beamo user manual

Original Instructions CE

WELCOME TO THE FLUX COMMUNITY!

FLUX started with a passion for digital creation and making intuitive and affordable tools for makers and designers. Since its inception, FLUX has been working on developing quality built tools for creative people like you. Now, there are tens of thousands of FLUX users in over 75 countries worldwide.

We're here to proudly present the FLUX beamo, the culmination of our experience in laser technology. To help you make the most of your creativity with beamo, we spent every effort on editing this book. With this book, you'll learn the basics of laser cutters, the features of various materials, how to keep the machine at its best status, and numerous design inspirations.

In pursuit of the goal we've had since day one, we work closely with our users, so please don't hesitate to contact us; we look forward to your feedback. You can always reach us at **support@flux3dp.com**.

Finally, thanks for your support in joining our mission, we will continue to innovate for this incredibly exciting time. We sincerely hope you enjoy using this machine.

Cheers,

FLUX Team

USING THIS USER MANUAL

Warning:

You must read and observe the following instructions carefully before using the product for the first time. Non-observance of individually listed points in the instructions manual can cause personal injury and/or property damage!

This icon represents a notice for the user. Please pay particular attention to the possible dangers.

Please keep this user manual for future reference, and make sure you have the latest version of the beamo user manual.

The latest version of the user manual can be found at:
https://support.flux3dp.com/hc/en-us/categories/5110933719951

beamo

FLUX beamo is a 30W CO2 laser cutter and engraver. Whether you're a first-time user or a more advanced professional, beamo's straightforward, intuitive ecosystem makes it easy and hassle-free to go from design to product. beamo can engrave and cut through various materials and customize a dynamic range of products in any unique shape or style. Ultra-fine laser engraves at an exceptional depth with a clear resolution of 1000 DPI fitting for any craft or small business project.

FLUX beamo comes fully equipped with Wi-Fi connectivity for a seamless workflow. Monitor work status, transfer files, or update settings plus, preview your design and drag and drop it to the exact position you want, or use auto alignment to get that perfect center configuration. The built-in camera makes it easy to engrave, cut, and even flip and cut again without worrying about problematic placements. Just scan the bed, drag your design and start your cut or engraving.

Designers can benefit from Beam Studio's seamless integration of Adobe Illustrator or import designs from AutoCAD, Inkscape, CorelDraw, and even Microsoft Word. Upload your high-quality designs in JPG, PNG, SVG, or DXF. Once you're ready to engrave or cut, enjoy preset parameters for power and speed based on your choice of materials.

Safety is a paramount at FLUX. FLUX beamo is designed for safety and is fully enclosed, it will automatically pause when the lid is opened during a task.

At FLUX, we believe in making high-quality, high-performance laser technology accessible to everyone. Our laser engravers are backed by a standard of excellence in both functionality and usability, empowering you to create more of what you love with confidence and ease.

Manufacturer

FLUX Inc.
1F., No. 79-3, Ln. 209, Sec. 2, Xinnong St.,
Yangmei Dist., Taoyuan City 326015, Taiwan

CONTENTS

Help center

CH 1
Before Getting Started

CH 1-1

Labels

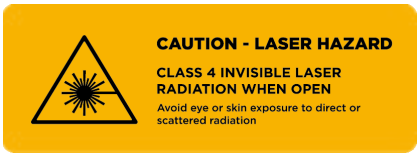
The beamo has 7 labels in total.
Warning labels describe potential risks.
Please familiarize yourself with all safety guidelines before use.

1. Product label

On the bottom right corner of the rear of the machine

2. Warning labels

On the right side of the first reflective mirror outlet (circle outlet)



On the rear of the machine

On the door cover

Below the screen

On the rear of the machine

Power button

CH 1-2

Safety Regulations

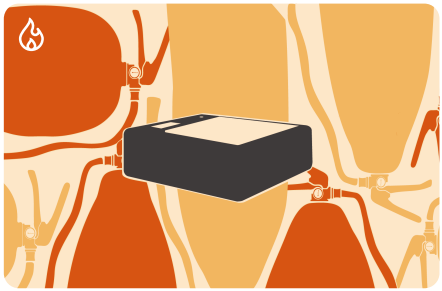
Please read the following safety precautions carefully before starting to operate the beamo. beamo generates high power laser, improper operation may result in fire, visual impairment, skin burns, or inhalation of toxic substances, and other hazards to personal and property safety.

Any usage or safety concerns are welcome to be confirmed with FLUX.
support@flux3dp.com / (+886) 2651-3171

Do not leave beamo unattended. Press the pause button if you need to leave.

Do not stare at the laser flashes constantly.

Please confirm that the engraving material will not be dangerous when burned at high temperature.



Always have a functioning fire extinguisher in the working environment.

Do not disassemble the beamo without the authorization of FLUX.

Operators

- Confirm that the person who intends to operate the machine has read the safety precautions carefully and followed the instructions in the manual.
- The repair or modification process can only be done by the authorized technician of FLUX. Repair by the user is not intended.

- Do not modify the machine without official authorization.
- Do not let minors operate alone.
- Do not disassemble the electrical cabinet to avoid the risk of electric shock.

Working Environment

- Place the machine on a stable surface to prevent it from falling over, do not overhang or tilt the machine.
- Place the machine in a well-ventilated indoor space with windows. Do not place the machine outdoors, in the basement, under a metal roof, direct sunlight or in other confined spaces.
- Connect the vent hose of the machine to the outdoor.
- In case of rain or extreme weather, please stop using the machine and put the vent hose inside.Do not place the machine in a humid, splashing rain or direct sunlight space.
- Ensure that the machine is stored at a temperature between 5°C - 40°C and a humidity between 10% - 75%. Keep the machine working environment from 5°C - 25°C (if the power is below 40%, the room temperature is relaxed to 5°C - 30°C).

- Do not place liquid, flammable, or explosive objects near the machine.
- Do not let children play and frolic in the area where the machine is placed.

Fire Risk

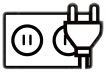
- Regularly clean the debris under the honeycomb table of the machine.
- If flame is generated on the engraving material during laser work, please turn off the power immediately and unplug the power cord at the back of the machine, then use a wet towel to extinguish the fire. Please pay attention to the possibility of irreversible damage caused by water in the machine.
- If the flame is relatively large, please use a fire extinguisher. Please note that the dry powder or foam in the fire extinguisher may cause irreversible damage to the machine.
- If the flame is uncontrollable, please call the fire department for assistance immediately.

- Do not use the material that is not suitable for lasers to be placed into the machine from the “Material Tips - Hazardous Materials (p.119)” for more information.
- Do not stack materials in the machine, such as trying to cut multiple boards at once.
- Do not allow the machine to operate unattended.

Door Safety Interlock

- When the cover is opened, the safety interlock will suspend the operation of the machine and stop the output of laser.
- Even if the machine is designed with the safety interlock, do not put your hands, eyes, or other parts of your body near the operating area of the laser to avoid danger.

Do not try to modify, defeat or disassemble safety interlocks.



Power and Wires

- Ensure that the operation power of ordered model is under 110V or 220V.
- Ensure that the 3rd hole of the socket is grounded. If the grounded is not confirmed, it may cause static interference and affect the performance and even increase the risk of electric shock.
- If you find the power cord is damaged, please stop using the machine immediately.
- Always turn off the power and disconnect the plug when clean ing and maintenance.

Do not allow the wires and plugs to be damaged, close to the heating apparatus, or forced to bend, twist, pull, and carry heavy objects.

Ventilation

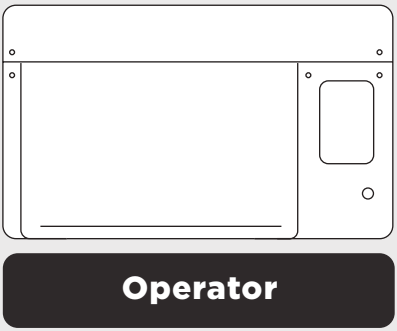
- Connect the vent hose to the outside or to an air purifier to ensure that the exhaust does not affect neighbors or public spaces.
- If you find strong odor or heavy smoke, please stop using themachine. Make sure the vent hose is properly connected and the ventilation system is working properly before usage.

Additional Operation Notes

- Suggest two or more people to move the machine simultaneously to avoid injury.
- Suggest wearing gloves while cleaning to avoid being scratched by honeycomb table or material.
- In case of burns, please continue to flush cold water and consult a doctor, do not use medicine by yourself.
- When opening the cover, please make sure to wear a mask and laser safety glasses with the protection level of OD5 (energy penetration rate 10^{-5}).
- There are no noise hazard concerns as the beamo's working level is below 70 dB.

- Do not constantly stare at the firelight during laser operation.
- Do not impact or vibrate the machine. It may cause the optical path to shift or damage the laser tube.
- Do not place any living beings in the machine. It is strictly prohibited.

Work Position of Operator



Laser Safety

To assess the potential hazards of laser systems, they are divided into eight safety classes: 1, 1C, 1M, 2, 2M, 3R, 3B, and 4. **FLUX beamo is a Class 1 Laser Product.** A class 1 laser product is a device the safest of all classes and complies with laser safety standards from the International Electrotechnical Commission (IEC). These regulations ensure that lasers identified with a “Class 1 laser product” are safe. This is guaranteed by its enclosed protective housing and its safety devices.

FLUX beamo works with a laser source that emits intense and invisible laser light. If the door cover is opened during the task, the interlock ensures the laser stops. Safety interlock switches on the front panel turn off the laser immediately if they are opened. Do not place magnets near the front panel or doors as they can interfere with the switches. Do not try to defeat the switches.

The accessible laser light is hazardous to the eye and the skin if the protective housing or interlock is defeated, modified or removed. Without protective devices, this direct light or diffused reflected light is dangerous to both persons and objects!
Do not modify or disassemble your beamo. Attempting to modify or service the unit may result in hazardous laser light exposure. All service must be performed only by factory-authorized technicians or only be modified with official authorization.

EU Declaration of Conformity

FLUX

EU DECLARATION OF CONFORMITY (English)

The latest version of the declaration of conformity can be downloaded from:
https://flux3dp.com/declaration/

CH 1-3

Product Specifications

This manual is applicable to beamo.
Software version: 1.7.X.
Firmware version: 3.5.X.
The illustrations are mainly for Mac.

	Laser Specifications	Machine

beamo

Compact Size
Detachable Bottom Cover

Laser power	Cutting thickness	Weight
30W	0-5mm	22kg

Wavelength	Working depth	Maximum engraving speed
10640 nm	45 mm	300 mm/s

Beambox

Wide Operating Space
Industrial Engraving

Laser power	Cutting thickness	Weight
40W	0-10mm	40kg

Wavelength	Working depth	Maximum engraving speed
10640 nm	80 mm	300 mm/s

Beambox Pro

Wide Operating Space
Industrial Engraving

Laser power	Cutting thickness	Weight
50W	0-12mm	48kg

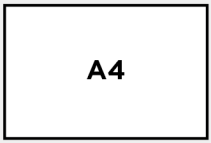
Wavelength	Working depth	Maximum engraving speed
10640 nm	80 mm	300 mm/s

Size
(length/width/height)

615 x
445 x
177 mm

Maximum working area

300 x 210 mm



300 x 195 mm
Camera preview area

1024 x 600 LCD
Touch panel

HD CMOS
Camera lens

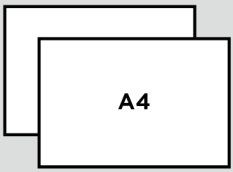
Wi-Fi
Ethernet
Direct Network
Cable
Transmission interface

Size
(length/width/height)

800 x
670 x
250 mm

Maximum working area

400 x 375 mm



400 x 360 mm
Camera preview area

1024 x 600 LCD
Touch panel

HD CMOS
Camera lens

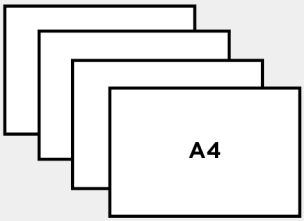
Wi-Fi
Ethernet
Direct Network
Cable
Transmission interface

Size
(length/width/height)

