 6.5 for more information.

File cannot be imported
This may be caused when you try to import a new generation of file. Laser work can only handle older generation files. Try to save the file with a file format from the time of 2002/2004/2006/2008.

Machine does not turn on
This is possible if the emergency stop has been activated, the plug is not in the socket or the circuit breaker has been switched. When you open the right side panel, you will notice the circuit breaker at the front of the machine.

No air comes out of the head
This may happen when the line of the machine or outside the machine is pinched. If this is not the case, it is possible that the gasket at the head is turned shut.

Image wrongly engraved
This can be caused by the fact that a square may be seen under the same layer in the drawing. Remove this frame to solve the problem.

Engine crackles
This may be the result of excessive speed, when the machine has to do too many curves and brake a lot. That is why we advise a maximum speed of 40 mm/s.

Drive also crackles at low speeds
This may be the result of cutting at high speeds. This makes the layers wear harder and will probably need to be replaced.

The machine does not reset even when all doors are closed
This can occur when the emergency stop has been activated. Go through the steps of chapter 4.8. If this is not the case, it is possible that a door is bent. Double-check that all circuits enter well. This is visible on the door switches themselves. They are equipped with an LED.

Bridge is tilted
This can occur when the tension of the belt is too low on 1 side. Tighten it as described in chapter 9.5.

Lines are not visible in the drawing but are cut
This can occur when a drawing is imported from another programme. Many drawing programs have special construction lines. These are regarded as cutting lines in laser work. Change the drawing and import it again to solve the problem.

Machine does not move when operated
This may be caused by an open door or if the emergency stop has been activated. Close all doors and cancel the emergency stop to proceed with the machine.

Machine cannot make a connection with the PC
This can occur when the USB is plugged into a different port. Reinstall the software to solve this problem.

Product catches a lot of fire
This can be caused when the speed is too low or too much air is used.

Extraction works poorly
If you are in the possession of a BOFA, please set it to a higher revolution speed. When set to the original extraction, it is possible that the hose is pinched. Both extraction settings may also have the problem of too much laser residue on top of the extraction mouth. When using a BOFA, it is also possible that the filters are full.

Laser head does not run smoothly
This is because the speed is too high. Lower the speed to solve this. If this does not work, check chapter 9.4 to clean and oil the lines.

Vibration in the engraving lines
This occurs when engraving at a speed that is too high. If this is not desired, the speed needs to be lowered.

Machine makes a lot of noise when axes move
This is because the speed is too high. Lower the speed to solve this. If this does not work, check chapter 9.4 to clean and oil the lines.

X-y-axis sometimes does not work
This can be caused by a ruptured signal cable to the engine. Please contact BRM for service repair.

Y-axis has no power
This can occur because the switch on the right side panel in front of the power supply of the y-axis is set to 'off'. It is also possible that the switch y-u is on the u-axis.

Laser beam does not work anymore
This may be the result of a defective tube or the cooler that is not on.

Pulse dot is not visible during calibration
This is caused by an open flap, the cooling that is not turned on, the max power is set too low on the operating window.

Machine does not refer well
This is because a door is loose or the emergency stop system has been switched.

Engraving lines have shifted away from one another
This can be caused because the belt of the x-axis has become looser. Run through the steps of chapter 9.5 to solve this problem.

Machine does not want to engrave, gives defect of a field that is too small
The machine extends during engraving. This extension goes beyond the range of the machine. Move the order further from the edge or lower the speed to solve this problem.

BOFA

- Red lamp flashes
  This means that the filters are full. If you have already purchased filters, install those. If you have not done that yet, you can order filters from BRM Lasers and do not use the machine until these have been replaced. Please note that health problems as a result of cutting with full filters are not covered by BRM Lasers.

- Orange lamp flashes
  This means that the filters are 75% full. It is recommended to order new filters. This can be done with BRM Lasers.

- Revolution speed increases without extraction power
  This can be caused by a pinched extraction hose, full filters or a clogged vacuum hose.

