

Mini-Laser Engraving and Cutting Machine

User Manual for BCL-M Series



Jinan Bodor CNC Machine Co.,Ltd.

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Preface

Thank you for choosing our products. We will provide you with comprehensive after-sales service and solutions, please keep this

instruction booklet and other attachments for your better use later.

This statement only applied to our standard equipment, for special ordered Machine, please read the attached documentation.

The Manual is going to show you the work Principle, methods of installation, operation, troubleshooting, transport and storage and maintenance. If it's your first time to use this product, please read this information carefully before installation and use.

For quick and efficient using this equipment, the user should meet conditions as below:

A. Operator requires a certain amount of computer expertise to edit the graphics software ,For Example:

Coreldraw,Photoshop ,Autocad and other CAD software.

B. Operators have a certain knowledge of optics and electrical related equipment repair and maintenance

C. Confirmed that the operator is familiar with the equipment operating procedures before starting the and do as it's instruction.

Apologized that due to the constantly product updated,maybe somewhere is different with your products.

If there is any doubts or better ideas ,please leave message on our website(www.bodorcnc.com) or Call our 24 hours hot line:

400-991-7771

Brief Introduction of Laser Engraving Machine

Safety knowledge

1.1 Basic Information

- Make sure that the operator is trained before operating the machine.
- In order to avoid unnecessary loss, the operator is prohibited from leaving and must observe the machine at all the times when it is under working.

1.2 Optical Security

Our Equipment Adopts the Fourth Laser that the wavelength is 10.6 μ m, Recommended that the operator wear the accredited laser protective glasses.

Even wear the laser protective glasses and do not look directly at the laser beam or any reflection of the laser beam.

1.3 Electricity Security

Observe the machine nameplate carefully such as power and voltage requirement before you access the power supply.

Without our permission, please do not disassemble the electrical parts yourself. Especially do not touch the laser power supply, laser tube when it is working because of its lethal voltage, the danger still exists even power outage.

1 Hazard

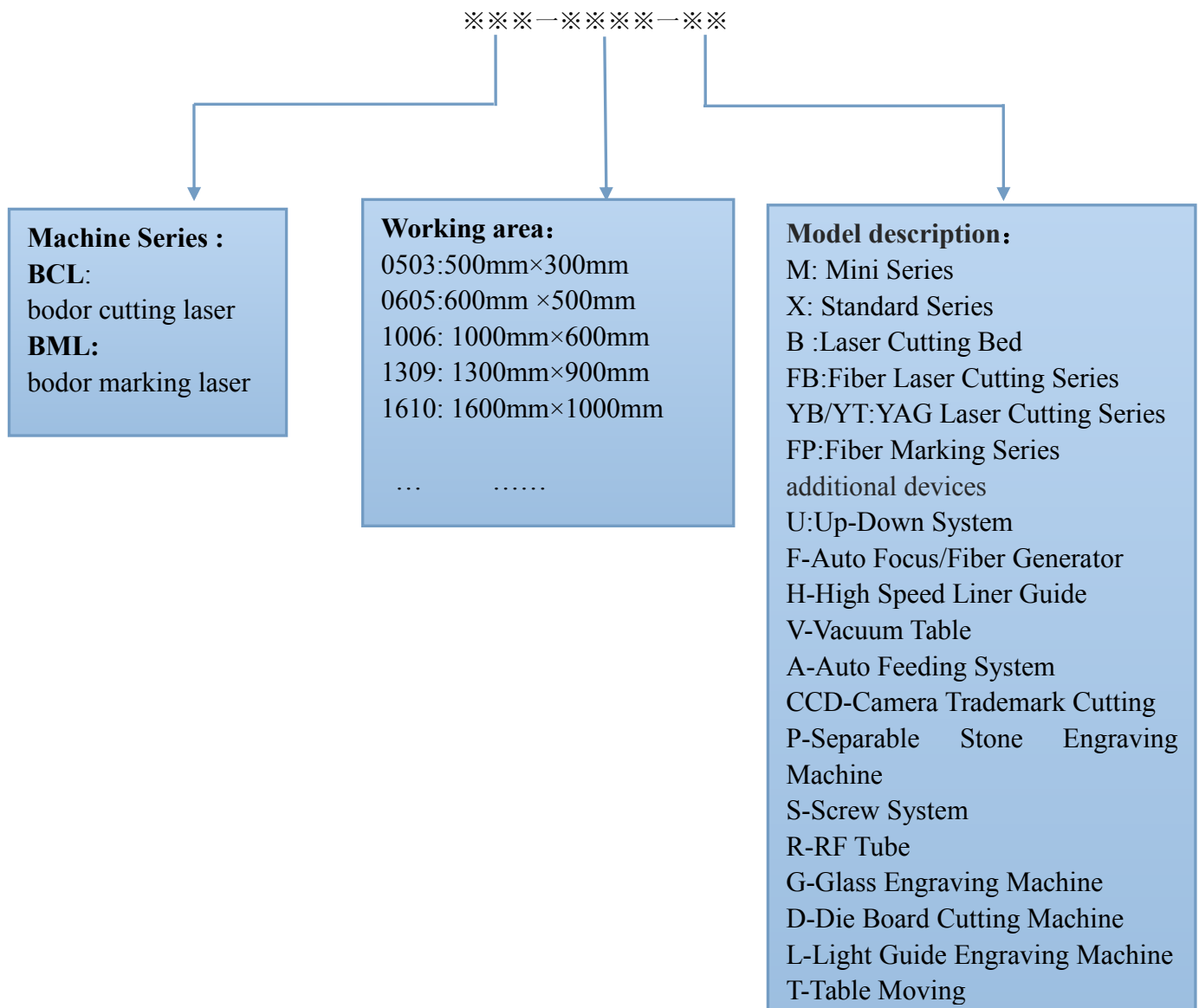
a wide variety of potentially dangerous substances that produced by the plastic materials when processing can be removed by the ventilation systems, if the smoke or the smell is too big, the gas mask is needed.

2 Other hazards

For security purposes, Equipment modification is strictly prohibited without the manufacturer agreement.

1. Equipment Brief Introduction

Equipment adopted the high-precision transmission shaft and servo-drive can be realized fast and smooth carving. Non-Metal materials can be cut or engraved by the high efficiency laser tube.

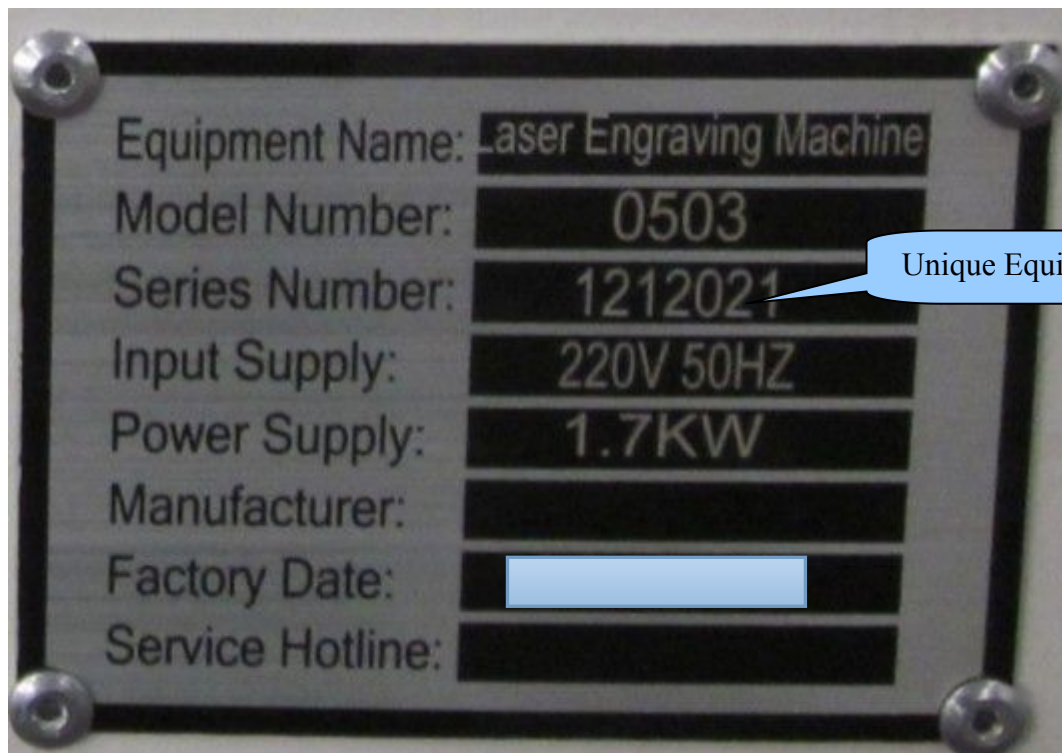


1-1 Machine Model Description

Example: BCL1309XU means working area: 1300mm×900mm with up-down system.

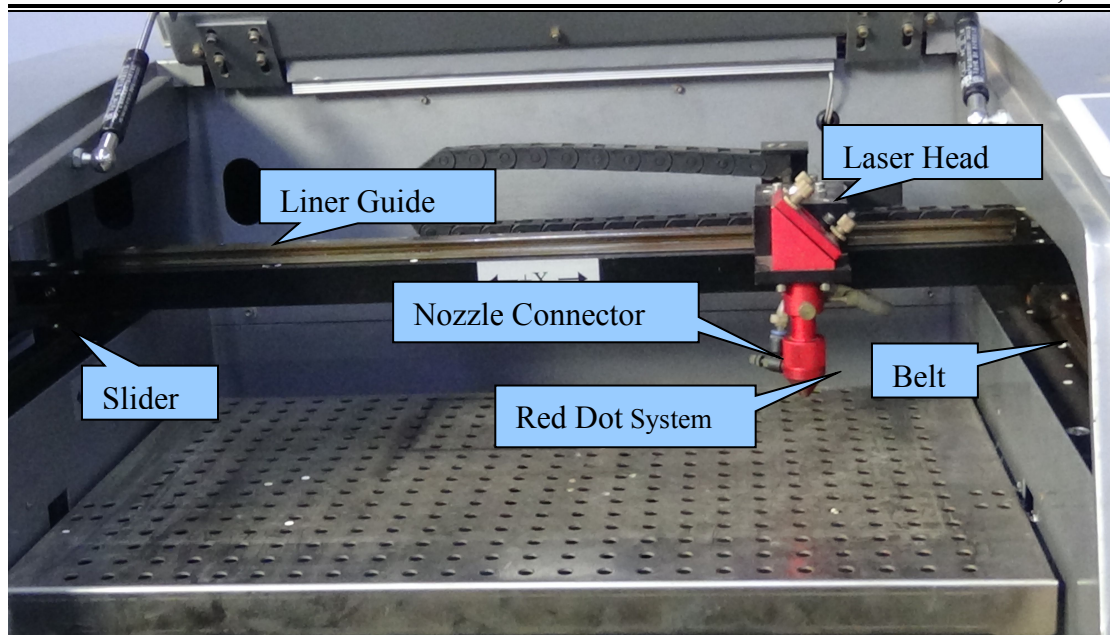
2.1 Nameplate Introduction

The nameplate fixed on the right rear of the device which can get more equipment information. No randomly change or demolition.

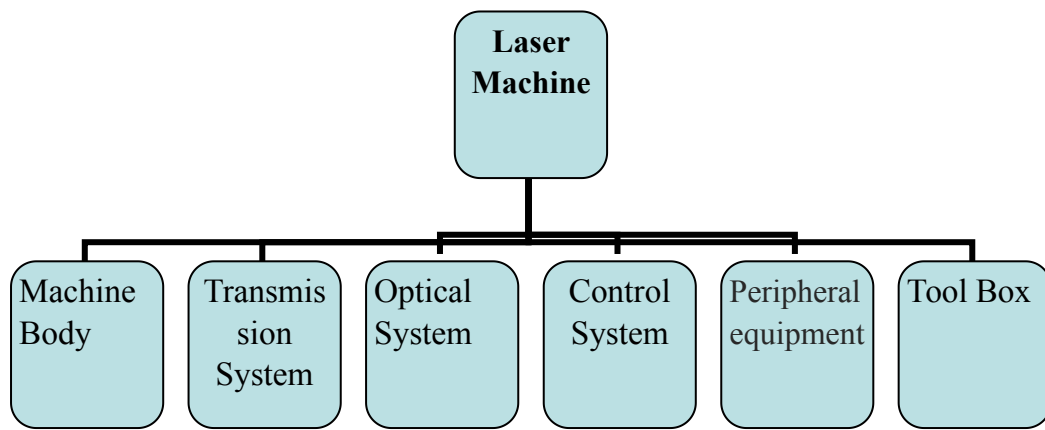


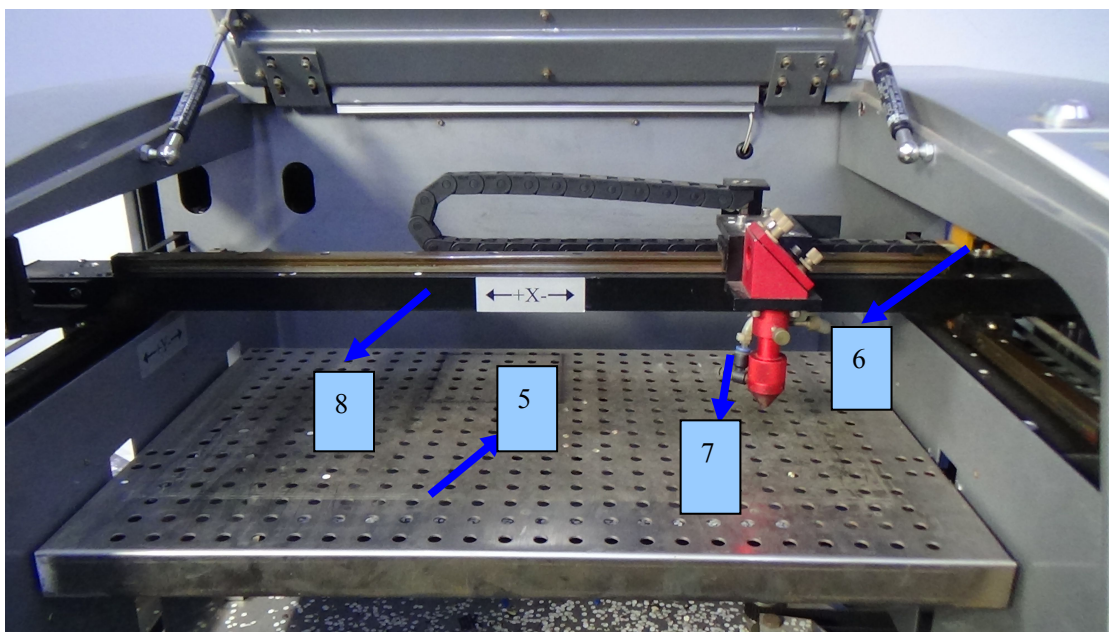
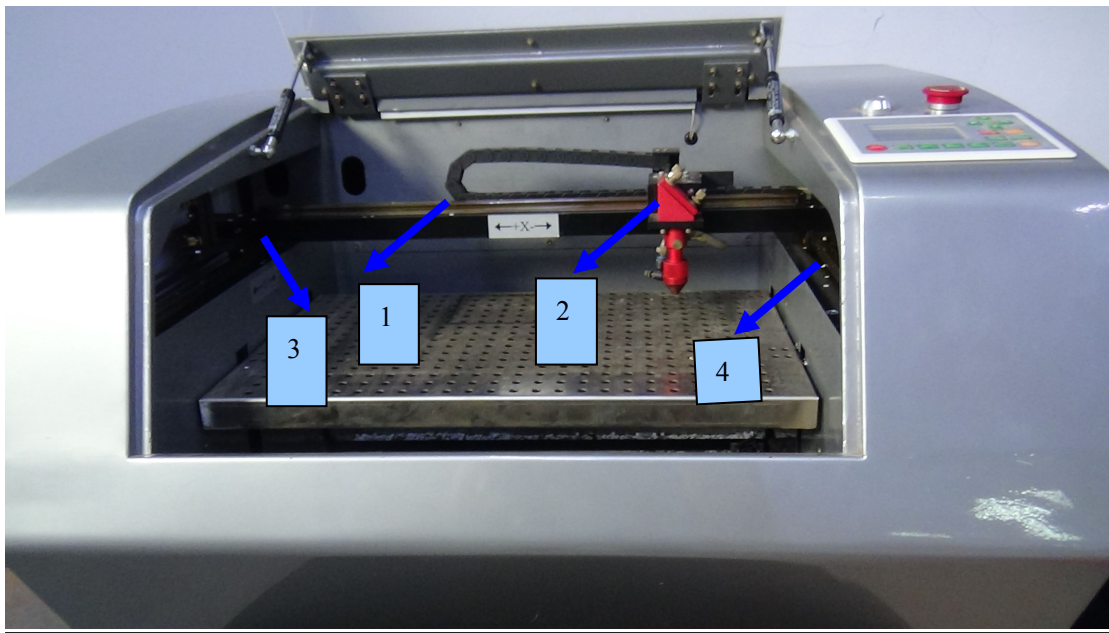
2.2 Equipment Composition

Machine Appearance or the some details are different because of the model or Machine improvement. Specific to the material object as the standard.