990 x
670 x
250 mm

Maximum working area

600 x 375 mm



600 x 360 mm
Camera preview area

1024 x 600 LCD
Touch panel

HD CMOS
Camera lens

Wi-Fi
Ethernet
Direct Network
Cable
Transmission interface

Add-on

Rotary

Autofocus

Diode Laser Module

Rotary

Rotary

Software

Operation Mode

Path/Infill

File Format

Operating System

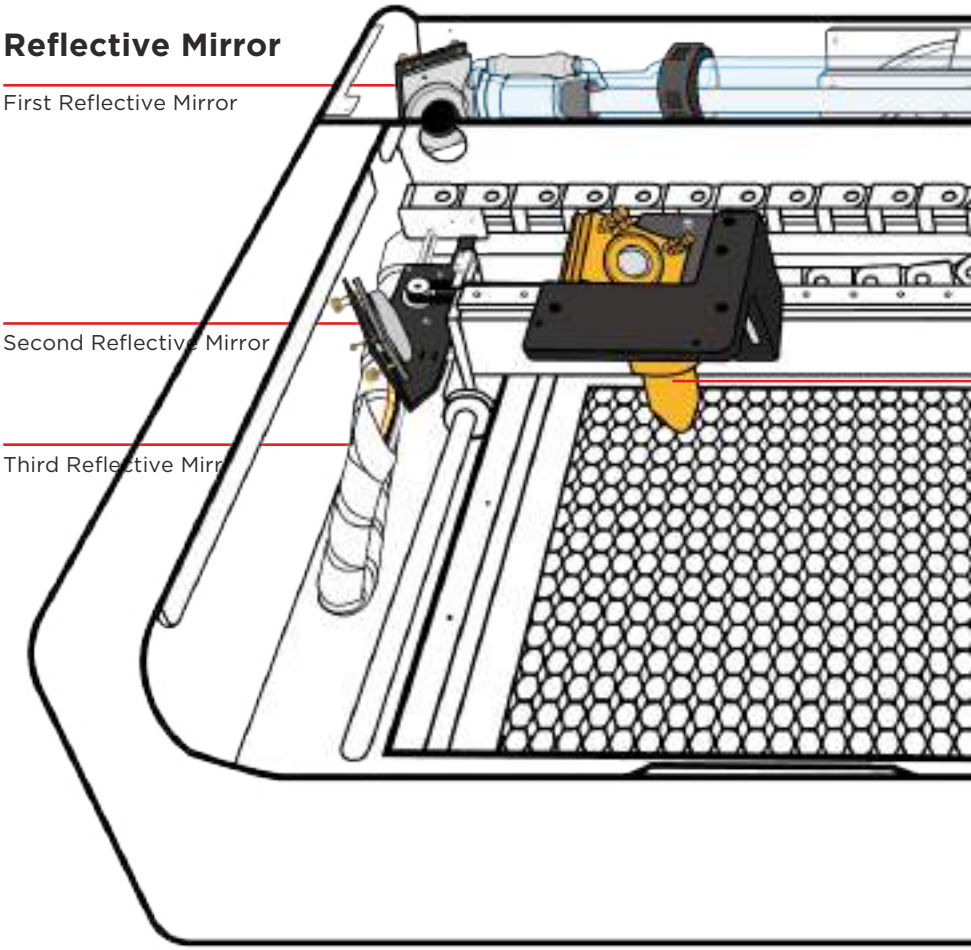
Windows
macOS
Linux

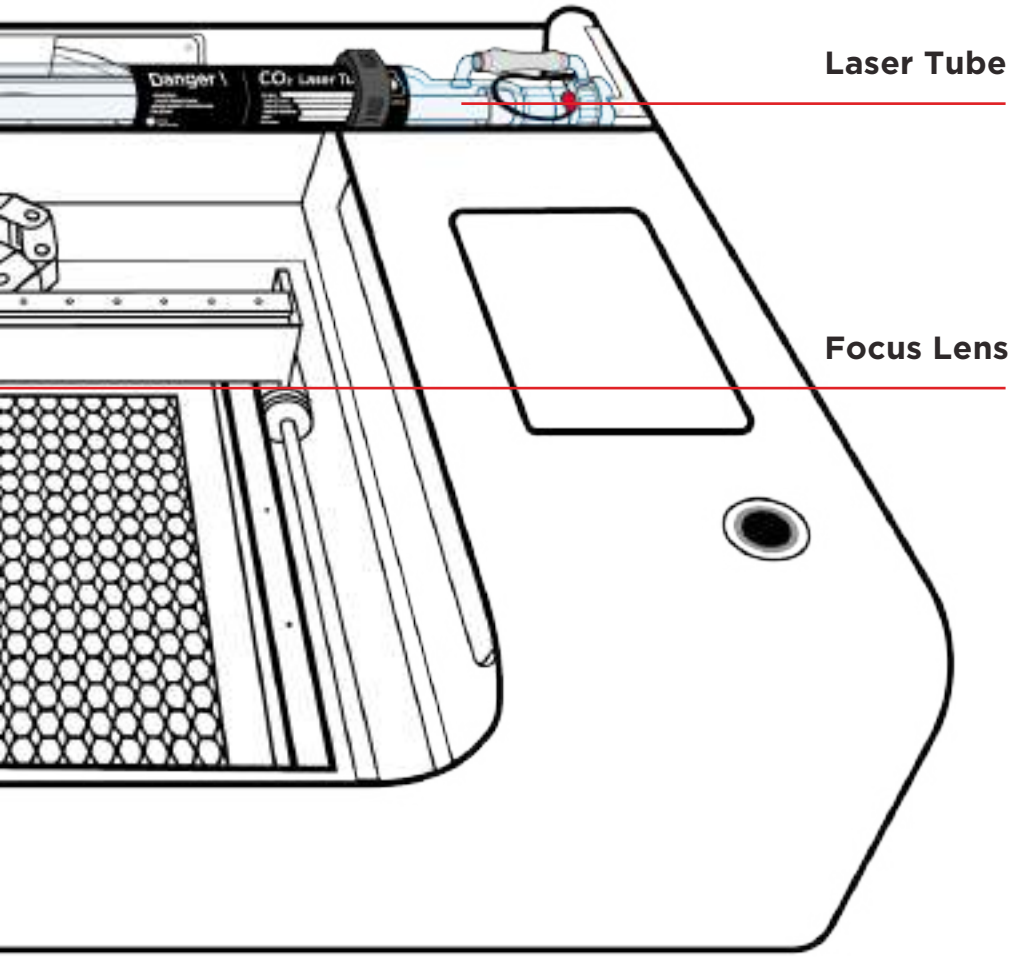
CH 1-4

Laser Engraving Principle

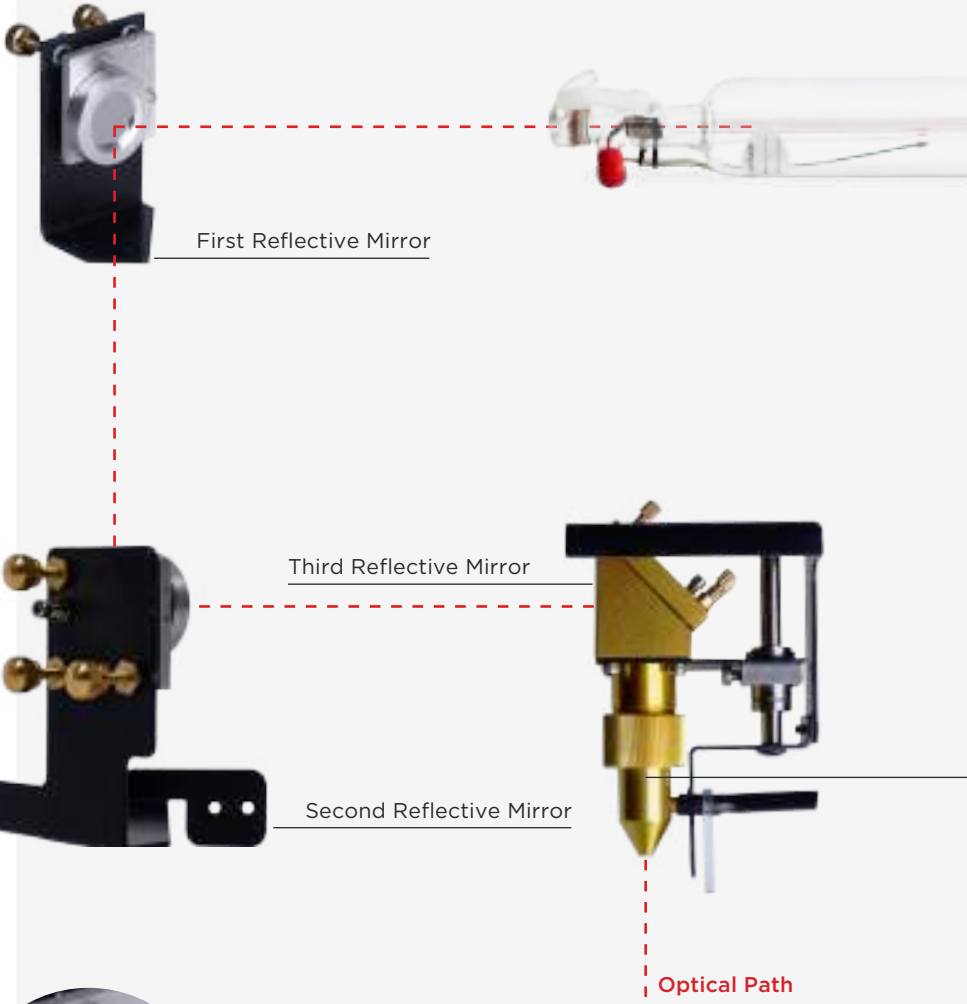
The principle of laser engraving is to focus a high-power laser beam on the surface of the engraving material, and the material will be instantly heated or vaporized after absorbing the high energy of the laser, thus creating an indentation or even a cut in the working path of the laser beam.

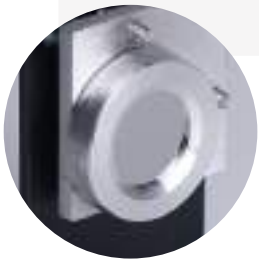
Reflective Mirror




Laser Tube
Focus Lens

Laser Principal





Reflective Mirror

There are three reflective mirrors inside the machine, the first mirror is fixed while the second and third mirrors can be driven by the motor to pan around in order to direct the laser beam to any position on the working table. The second mirror will move forward and backward, which is to control the position of the Y-axis, while the third mirror moves left and right to control the X-axis.

Laser Tube

The beamo is equipped with a 30W CO_2 laser, where the CO_2 gas is sealed inside a glass tube and when the voltage is applied to both ends of the laser tube, the gas is excited producing an invisible laser with a wavelength of 10.6 μm. When the light is emitted from the end of the laser tube, it is a parallel beam of about 5 mm in diameter. Due to the small divergence, the parallel beam can be transmitted inside the machine with little energy loss.

Exploded view of laser head

Focus Lens

After the third reflection, the laser beam will be directed to the surface of the engraving material. To achieve higher energy density, a glass focus lens inside the laser head will focus the parallel beam of about 5mm diameter to about 0.2mm diameter. If the laser beam is properly focused on the surface of the material, the energy is sufficient to instantly burn through non-metallic materials such as wood, acrylic, or metal materials after anodizing, or stainless steel after specific spray processing.

CH 2
Start

CH 2-1

Unboxing

The beamo weighs 22 kilograms. It is recommended to have two people lift it cooperatively to avoid injury.

01 Opening the box, it contains the machine (including the vent hose), and the accessory box (including the manual).

02 Remove the four corners of the cushioning material and take out the machine from the carton to place it on a stable surface. Please preserve the original carton and cushioning material for future usage.

03 The accessory box contains 1 | Torx screwdriver, 2 | 2.5mm hexagonal wrench, 3 | Double head wrench, 4 | Lubricating oil, 5 | Funnel, 6 | Ethernet cable, 7 | Double-sided tape, 8 | Clamp, 9 | Power cord, 10 | Wi-Fi dongle, 11 | Engraving sample, 12 | Wood piece.

04

Machine front :

1 | Nozzle fastening ring、2 | Focus probe、3 | Honeycomb table
4 | Power button、5 | Touch panel、6 | Acrylic door cover

05

Machine back :

1 | USB port
2 | Ethernet port
3 | Power port
4 | Ventilation fan

CH 2-2

Assembly and Start-up

Please read the safety regulations carefully before starting the operation.

Install the power cord and vent hose at the back of the machine to turn on the power and start usage.

01 Insert both ends of the power cord into the rear side of the machine and into the outlet.

02 Insert the clamp from the smaller end of the vent hose and put the larger end of the vent hose on the back side of the machine, then use the double head wrench provided in the accessory box to adjust the tightness of the clamp until the vent hose is not easily loosened.

Make sure to install the vent hose properly. Exhaust hose missing or not installed properly will increase the risk of fumes and dust inhalation.

03 Press the power button to turn on the machine, the first time it takes about two minutes to turn on.

04 First unboxing, please follow the machine test guide to select interface language, to read FIRE HAZARD carefully (as shown in the next page), to do the Startup Test, and to set the internet connection. Please refer to 【Connection Settings】(p.52) for other connection methods. Make sure the device connected to the machine and the machine itself are using the same local area network.

Before engraving, you need to change the language and network in the machine as well as download the software and set up the network in the computer in order to match the computer and the machine.

FIRE HAZARD

Refer to the user manual for additional information before using your FLUX Laser

* Do not stare at the flame generated by the laser.
* Do not operate machine unattended.
* Do not try to service, repair, or modify the machine without authorization from FLUX Support.
* Be sure to have a properly maintained fire extinguisher near the machine at all time.
* Please make sure that the processed material does not pose a hazard when burned at high temperatures.
* Periodically remove the cutting grid and clean debris from the work area.

Agree

CH 2-3

Machine Interface

This chapter will introduce the machine interface and the seven key functions.


A
START
B
MAINTAIN
APP
C
D
NETWORK
MACHINE
E
F
G
Help Center

A：Status Bar

Machine status checking

B：START

Work file manager

C：MAINTAIN

Mechanism switch, usage during maintenance, repair, and troubleshooting

D：APP

Matching mobile devices and machines

E：NETWORK

Network status checking, network setting

F：MACHINE

Machine name search, language and hardware related settings

G：HELP CENTER

Help Center access

A：Status Bar

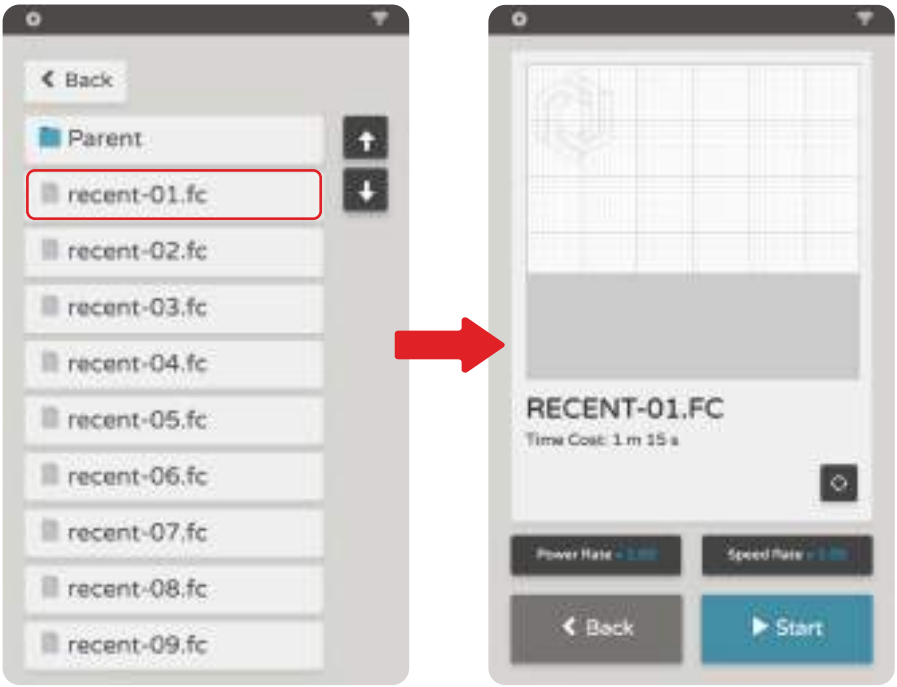
Machine status checking

The status bar shows the connection status of the machine, whether it is connected to Beam Air or not as well as the temperature, water flow and door opening/closing status when the work is in progress. Most of the time, clicking on the status bar will return to the home page, during carving will reorganize the page.

Status Bar	Icons			
Temperature / Beam Air	Temperature	25 °C	Beam Air	BA
Water pump	In Progress		Out of Progress	
Door cover	Door cover opened		Door cover closed	
Network connection	Wireless network		Ethernet network	

B : START

There are two ways to transfer the working tasks, either by Beam Studio software or by USB flash drive, both of which can be used to find and use the files from "START" after transfer.



1. **Tasks sent to the machine from Beam Studio : “Built-in Memory” > “Recent” > specific tasks.**
   The machine can record up to 15 tasks sent by the software Beam Studio, and recent-01.fc will be the latest task sent.
2. **Files read from USB flash drives : USB flash drives > specific tasks.**
   There is no limit to the number of files that can be viewed on a USB flash drive.

Work file manager

When you click a Work/File, the actual position of the image in the working area, the estimated working time, and the real-time power and speed setting multiplier will be displayed on the screen.

The starting point can be set manually before work, and the power rate and speed rate can be set instantly during work.

Manual start point setting: The start point is the zero position (0,0), click > Move the laser head to the appropriate position through the control panel > OK.

C : MAINTAIN

Mechanical switch for maintenance, repair, and troubleshooting

Maintenance and repair will enter the MAINTAIN page, mainly for hardware switch and signal display, it is highly recommended to read the subsequent maintenance chapter or through the customer service guide before operation.

D : APP

Matching mobile devices and machines

After downloading the mobile version of Beam Go and connecting your mobile device to the same wireless network, click on the APP and scan the QR code to pair your mobile device with your machine.

* Beam Go is the mobile version of the Beam Studio software for mobile devices.

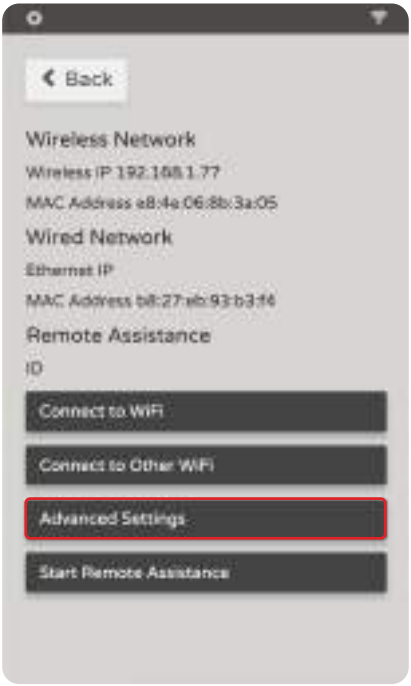
E : NETWORK

Network status checking, network settings

Network IP address can be confirmed and whether the Wi-Fi dongle or the Ethernet cable is normal (the MAC address has a value when normal).

Advanced Settings : You can set the Static IP manually for the machine, which requires filling in the IP address, subnet mask and router.

Start Remote Assistance : Guided by customer service.

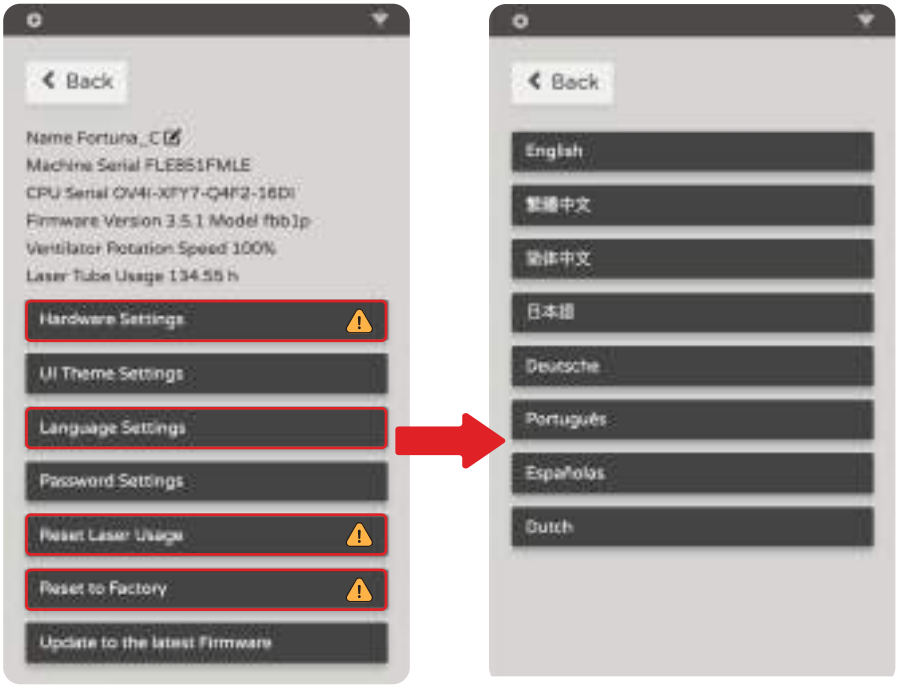


Note: When using a wireless (Wi-Fi) or wired network (except for Direct connection), the machine can automatically obtain an IP address through DHCP (for general users) or be manually set to a Static IP.