- Poor extraction despite high revolution speed
  This can be caused by a pinched extraction hose, full filters or a clogged vacuum hose.

8 Transport and storage

8.1 Disconnect/prepare for relocation for the purpose of transport

In order to disconnect the machine to potentially relocate/move or sell the machine, a few steps need to be taken.

Caution!! If this is not carried out correctly, there is a chance of irreparable damage to the machine.
This damage does not fall under the warranty and is completely at the expense and responsibility of the user.

The laser tube is cooled by means of cooling water that consists of demineralised water and anti-freeze. This cooling water is permanently in the machine. For the purpose of transport, the cooling water must be removed from the laser tube to prevent that the tube breaks because of the weight of the cooling water.

Caution! The coolant is harmful to your health.

The 2 hoses that go to the cooler must be disconnected to remove the cooling water. The hose of the inlet of the machine must be placed in a receptacle. Connect the hose of the outlet to the activated air pump.
The air pump will pump the excess coolant out of the laser tube. Check this before opening the laser flap. This process is completed when all the fluid has been removed from the tube.

Disconnect the air pump from the machine. When the laser tube no longer contains cooling water, it is safe to disconnect the power cord, cooler alarm cable, inlet cooling hose and outlet cooling hose from the machine. The liquid in the receptacle can be disposed of as small chemical waste.

Turn all legs upward and remove the brakes from the wheels. The machine is now ready for transport/relocation.

8.2 Storage of the machine

The machine must only be stored in a conditioned lab/warehouse with a temperature between 20/23°C and a relative humidity of plus minus 50%.
Do not place the machine near a radiator or other heat source.
Do not place the machine near water.

9 Service/maintenance (mechanical)

The master switch (power switch) must be turned off during service and/or maintenance work.

Opening the casing can cause dangerous situations and may void the warranty.
Both the manufacturer and CE-holder are not liable for consequences arising from the neglect of this warning.

If unexpected defects occur in the machine, please contact BRM Lasers.
If parts need to be replaced in consultation with the manufacturer, please have the parts replaced by a trained technician.

Daily maintenance and inspection by the machine operator before and during the use of the machine:

- Keep the machine and work environment clean before and after use.
- Check the lubrication of the transition on the main axis (drive)

Daily maintenance (by machine operator)

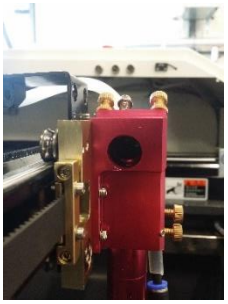
- check the mirrors and, if necessary, clean/replace (see paragraph 9.1)
- check the lens for defects and, if necessary, clean/replace (see paragraph 9.1)

Weekly maintenance (by machine operator)
- check to see if the nozzle is dirty/still lets air through
- empty and clean waste tray

Monthly maintenance (by instructed personnel (technical department or the machine operator if he has not been instructed)
- align the beam (see also chapter 6)
- clean grease of the lines (see paragraph 9.4)
- check if the driving belts are under tension (see paragraph 9.5)
- check if the table is flat (see paragraph 9.6)
- check the fill level of the cooler (see paragraph 9.7)
- check the colour of the coolant (see paragraph 9.8)

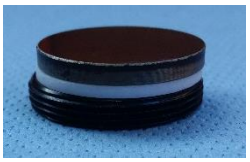
9.1 Cleaning and inspection of the lens and mirrors

All surfaces on which the beam falls must be checked and cleaned every day. If there is any contamination on the mirrors, this will affect the beam and the usable power can decrease. Worn mirrors and lens will cause a good machine with proper tube not to be able to cut even the simplest material.
The machines feature 3 mirrors (4 for the metal laser) to send th beam to the laser head. The laser head contains a lens to turn the straight beam into a point that can burn away the material.