2.2.1 Equipment Composition



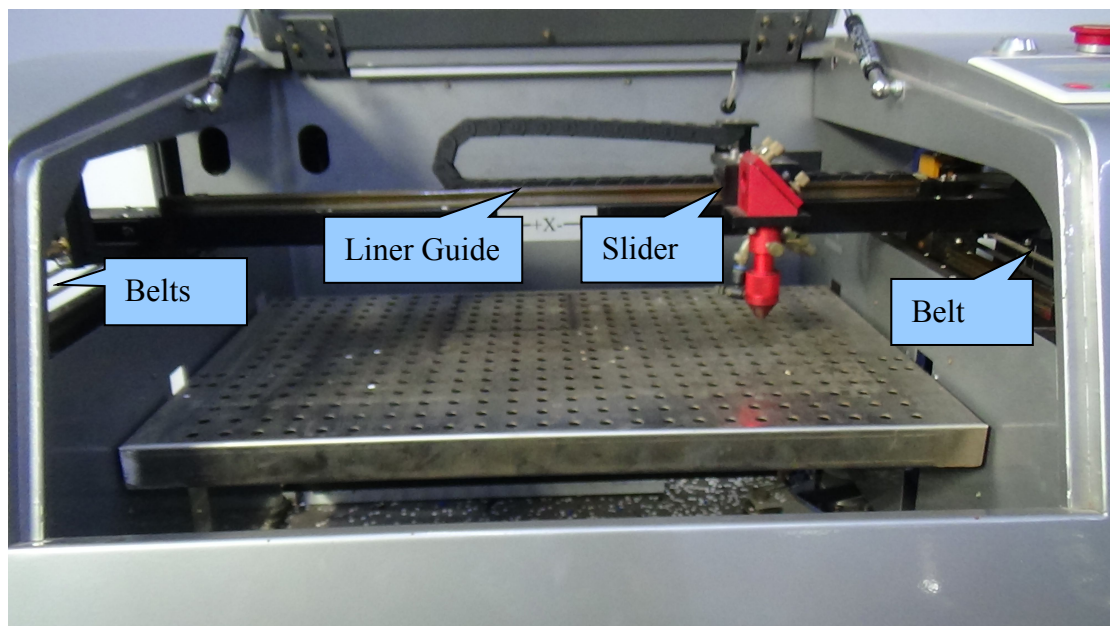
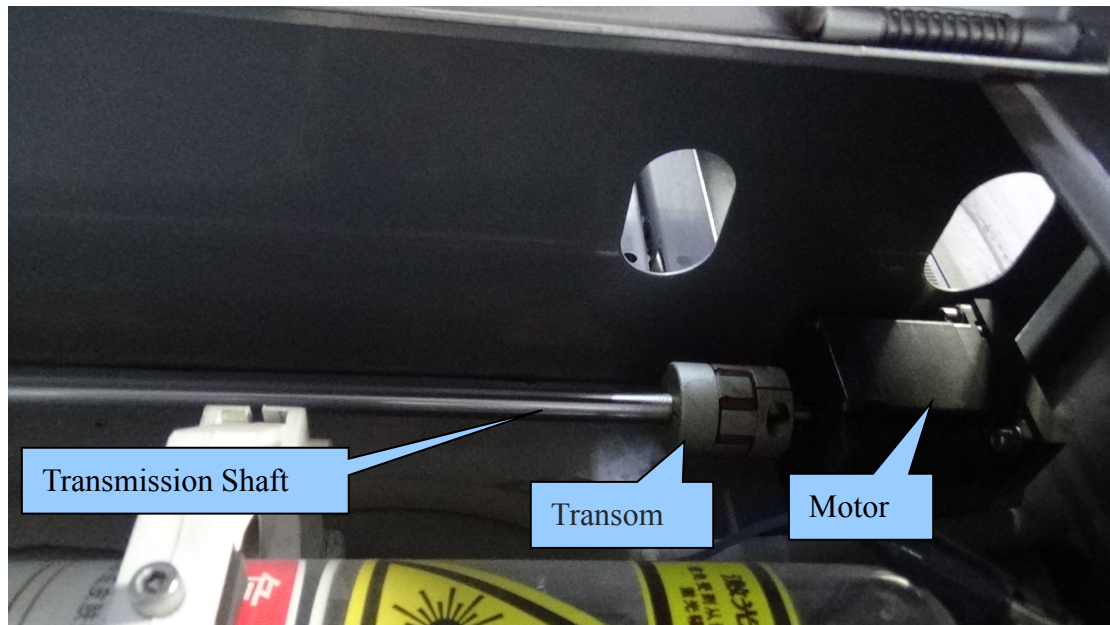


Picture 1: Machine body: body、transom、upper shield,Up&Down table

1-Liner Guide 2-Laser head 3-Slider 4-Belts 5-Stainless Steel Working

Table 6-Photoelectric switch 7-Nozzle Connector 8-Red Dot System

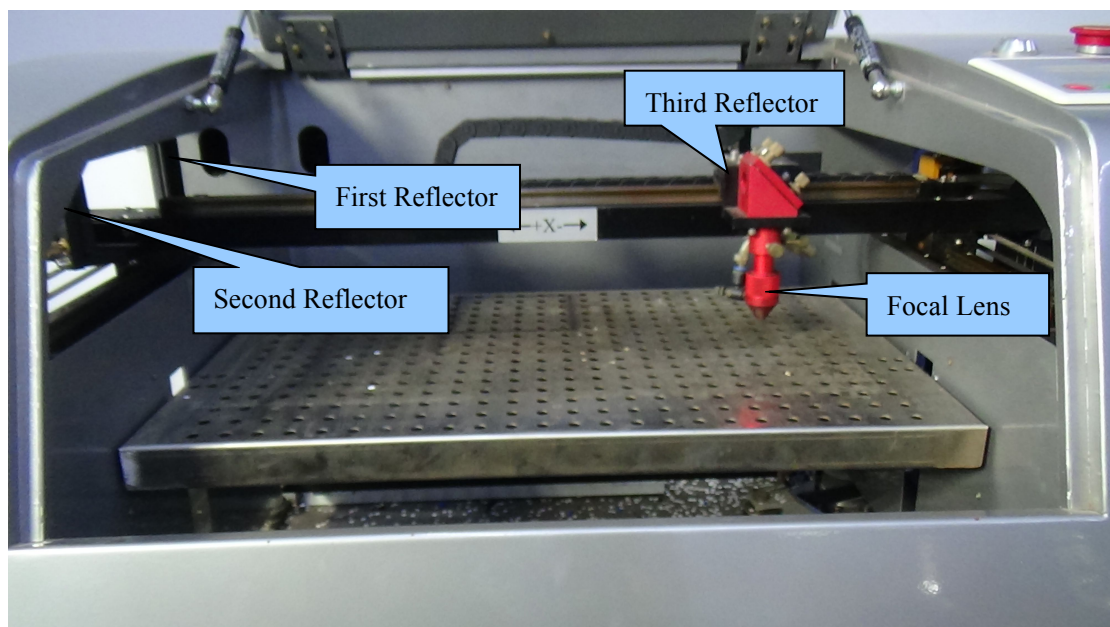
2.2.2 Transmission System



Picture 2: Transmission System is Composed of Motor ,Driver ,
Transmission Shaft,Liner Guide,Slider,Belt.

2.2.3 Optical System

Note: Laser tube must be handled with care during installation; High Voltage and Cathode lines should be tense properly; Water inlet on the upper and outlet on the below (Reci Tube); Ensure that no bubble inside the tube; Evenly Strength on both sides when fix the laser tube on the Basement. Make sure it Solid and not crushed.



Picture 3:Optical System :Three Reflectors and Focal Lens Device

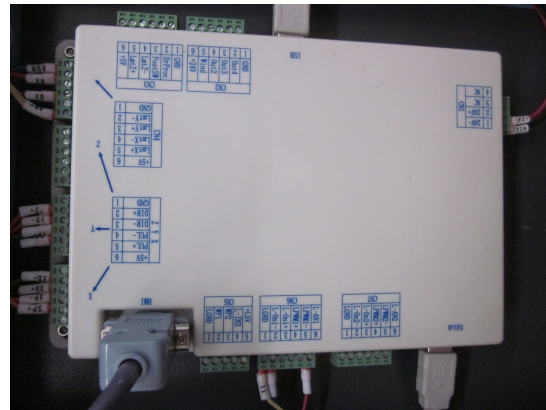
2.2.4 Control System

Control Systems are different because of the machine model, Specific to the material object as the standard!

Our control systems as below :Leetro 、 Ruida、 Bodor。



Ruida Control Panel



Ruida Control Card

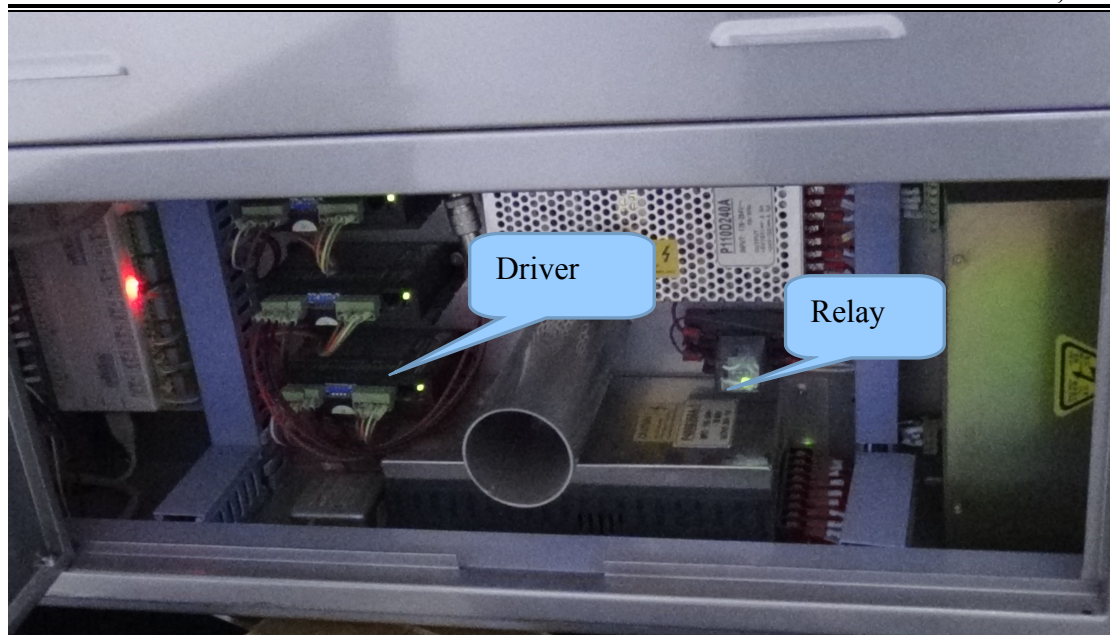


Leetro Control Panel



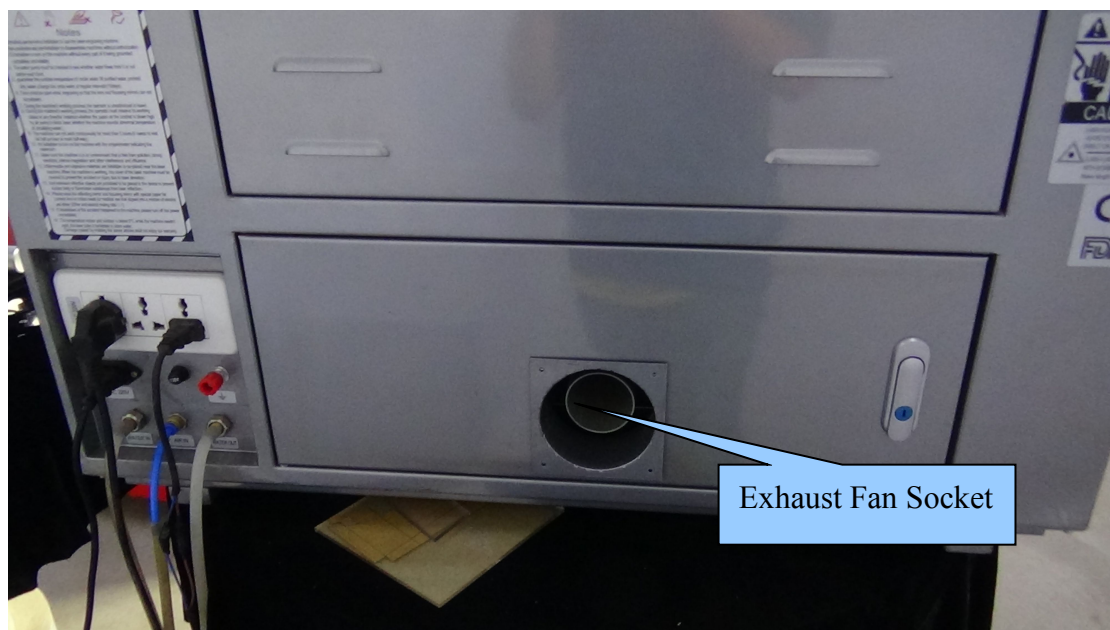
Leetro Control Card

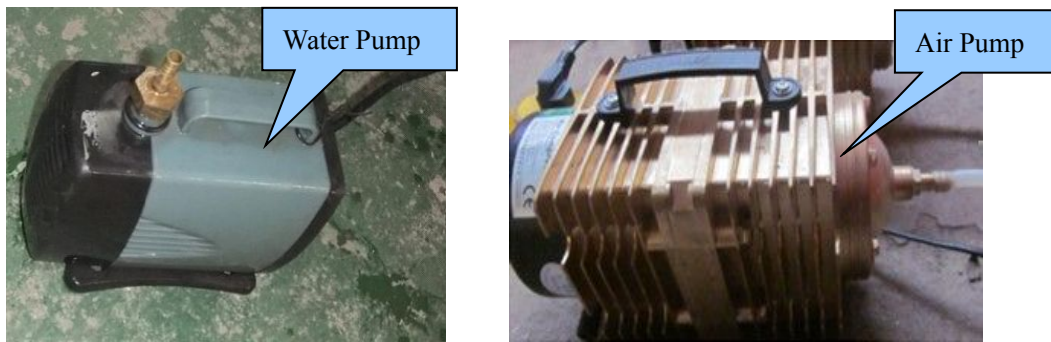




Picture 4: Control System:Control pane, Control Car,Computer

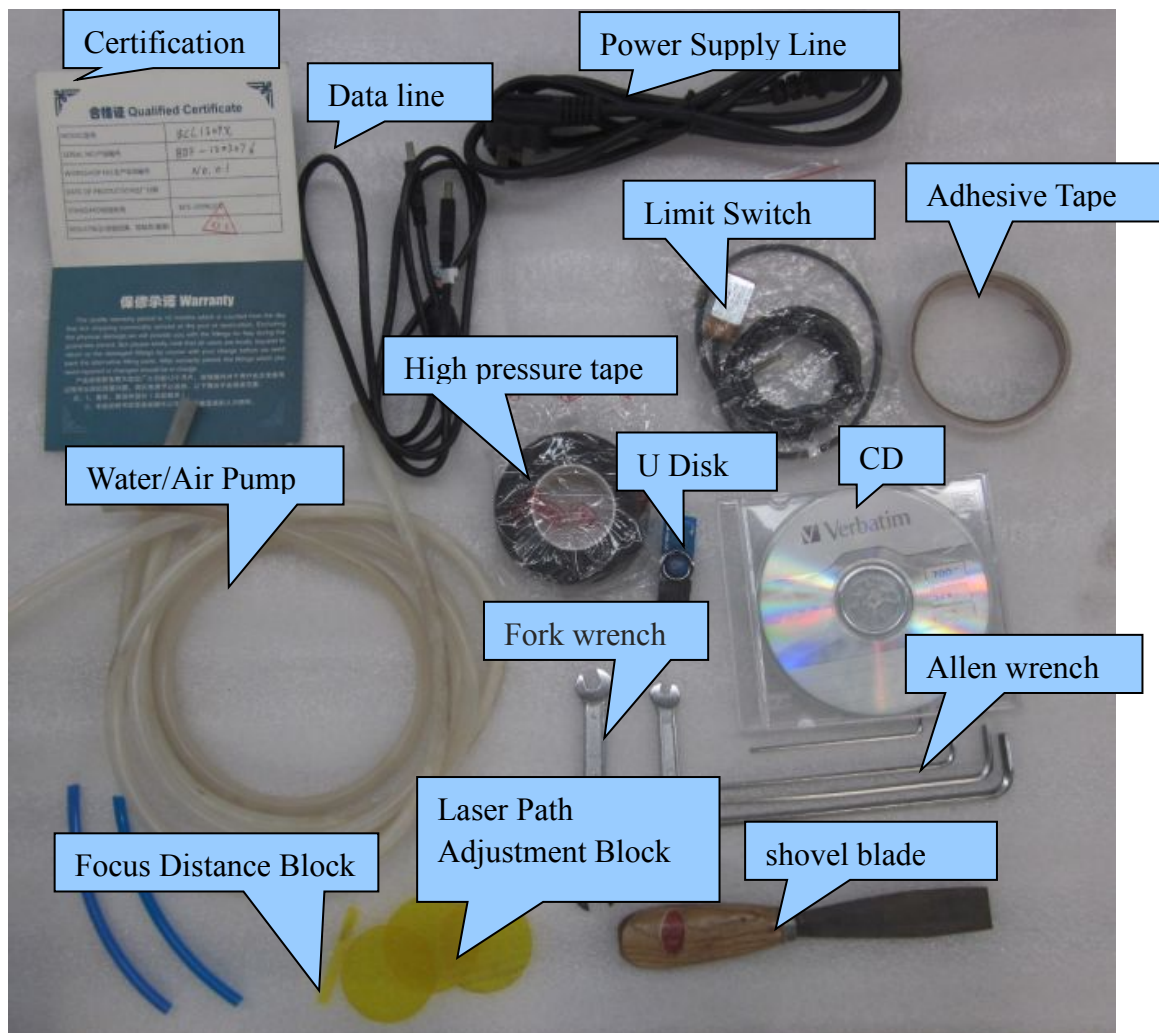
2.2.5 Peripheral equipment





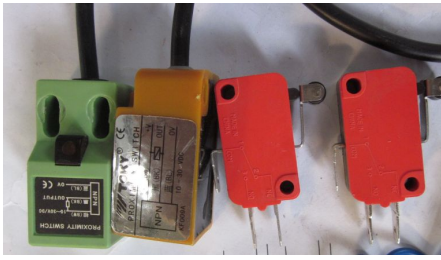
Picture 5: Peripheral equipment: Water Pump, Exhaust Fan, Air Pump

2.2.6 Tool Box



Picture 6 Tool Box

Note: Tool Box is different because of the machine model, Specific to the material object as the standard.!