F : MACHINE

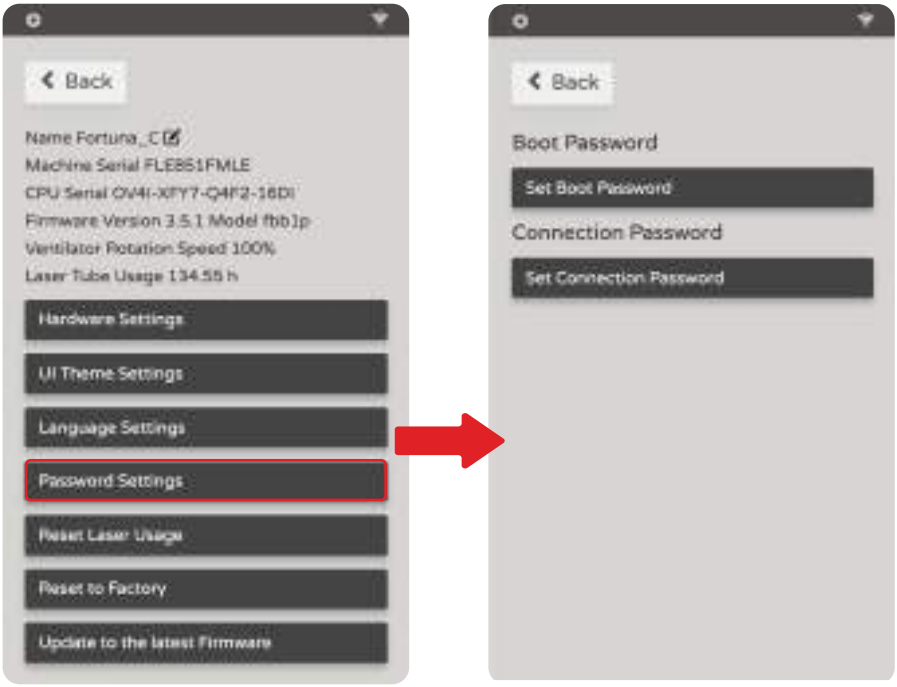
Machine name search, language, and hardware related settings

If you have any questions, please click "HELP CENTER", scan the QR code, and find possible solutions from the Help Center of FLUX official website.



“Hardware Settings”, “Reset Laser Usage”, and “Reset to Factory” all require customer service guidance before operation to avoid consumer disputes caused by machine damage.

Once the connection password is set, it is required to enter the connection password in the software when connecting to the machine for the first time, and it can be modified and cancelled.



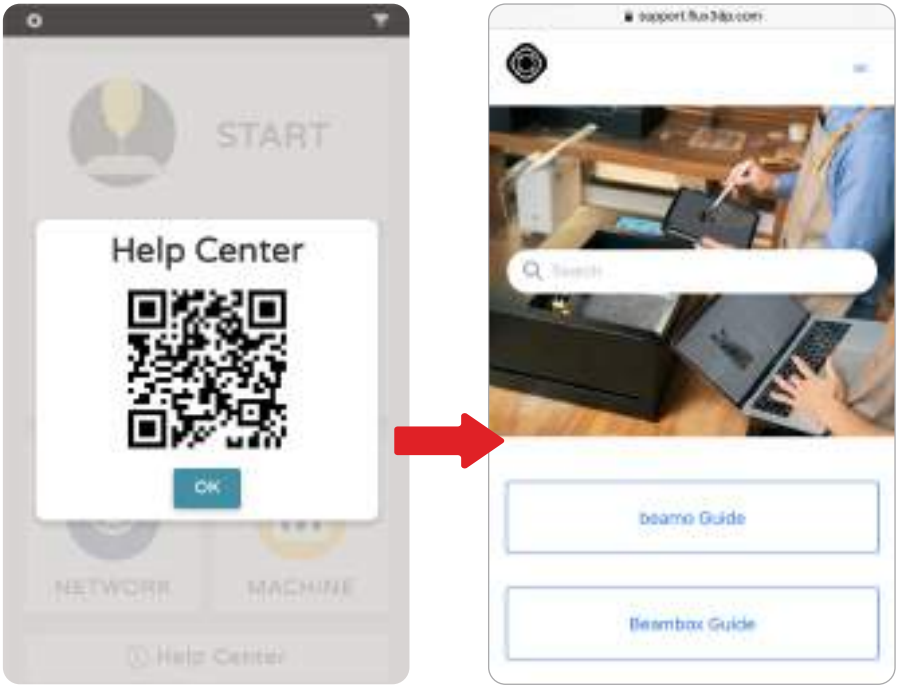
Clicking "Update to the latest Firmware" will update the firmware to the latest beta version. In addition to updating the firmware using the machine, you can also update the machine's firmware through the software interface. See 【Software Operation】"Menu" - "Machines" (p.91). Or update the machine's firmware through the USB flash drive. (storage size <= 64GB, with format as FAT32; rename the firmware file downloaded from the website as autoupdate.fxfw. Restart the machine after plugging the USB flash drive into a USB port in the back of the machine.)

Firmware upgrade takes a few minutes, do not turn off the machine during the process.

G : HELP CENTER

Help Center access

If you have any questions, please click "HELP CENTER", scan the QR code, and find possible solutions from the Help Center of FLUX official website.



CH 2-4

Software Installation and Activation

Download the latest Beam Studio version from the official FLUX website.

Please go to the official FLUX website > “Supports” > "Downloads" and select the Beam Studio version from the drop-down list according to your operating system.

For Windows :

Download the corresponding files according to your computer's operating system bit: X86 for 32-bit and X64 for 64-bit.
After downloading, please run Beam + Studio + Installer (.exe) and Beam Studio is ready to use. Beam Studio can be opened on the desktop or in C:\Users\User\AppData\Local\Programs\beam-studio\Beam Studio.

For macOS :

Confirm the mac version to download the corresponding file. Some features are not available on older Mac versions. For system version information: > “About This Mac” > Version.
Once you have finished downloading, click on the file in the Downloads section, use the cursor to drag the icon into the folder, and click on Beam Studio in the application.

In case of unable to open because it is from an unidentified developer, please open “System Preferences” > “Security & Privacy” > click on the lock to modify > “Open Anyway”.

【Troubleshooting】 Unable to Open Software Properly (p.213)

CH 2-5

Connection Settings

This chapter explains the various connection installation methods, once the connection is completed, the machine can be operated from the computer.

There are three types of connection between computer and machine, namely Wi-Fi, wired network, and direct connection (direct connection has different setting steps depending on the operating system).

1

Wi-Fi

Preparation Items
(included in the accessory box) :

-Wi-Fi dongle

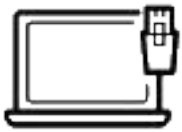
2

Wired Network

Preparation Items
(Self-preparation) :

-RJ45*1
(machine-router)
-RJ45*2 + router*1
(machine-router/
computer-router)

3



Direct Connection

Preparation Items
(Self-preparation) :

-RJ45*1
(machine-computer)
-Plugable USB/USB-C
to Ethernet Adapter

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1 Wi-Fi

a. Install the Wi-Fi dongle :
Remove the Wi-Fi dongle from the accessory box and install the dongle antenna at 90 degrees to any USB socket on the back of the machine for signal reception.

b. To set up the network of the machine [must use the same Wi-Fi (2.4GHz) as your computer network]:
"NETWORK" > "Connect to Wi-Fi" > Select the Wi-Fi you want to use > Enter the Wi-Fi password and press "Confirm" > "NETWORK" > Confirm the "Wireless IP" of the machine.

c. Set the software interface display language :
Use the drop-down list to select the language, and then click "Next".

d. Membership Login :

Login to the membership, you can access more functions added to the software from time to time in the future.

e. Select the connection method :

Select “Wi-Fi”.

f. Enter the IP address of the machine to complete the setting :

Check the “Wireless IP” address of the machine from the panel. Enter the wireless IP address of the machine into the computer to complete the setting.

2 Wired Network

a. Install the Ethernet cable :

Install both ends of the Ethernet cable in the network slot on the back of the machine and slot on the router. The machine will automatically connect to the network in about 10 seconds after the installation is completed.

b. Confirm the machine network :

Confirm the value of Wired Network “MAC Address” of the machine in “NETWORK” page.

c. Set the software interface display language :

Use the drop-down list to select the language, and then click “Next”.

d. Membership Login :

Login to the membership, you can access more functions added to the software from time to time in the future.

e. Select the connection method :

Select “Wired Network”.

f. Enter the IP address of the machine to complete the setting :

Check the "Wired IP" address of the machine from the panel. Enter the wired IP address of the machine into the computer to complete the setting.

3 Direct Connection

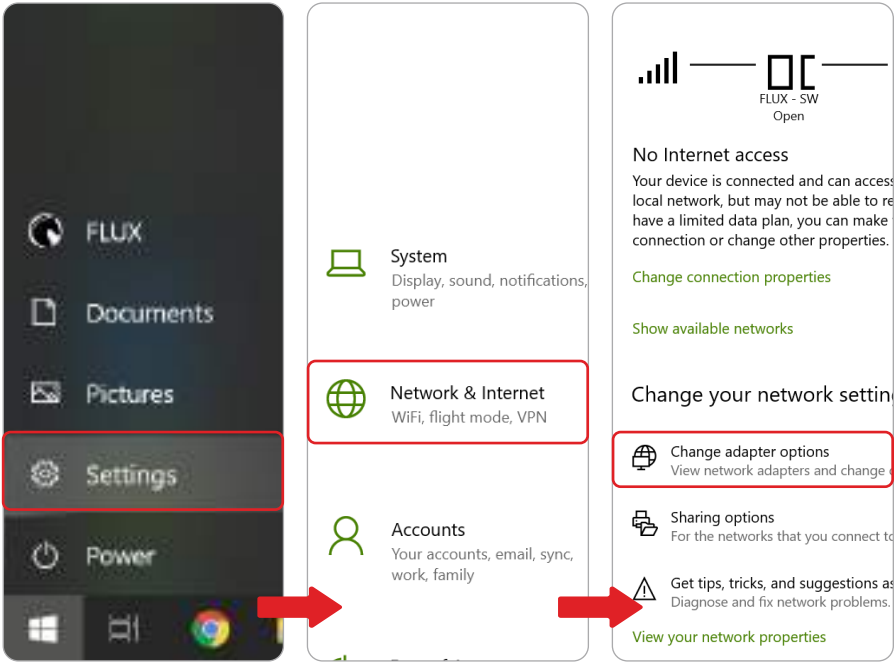
Apart from connecting through a router (Wi-Fi / LAN), you can also connect directly to your computer via an Ethernet cable.

1. Windows : The method is applicable to Windows 10 system.

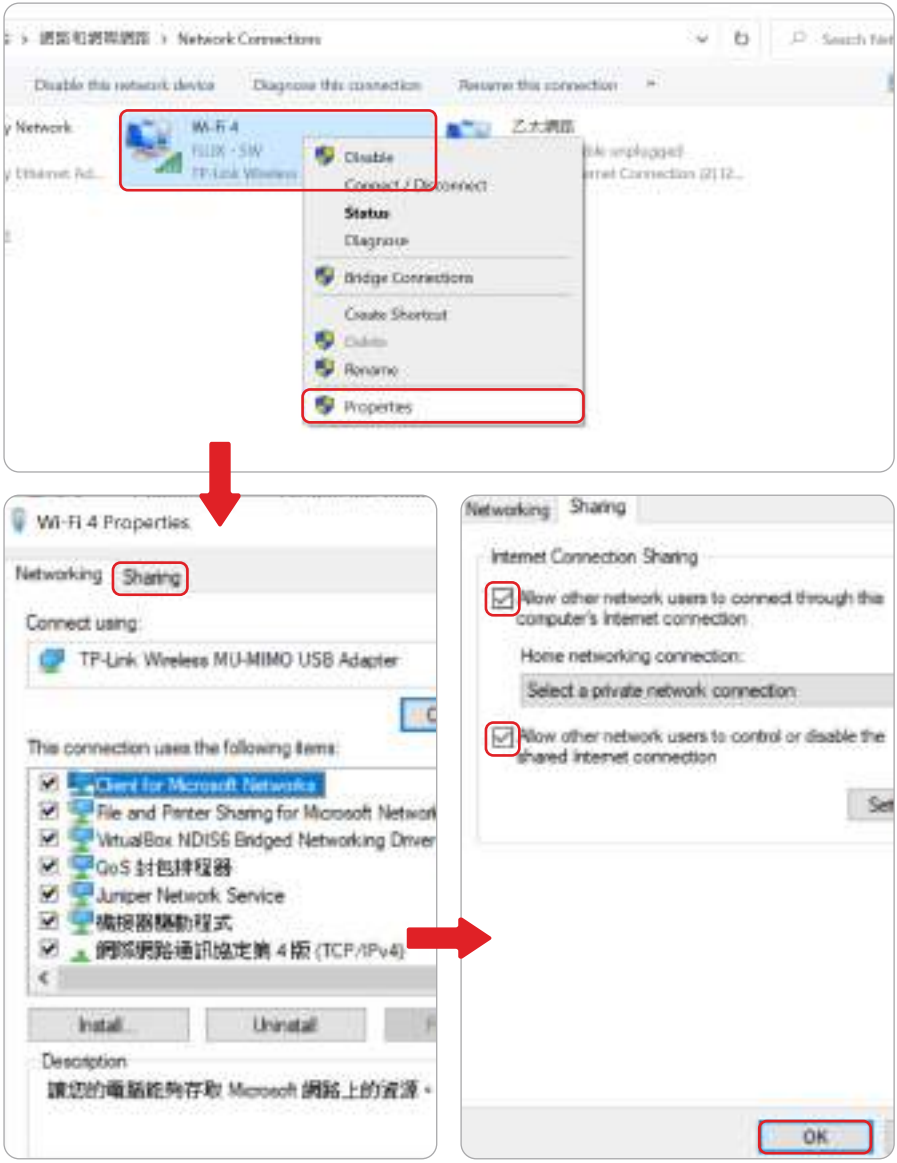
a. Install the Ethernet cable :
Install both ends of the Ethernet cable in the network slot on the back of the machine and in the computer network slot.

b. Confirm the machine network :
Confirm the value of Wired Network “MAC Address” of the machine in “NETWORK” page.