The 1st mirror is in the beam tube that sends the beam to the 2nd mirror that is located on the gantry (the large bar where the laser head is hanging). This mirror reflects the beam to the 3rd mirror which is installed in the laser head. This 3rd mirror moves the beam in the direction of the lens that changes the beam from a straight beam to a point that ends up on your product. All these surfaces must be clean in order for the laser to perform well. Please note that these are sensitive surfaces and must be cleaned with 70% alcohol and cotton bud. Other parts can cause damage. Scratches are detrimental to the laser and the mirror or lens will have to be replaced. Please contact BRM to procure new lenses or mirrors. Please note that when you remove the mirrors/lens, you place these back in the same manner.

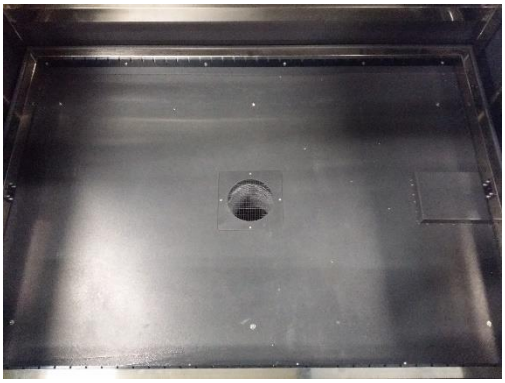




9.2 Checking the nozzle

The nozzle is the lowest point of the laser head. This comes after the lens and this where the beam is already running into a point. The nozzle is the place where the air (or O^2 for metal) is fed into the head. The point of the head has a hole where the steel and air/O^2 comes out of. This hole must be clean to make sure that the air/O^2 can flow through well and the beam is not obstructed. The hole at the air hose must be kept clean as well.

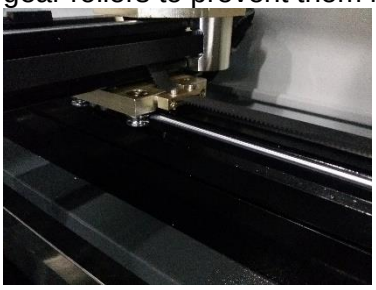
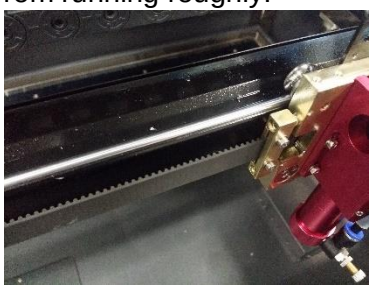
9.3 Emptying and cleaning the waste tray

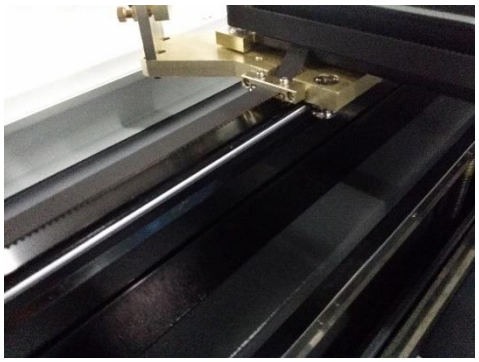


The waste tray must be kept clean. Cut material is flammable and too much cutting material can ignite due to the heat of the beam. The port of the extraction unit must be kept clean to guarantee proper reduction of laser gases.

9.4 Cleaning grease from the lines

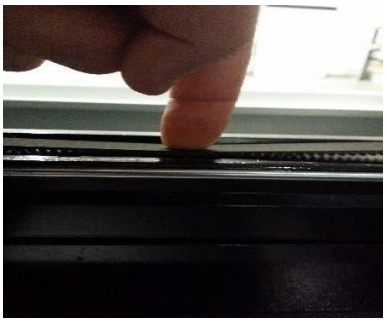
The granty and laser head move over the lines. The smoother these move, the better this is for the engines, the lines and the product. If there is a lot of dirt on the lines, the machine will run with a grainy sound instead of a buzzing sound. This grainy sound means that the dirt corrodes the lines and causes damage to the machine. If this does not get solved, so much damage will be caused that the line will have to be replaced to maintain the guaranteed product quality.
Greasing alone is not good enough. First wipe all lines with a paper cloth to make them completely free from grease. Afterwards, grease them again and also spray the axles of the gear rollers to prevent them from running roughly.