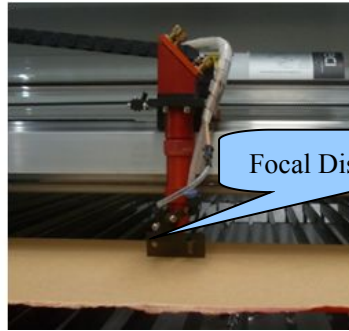


Limit switches :Proximity switches and Micro switches



shovel blade Usage

Picture 7 Shovel Blade

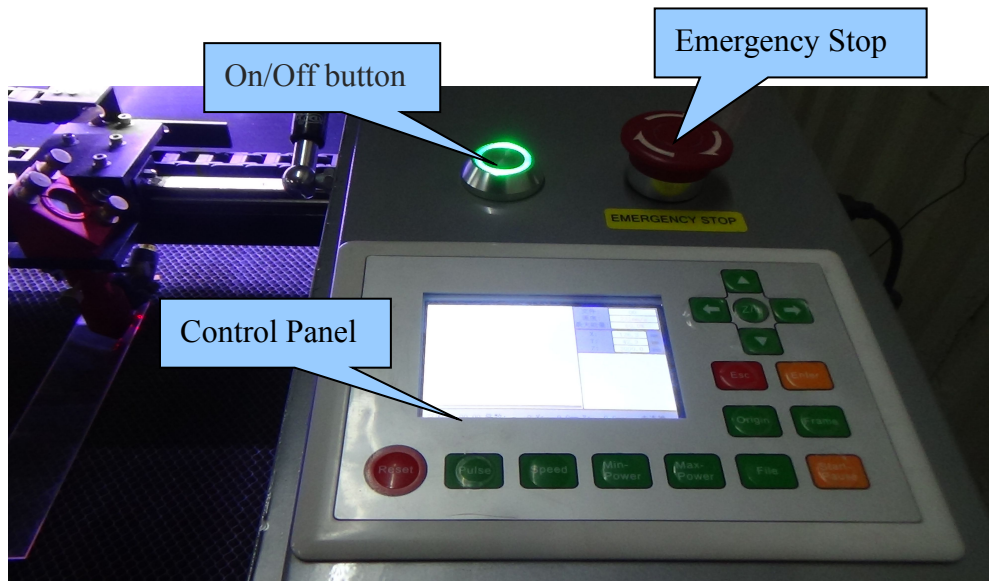


Focal Distance Block

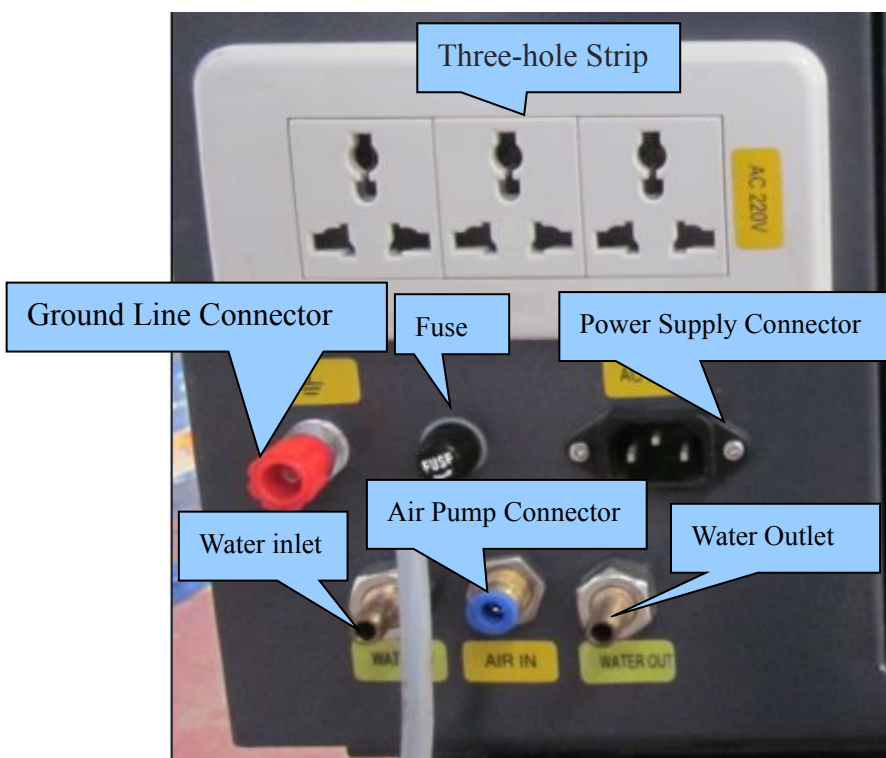
Focus Distance Block Usage

Focus Distance Block

2.3 Front of the Machine



Picture 8:Control Panel



Picture 9: Machine Power Supply Socket

3.Equipment Installation

3.1Preparation before Installation

3.1.1 Site Preparation

Equipment should be set in dry environment without electromagnetism

and high-strength electricity, without pollution's disturbance and effect. Temperature of working environment is 10-38℃, humidity is 10-90%, AC 220V±10%, 50HZ, resistance to ground should be smaller than 5Ω.

3.1.2 Personnel Preparation

The operator must master the main point of installation. Otherwise, the damage of machine parts will not in our scope of protection.

3.1.3 Tool Preparation

There is tool box with this machine. Besides, multimeter and screw driver and other detection tools are needed.

3.1.4 Other Preparation

Purified water for water chiller, power strip, pipe for discharge smoke, sample material, etc.

3.2 Installation procedure

3.2.1 Package of Laser Tube

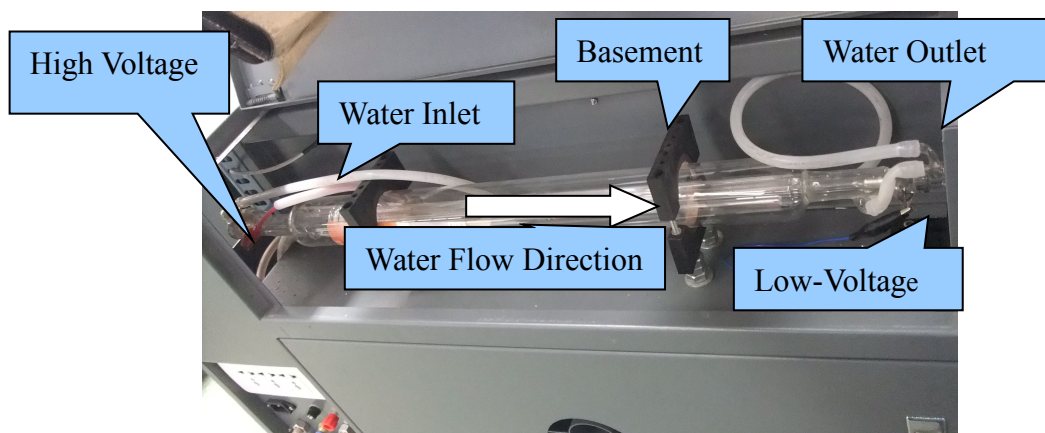
In case of damage during transportation or outside force, the tube is packed with sponge. And two ends of tube are sealed with zip lock bag to prevent the mirror from pollution or scratch. Finally, the tube is built up with sponge supports to prevent tube have direct contact with surrounding.

3.2.1.2 Open the carton box, take out the laser tube. Both hands hold the middle of the tube; take off the sponge supports; take off the packing sponge; take off the zip lock bag. Then inspect whether the tube is intact. If tube have any defect, please take photo and send to Bodor for confirmation.

Attention: It needs as least two person when remove the package. Handle the tube with care.

3.2.2 Installation of Laser Tube

Open the back cover. You can see two white laser basement, two water pipes, and black color low-voltage line and red color high-voltage line.



Picture 10:Laser Tube Installation

3.2.2.1

Use Allen wrench M3 take off the screws that fix the laser tube and remove the upper parts.

Put the low voltage side of the laser tube on the basement that nearby the First reflector mirror.

Put back the basement upper parts and fix the screws.connect the high voltage socket and water inlet and outlet pipe.Fix the laser tube well as Picture 10.

Notice:

- Distance is 2cm between the laser Output and the first reflection mirror.
- Do not too tense to crush the laser tube.
- Solid connect the water inlet pipe to prevent the water leakage.
- Laser Tube inside water flow from the high pressure side to low pressure side,start to work without bubbles

3.2.3 Water Pump Installation



Picture 11 Water Pump

- ▲ Find one container, fill in purified water or distilled water.
- ▲ Put the water pump into this container.
- ▲ Connect the water pump Outlet with the machine water inlet by water pipe.



Picture 11 Water Pump Installation

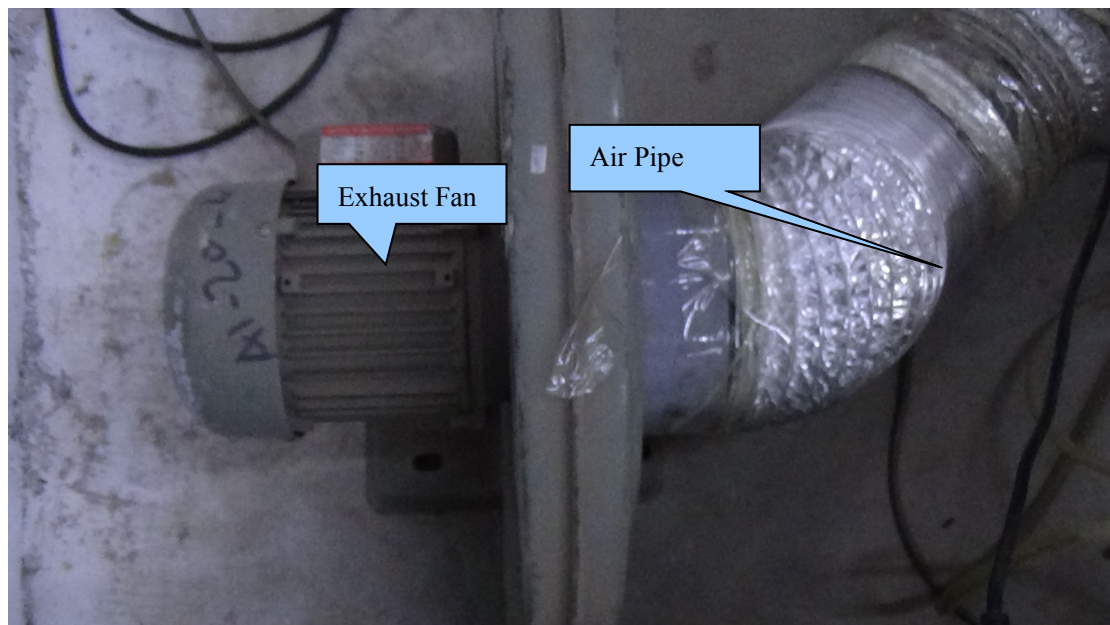
Notice:

- Laser Tube inside water flow from the high pressure side to low pressure side, Or broken the laser tube.
- When powered on, the bubble in the tube can be removed by extruding

the water pipe or turning the laser tube.

- Do not touch high voltage lines during working or shut down the machine for a while, or may cause an electric shock and threaten safety.

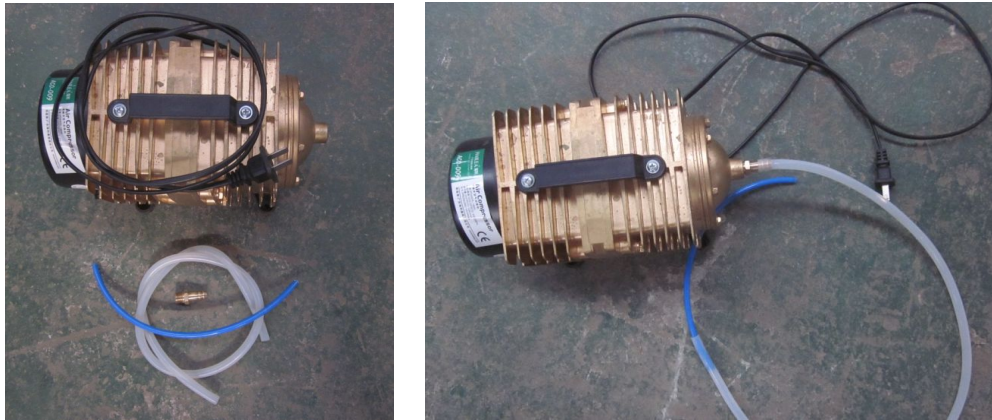
3.2.4 Exhaust Fan Installation



Picture 13: Exhaust Fan Connection

Attention ,Exhaust fan is different because the model,Specific to the material object as the standard.

3.2.5 Air Pump Installation



Connect the Silicone with the machine air connector by a shorten air pipe. please ensure the laser head blow works fine when power on the machine. as the upper picture.

Air Pump (compressor) plays an important role in the whole system, the air filter is necessary for the high pressure gas to prevent that the pollution of the focal lens and thus effect the engraving. or it will broken the focal lens. keep the air pipe connector unobstructed : on one hand can keep the focal lens cleaning , on the other hand , to prevent the processed material is subjected to high-temperature combustion.

3.3 Ground Line Connection

The Laser Machine is very strict with ground line connection. Your local electric system must be meet the local electric security standard.

L : 220V Live line; Phase line

N : Zero Line, compose the electric system together with phase line

E : Grounding line, resistance to ground should be less than 4 Ω

Attention:

Nonstandard grounding may lead to high failure rate and other security accident. All these are not in the range of Bodor's protection.

4 Equipment Debugging

4.1 Inspection before Debugging

Before power on, please inspect and make sure all electric wire terminals are intact. And move the laser head and X axis beam to make sure they are smooth enough. Power on when everything is ok.

4.1.1 Boot Process

Power On:

Connect the Power supply lines→turn the Emergency stop→press the green button

Power off:

Press green button→emergency stop→disassemble power supply lines

4.1.2 Test Running

Use the direction key on control panel to test whether laser head can move normally after power on, whether beam have any noise,each device can work properly. Debug the laser path is all works properly.

4.2 Laser Debugging

Laser Debugging divided into two sections:output of laser tube and Laser Path Debugging

4.2.1 Output of the Laser Tube

After the equipment power on, please make sure the water flow direction is from high-tension terminal (red line) to low-tension terminal (black line); inlet and outlet water pipe and electric line connect properly. Most importantly, be sure there is no bubble in the tube.

Next, stick one acrylic block on the first reflection mirror, press the "Laser" button on control panel to test whether there is laser out of tube.

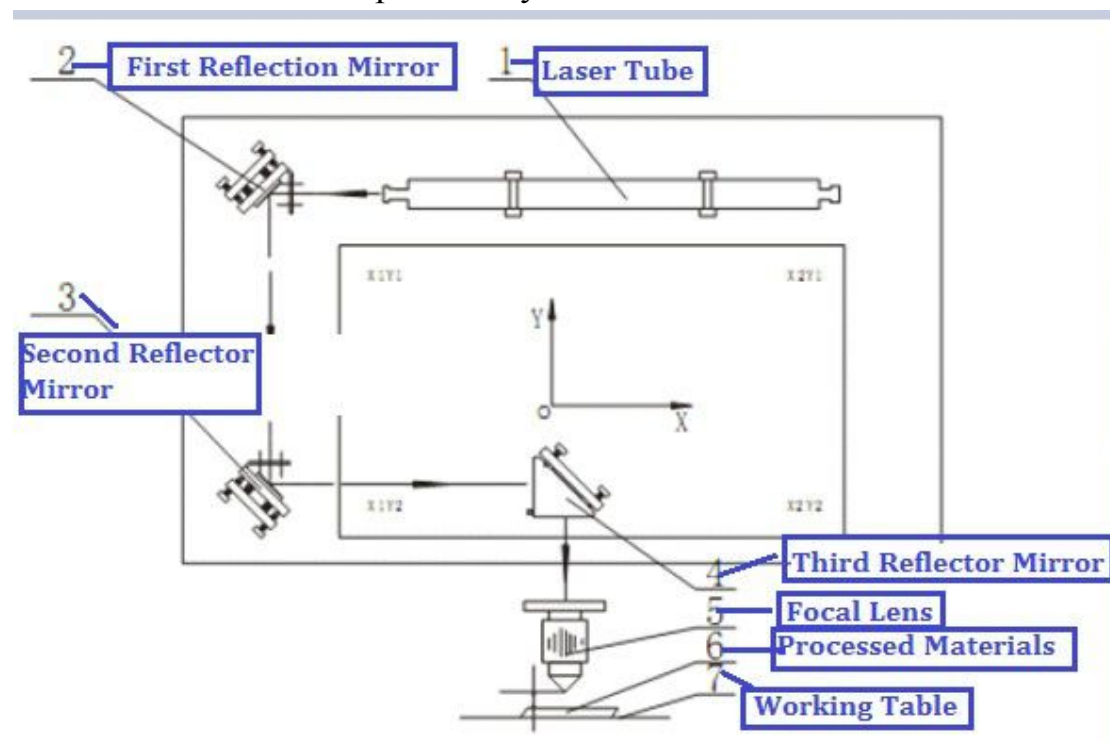
If there is no facula or weak light, then you need check whether you have set the ammeter on the max value, or whether the water chiller is connected in right way. If still have no light from tube, then there may be some defect of laser tube or laser power supply. Now, you need to have simple test of this device or take some photo to Bodor for quality confirmation.

4.2.2 Laser Path Debugging

The laser path is debugged OK before shipment. While there may be displacement of laser path during long time transportation. So it's better to debug the laser path again for security.

Laser Fundamental Diagram as below:

Optical system consists of a laser tube, 3 reflection mirrors, 1 focus lens, a laser head and red dot position system.



Laser shoot out from the laser tube, reflected by first, second, third reflection mirror, and then reaches the working table through focus lens. Finally reach on the work table.