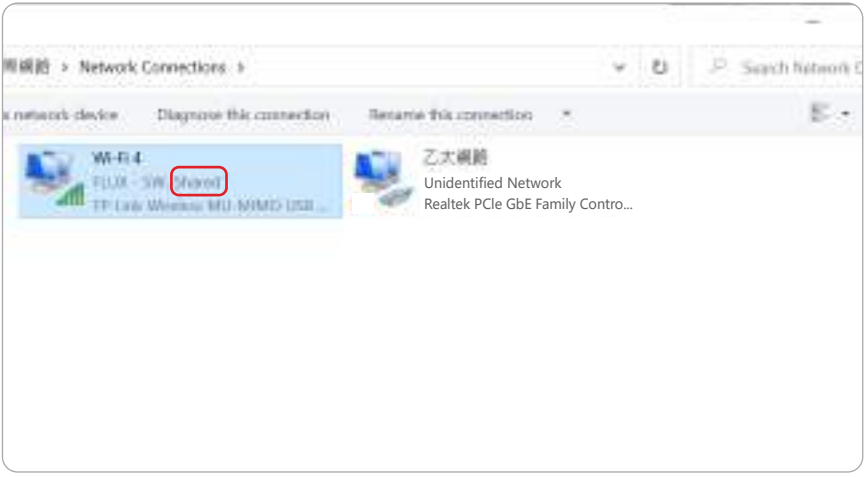
c. Enable Internet connection sharing :
“Settings” > “Network & Internet” > “Change adapter options” >



Right-click on the network you are using (Wi-Fi or Ethernet) > “Properties” > “Sharing” > Select “Allow other network users to connect through this computer's Internet connection” and “Allow other network users to control or disable the shared Internet connection” >



After confirmation, the word “Shared” will be displayed under that network.
In the “Network Connections” window, the user will see more than two networks. There is also one “Unidentified network”, which is the network to which the machine is connected.



d. Set the software interface display language :
Use the drop-down list to select the language, and then click “Next”.

e. Membership Login :
Login to the membership, you can access more functions added to the software from time to time in the future.

f. Select the connection method :
Select “Direct Connection”.

g. Enter the IP address of the machine to complete the setting :
Confirm the “Wired IP” address of the machine from the panel. Enter the wired IP address of the machine into the computer to complete the setting. It usually starts with 192.168.(If it starts with 169.254, it means the computer may be set up incorrectly or the network cable).

2. macOS: The method is applicable to macOS environment. If you are using macOS Catalina, please update to at least 10.15.4.

a. Install the Ethernet cable :

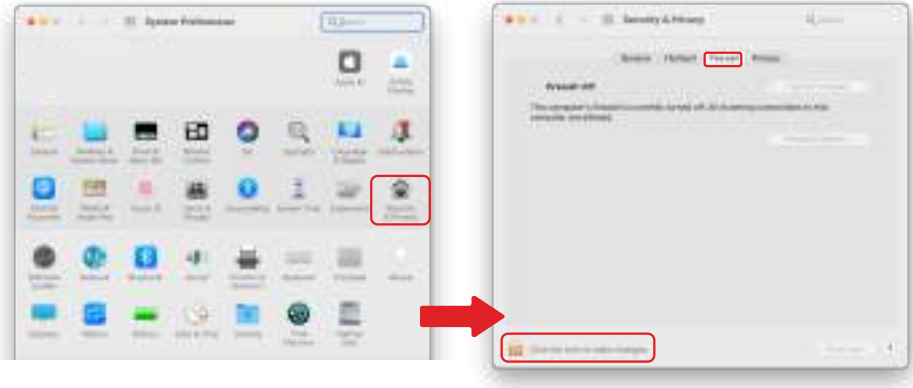
Install both ends of the Ethernet cable in the network slot on the back of the machine and in the computer network slot.

b. Verify the machine network :

Verify that the machine has a value for Wired Network “MAC Address” in “NETWORK” page.

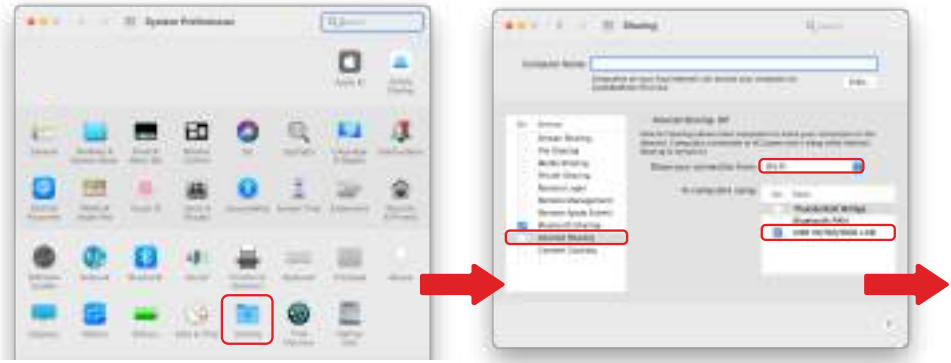
c. Turn off the computer firewall:

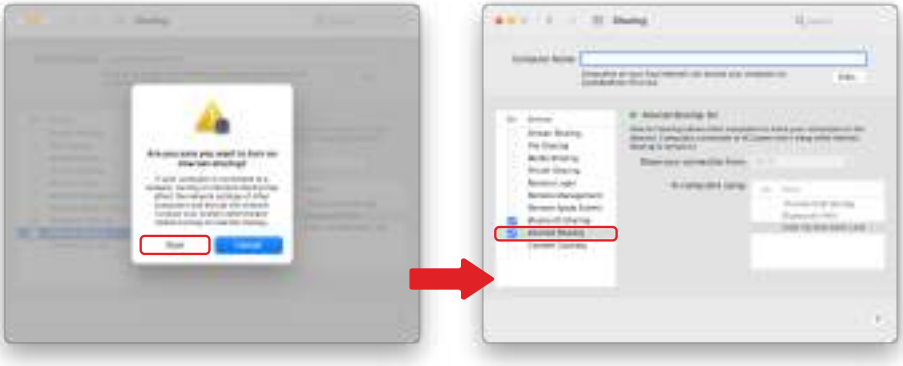
“System Preferences” > “Security & Privacy” > “Firewall” > “Turn Off Firewall”.



d. Enable Internet connection sharing :

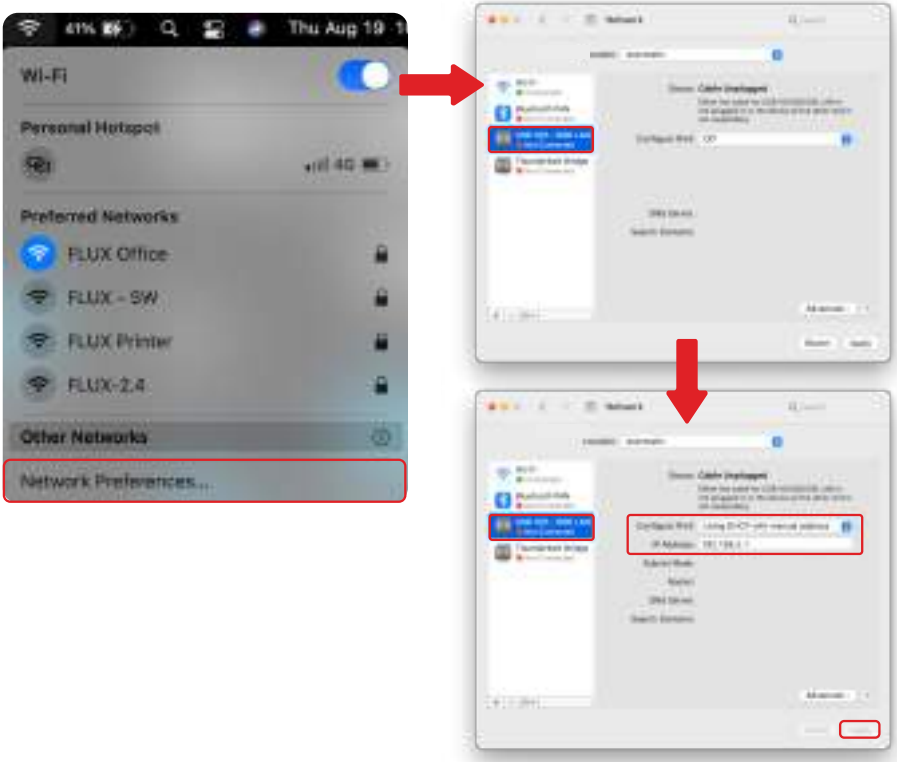
“System Preferences” > “Sharing” > Set the “Share Your Connection From” to the network you are using (Wi-Fi or Ethernet) > Select the port to use > Click “Start” on the pop-up message to enable the sharing.





e. Set the IP address of your computer to 192.168.2.1 :

Click the network icon in the upper right corner, select “Open Network Preferences” > select the interface intended to use (RJ45 adapter) > Select “Configure IPv4” as “Using DHCP with manual address” > And set the “IPv4 address” to 192.168.2.1.



f. Set the software interface display language :
Use the drop-down list to select the language, and then click “Next”.

g. Membership Login :
Login to the membership, you can access more functions added to the software from time to time in the future.

h. Select the connection method :
Select “Direct Connection”.

i. Enter the IP address of the machine to complete the setting:
Confirm the “Wired IP” address of the machine from the panel. Enter the wired IP address of the machine into the computer to complete the setting. It usually starts with 192.168. (If it starts with 169.254, it means the computer may be set up incorrectly or the network cable needs to be plugged in again).

If you have previously skipped setting the connection method, you can go to the setup screen to set the IP via “Machines” > “Machine Setup” in the menu.

【Troubleshooting】Connection Issue (p.215)

Once the connection is complete, you can start your first engraving!

CH 2-6

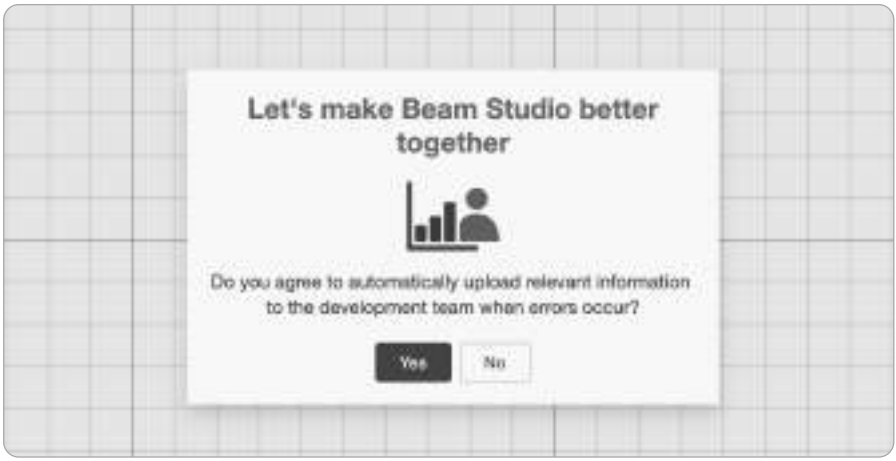
Beam Studio Tutorial

Chapter Highlights: Camera Calibration, Engraving Material Focusing, Common Software Functions.

1. Automatic error return :

When an error is encountered, agree to automatically upload the information to the development team to help the team identify potential problems with the software.

Note: If you encounter an error alert window in the future, you still need to access the bug report to the development team.

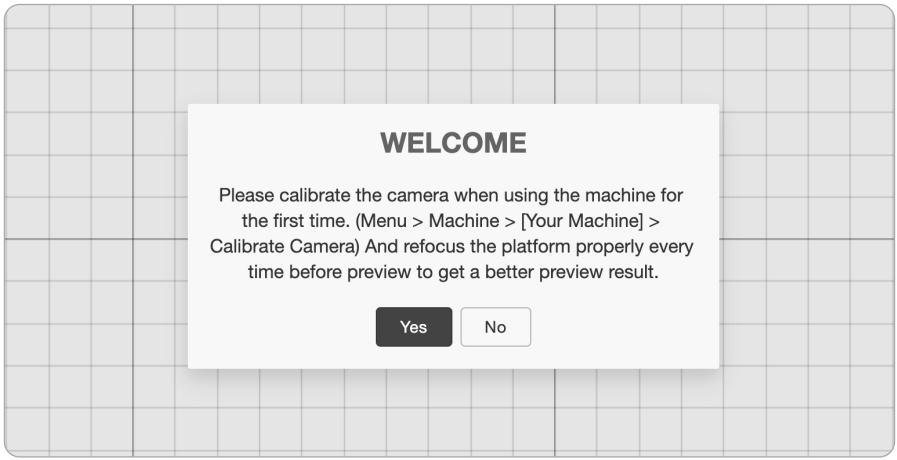


2. Camera Calibration :

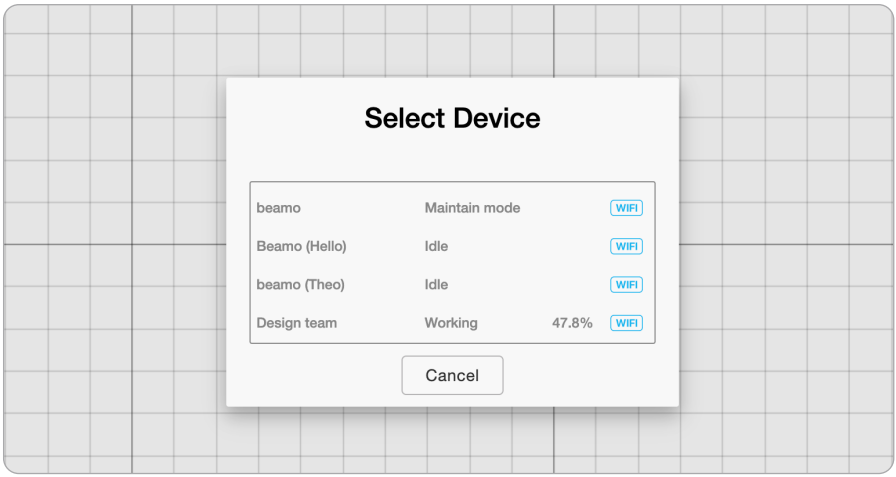
Calibration of camera and engraving position consistency to ensure accurate machine engraving result.

Preparation Items : A4 (Letter size) white paper (self-preparation)

Note : 1. When using the camera preview function for the first time out of the box, camera calibration is required first. 2. Each time you use it, you need to focus on the engraving material (confirm the focus).



a. Select Device : Select the name of the machine in use.



b. Place white paper : Place clean A4 (Letter size) white paper in the upper left corner of the working area.

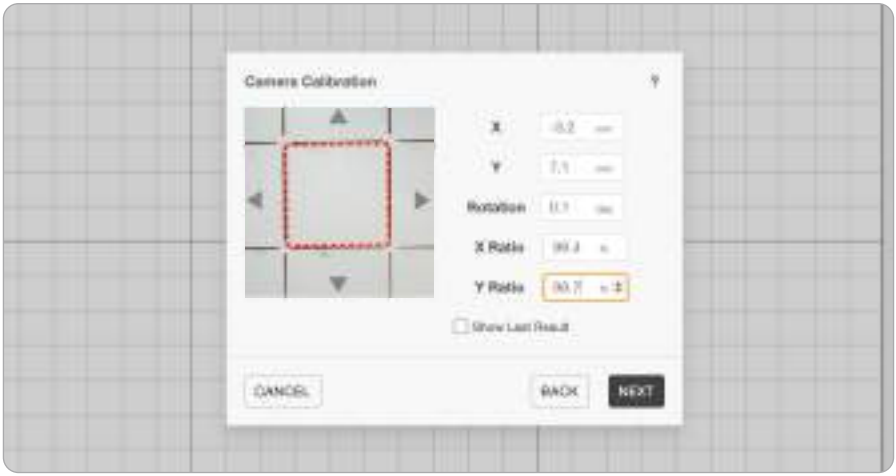
c. Focusing : For manual focusing, loosen nozzle fastening ring and make the focus probe touch the engraving material, and tighten the ring and turn back the focus probe after completed focusing.

For auto focus, double click the side button of the add-on to make the probe touch the engraving material.

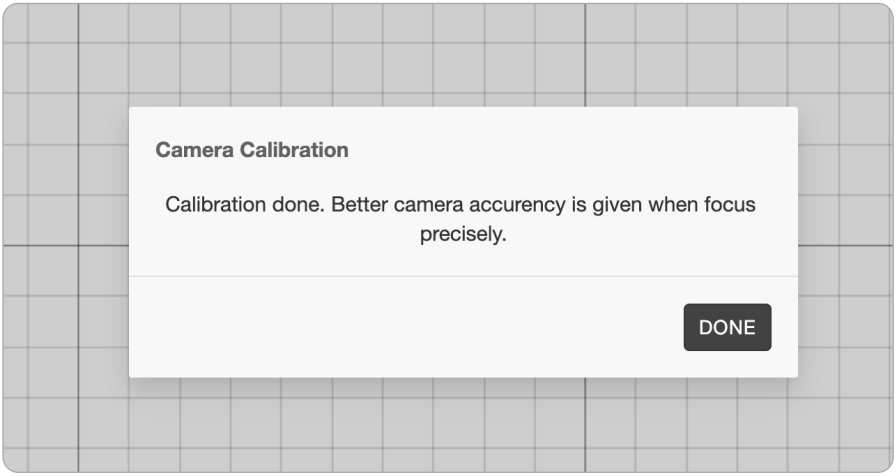
d. Draw calibration image : the machine will cut out grid lines on the paper.

e . Place the red square : After clicking anywhere to cancel the prompt, move the grid lines to the center, align the outside of the red square with the center square of the grid lines by adjusting the directional keys, horizontal and vertical translation, rotation angle, and size ratio (keyboard up and down keys can adjust the value).

e-1. Red square adjustment completion position.



f. Camera calibration completed : After the camera calibration is completed, the first engraving can be started.