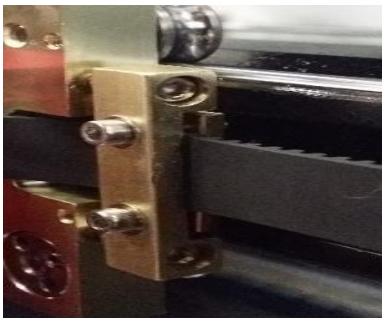
9.5 Check if the driving belts are under tension

The head and granty are moved by means of driving belts. These must not be too loose because it will create deviation. These will stretch out over time and will become loose anyway. You can put these under tension again with the setting screws. First put the laser head in the middle of the machine. Then look along the belt and the line above it. If the belt is not parallel to the line, it means the belt is too loose. Afterwards, carefully press on the belt with your finger and push it against the line.

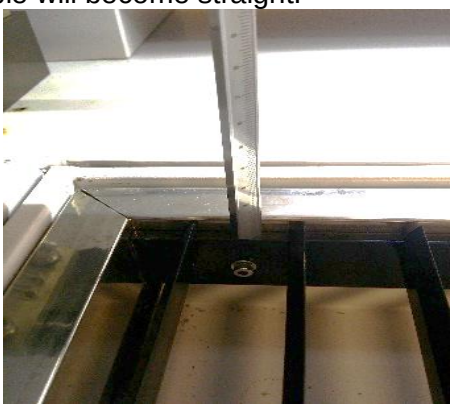

As for the x-axis, you cannot check if it is suspended. In other words, pull it carefully towards you until you feel a bit more resistance. Then you measure the distance to the line. This must be maximum 30 mm. If this is a lot more, that means the belt is loose. And just like the y-axis, afterwards push the belt with your finger against the line.





9.6 Check if the table is flat

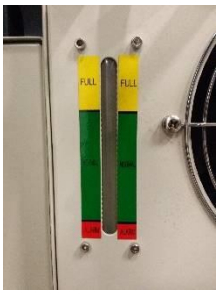
The table must be flat to make sure that the cutting quality is optimal everywhere on the table. If the table is lower or higher at a certain location, this will reduce the cutting quality because the focal point is not on the set level.
The joists for the table are fixed with various screws which can be height-adjusted by slotted holes. By taking measurement from the granty, 1 dimension can be maintained at each screw which results in the fact that the table will become straight.

Measure the dimensions to the granty above each screw and move the height so that everything above the entire table is at the same height.

9.7 Check the fill level of the cooler

The fill level of the cooler is very important. If this is not sufficient enough, it is no longer possible to cool and this can damage the tube or even make it explode. However, this will not happen if checked and filled periodically.



9.8 Check the colour of the coolant

The colour of the coolant depends on the age. Normally, this should be clear blue. However, if it has changed into a greener colour, it is recommended to completely drain your coolant and fill with clean coolant. This is to prevent any deposits in the line, tube or cooler that will a negative influence on the service life.

10 Disassembly and removal

When disassembling the machine, it is possible transport the metal and plastic parts without extra measures to a location suitable for this purpose.
The machine must only be disassembled by authorised personnel.

11 Technical data

11.1 Electricity

Power supply: 230v~ 50/60Hz 1-phase earthed
Power consumption: 2.2KW
Fuse: built-in automaton 8A
Outlet: 2x 230v~ 50/60Hz 1-phase earthed socket 4A per socket

11.2 Surroundings

Maximum
ambient temperature: 30^0C

11.3 Software

Software-supported file formats:
Vector format: dxf, ai, plt, dst, dsb…etc.
Bitmap format : bmp,jpg,gif,png,mng,…etc.
Saving format: RLD, RD
Exporting format: AI

11.4 System requirements

- Windows XP or higher, Windows 10 is recommended Mac not supported
- Higher than CPU586, higher than Pentium III or Pentium IV is recommended.
- Memory, more than 1 GB is recommended.