Actually ,the working principle is through multi-reflecting and focusing to achieve the best cutting and engraving effect.During this period ,there will be no laser if the screws are loosen.

4.2.2.1 Needed Parts for Debugging:

Laser Path Adjustment block,Adhesive Tape, Focal Distance Block,Shovel Blade,Pliers.

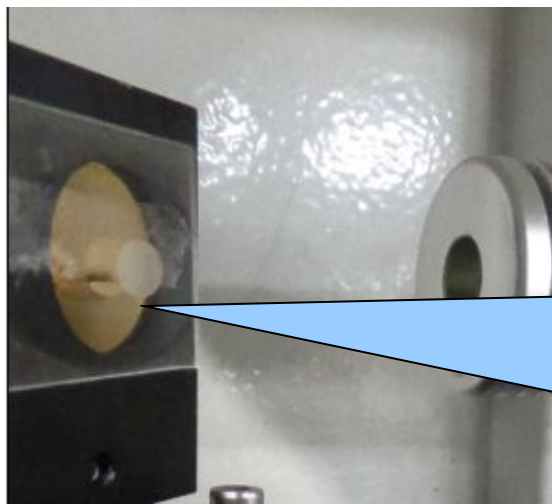
4.2.2.2 Laser Path Debugging Steps

Work Principle: Put the reflected Facula as the point,and then put it in the center through by adjusting the position of the laser tube.

Detailed Steps:

Laser shoot out from the laser tube, reflected by first, second, third reflection mirror, and then reaches the working table through focus lens. Finally reach on the work table.

It's working theory is through multi-reflecting and focusing, to achieve the best cutting and engraving effect. If light path isn't adjusted properly, it may destroy laser tube, reflectors, lens and so on. Please re-adjust the light path if it tilts. Following steps for your reference:

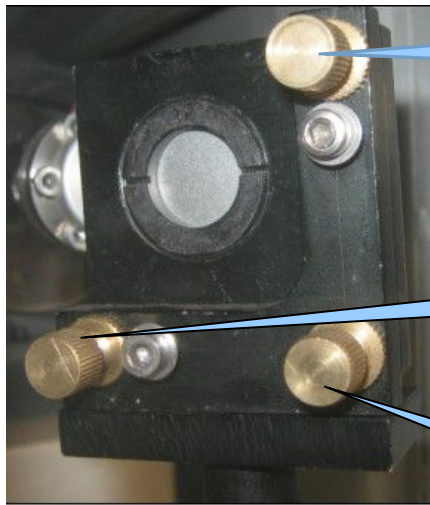


Before adjusting the laser, outlet of laser tube and circular hold on laser head should be consistent.

The laser beam should shoot on on the right side of the central point of the mirror. It's better for reflection.

Adjusting method: adjust first mirror bracket.

No.2 Screw



No.1 Screw

No.2 Screw

No.3 Screw



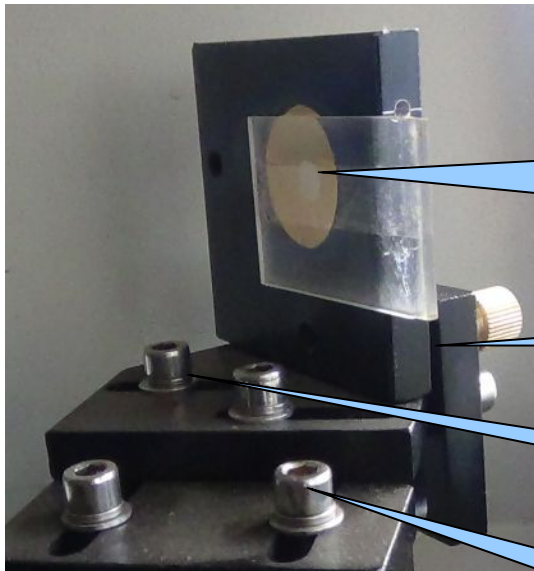
From the first reflector to second reflector, the laser beam should be fell on the same point from both nearest and farthest position to the first reflector.

Upper--please adjust No.1 screw;

Lower--please adjust No.1 and No.2 screw;

Left—please adjust No.2 screw;

Right—please adjust No.1 and No.2 screw.

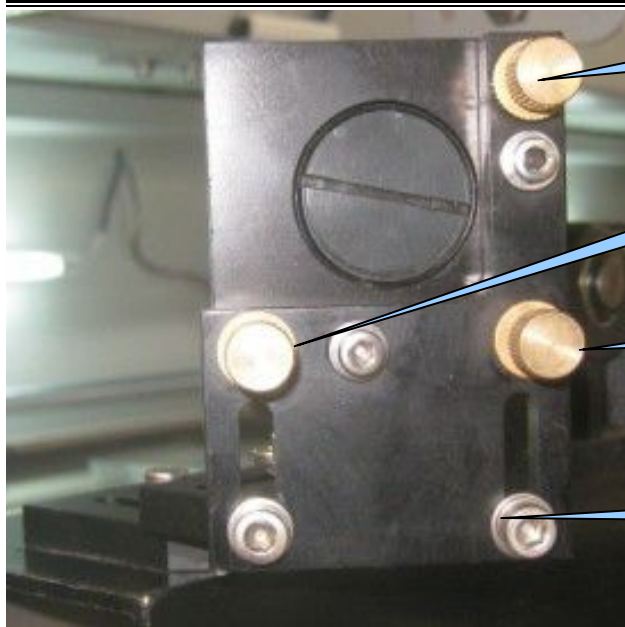


If light on same point and not on right side of the center, please adjust No.11,12,13 screw.

No.11 Screws (Two)

No.12 Screws (Two)

No.13 Screws (Two)

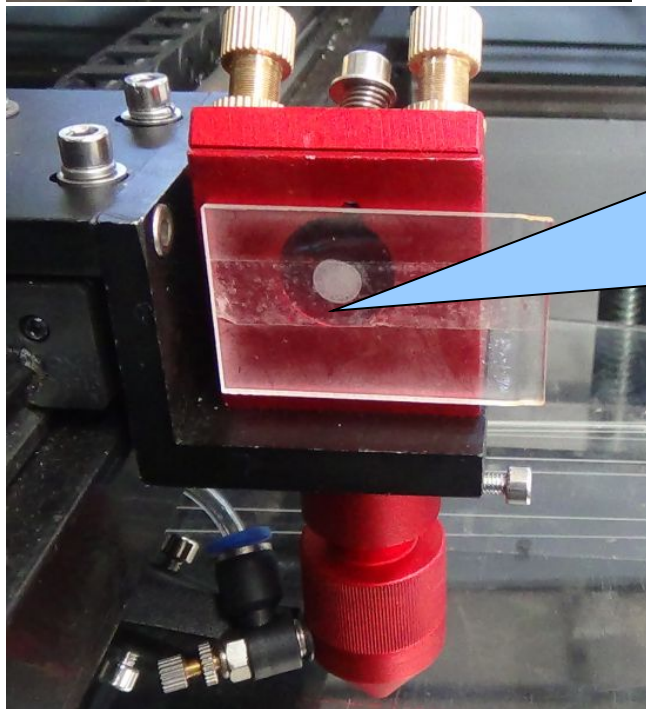


No.21 Screw

No.22 Screw

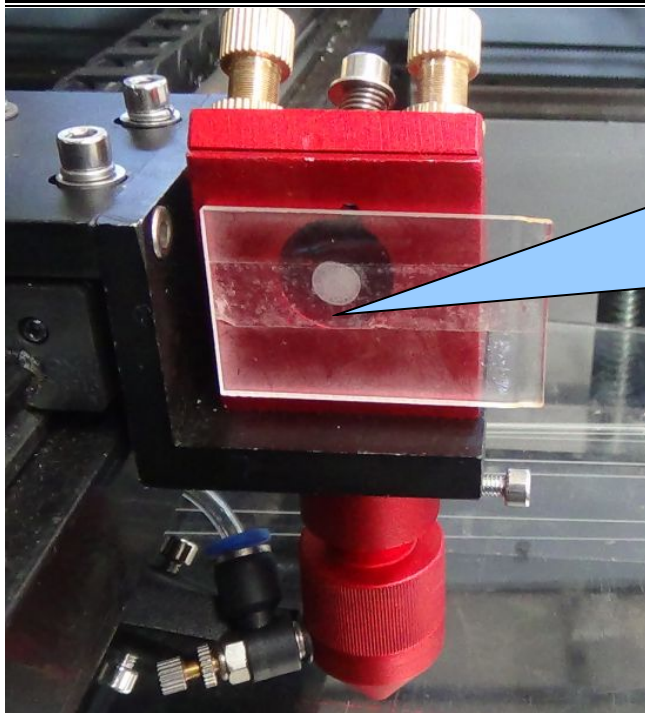
No.23 Screw

No.11 Screws (Two)

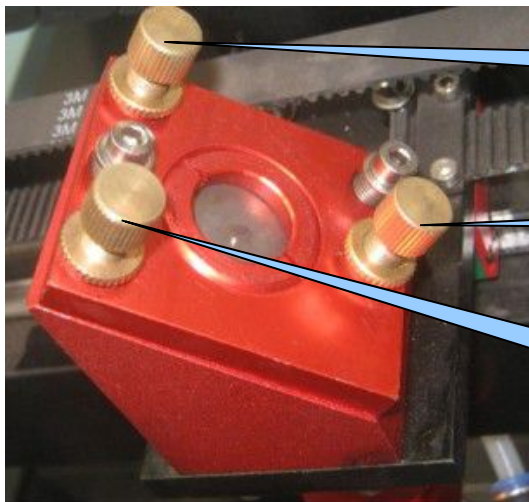


Accordingly, from second reflection mirror to third reflection mirror, laser should fall on the same upper side of the center slightly.

Upper—adjust No.21 screw;
lower—adjust No.21,22 screw;
Left—adjust No.22 screw;
Right—adjust No.21,23 screw.



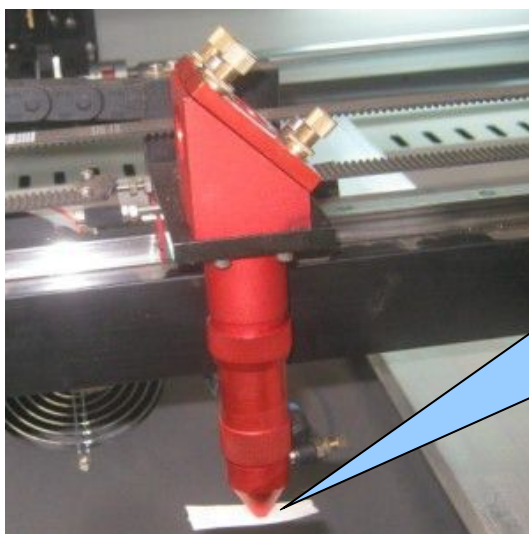
If light is on same point and not on upper side of the center slightly:
Left or Right -- you need to adjust No.11 screw;
Upper / lower -- please adjust the position of laser tube.



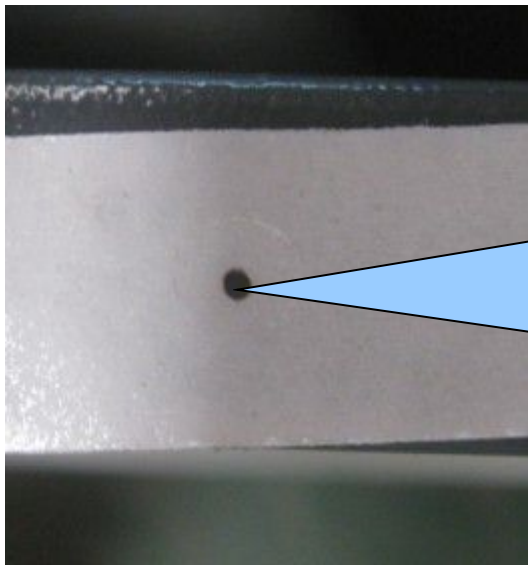
No.31 Screw

No.32Screw

No.33 Screw



put a double sides adhesive tape on the outlet of the laser head, take left hand side as left, right hand, right;laser tube side, front and people where we stand, backside. Just as picture shows



The Facula should be in the center of the outlet as Picture A

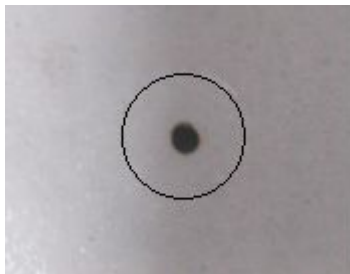
If not:

Left -- adjust No.32 screw;

Right -- adjust No.31 and 33 screw;

Front -- adjust No.32 and 33 screw;

Back -- adjust No.31 and 32 screw.



Picture A

Attention:

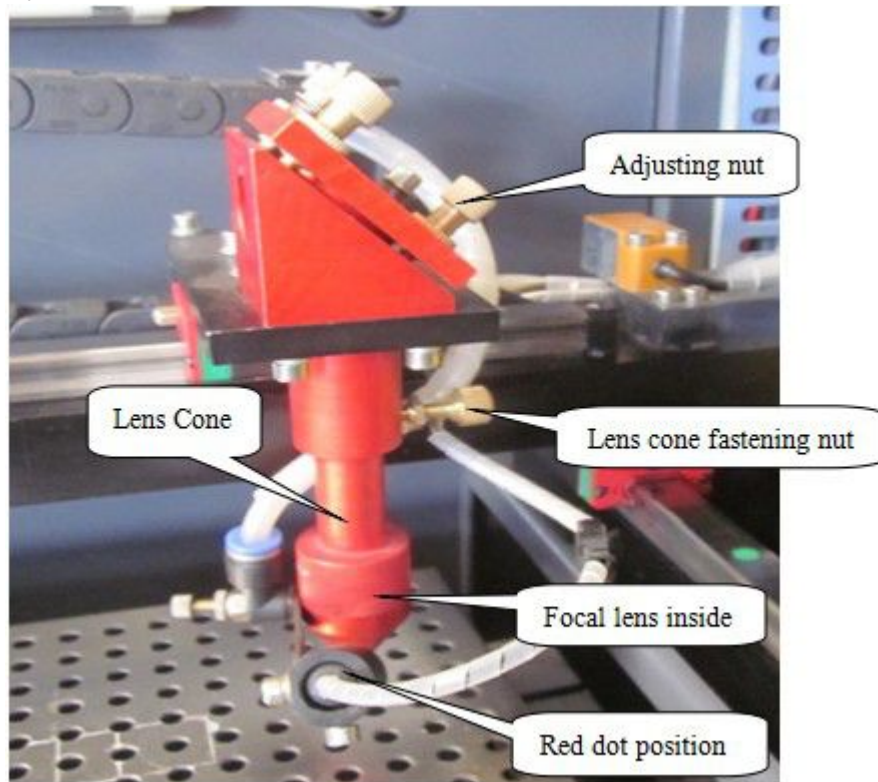
Laser is invisible light but can do harm to human body. Please keep away from the laser path when debugging. The operator must master the basic knowledge of laser machine.

4.2.3 Test Processing

After debugging of light path, put the working material on the working table, then spin the laser head clockwise(overlooking the laser head), to make it stay in the focal length height. After adjusting the focal length, then anticlockwise the lens cone nut. Then move the laser head to the designated spot, finally open software to design patterns you need, set the processing way, speed and power. Download and name it, then machine could cut or engrave the files as you command. Take following picture as a reference.:

Notice: Only need to operate the control panel if there is Auto Focus

System.



5. Simple operating instructions

Before operation, please electrify the equipment, then connect the machine USB and computer USB with USB data line.

5.1 Simple operating instructions

A. Double click on 'RDCAMSetup6.exe' in the disk then indicate the dialog box as below:



B. Click **【Install】** button. Installation interface shows up as below:

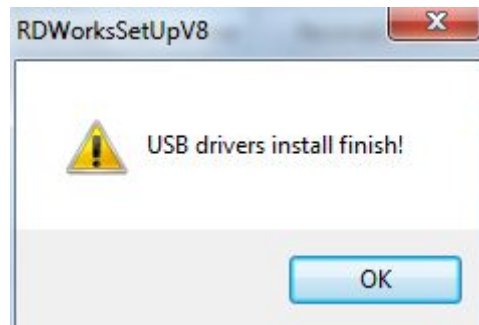


C. Click **Install USB driver** Firstly. The following dialog box shows up.



D. After confirming USB data line is connected well, click “ok”.The

following dialog box shows up.



E. After installing USB drive, click



to install software.

After that, the following dialog box will show up and indicate that the software has been installed successfully.



Esc:

F. After finishing all installations, click 【】

to end up installation process.

The user may need to install some different software (install external software while installing LaserWork). So after finishing all installations,

the dialog box cannot close automatically. The user can end up

installation by clicking 【】

button.

5.2 Data line using operation

Before operation, the machine has been started. All accessories such as water chiller and pump can function well

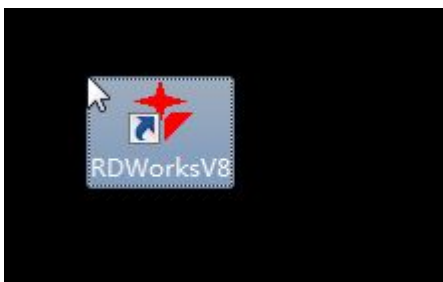
5.2.1 Parameter Matching

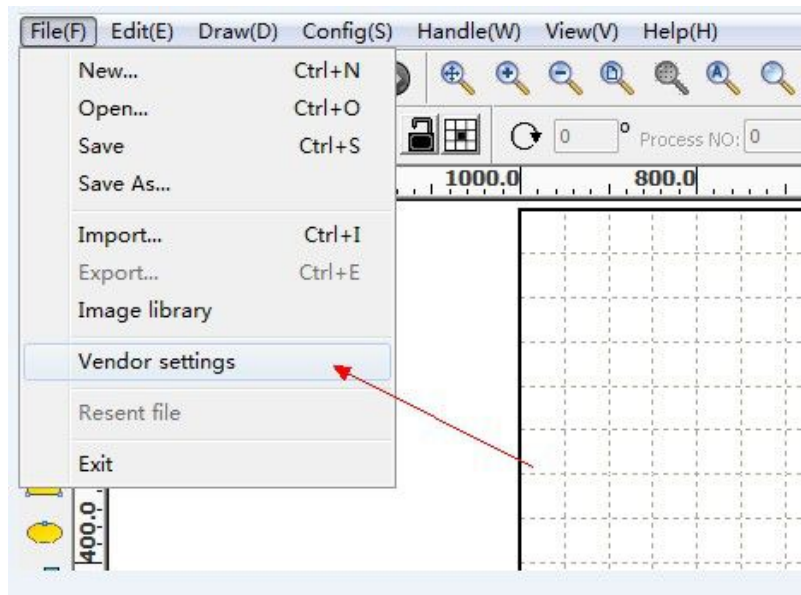
Different machines have different versions.