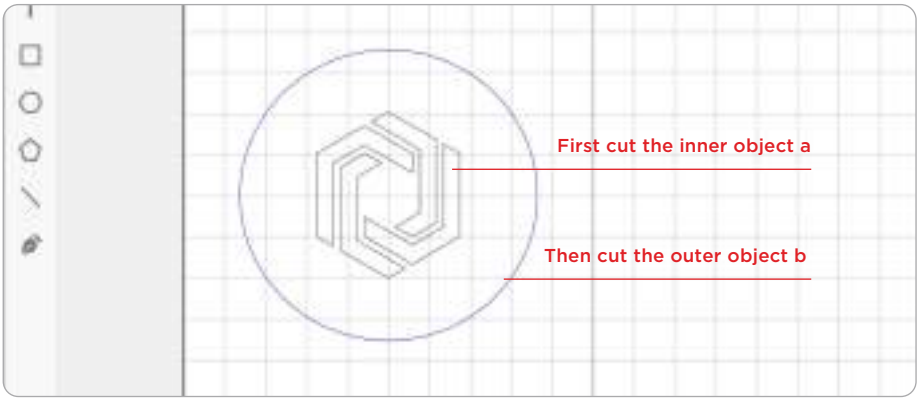
3. Beam Studio Tutorial : After completing the Beam Studio tutorial, users can carve round and square shapes out from the wood piece.

Preparation Items : Engraving Material: 3mm wood piece (included in the accessory box).

Note - To ensure that the engraving results are not affected by the order of execution, there are two recommendation :

1. Engraving before cutting : the order of work execution is from the top to the bottom of the layer, make sure the engraving layer is on top and the cutting layer is on the bottom to avoid the wrong focus of engraving caused by the collapse of the object after cutting, which will affect the engraving result.

2. As shown below, if there are multiple cut objects in the same layer, and there is an inner and outer relationship, then the inner objects will be cut first, and then the outer objects will be cut; if object a is in object b, then object a will be cut first and then object b.



Steps :

0. Select "Yes" if you would like to start the Beam Studio tutorial.

1. **Switch to Preview Mode :** Tap the Camera Preview icon on the left > Select the machine in use.

2. **Preview the Platform :**
   a. Put the wood piece
   b. Adjust the focal
   c. Close the door cover
   d. Preview the range of engraving material : click on the working interface or select a preview range

3. **End Preview Mode :** Select “End Preview”  .

4. **Draw a Rectangle :** Select a “Rectangle (M) ”  to draw a square in Layer 1 and press Shift to square it.

5. **Drag to Draw :** Drag to draw a square in the working interface.

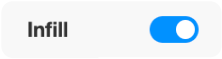
6. **Switch to Layer Panel :** Switch to the layer  to set the parameters.

7. **Set Preset :** Wood - Cutting : “Wood - 3mm Cutting”.

8. **Add a New Layer :** The new layer name is Layer 2.

9. **Draw a Circle :** Select “Oval (L)”  to draw a circle in layer 2 and press Shift to make a circle.

10. **Drag to Draw :** Drag to draw a circle in the working interface.

11. **Turn on Infill :** Turn on the infill function. 

12. **Switch to Layer Panel :** Switch to the layer  to set the parameters.

13. **Set Preset :** Wood - Engraving : “Wood - Engraving”.

14. **Send the File**  **:**

    a. Confirm the parameters and layer settings.
    b. Select the name of the machine in use.
    c. Click “Start” to execute the engraving and cutting process.

【Troubleshooting】“Cooler Off” (p.187), “Door Opened” (p.189), “Homing Failed”(p.197), etc.

- *** If you have already skipped Beam Studio tutorial, you can find the tutorial under “Help” > “Show Start Tutorial”.**
- **If the engraving result is blurred or the color is light, please check the focus first. If the foregoing does not work, we recommend inspecting or adjusting the optical path. See** 【Maintenance】 “Optical Path Inspection” (p.146), “Optical Path Alignment” (p.148).

CH 3
Software Operation

CH 3-1

Software Interface

This chapter introduces the software features and demonstrates the 4 creation techniques, including Beam Studio creation, importing work files, Trace Image, as well as mass production, and concludes with formatting instructions. Available for Beam Studio 1.7.X.

The software interface can be divided into 5 sections

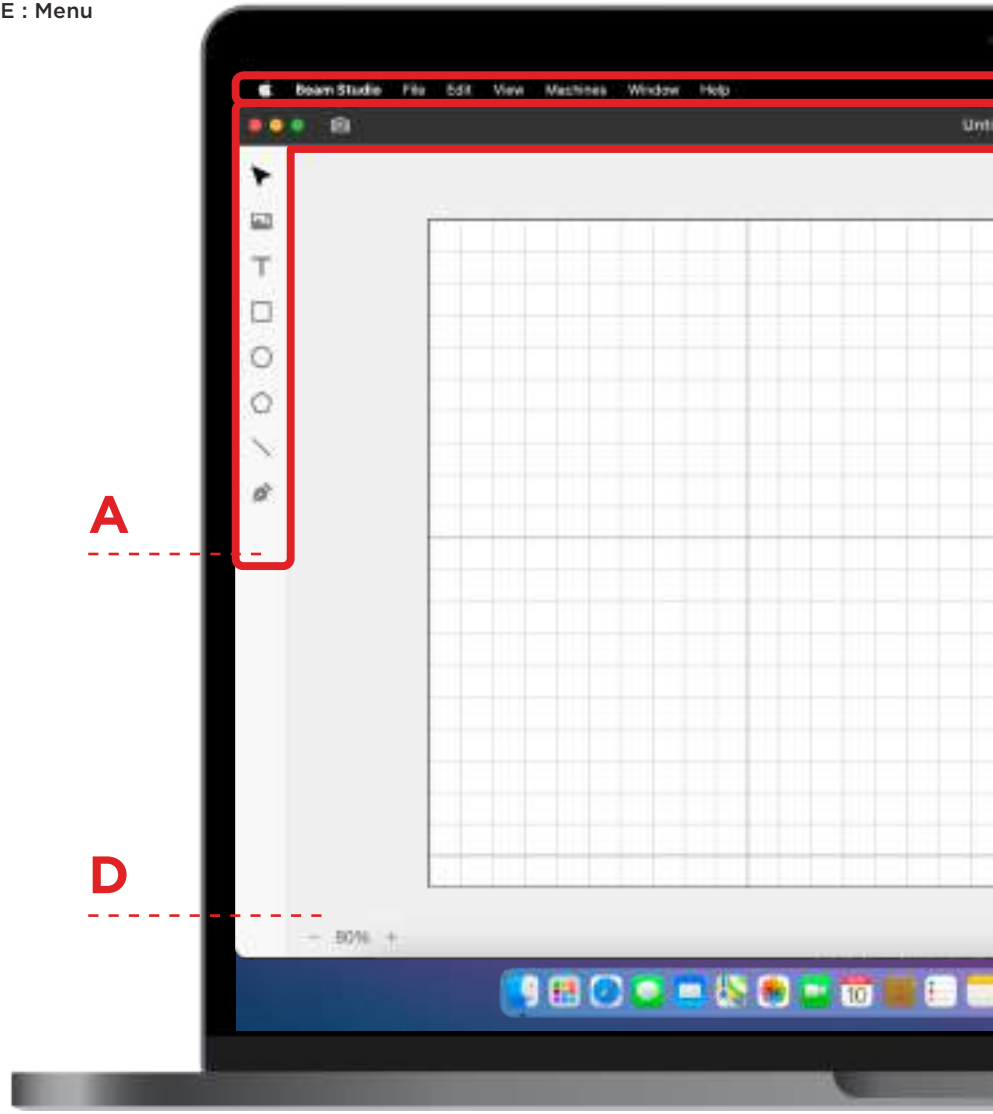
A : Toolbar

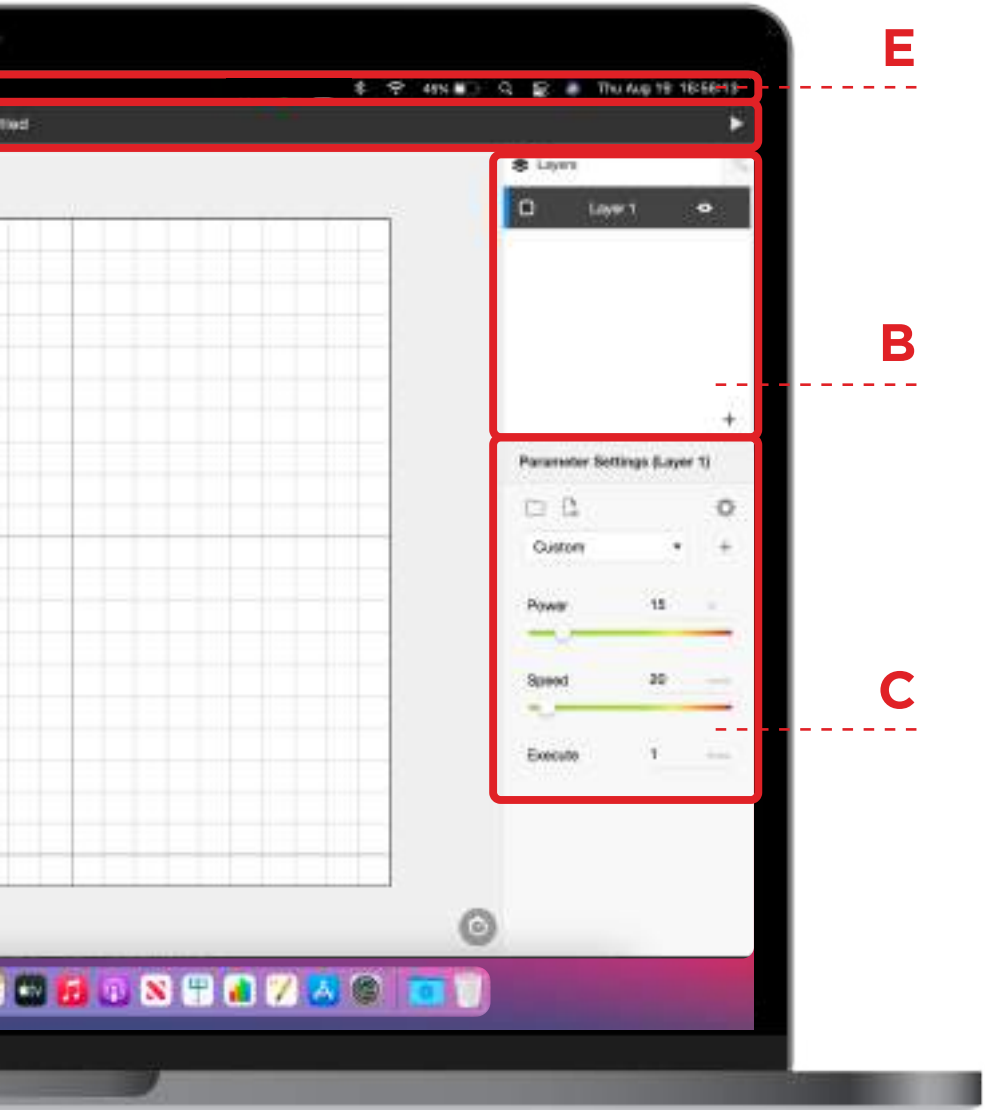
B : Layer and object management

C : Parameter Settings

D : Working Interface

E : Menu




E
B
C
Layer 1
Parameter Settings (Layer 1)
Custom
Power
15
Speed
20
Execute
1

A : Toolbar

Select (V)

Select specific objects.

Image (I)

Import JPG / PNG / SVG / DXF / AI / PDF files and drag and drop them directly into the software or paste them directly from the browser after "Copy image".

Text (T)

Add new texts. When the Infill is not on, there is only a text stroke, once it is on, text will be solid.

Rectangle (M)

Draw rectangles. Able to adjustable rounded corners radius.

Oval (L)

Draw ellipses.

Polygon

Draw polygons. The number of polygon vertices can be increased or decreased by using the "+" and "-" keys of the keyboard while drawing.

Line (\)

Draw line paths.

Press and hold the keyboard Shift :
Able to draw squares and circles from Rectangle (M) and Oval (L).
Able to rotate drawing objects and texts (except importing files) 45 degrees, and scale one drawing object or text at a time.
Adjust import files freely (scale by default).

Pen (P)

Outline the lines and curves of the vector and adjust the shape with the anchor point after you finish drawing.
Press and hold the left mouse button while drawing : Able to draw curves. Double click the end point or use the keyboard esc to end the pen path. Double click the pen drawing path to edit the path.

There are 3 modes according to the node type :

tCorner :
When adjusting the length of one side of the handle, only the path on that side will change.

tSmooth :
When adjusting the length of one side of the handle, the path will change on both sides of the selection point, but the path will change more on the controlling side.

tSymmetry :
When adjusting the length of one side of the handle, the path on both sides of the selection point will change, and the change is symmetrical.

Camera Preview Function

Camera Preview :
Preview the range of engraving materials. Click or select a range to preview the location of the materials to be engraved.

Trace Image :
Scan and convert a pattern to vector grahpics for software editing via camera preview.

Clear Preview :
You can delete the images previewed by the camera, but the objects of the Trace Image will not be deleted.

Select the name of the machine in use and deliver the task.

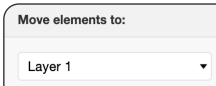
B：Layer and object management

Layer management and object management. Object management not only covers the functions shared by picture, text, and drawing objects, but also have their own adjustable OPTIONS and ACTIONS. The introductions are as below.

Layer management :

Add Layer

Create and name a new layer.



Move elements to

When there are multiple layers, you can transfer the selected object to a certain layer in the drop down list.

Layer Color

After changing the color, open “View” > “Use Layer Color” to distinguish the color of objects between different layers. When displaying layer colors, the software performance and editing speed may be affected if the shapes are complicated or numerous.

Show Layer

Click to turn off the layer.

Right-click on the layer column is able to do the following :
Duplicate Layer : Duplicate the objects and parameters of the layer and add a new layer on the list top.

(Next page)

Lock Layer : You cannot edit the layer objects after locking it, but you can rename, delete, move, and merge the layer.
Delete Layer : Delete the layer.
Merge Down : After merging, the layer name will be the name of the next layer.
Merge All : After merging, the layer name will be the name of the bottom layer.
Merge Selected Layers : After merging, the layer name will be the name of the last selected layer (labeled by a blue mark in front).
Delete multiple layers at the same time : Press the keyboard Shift and select the layer you want to delete, then use the right-click delete or keyboard delete key to delete the selected layers.
Drag and drop the layer to adjust the layer order.

Object management : shared functions for picture, text, and drawing objects.

Horizontal Distribute

Distribute the selected objects evenly by the center of the graphs in the horizontal direction.

Top Align

Align all the selected objects to the top bounding of the objects.

Middle Align

Align all the selected objects to the middle vertically.

Bottom Align

Align all the selected objects to the bottom bounding of the objects.

Vertical Distribute

Distribute the selected objects evenly by the center of the graphs in the vertical direction.

Left Align

Align all the selected objects towards the leftmost bounding of the objects.

Center Align

Align all the selected objects to the center horizontally.

Group

Group multiple objects together.

Ungroup

Cancel the grouped objects.

Right Align

Align all the selected objects towards the rightmost bounding of the objects.

Union

Combine multiple closed vector graphics into one.

Difference

When Infill is on, only the un-overlapped parts of multiple closed vector graphics are kept. If two vector shapes are on two different color layers, the color of the pattern kept will be the selected (blue marked) layer color.

Intersect

Keep only the part of multiple closed vector graphics that overlap. If two vector shapes are on two different color layers, the color of the pattern kept will be the selected (blue marked) layer color.