The purpose of reading parameters is to match “Supplier Parameter” and “User Parameter” in main board with parameters in software.

Double Click the Software “RDWorksV8”

Click the “Vendor Setting” in the “File” as below:

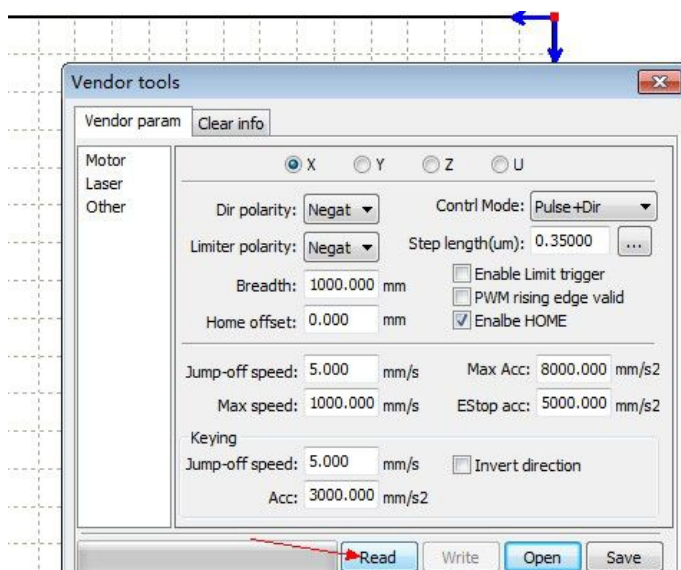




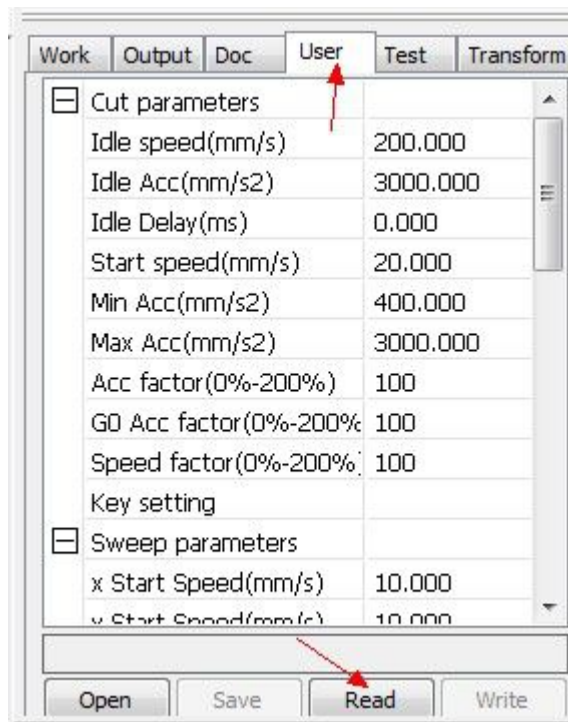
Insert the Password “rd8888” :



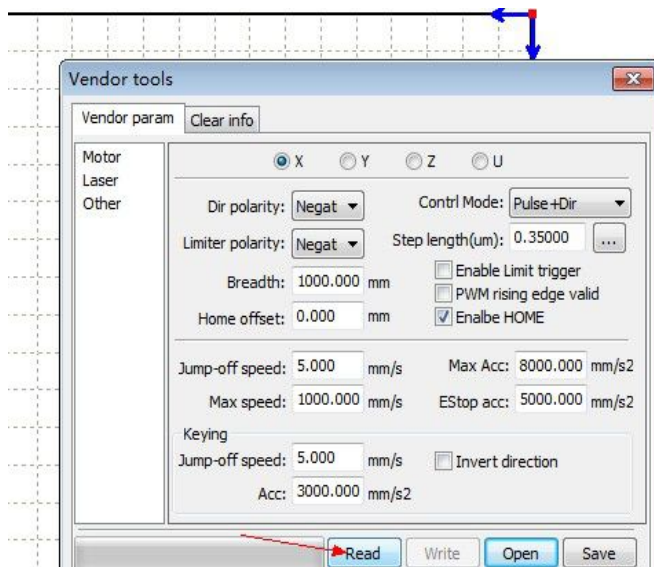
Click “Read” after enter into the interface:



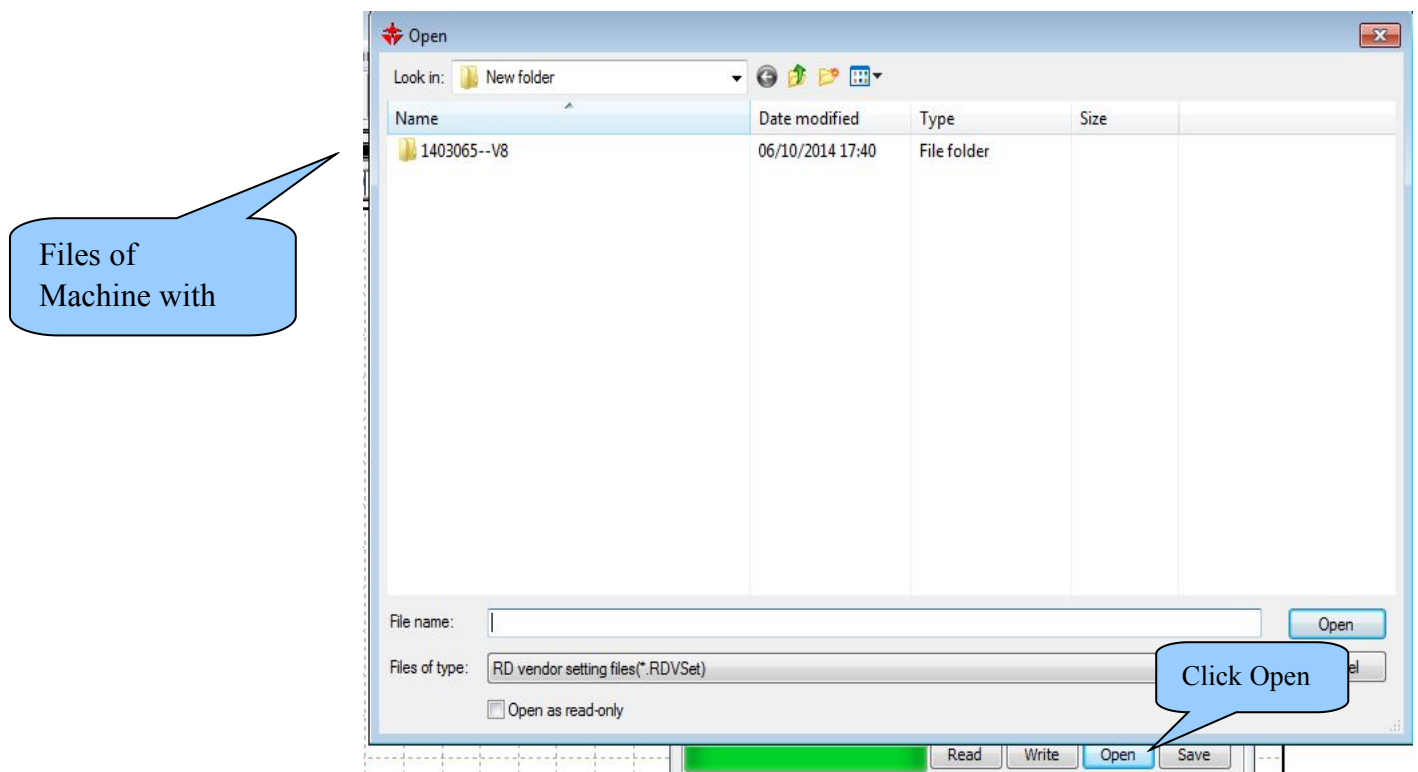
Click “user” as shown in the following picture. Click “Read”:



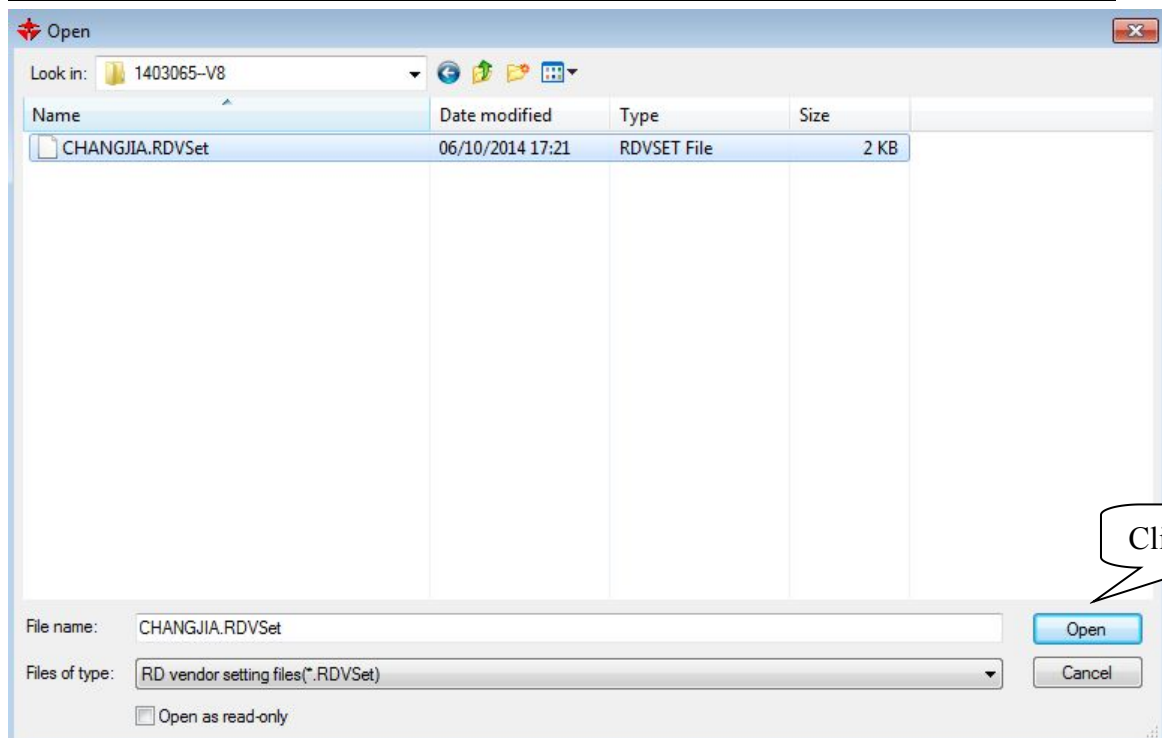
Attention: if changing main board or parameters, please first go through “Read” Then find parameters of CD or U disk and go through “Open” and “Read”



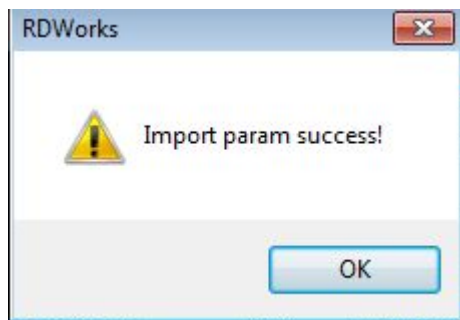
In the U disk or CD along with the machine, find the file folder named by machine serial number.



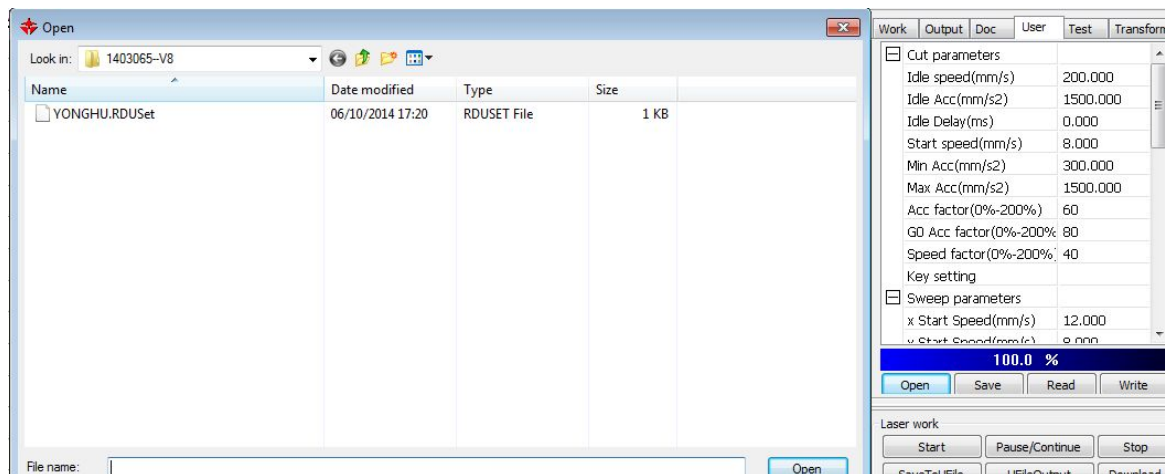
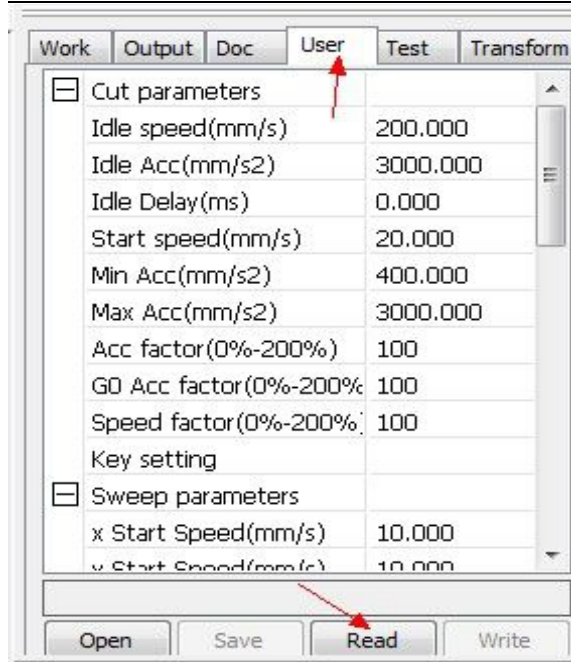
You can check“CHANGJIA.RDVSet”after open it :



After opening it, “Insert Succeed shows up.



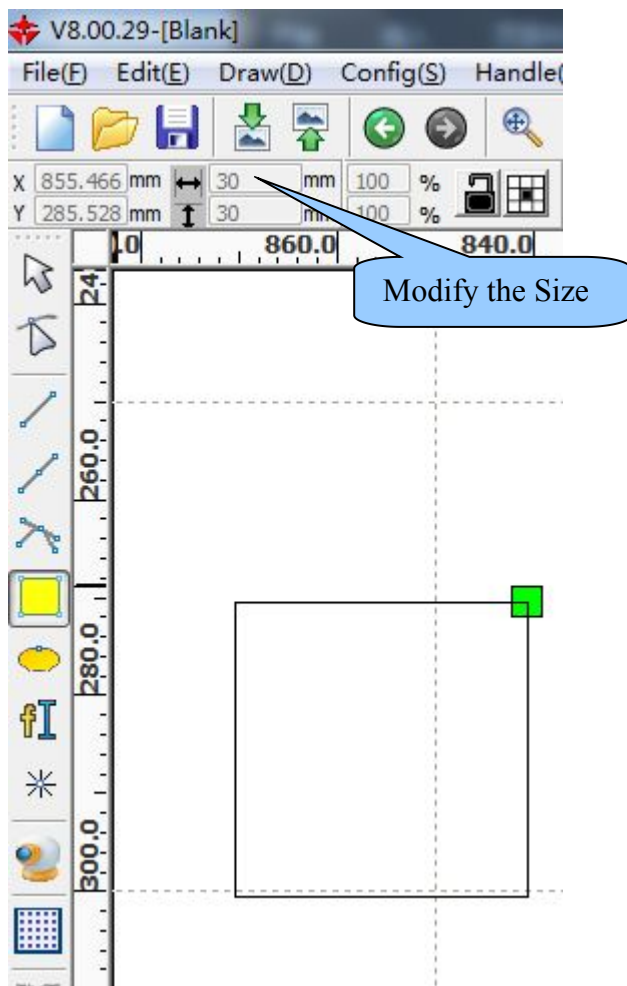
Click “User” as shown in the following picture. According to the supplier’s setting mode, follow the sequence of read—open—write to import user parameters.



After importing parameters of the supplier and user, close the software.
Reopen the software, you can use it normally.

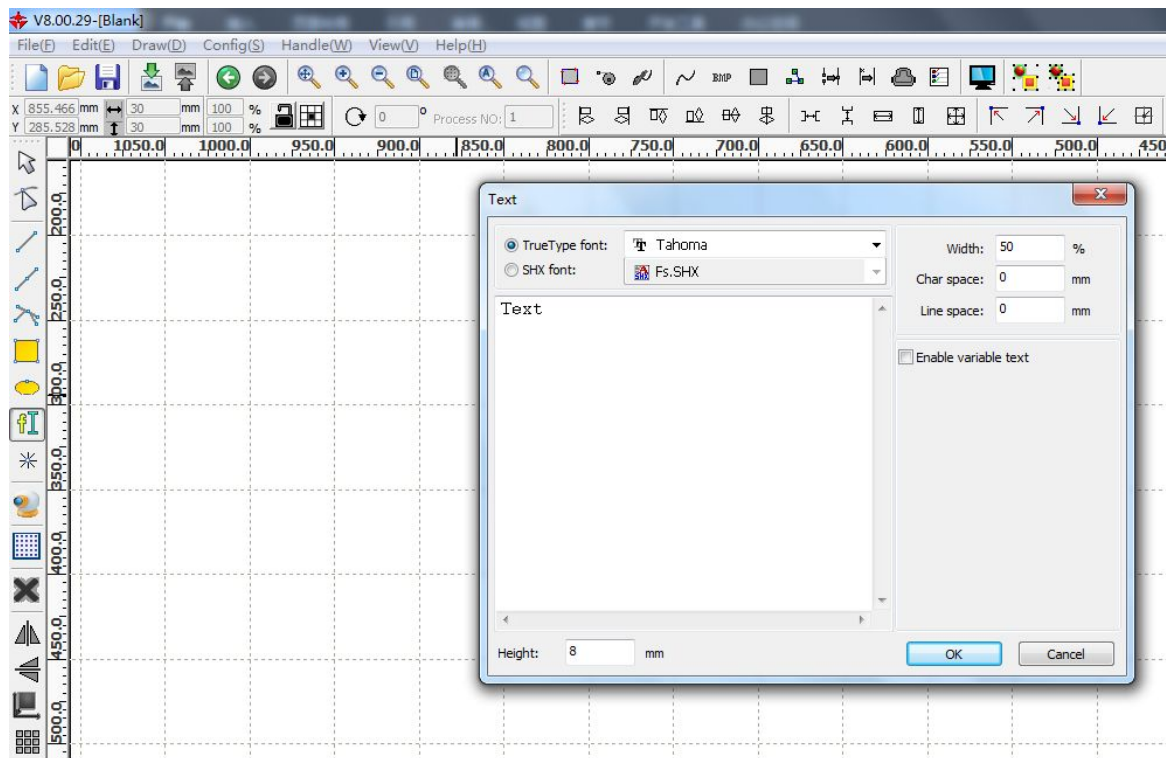
5.2.2 Make simple pictures&Set picture layers

A .In the software, choose “Rectangle”and draw a simple square. Then modify the size

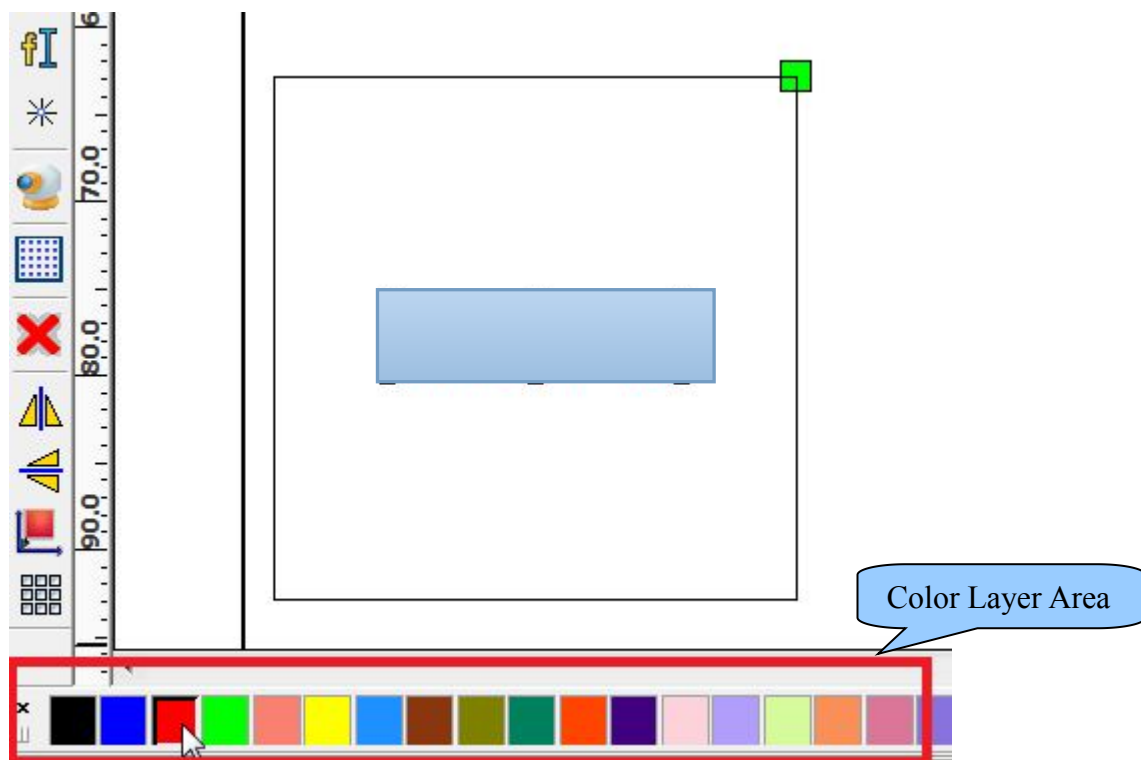


B. Click “TEXT”.

Click once in the drawing zone. In the dialog box, edit text and click “OK” button.

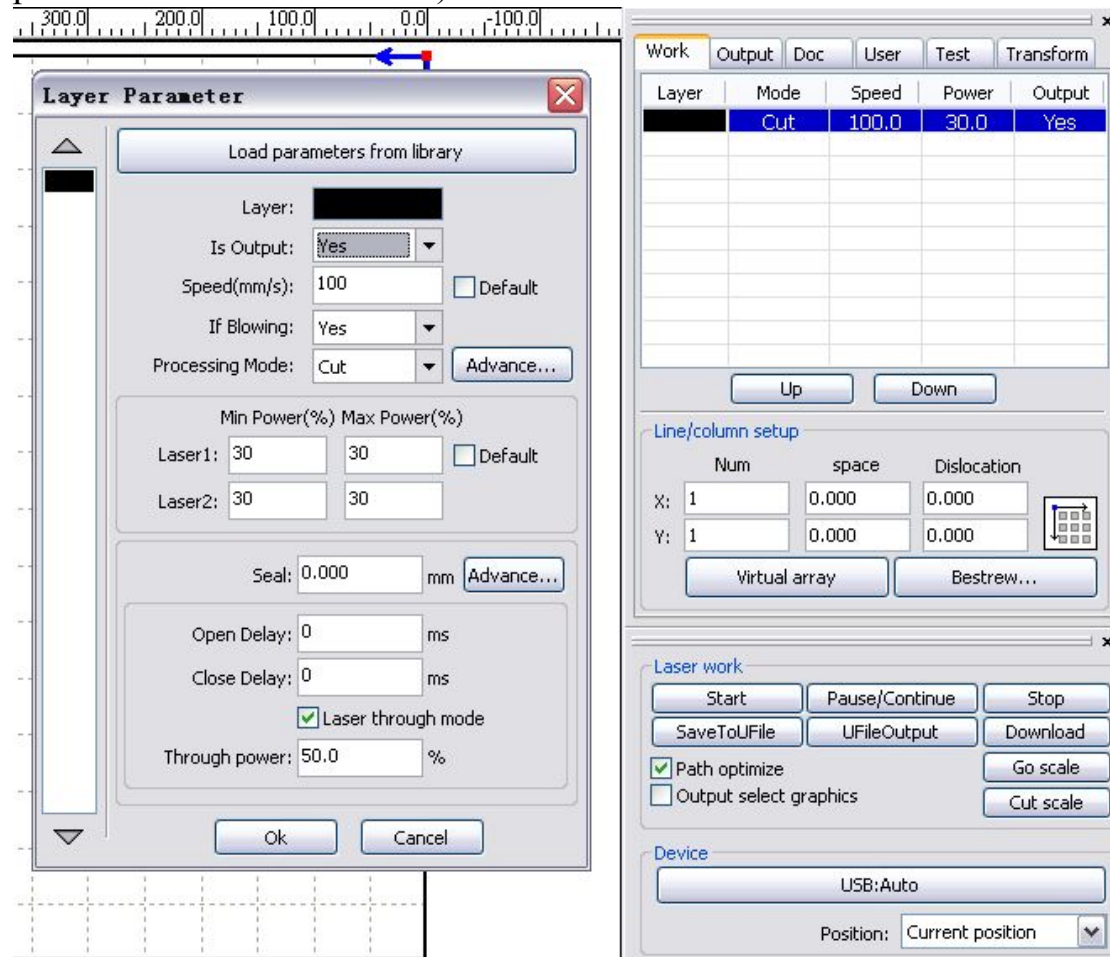


Select the Color Layer after finish the text.:

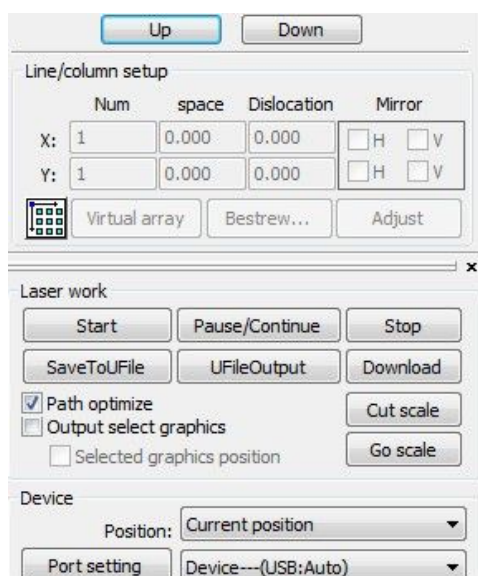


5.2.3 Set working mode

Select the Power and Speed according to the materials.(take the parameter sheet as reference)



5.2.4 Download files



Click “Download”, Name the file and confirm “ok”

Download Here

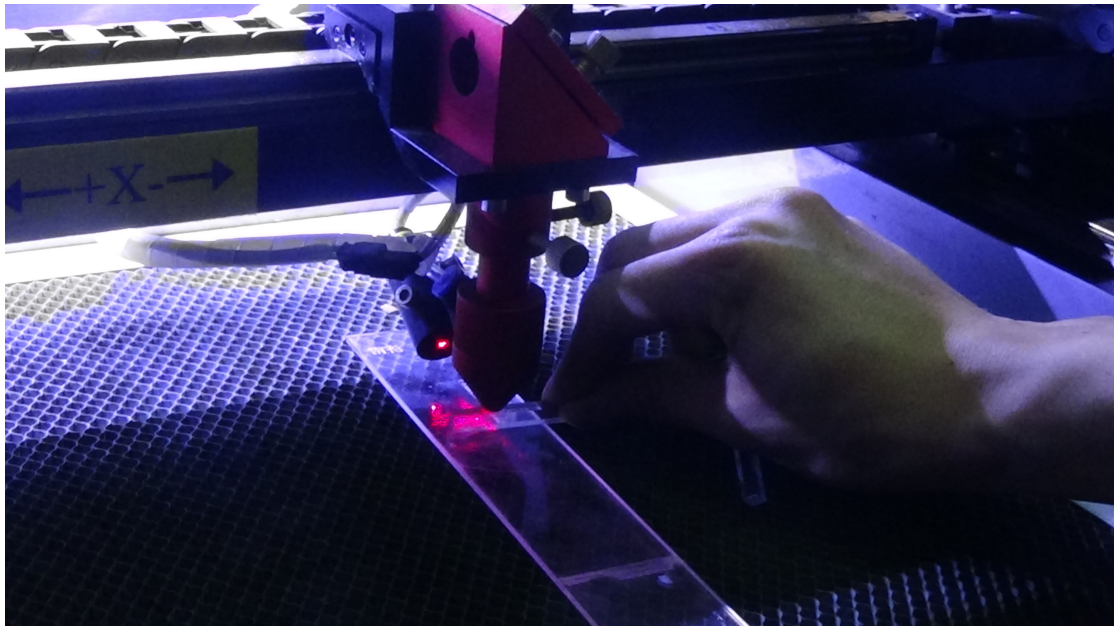
5.2.5 Equipment Operation



On the main board, press "File"



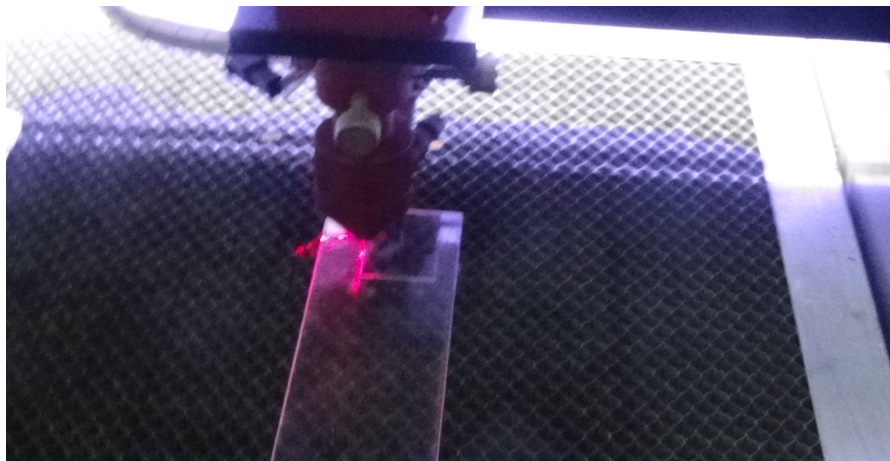
Find your file, press"Enter"



Put your processing object in a right position, adjust a proper focal distance.



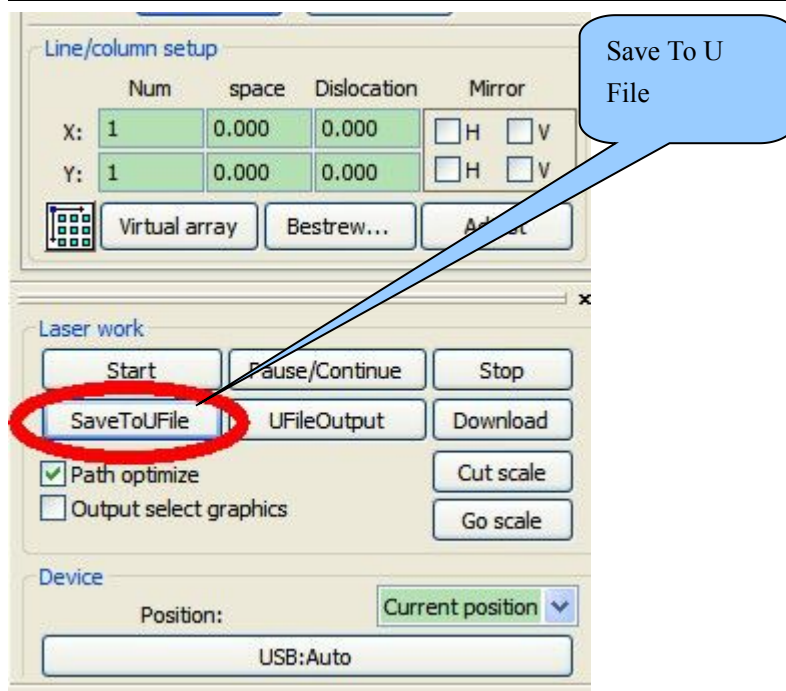
“Origin”-- “Frame”--“Start-Pulse”



5.3 U-disk Operation

(same as Data Line Operation will not be illustrate again)

After set parameters of “Power” “Speed” “Processing Mode” save the file into U-disk.



Connect U-disk into U-FLASH.



Choose “Read U disk” , Press “Enter”,
Choose your file which need to be processed, choose “Copy to Memory”,
Press”Enter”.

(Notice: the file name you will process should not be the same as your previous imported file in the main board, if so, U-disk file will not allowed to import again, you need to change another name then import it into the main board)

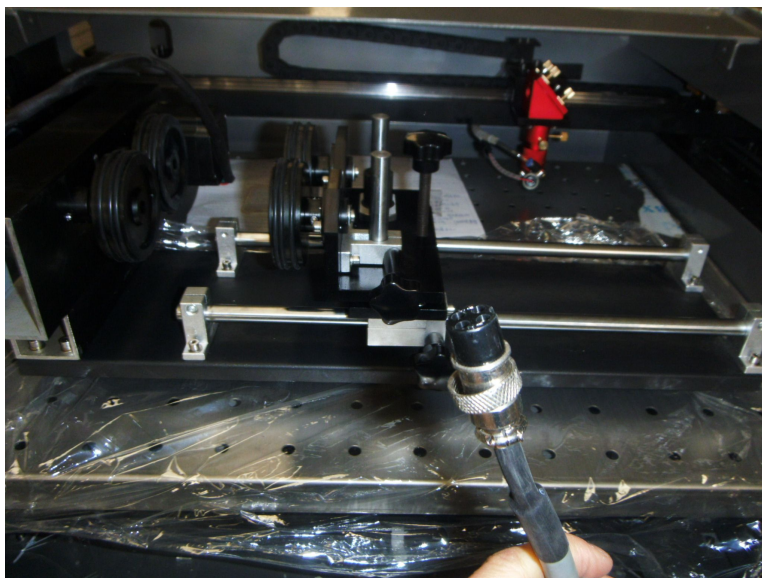
Find the your imported file, then start/cut.