Subtract

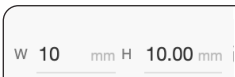
Delete the overlapping parts of the two closed vector graphics. If two vector graphics are on the same layer, the pattern will be subtracted to keep the last drawn part; if two vector shapes are on two different color layers, the pattern will be subtracted to keep the upper layer and the color will be the selected (blue marked) layer color.

Coordinate

Object coordinate on the working interface.
Center point : Oval **Two endpoints :** Line
Top left point of the bounding box : Image, Rectangle, Polygon
Top left point of the highlight range : Text

Rotation Angle

Adjust the angle of the selected objects.



Object Size

Adjust the size of an object, W is its width and H is its height.

Lock

Click to open or close the lock.
Lock opened : press and hold the keyboard Shift to scale the selected objects.
Lock closed : press and hold the keyboard Shift to enlarge or reduce the sizes of selected objects freely.

Horizontal Flip

Flip the selected object(s) according to the horizontal line through its (their) object center.

Vertical Flip

Flip the selected object(s) according to the vertical line through its (their) object center.

OPTIONS:

Gradient

When importing bitmap graphics, images are converted to grayscale and gradients are turned on by default.

If the Gradient is turned off, the Threshold brightness can be used to adjust the binarization threshold.

Threshold brightness

This function defines the RGB color components on a scale from 1 to 255, with 1 being black and 255 being white. If the threshold is set to 125, all colors above 125 will be converted to white and below to black. Move the slider to clear the noise and enhance the contour.

If the Gradient is turned off, the Threshold brightness can be used function to adjust the binarization threshold.

Font Arial Narrow **Font**

Apply any fonts installed in the operating system to a Text.

Style Regular **Style**

Different font-styles are available with different font installed in the operating system, as bold, Italics, etc.

Size 100 px **Size**

Set the Text size.

Letter spacing 100 px **Letter spacing**

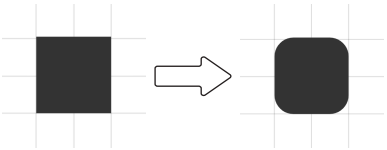
Set the space between letters.

Line spacing 0 em **Line spacing**

Set the space between adjacent lines of type.

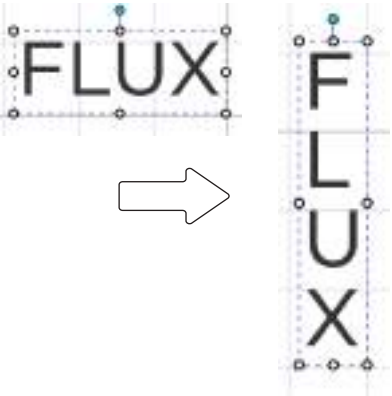
Rounded corner 0 mm **Rounded corner**

Round the corners of a Rectangle.



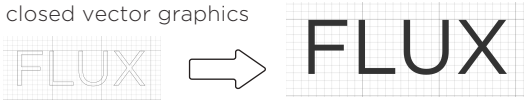
Vertical text **Vertical text**

Create vertical scripts.



Infill  **Infill**

Fill the blank areas of texts or closed vector graphics with color, often used for engraving.



OPTIONS

Tool / Funtction	Image	Text	Rectangle	Oval	Polygon	Line	Pen	Multiple Objects
Gradient	○	✕	✕	✕	✕	✕	✕	✕
Threshold brightness	○	✕	✕	✕	✕	✕	✕	✕
Rounded corner	✕	✕	○	✕	✕	✕	✕	✕
Font	✕	○	✕	✕	✕	✕	✕	✕
Style	✕	○	✕	✕	✕	✕	✕	✕
Size	✕	○	✕	✕	✕	✕	✕	✕
Letter spacing	✕	○	✕	✕	✕	✕	✕	✕
Line spacing	✕	○	✕	✕	✕	✕	✕	✕
Vertical text	✕	○	✕	✕	✕	✕	✕	✕
Infill	✕	○	○	○	○	✕	△	△

△ : **Infill of Multiple Objects :** When the selected objects do not contain an image and there are more than 2 drawn closed vector graphics, you can select multiple objects at the same time and perform the Infill function.

Infill of Pen : When the pen path is a closed vector graphic, the Infill function can be used.

Delete Multiple Objects at the same time : Delete after selecting multiple objects.

ACTIONS :

Replace With...

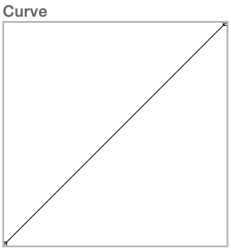
Change an image to a new selected image from the computer file.

Trace

Convert a binary image to a vector path. The more complex the pattern, the longer the conversion time.

Grading

Adjust image brightness and contrast. Tap the middle of a line segment to create an adjustment point.



Crop

Remove unwanted content. Drag any edge of the crop box to adjust its size.

Sharpen

Sharpness : Enhance the edge contrast of an image in an attempt to improve its acutance.
Radius : If Sharpness has a value, you can move the slider to remove noises.

Convert to Path

Convert a Text to paths for editing.

Decompose

Discontinuous paths are "single" paths made up of a Pen, or several closed vector graphics being processed by Union, Subtract, Intersect, or Difference. Decompose is to dissolve a single discontinuous path into multiple paths.

Invert

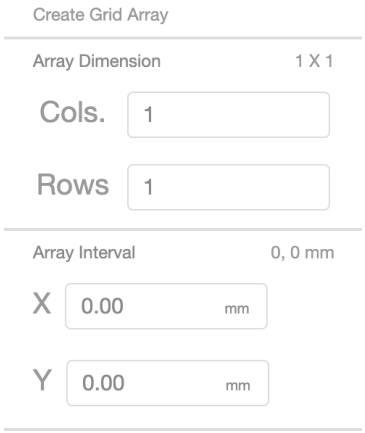
Reverse the color of an image, such as negative effect. When engraving transparent materials (such as acrylic), Invert is usually needed to be turned on.

Bevel

Create a blurred grayscale gradient for edges of bitmap graphics. Bevel is often used to smooth out engraving depth differences.

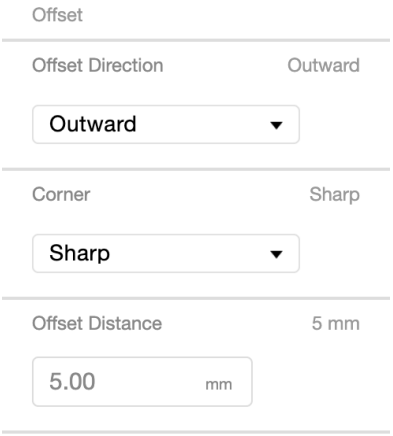
Array

Copy a large number of objects. The number of rows (horizontal direction), the number of columns (vertical direction), and the object spacing (The spacing is the distance between centers of two objects.



Offset

Create concentric objects at a custom distance inward or outward.



ACTIONS

Tool / Funtction	Image	Text	Rectangle	Oval	Polygon	Line	Pen	Multiple Objects
Replace With...	○	✕	✕	✕	✕	✕	✕	✕
Trace	△	✕	✕	✕	✕	✕	✕	✕
Grading	○	✕	✕	✕	✕	✕	✕	✕
Sharpen	○	✕	✕	✕	✕	✕	✕	✕
Crop	○	✕	✕	✕	✕	✕	✕	✕
Bevel	○	✕	✕	✕	✕	✕	✕	✕
Invert	○	✕	✕	✕	✕	✕	✕	✕
Array	○	○	○	○	○	○	○	○
Convert to Path	✕	○	✕	✕	✕	✕	✕	✕
Offset	✕	△	○	○	○	○	○	△
Decompose	✕	✕	✕	✕	✕	✕	○	✕

△ **: Trace of Image :** Only binary images can be converted to vector paths (one at a time). Grayscale images are not allowed to do Trace.
Offset of Multiple Objects : When the selected objects do not contain an image or a Text, and there are more than 2 drawn objects, you can select multiple objects at the same time and perform the Offset function
Offset of Text : When the text has been converted to path, the Offset function can be used.

C：Parameter Settings

Import

Import all engraving parameters stored in a .json file into the parameter list.

Export

Export all parameters as a single .json file.

Custom **Select parameters**

The suggested parameters for common materials can be found in the drop-down list.

Manage

Browse all parameters, and edit or delete customized parameters.
“Z STEP (mm)” : When performing multiple cuts of the same path for a single layer (“EXECUTE” > 1), you can set the descending amount of the laser head for each execution to cut thicker materials. This setting is only available for autofocus add-on.

Add current parameters

Name the current parameter and save it to the parameter list.

Power (%) : the percentage of laser output power.
Speed (mm/s) : the number of millimeters per second the laser head moves.
Execute (times) : the number of times a single layer is executed for the same job.

Since there are various materials, for the first time, you can choose the built-in parameters to observe the engraving results and then fine-tune them to achieve the desired effect.
It is recommended that the power setting be less than 70% to reduce laser tube consumption.
The decline of laser tube caused by usage and time is normal, and the parameters should be adjusted according to the situation.

D：Working Interface

The center of the window is the area for importing images or drawing objects. Note that objects should be placed in the area to proceed the task.

— 100% +	Zoom in or zoom out the working interface

E：Menu

The menu will explain the frequently used functions in each tab.

Beam Studio - About Beam Studio, Preferences ...

Preferences : Modify default settings such as language, machine IP address, and add-on.

File - Open, Save, Save As, Examples, Export To ...

Examples : Use examples, including different files and material engraving tests (different power speed combinations to find out the suitable parameters for new materials).
Export : Export files to several formats, including BVG, SVG, PNG, JPG, FLUX task. Detailed information is explained in this chapter on file formats.

Edit - Optimize, Document Settings, Clear Scene ...

Optimize : Optimize the object arrangement, so that the engraving material can be used more effectively.
Document Settings : Adjust the engraving resolution, working area (select the model), and add-on switch.

View - Show Grids, Use Layer Color ...

Show Grids : Display the grids in the working interface.
Use Layer Color : Show the layer color on objects in that layer.

Machines - Test Network Settings, Calibrate Camera for machines connected to this network, Update Firmware ...

Test Network Settings : Check the quality of the network connection between the computer and the target machine.
Update Firmware : Download the firmware from the official website and save it on the computer, then change the machine firmware to the selected version by selecting the firmware file on the computer. Note: It takes a few minutes to upgrade the firmware, so do not turn off the machine in the middle of the process.

Window

This is the default menu for Mac systems; Windows and Linux Ubuntu do not have this option.

Help - Show Start Tutorials, Bug Report, Debug Tool ...

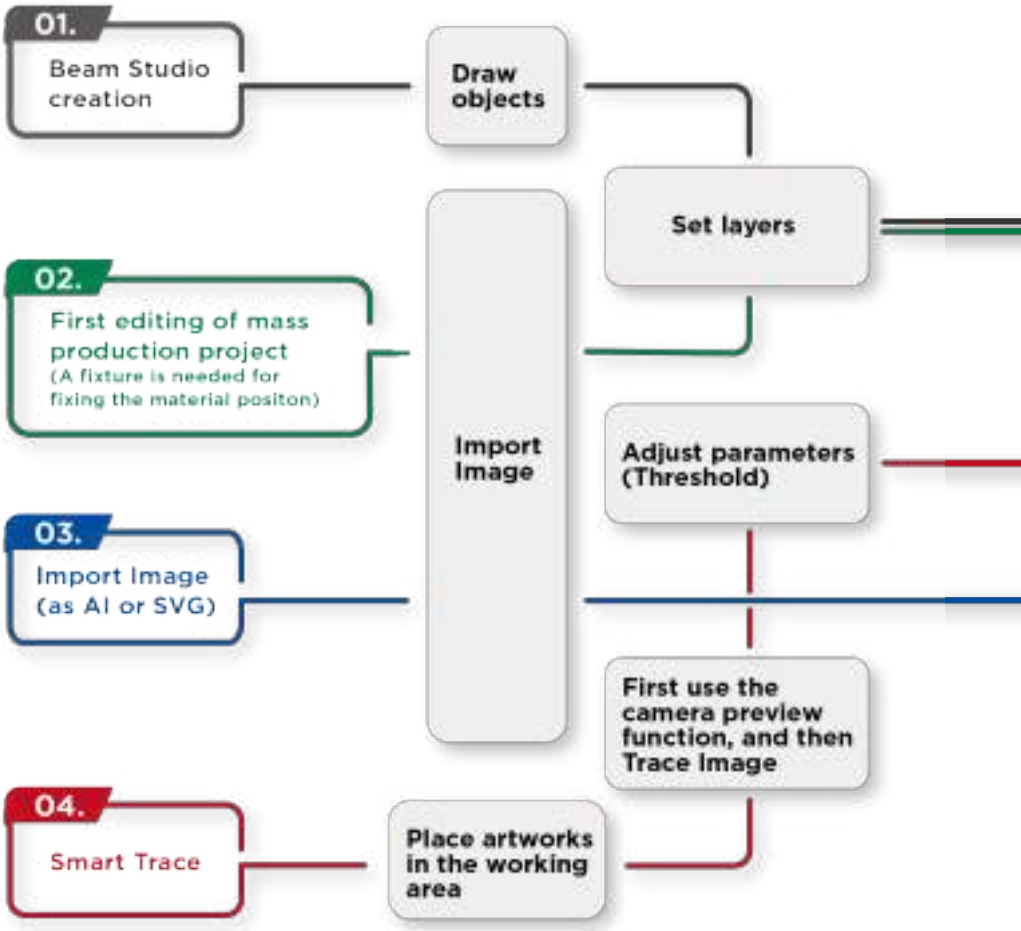
Bug Report : Export a bug report after an error is encountered. Please mind that the software cannot be reorganized or shut down before exporting a bug report. Customer Service guides the export of bug report files to troubleshoot Beam Studio errors.
Debug Tool : An interface for developers to debug software issues.

CH 3-2

Four Creation Techniques

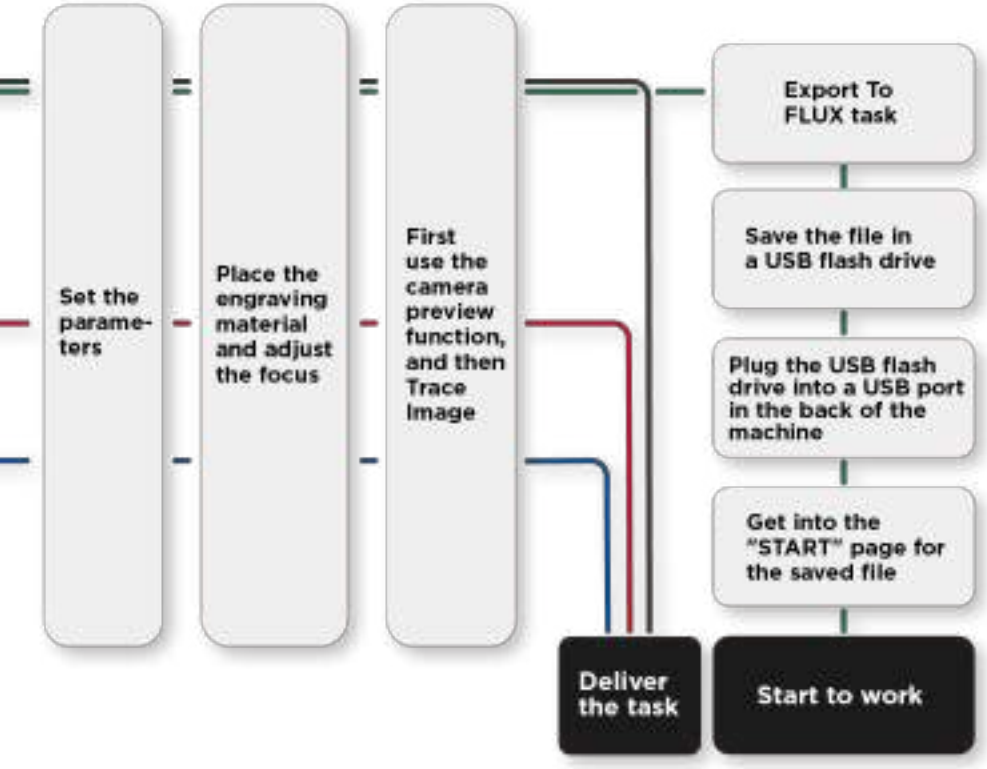
This section contains Beam Studio creation, Import Image, Smart Trace, and mass production operation steps.