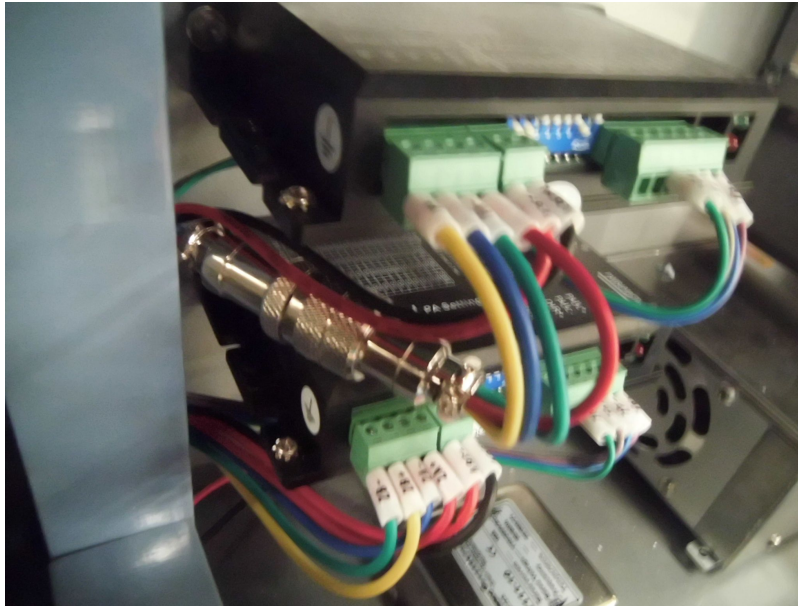
6. Rotary Processing

6.1 Electrical Installation

6.1.1 Rotary Connection



Place the rotary on the working table and keep flatness.



Unplug the aviation plug that connected with driver.

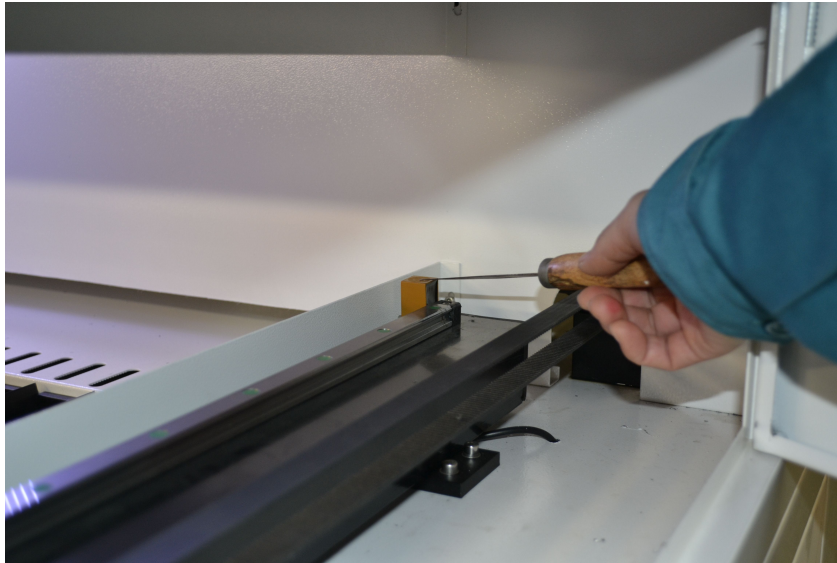


Connect the male connector on driver with female connector on the rotary.

6.2 Software Operation

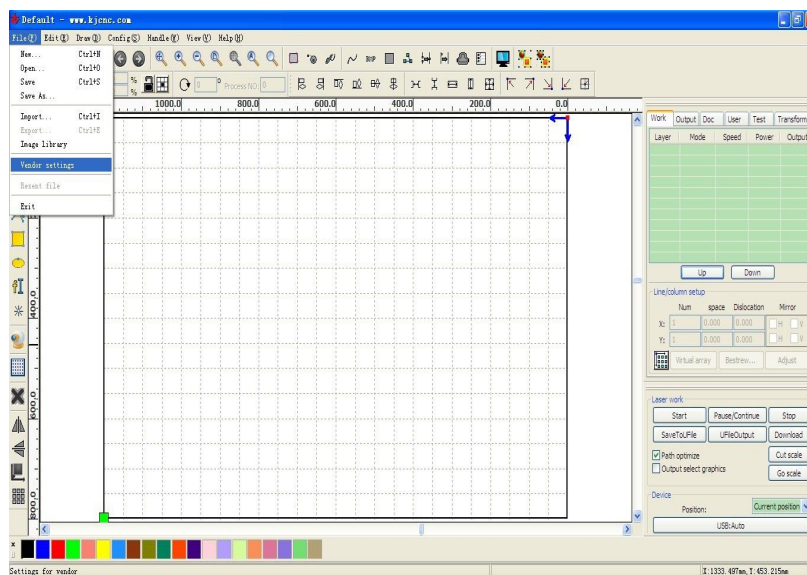
Start up: Reset machine with Metal. Click the limited switch on Y-axis

TWO TIMES to help it reset. Pictures as followed:

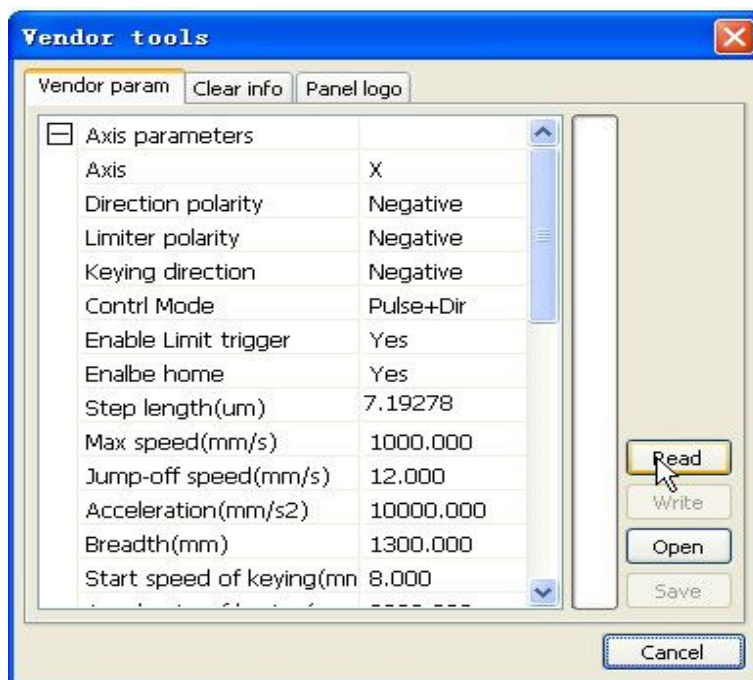
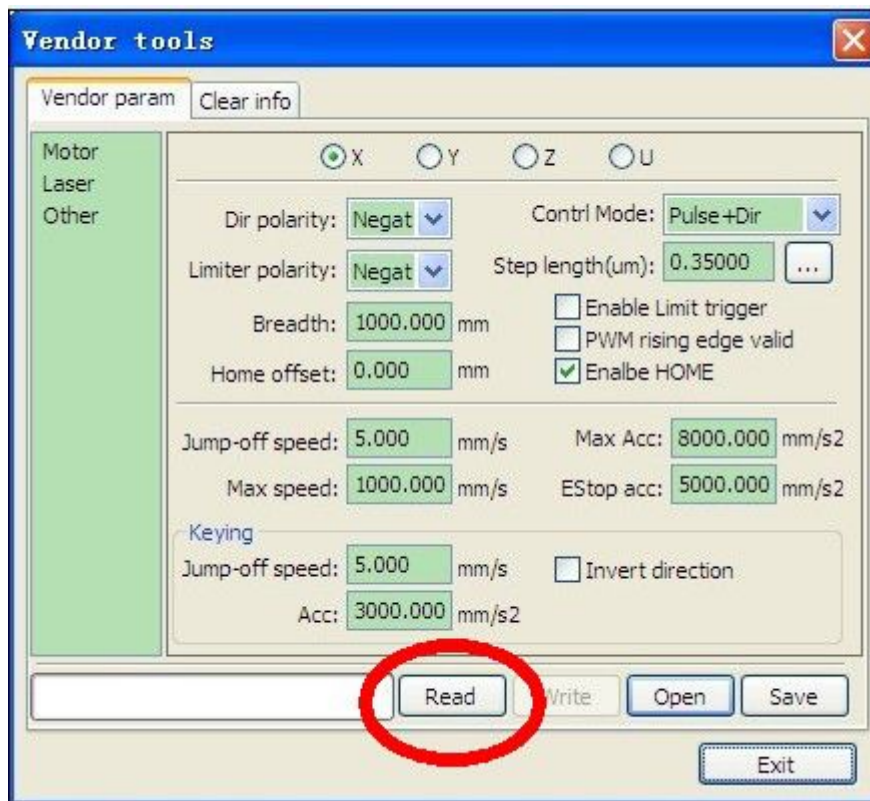


6.2.1 Software Setting

Open the software"RDWorks", File--Vendor Setting--Vendor Parameter Password: rd8888--OK



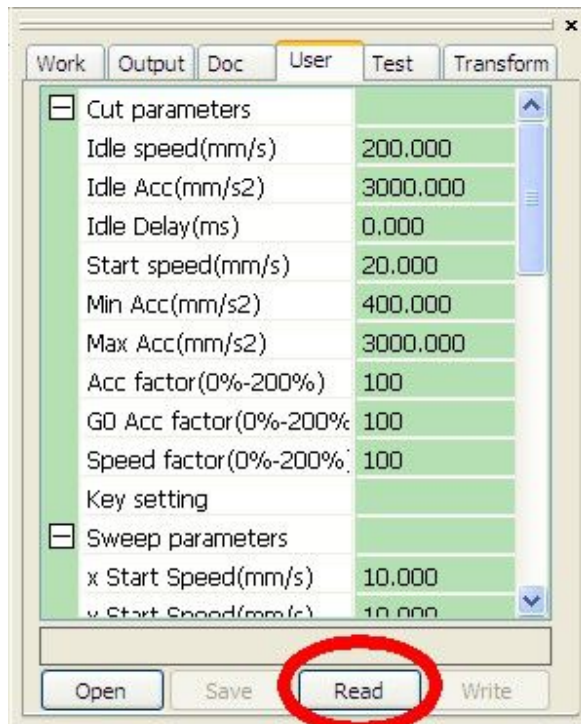
Press "Read", then close the dialog box.



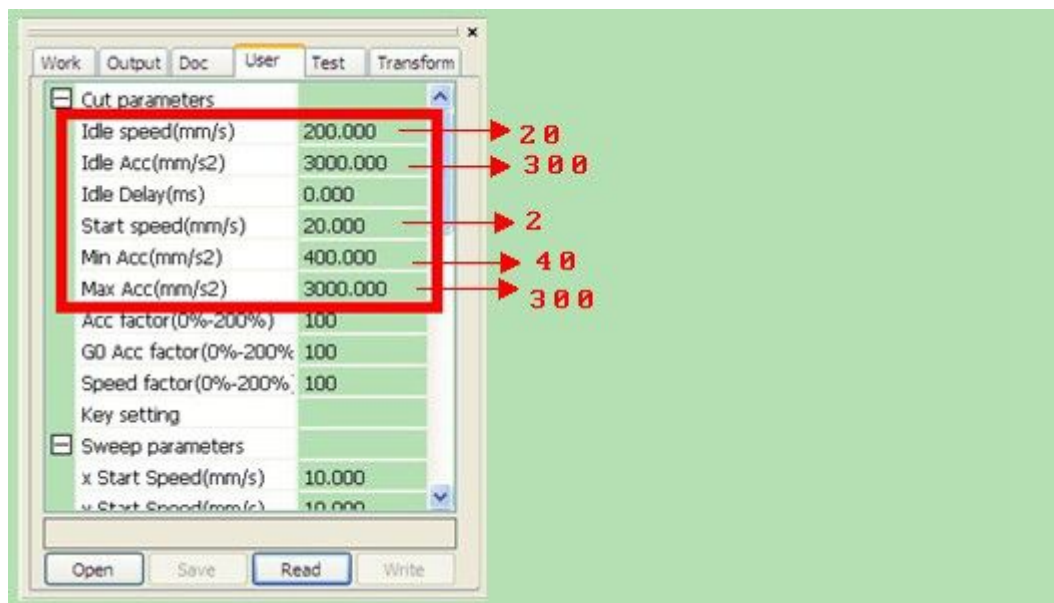
NOTICE: RECORD ALL INITIAL PARAMETERS BEFORE THE FOLLOWING MODIFICATION.

It has to be recovered when not use rotary.

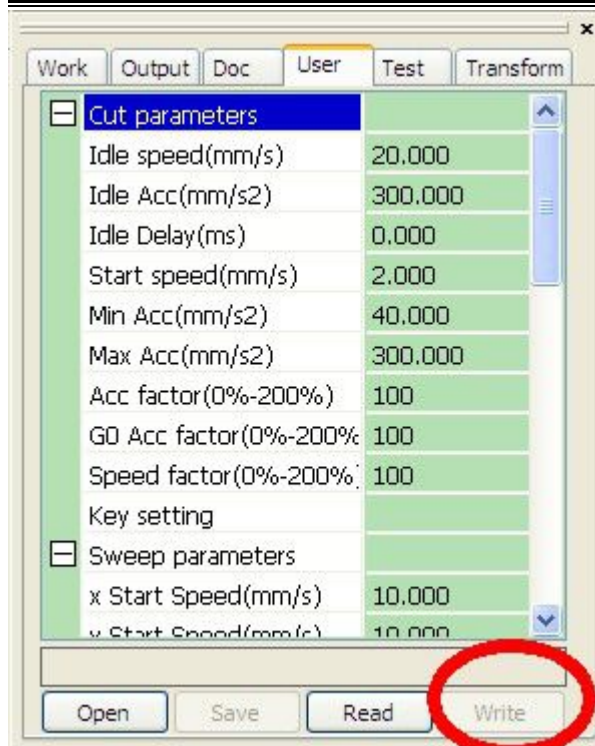
In the right side of software, choose " User"--Press "Read"



In the following “Cut Parameters” with red frame, REMOVE A ZERO, like: 200.00-20.00, 3000.000-300.00, 20.000-2.000, 400.000-40.000, 3000.000-300.00, refer as followed:



Press “Write”



6.2.2 Cutting Test

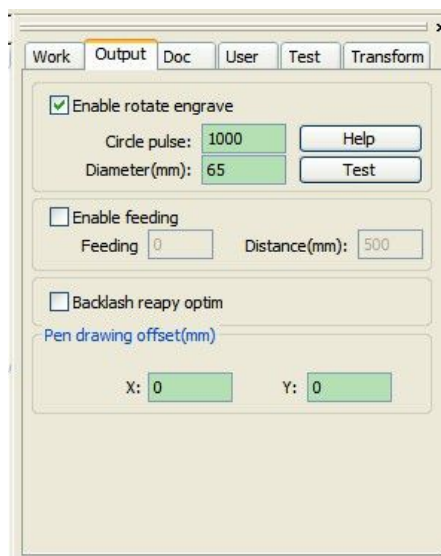
“Circle pulse” will be changed according to the diameter of processing object. Formula in the following:

Actual Pulse= {theoretic pulse * theoretic length}/actual length

Illustration: engrave a 20mm line on the bottle (diameter=65mm)

(1) Output--check the box “enable rotate engrave”--Circle Pulse:

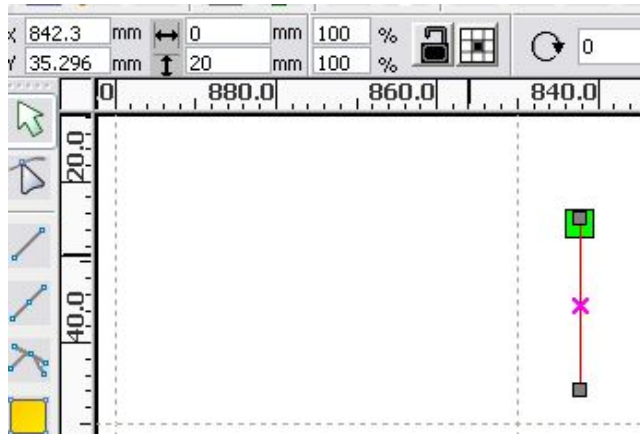
1000--Diameter: 65mm, refer to the following:



Noted: a. The box “enable rotate engrave” should be checked.

b. Diameter: processing object’ s diameter

(2) Draw a 20mm line in the software, parameter setting: suggest “max speed=15mm/s”, “ max power=15%”, download.



(3) Stick a pare tape on the surface of processing object.



(4) Set right rotary, adjust the processing object in a right position, pull laser head just above the processing object.



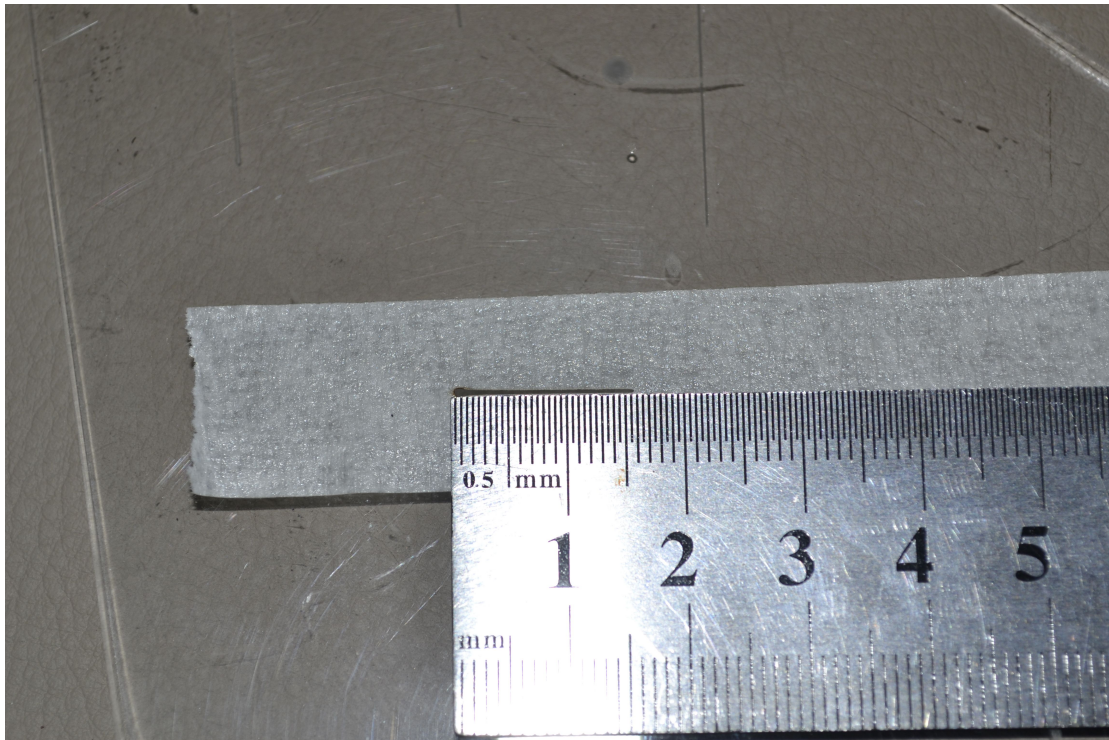
Notice: Direction of rotary confirmation:

Press Direction Button on the control panel, if the direction of rotary wheel is apposite with the button on control panel, that is correct. If is not, the engraving image will be mirror image, Then turn the rotary 90 degree.

(5) Adjust proper focal distance then start engraving



(6) Measure the length of line

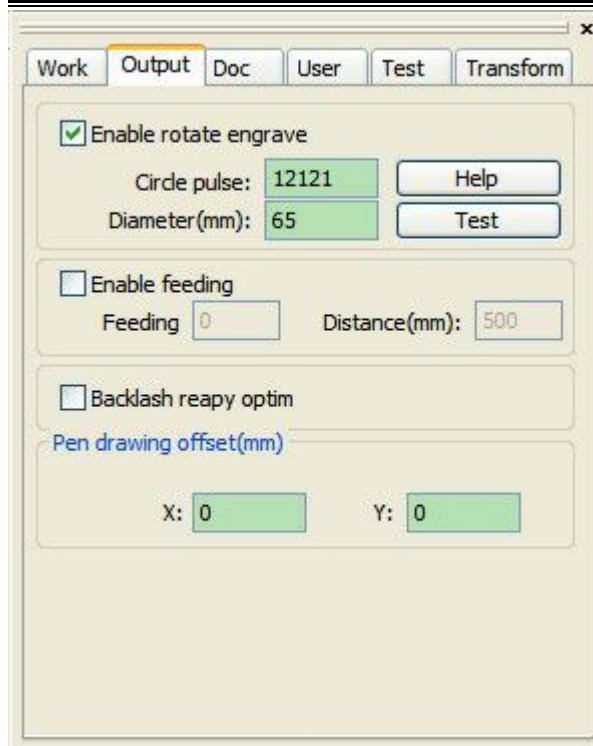


Through measurement, the length is 16.5mm, it is not matched with previous setting parameter 20mm, so the circle pulse (10000) is not correct.


(7) Revise circle pulse, and figure out the following according to formula:

$$\text{Actual pulse} = \{10000 * 20\} / 16.5 = 12121$$

Then fill this value and diameter into the following parameter setting:



Notice:

- A. The direction of rotary will influence the engraving effect, if direction is wrong, the engraving image will reverse.
- B. When you do not use rotary, don't forget set the parameters into initial, and removed the check of "enable rotate engrave" .

7. Equipment maintenance and repair

7.1 Daily maintenance

Equipment's working environment could not be too scurviness. If temperature is higher than 30℃, lower than 18℃, and if there is too much dust, with severe air pollution, then the machine could be badly damaged, failure rate goes up steadily. Various electric parts are easily damaged under wet environment.

7.2 Water tank's change and clean (suggest to change water and clean water tank per week)

Attention: before machine starts to work, be sure that laser tube is full of water and without bubble.

Recycling water's quality and temperature could affect laser tube's lifespan directly. We suggest to use pure water, and control the water under 35°C. If it's higher than 35, then need to change recycling water, or add ice to water (we suggest customers choose water chiller, or use two water tanks)

Clean water tank: firstly, switch off electric power, take off the water-inlet water tube to let water inside laser tube go to water tank. Open water tank, take out water pump, clean dirt on it. After cleaning water tank, changing new recycling water, put back the water pump. Connecting water tube on pump to water-inlet gate, and other joints. Connect electric power to water pump separately for 2-3 minutes (make laser tube be full of recycling water).

7.3 Exhaust fan's clean

After long term's using of exhaust fan, it would accumulate much solid dust, which could make exhaust fan produce big noise and it is also not good for eliminating wasted air and smell. When it occurs that exhaust fan is not good enough to suck and eliminate air, firstly close the power, take off air-in and out tubes, remove dust inside, bottom up the exhaust fan, roll fan blades inside until it's totally cleaned. Finally, set up the exhaust fan.

6.4 Reflectors' and lens' clean (suggest to clean before working everyday, equipment should be under power off situation)

There are 3 reflectors and 1 lens on Laser equipment (the first reflector is set on emission exit of laser tube, mean on the laser equipment's upper-left side, the second reflector is on the left side of transom, the third one is on the top side of laser head, lens is inside in lens cone), laser beam is transmitted through these reflectors and lens. It's easily for mirrors to smear dust and other dirt, which could result in laser's loss or mirrors' damage. The first and second reflector needn't have to be taken off when do cleaning. Take lens wiping paper with leaner to wipe

reflectors from center to edge. The third one and lens need to take off from lens frame and clean them with same way, and put back after finishing.

Attention:①wipe the reflectors and lens softly, do not damage their surface coating film;②handle gently during wiping to avoid falling down;③the convexity side must be arranged downward.

6.5 Guide rail's clean (suggest clean half a month, power off operation)

As key parts, guide rail and straight line axis play role of guiding and supporting. In order to guarantee higher processing precision, higher requirement for guide rail's guiding accuracy and straight line axis' moving stability. During processing, the material processed can produce much corrosive dust and smog. After long term acceleration of these dust and smog on guide rail and straight line axis, equipment's working precision can be affected and can also form corrosive spot on them, thus shorten machine's lifespan. For maintaining equipment's normal and stable work, make sure the products' processing quality, please do well in guide rail and straight line axis' daily maintenance.

Attention:For cleaning guide rail, please prepare dry cotton cloth, lubricating oil(sewing machine oil can be adopted).

6.5 Light path's examination

Laser engraving equipment's optical system consists of reflectors' reflection and lens' focusing. In light path, lens doesn't exist excursion, however, the three reflectors are fixed through machinery, so possibility for excursion can be big. Generally speaking, the light path could be skewing, we suggest users to test it before everyday working.

6.6 Slide block's maintenance

Slide block is one of key parts. It's role is to guide and support, same as guide rail and straight line axis. In order to guarantee it's normal work, lubricating oil must be added periodically.

8. CO2 Laser Tubes of Glass Usage Considerations

8.1 Before using, please connect the water pump/chiller first, adopts lower side in and higher side out principle, adjust water-outlet tube's

position, guarantee cooling water is full of cooling tube. There should be not any bubble inside the laser tube, then power on. Requirement: cooling water should adopt software (distilled water or pure water), and frequently pay attention to cooling water's temperature, should be within 12-30°C. It should not be too low or too high, especially in summer. Once water's temperature is too high, should change cooling water in time or stop the equipment for some time. Cold area should guarantee water should not be freeze, especially when machine stops working, cooling water must not stay inside in laser tube in case there is any frozen cooling water to cause explosion. (Specially attention: users who use AC, cooling water tank must connect with ground)

8.2 The two supporting points should be on the 1/4 point on the laser tube, and guarantee water-flow at the level of 2L-4L per minute, or the effect is not good, which could lead to mode hopping, light spot becomes several, thus result in power going down. Cooling water's water-outlet tube must be submerged in water, or there will occur laser tube is not filled totally with water when power off and on.

8.3 Pay attention to protect laser tube's exit side, to avoid smog sputtering on the exit surface and pollute the it, or power will be lower down. The mirror on exit side can not be cleaned with cotton ball and other tools, or it's power will be severe affected. Correct methods for cleaning this mirror:

- once the mirror is polluted, do not open the laser tube
- obliquely blow mirror's surface
- use pure alcohol compressed by cylinder needle to spray the mirror surface
- open the laser after alcohol volatilizing totally

If above methods have no effects, professional stuff need to use cotton to clean it's surface from center to edge vortically with cotton ball dipped in alcohol. The best way is to protect mirror from pollution. Special attention: don't use ACETONE to clean the mirror.

8.4 During the debugging, through adjusting laser tube's supporting position or rotating laser tube's direction to reach the best effect, then fix the laser tube.

8.5 Must pay attention: avoid dust acceleration on high voltage electrode, keep dry. Be away from metals as much as possible in case any fire hazard. In order to protect high voltage sheath from dust, please entangle plastic wrap on it.

8.6 During using of laser tube, there should be no scale inside laser tube in case to cause water plugging, thus affect cooling effect. Once there is any scale, use 20% diluted hydrochloric acid clean it.

8.7 Laser tube belongs to glass products, fragile. Avoid local stress when arranging laser tube.

8.8 To use laser tube properly, save laser power. Laser tube's best power is 80% of rated power.

9. Common troubleshooting

Symptoms	Problem analysis	Processing method
No laser beam during working	1. Firstly, check if laser tube itself works normally(the exit of laser),if it works normally	Test if mirrors are damaged or not, light path is skewing.
	2. The exit of laser tube has no laser, then check if water recycling works normally(see if water flow is smoothly), if no water flow or it's not smoothly	clean water pump, dredge water tube
	3. Water recycles normally, then check if laser power guiding light is bright or not, fan rotates or not, if not	Laser power goes bad, need to change laser power
	4. Press "laser", if there is no light	Laser power or laser tube has problem

	5. If there is light	Water protector goes bad, need to change
	6. If short circuit water protector, there is still no light	Main board or wiring board has problem, need to change
Scanning becomes shallow	1. Check working light's intensity and speed, if speed is too fast, intensity is small, water temperature is too high	Enlarge light's intensity, lower down speed, change recycling water
	2. Check depth of crispering, and see if it's normal, if it's normal,	Increasing graphics resolution or scanning precision
	3. Crispering is still shallow, or both occasionally,	Check if Mirrors are dirty or damaged, light path is skewing
	4. Connect ampere meter, if it can reach 20MA, but the depth is still shallow	Laser tube aging, need to change laser tube
Laser is not stable, sometimes has, sometimes does not	1. Check if the mirrors are too dirty or if they are damaged, light path is skewing or not	Clean or change mirrors, adjusting light path
	2. Mirrors' light path is normal, then check if water recycling is normal or not, if it is not normal,	Clean or change water pump, dredge water tube
	3. Water cycling is normal, it's may water protector's problem	Change water protector
	4. If problems remain, main board, laser power, laser tube, all possible to lead to this phenomenon	Change all part above alternately, and check the reason
Output patterns, but the size is not right	1. Check "Coreldraw" and see if Graph Plotter unit is 1016 when it outputs PLT	1016Change graph plotter's unit to 1016
	2. See if resolution ratio is right or not	Recount resolution ratio
Equipment reset abnormal	1.The direction is right when reset, but reaches the vertex,the transom can not stop(if new machine, please check main board's parameter first, if it's right)	Check if it's stuck during moving, main board, tool sensor problem, change

	2.Transom resets normally, laser head doesn't move, maybe tensioner get stuck or motor axis break, parameter is wrong	Change tensioner or small motor, modify parameter, check motor line's clip
	3.Contrary to transom's movement, and strike the side	Main board parameter is wrong. Stop the machine and modify main board parameter. Re-down load configuration
	4.Drivers or Motors' problem	Change drivers or motors
Equipment stop engraving, skip engraving or disordered engraving	1.Check equipment's grounding situation, and check grounding line is standard or not(resistance to ground should not be bigger than 5Ω)	Modify grounding line to reach standard requirement.
	2.Check if the original pattern has mistake, such as pattern is cross, leaking, or lack something	Correct mistakes in patterns
	3.If other patterns don't have this problem, only some one has such problem	Patterns and date mismanage, need to make working sketch again
	4.Problem remains	Maybe it's computer's serial port, engraver's main board's problem

Appendix 1

After-sale warranty of Laser Engraving Cutting Machines

First of all, thank you very much for purchasing a Bodor product. In order to guarantee the smooth processing of after-sales service, we will make the following announcements:

General principles

1. We are responsible for the maintenance of facilities which are within the Warranty conditions.
2. Users must keep the machine's integrity and independence during

operation. In the following situation, our company will not take any direct, indirect or joint liability. Furthermore, if any equipment is damaged or there are any losses in either economic or reputation to our company due to the following situation, we, Bodor company, reserve the right to investigate any legal liability.

- 1) Using the equipment in an environment that it was not designed for..
- 2) Altering the machines privately, including, adding parts, reducing parts, dismounting, using another brand's parts, etc.
- 3) Human damage or doing operations and maintenance without following the requirements in the instructions.
- 4) Damage caused by movement or transportation.

On condition of not influencing the machine's performance, our company reserves the right to change the product's specifications and name the products before informing the customer.

Our company is responsible for the quality and performance of the machine we sell. However, we are not responsible for other indirect obligations and responsibilities.

Detailed Principles

Equipment Warranty: 2 years. Calculated from the production date in machine's nameplate. Specific details are as below:

2 .Laser module Warranty:

- (1)RF Tube's and fiber module's warranty: 1 year
- (2)Standard CO2 Glass Laser Tube's warranty: 40w ~ 80w: 4 months ;100w ~ 150w: 6 months. Warranty of related laser power supply is one year.
- (3)RECI Laser Tube's warranty: 10 months .Warranty of related laser power supply is one year.

(P.S. Laser module's warranty date calculated from the production date in laser module tag. CO2 Laser Tube is suggested to be used in nonmetal and opaque materials' engraving and cutting, and should be kept clean. Improper use will cause the front lens to breakdown. Any breakdown of the front lens and an incomplete laser tube will not be

guaranteed.

3.The warranty does not include consumable parts, such as glass mirrors, belts, switches, gas nozzles ,foots/wheels, keys/press boards, etc.

4.Warranty of peripheral devices (if the machine has them):

Warranty of peripheral devices is 1 year, calculated from the production date in the device's tag. Maintained by device's manufacturers as standard,Our company assist maintenance. Peripheral devices including water-chillers, fans, air pumps, water pumps etc.(If the machine has them).

Accessories repair and shipping cost

Within the warranty period:

For free repair or replacement of accessories, the buyer should bear the shipping costs from their local place to our company if it needs to tested, repaired or replaced.

If the failure cause by the parts quality after testing(non human factors and use environment etc.), it will be repaired or replaced free of charge, and Bodor company will bear the return shipping cost. If the failure doesn't cause by the parts quality, the buyer should pay the repair fees and round-trip shipping cost.

P.S. The repaired parts should be returned to our factory. if the buyer is in arrears of spare parts, Bodor company will cancel the warranty terms of the machine).

Outside the warranty period:

The buyer should paid for repairs and round-trip shipping.

Door to Door Service Policies

Bodor supplies door to door services all over the world. Charging standards and service processes are as below:

(A). Charging standards :

1. Technician visa fees, domestic travel expenses (including transportation cost occurred during handling documents);
2. Training and maintenance fees: \$100/day/person (take the time of landing and starting off of plane in customer's country as standard) ;
3. International round-trip tickets (reserved and paid by the buyer, and

supply the e-ticket information to our company);

4. Abroad accommodation(arranged and paid by the buyer)

(B).Overseas training/maintenance processes:

1. Bodor company will calculate the fees of item 1 and item 2 above, and then inform the buyer. After the buyer pays the fees, Bodor company will arrange for the technician to apply for a visa.

2. We will inform the buyer after the technician gets the visa. The buyer should supply the round-trip ticket information mentioned above in item 3, and arrange accommodation from item 4 after the technician arrives.

3. Only after getting the approval of Bodor company, the buyer can apply for an extension for the training and maintenance.The buyers should pay for the “extend training and maintenance service fees” before the start of the extend service.

Appendix 2

Reference Parameter Setting List for Cutting/Engraving:

40W PARAMETER SETTING

Thickness(mm)	Speed (mm/s)	Max Power (%)	Min Power (%)
Acrylic			
3mm	10~15	50~75	50~70
6mm	4~5	65-80	65~75
8mm	2~5	60~80	65~75
Cloth/ Paper			
1mm	100	25	22
Leather			
2mm	100	35	30
MDF (WOOD/PAPER)			
3mm	30	60	55
6mm	10	70	65
9mm	3	80	75
Glass	300~600	18-65	Interval 0.03-0.1

Acrylic	300-600	18-65	Interval0.03-0.1
Double-color board	30-50	40~50	Cutting
Double-color board	300~600	23~30	Interval0.03-0.1

80W PARAMETER SETTING

Material	Thickness	Speed	Working Max Power(%)	Corner Min Power (%)	Usage	Remarks
Acrylic	3mm	10-20	40-70	35-70	Cutting	
	6mm	5-10	70-80	65-80	Cutting	
	8mm	2	80	75-80	Cutting	Lower than the focal Block 0.5mm
	10mm	1-2	80	75-80	Cutting	Lower than the focal block 1mm
Cloth/ Paper	0.5mm	100-400	20-50	20-50	Cutting	
Leather	0.5mm	100-400	35-50	35-50	Cutting	
Double-color board	1.5mm	30-50	45-55		Cutting	
Marble		300-600	25-75		Engraving	Interval 0.03-0.1
Acrylic		300-600	25-75		Engraving	Interval 0.03-0.1
Wood		300-600	25-75		Engraving	Interval 0.03-0.1
Double-color board		300-600	25-75		Engraving	Interval 0.03-0.1

Notice:

Above parameters are just for your reference, please change accordingly based on your materials.

Postscript:

Copyright owned by Bodor, without permission, no one can copy, manufacture, process and use this product and other related parts directly or indirectly. Without permission, no one can imitate, copy, extract or translate this user manual. People who violates this requirement will be investigated legal liability.