Beam Studio is designed for FLUX laser engraving machines, which can effectively interface with other professional design software
(see Appendix II 2-1 Design Software Recommendations) for laser engraving; if there are more complex objects and shapes to be engraved, it is recommended to use the method of Import Image, and after importing the drawings, final layout and parameter settings are made in Beam Studio.



When previewing the Smart Trace image, make sure the least amount of preview is done to avoid the misalignment of the image caused by stitching. If the tracing image is small, you can click the center of the image to place it in one camera preview screen when previewing.

After confirming the position of the fixture and objects in the first editing of mass production project, FLUX task can be exported to the USB flash drive. In the future, you only need to insert the USB flash drive into the machine, focus on the engraving material on the fixture, and then click "START" page to select the file and directly start the engraving job.

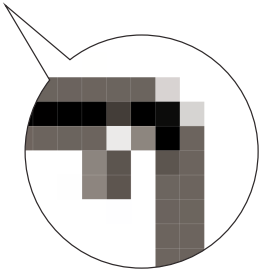


CH 3-3

File Formats

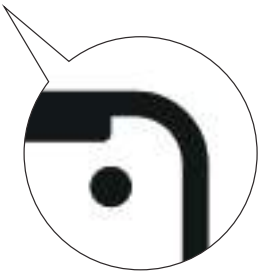
There are two main types of digital image files, bitmap files and vector files.

1 Bitmap Graphics



Bitmap is an image type that consist of numerous square pixels. Bitmap files are rich in details which are mostly suitable for photography or digital applications. However, the quality is related to the resolution so the image can get jagged or blurry when resized.

2 Vector Graphics



Vector images are composed of paths defined by multiple points and are especially suitable for logos and font layout. For each path, curve, or shape has its own formula, and can therefore be resized without affecting the graphic quality.

Suitable for infill engraving	Suitable for outline engraving and cutting
Long working time	Short working time
Complete image quality	Clear contour
JPG / PNG are commonly used bitmap format	AI / PDF / SVG are commonly used vector format

It is essential to use the vector format when cutting. The next page will contain a table explaining the file type of import image and the file type of saving, etc. There is also an overview of the layer layering method and the engraving resolution.

File import and export formats :

Content \ File type of import image		BVG	SVG	PNG	JPG	DXF	AI	PDF
Layering Style	Layer	as the original file settings	○	×	×	×	×	×
	Color		○	×	×	×	○	○
	Single Layer		○	×	×	○	○	○
Scale Setting		×	×	×	×	○	×	×
Vector	Bitmap	○	○	× ○	× ○	○ ×	○	○
Options	Gradient	△	△	○	○	×	△	△
	Threshold brightness	△	△	○	○	×	△	△
Saving Condition		as the editing condition	separate vectors and bitmaps into different layers	Bitmap	Bitmap	N/A	N/A	N/A
Export To		BVG / SVG / PNG / JPG / FLUX task *						
Save As		.beam						

△ : **applicable for the bitmap graphics in the files**

.bvg / FLUX file (.fc) / .beam is a special file format saved by Beam Studio. If a file contains a bitmap, the software will export it to the bitmap preview quality in a .bvg file, while saving it as a .beam file will preserve the original image resolution.

***FLUX work :** .fc file. .fc file is a machine-readable file that saves the software values as object layout, power, etc. This file format cannot be reimported into Beam Studio for editing and is often used for mass production work using fixture positioning.

Things kept after import	File type of reimport file					
	BVG	SVG	PNG	JPG	FLUX task*	.beam
Bitmaps of original resolutions	✗	✗	✗	✗	✗	○
Object	○	○	✗	✗	✗	○
Object size	○	○	○	○	✗	○
Layer Settings	○	✗	✗	✗	✗	○
Parameter Settings (Power, Speed)	○	✗	✗	✗	✗	○

Layering : You can set the layering style by “Layer”, “Color”, or “Single Layer” when importing SVG files in Beam Studio.

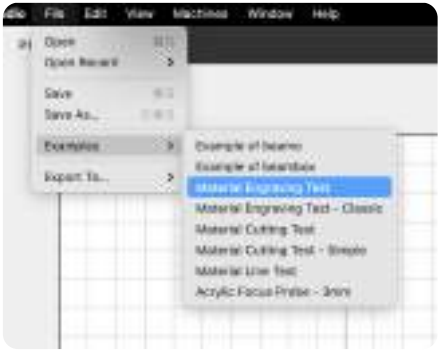
1. **Layer :** If you have set up layers in external software, you can choose this layering method.
2. **Color :** If there are objects of different colors in the file, you can choose this layering method, and the software will create layers according to different colors.
3. **Single Layer :** If there is no need to set different power and speed, you can choose Single Layer, and the software will merge all layers into a single layer.

Engraving Resolution : In Beam Studio, you can set the engraving resolution, i.e., engraving fineness, from low to high, at 100, 250, 500 and 1000 DPI by menu > Edit > Document Settings. High resolution engraving result can show more details but take longer time, on the contrary, low resolution engraving result is simpler but takes less time to complete. It is recommended to choose the suitable engraving resolution according to the creation needs and time consideration.

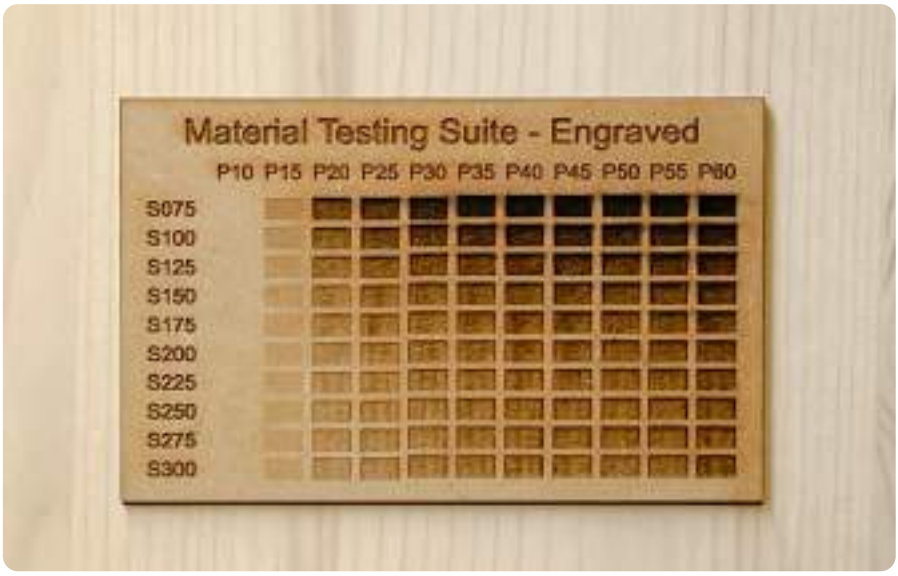
CH 4
Material Tips

CH 4-1

New Materials Testing



When new materials are used, different combinations of speed (S: Speed) and power (P : Power) can be used to find the appropriate parameters for the material. Sample files can be imported through "Menu > File > Samples > Material Engraving Test", in addition to engraving combinations, cutting test files are also available.



Thin material (thickness less than 0.5 mm) whether engraving or cutting, it is recommended to start the test from high speed and low power (e.g., P:20, S:300), and it is not recommended to use the sample file for trial to avoid excessive burning resulting in oversized engraving or cutting openings.

CH 4-2

Material Introduction

In this chapter, we will introduce the characteristics, advantages and disadvantages, and possible solutions for each of the 8 types of materials and conclude with a comparison of the characteristics of the same thickness materials.

Read and observe the following instructions and caution carefully.

1. Wood - Fiberboard, also known as dense board, MDF :

Overall : glued and pressed wood fiber

Material	Suitability	Photo
New Zealand dense board	○	

Advantages	Disadvantages
1. Good material stability and easy to cut 2. Low surface embossing impurities	Lower density than Asian dense board

Caution

It is recommended to buy low formaldehyde fiberboard to avoid inhaling ingredients that are harmful to health

Material	Suitability	Photo
Asia dense board	△	

Advantages	Disadvantages
Low price	1. Engraving only, not easy to cut 2. Black dust produced by engraving is relatively high

Caution

It is recommended to buy low formaldehyde fiberboard to avoid inhaling ingredients that are harmful to health

1. Wood - Plywood :

Overall: Surface: solid wood / Interior: glued and pressed wood fiber.

Material	Suitability	Photo
Teak plywood	○	

Advantages	Disadvantages
Beautiful synthetic material	Higher power required for cutting

Caution

It is recommended to buy low formaldehyde fiberboard to avoid inhaling ingredients that are harmful to health

Material	Suitability	Photo
Yound wood plywood	○	

Advantages	Disadvantages
1. Mild wood, fine grain, easy to work 2. Light white, straight grain 3. Light material, suitable for making crafts with low density, as well as children's toys 4. Easily engraved with a slight blur, even color after engraving, the edges are not easily scorched and broken	Engraving results are slightly blurry due to lower material density

Caution

It is recommended to buy low formaldehyde fiberboard to avoid inhaling ingredients that are harmful to health

Material	Suitability	Photo
White Russian basswood plywood	○	

Advantages	Disadvantages
1. Mild wood, fine grain, easy to process, strong toughness, not easy to crack and deformation 2. Creamy white, with fine grain and low blur density, straight grain carving is easier to show a slight blur after sanding, staining, and polishing, can obtain a smooth surface	Engraving results are slightly blurry due to lower material density

Caution

It is recommended to buy low formaldehyde fiberboard to avoid inhaling ingredients that are harmful to health

Material	Suitability	Photo
Plain plywood	○	

Advantages	Disadvantages
1. More complex material, hard texture, less likely to break when cutting 2. Used in various building materials or crafts	Texture quality is poor, slightly rough

Caution

It is recommended to buy low formaldehyde fiberboard to avoid inhaling ingredients that are harmful to health

Material	Suitability	Photo
Walnut plywood	○	

Advantages	Disadvantages
1. Mild wood, fine grain, easy to process, strong toughness, not easy to crack and deform 2. Coffee color, with fine grain and straight grain of different shades. 3. Smooth surface by sanding, staining and polishing	Engraving effect is not obvious due to the dim color

Caution
It is recommended to buy low formaldehyde fiberboard to avoid inhaling ingredients that are harmful to health

1. Wood - Solid Wood :

Natural, healthy, non-toxic, eco-friendly.

Material	Suitability	Photo
Solid wood	○	

Advantages	Disadvantages
Diverse and natural texture performance	Growth rings are easily shown while engraving

Caution
Growth rings are a normal representation of uneven wood density

⚠ **Common Wood Problems :**

Problem	Solution	Possible Drawback
Color Shades	1. Deepen the color : lower the Speed 2. Deepen the cutting depth : increase the Power	1. Burn marks grow 2. Fineness decreases and distorted proportion occurs
Engraving Burn Marks	Before processing 1. Cover the surface of the engraving material by paper tape 2. Slightly wet the wood After processing 1. Remove the burn marks with sandpaper	Before processing 1. Tape residue stays 2. Bumps are created on the surface After processing 1. Scratch marks appear
Cutting Burn Marks	1. Use wood with lower density 2. Clean with a small amount of alcohol	1. Wood is easily deformed by moisture 2. Excessive alcohol causes tar to penetrate into the wood

2. Leather - Synthetic Leather :

Base layer: mostly woven fabric; adhesive layer; resin layer: PU and PVC, etc

Material	Suitability	Photo
Polyurethane (PU)	△	

Advantages	Disadvantages
1. Base cloth: PU looks much thicker than PVC from the edges 2. Texture: PU feels softer than PVC	–

Caution
Incomplete burning will produce toxicity

Material	Suitability	Photo
Polyvinyl chloride (PVC)	✕	

Advantages	Disadvantages
–	The gas produced by engraving is corrosive and will cause the screws in the machine to rust

Caution
Hazardous materials

2. Leather - Genuine Leather :

Mild, soft, elastic

Material	Suitability	Photo
Vegetable tanned leather	○	

Advantages	Disadvantages
Original color, easy to absorb oil and moisture, firm	–

Caution
–

Material	Suitability	Photo
Chrome tanned leather	✗	

Advantages	Disadvantages
Flexible, water and stain resistant, not easy to fade	–

Caution

Toxic gas will be generated when burning, not suitable for laser processing

⚠ **Common Leather Problems :**

Problem	Solution	Possible Drawback
Scorched and curled	Before processing Wet the whole piece of leather	Leather wrinkles after drying
Heavy smell of laser processing	Use with an air filter	Air filter foam sheet is consumable

3. Acrylic - Acrylic, also known as PMMA, plexiglass, poly (methyl methacrylate):

Strong, tough, durable

Material	Suitability	Photo
Acrylic	○	

Advantages	Disadvantages
There will be no burn marks after laser processing	Easy to produce dust during processing

Caution
Make sure that the material is not plastic (PVC, PC)

⚠ **Common Acrylic Problems :**

Problem	Solution	Possible Drawback
Scratches	After processing Use special plastic abrasive to remove scratches	Only remove shallow scratches
Cloudy acrylic	1. Keep the acrylic protective film when not engraving gradient images 2. Clean with a small amount of alcohol	Some acrylics with too much alcohol will cause surface defects, such as cracks. But gently heating acrylic may help repairing the minor cracks.
Bursting sound when cutting	Some acrylics contain more impurities, we suggest to use better quality acrylics.	Big price difference between first grade acrylic and second grade acrylic

4. Paper - White Paper:

Widely available

Material	Suitability	Photo
White paper	○	

Advantages	Disadvantages
Widely available	Warps will form when burning papers at high temperatures, so make sure the paper is fixed

Caution
–

4. Paper - Corrugated Cardboard :

Cheap, strong structure, suitable for three-dimensional art pieces

Material	Suitability	Photo
Corrugated cardboard	○	

Advantages	Disadvantages
Easy to obtain, and does not require high power to process, suitable for structural works	Uneven surface, need to pay attention to the focus position

Caution
–

⚠ **Common Paper Problems :**

Problem	Solution	Possible Drawback
Yellowish carbonized burn edges	Before processing Paper material will affect the amount and color of the ashes, it is recommended to use paper with PP material. After processing Use low-viscosity material, such as universal clay, to remove the toner.	–
Burning of the downward layer	Before processing Slightly wet the corrugated cardboard	Paperboard is more likely to be deformed (uneven)

5. Glass :

Material	Suitability	Photo
Glass	○	

Advantages	Disadvantages
Easy to obtain, such as beverage bottles and cans	Easy to produce glass chips during processing, and different engraving results depending on the glass material

Caution
–

⚠ Common Glass Problems :

Problem	Solution	Possible Drawback
Cracked	1. Choose thick glass 2. Reduce Power	Some glass material itself will be cracked by laser processing, which is a material characteristic and cannot be avoided

6. Metal - Anodized Aluminum Alloy Surface :

Wear-resistant and textured

Material	Suitability	Photo
Anodized aluminum alloy	○	

Advantages	Disadvantages
Engraving effect is obvious with low power and no color loss	Blurred pattern or even brown color may be produced while using too much power

Caution
The metal material can reach high temperatures after the laser process. However, it can be quickly cooled down within a minute

6. Metal - Special Spray Oxidized Stainless Steel :

Material	Suitability	Photo
Stainless steel after oxidation	○	

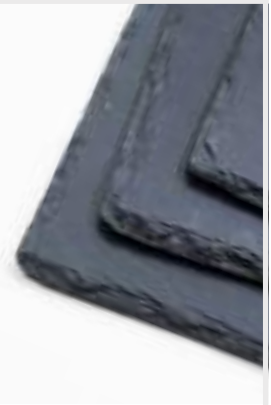
Advantages	Disadvantages
Easy to engrave stainless steel by spraying the special spray evenly before processing	The engraving result is not too fine and is only suitable for artistic creation and entry experience

Caution

1. Oxidize the stainless steel with Steel Engraving Spray before engraving
2. It is recommended to wear gloves when using the spray to avoid staining the skin
3. The metal material can reach high temperatures after the laser process. However, it can be quickly cooled down within a minute

7. Other Engravable Materials - Stone :

There are differences between artificial materials and natural materials, and the textures are diversified.

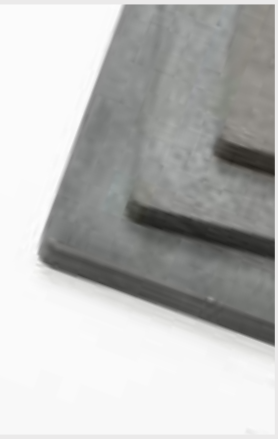
Material	Suitability	Photo
Stone	○	

Advantages	Disadvantages
Depending on the stone, materials that more suitable for surface engraving are shales and marbles	Engraving effect is usually not obvious when using stones with lighter colors

Caution

–

7. Other Engravable Materials - Cement :

Material	Suitability	Photo
Cement	○	

Advantages	Disadvantages
Textures can be easily created on the cement surface	Particle size of cements will affect the overall engraving result

Caution
–

7. Other Engravable Materials - EVA Foam :

Lightweight and low density, commonly used in molds and cushioning materials

Material	Suitability	Photo
EVA foam	○	

Advantages	Disadvantages
Can cut with extremely low power and not easy to produce burn marks	Need to keep good ventilation because pungent odor will be produced while engraving and the material is more flammable

Caution
–

7. Other Engravable Materials - Cotton and Linen Fabric :

Material	Suitability	Photo
Cotton and linen fabric	○	

Advantages	Disadvantages
Can engrave with low power	Need to keep good ventilation because pungent odor will be produced while engraving and the material is more flammable

Caution
–

7. Other Engravable Materials - Silicone :

Material	Suitability	Photo
Silicone	△	

Advantages	Disadvantages
Eco-friendly, non-toxic	Instantly be hardened when heated, so it is not suitable for cutting, if you need to cut, it is recommended to use scissors or blades

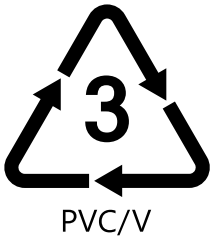
Caution
Necessary to increase the cleaning frequency of the reflective mirrors to avoid them from sticking to the dusts and affecting the laser output

⚠ **Other Engravable Materials - Common Silicone Problems :**

Problem	Solution	Possible Drawback
Engraving is not visible	Increase Power and repeat engraving	Possible to get crude results
Difficult to cut off	Cut with other tools : scissors, utility knife	Shapes are not identical
Silicone is dusty after engraving	Clean with a toothbrush	Consumption of toothbrush

8. Hazardous Materials - Polyvinyl Chloride (PVC) :

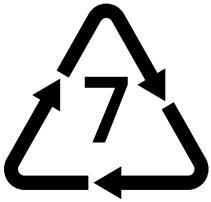
Usually appears as stickers, thin films, or transparent slabs, for example, cutting sheets

Material	Suitability	Photo
Polyvinyl chloride (PVC)	✗	

Advantages	Disadvantages
–	Prone to have jagged melting marks on the edges

Caution
Highly carcinogenic substances and health hazardous and corrosive gas may be generated when burned

8. Hazardous Materials - Acrylonitrile Butadiene Styrene (ABS) :

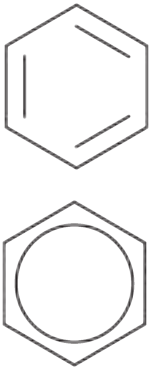
Material	Suitability	Photo
Acrylonitrile butadiene styrene (ABS)	✕	

Advantages	Disadvantages
–	–

Caution

Carcinogenic substances may be generated when incompletely burned

8. Hazardous Materials - Plastics with Chlorine, Benzene, Ammonia, Fluorine, Phenol, Aldehyde in its Scientific Name or with a Hexagonal Benzene Ring in its Molecular Formula :

Material	Suitability	Photo
Plastics with chlorine, benzene, ammonia, fluorine, phenol, aldehyde in its scientific name or with a hexagonal benzene ring in its molecular formula	✕	 Hexagonal Benzene Ring

Advantages	Disadvantages
–	–

Caution

Carcinogenic and toxic substances are highly possible to be generated when burned

Take resin identification codes for example, the following numbers are not suitable for engraving process :

⚠ Common Problems :

Problem	Solution	Possible Drawback
Reflections from the material itself, e.g. glossy metals	Avoid using, except for spray oxidized stainless steel	–
Reflections caused by the laser penetrating the material and hitting the honeycomb table	Pad the material and Distance the material from the honeycomb table to avoid burn marks on the material from laser reflections	–

Material comparison :

Comparison of materials of the same thickness	Wood	Leather	Acrylic	Paper	Glass	Metal
Processing difficulty	Easy	Medium	Easy	Easy	Difficult	Difficult
Strength of smell	Medium	Strong	Strong	Faint	No	*Faint
Dustiness	Medium	Medium	Much	Much	Less	Less
Amount of tar	Much	Medium	Less	Less	No	No
Gradation effect	○	△	○	○	×	×

* : metallic dusty smell

The above comparisons are based on common materials, and the actual engraving effect is subject to your own test results.

CH 5
Maintenance

CH 5-1

Maintenance

To facilitate maintenance and repair instructions, this section divides the machine into three general areas: the panel, the working area, and the back cover.

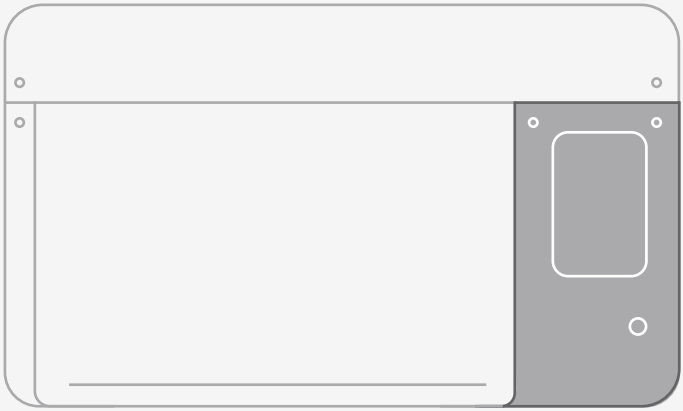
Maintenance of the machine according to the maintenance frequency can effectively reduce the chance of failure.
【Appendix 3】 Maintenance Checklist (p.252) provides maintenance record sheet for users to use.

Area	Maintenance Content	Maintenance Frequency
Panel	**MAINTAIN page ***	Once every 1 month
	Screen cleaning	Once every 2 weeks
Working Area	**Lubricatingt* :**	
	- Wood, Plywood	Once every 2 weeks
	- Acrylic	Once every 1 week
	- Leather	Once every 2 weeks
	- Paper	Once an operation day
	Honeycomb table cleaning	Once every 2 weeks
	Chassis cleaning	Once every 2 weeks
	Mirrors and lens cleaning*	Once every 1~2 weeks
	Optical path inspection*	When first unboxing, after laser tube replacement Once every 1 month
	Optical path alignment	Adjust when the optical path misaligned
	Door cover cleaning	Once every 2 weeks
Back Cover	**Laser tube replacement**	Depends on power, usage hours, room temperature, water temperature, etc.
	Water changing and adding*	Once every 3 months
	Ventilation fan cleaning	Once every 1 month

*** : Necessary maintenance**

CH 5-2
Panel

The panel contains the machine interface and the components underneath.

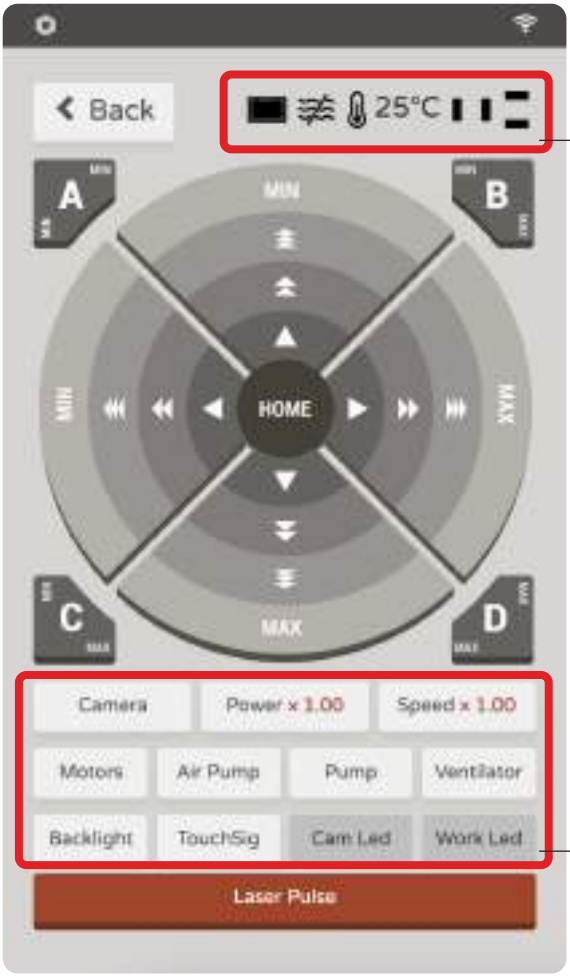


MAINTAIN Page : Function Test

It is recommended to check once every 1 month.

Preparation Items : None

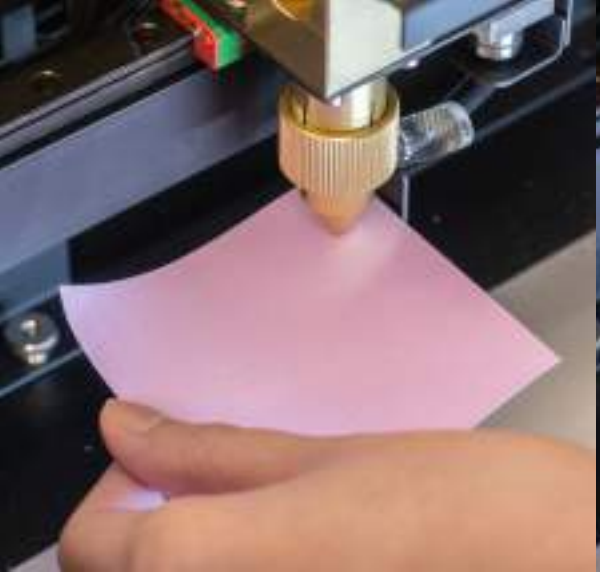
Maintenance Steps : After homing successfully, check the status display and switches except for the “Laser Pulse”, and the standards are as follows

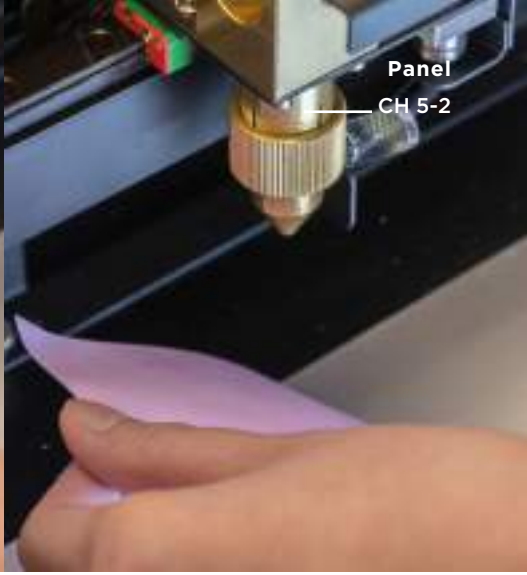


Status display

Switches

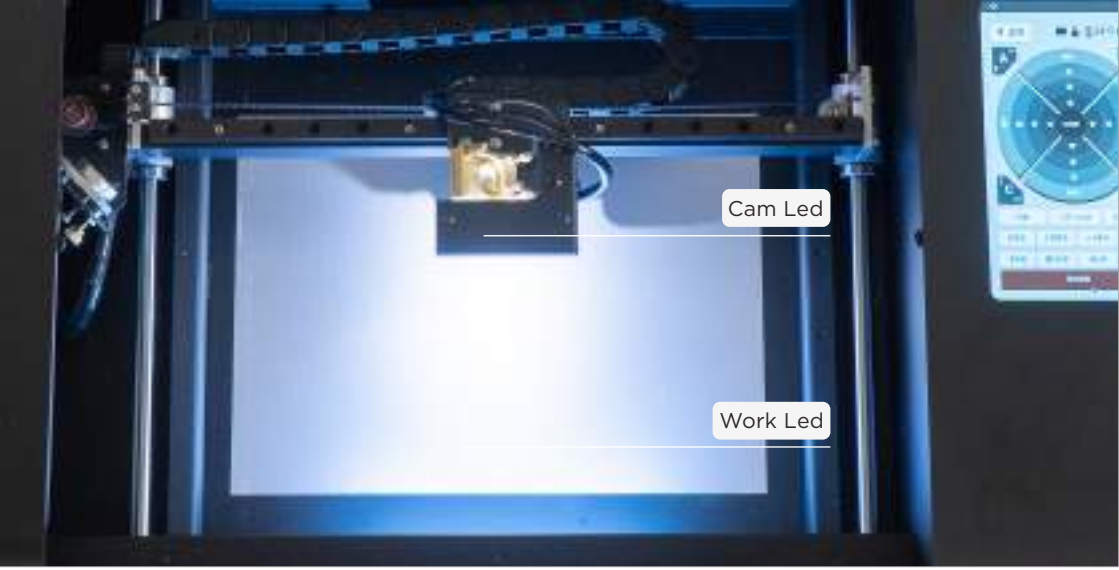
Status display	Test method	Icon
Door cover	Open and close the door cover	Opened  Closed 
Water pump	Press the “Pump” switch (start pump)	On  Off 
Water temperature	Verify that the water temperature is displayed properly During working, the water temperature should show 5℃-30℃.	
X-axis limit switch	After pressing “Motors” to release the motors, move the laser head to the leftmost side of the machine until hearing a clicking sound. (Trigger switch)	Triggered  Not triggered 
Y-axis limit switch	After pressing “Motors” to release the motors, move the laser head to the backmost side of the machine until hearing a clicking sound. (Trigger switch)	Triggered  Not triggered 





Switches :

- **Camera :** Check whether the camera view appears on the screen and move the laser head to observe whether the screen keeps changing with the camera movement. (Camera view is updated every 3 seconds)
- **Motors :** Check whether the laser head can move normally along the X-axis linear rail and Y-axis guiding rods.
- **Air Pump :** Check whether there is air coming out of the laser outlet with a piece of paper, as shown above.
- **Pump :** Open the back cover to check whether the blue light of the water pump is on (as shown below) and whether the water pump icon on the screen is .



- **Ventilator :** After clicking, there will be a sound of acceleration and rotation, like the sound of aircraft taking off.
- **Backlight :** The screen will turn black and then light up after clicking.
- **TouchSig :** The screen will be untouchable for 3 seconds after clicking.
- **Cam Led :** The light next to the camera, check if it can be normally illuminated, as shown below.
- **Work Led :** At the front side of the chassis, check if the light can be normally illuminated, as shown below.

If there is any abnormality, please go to 【Troubleshooting】(p.184) to find the solution.

	Screen Cleaning	It is recommended to check once every 2 weeks.

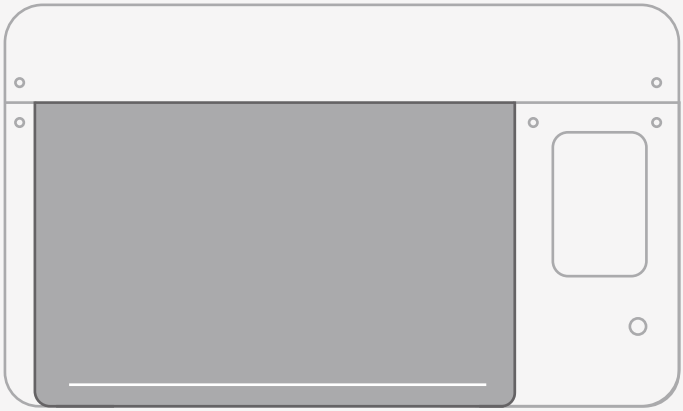
Maintenance Steps : If the screen is dirty, spray a small amount of alcohol on a cleaning cloth and wipe the screen lightly.

Preparation Items : Self-preparation : 1 | 75%~99% alcohol, 2 | Cleaning cloth

CH 5-3

Working Area

The working area includes the working range and the laser optical path.



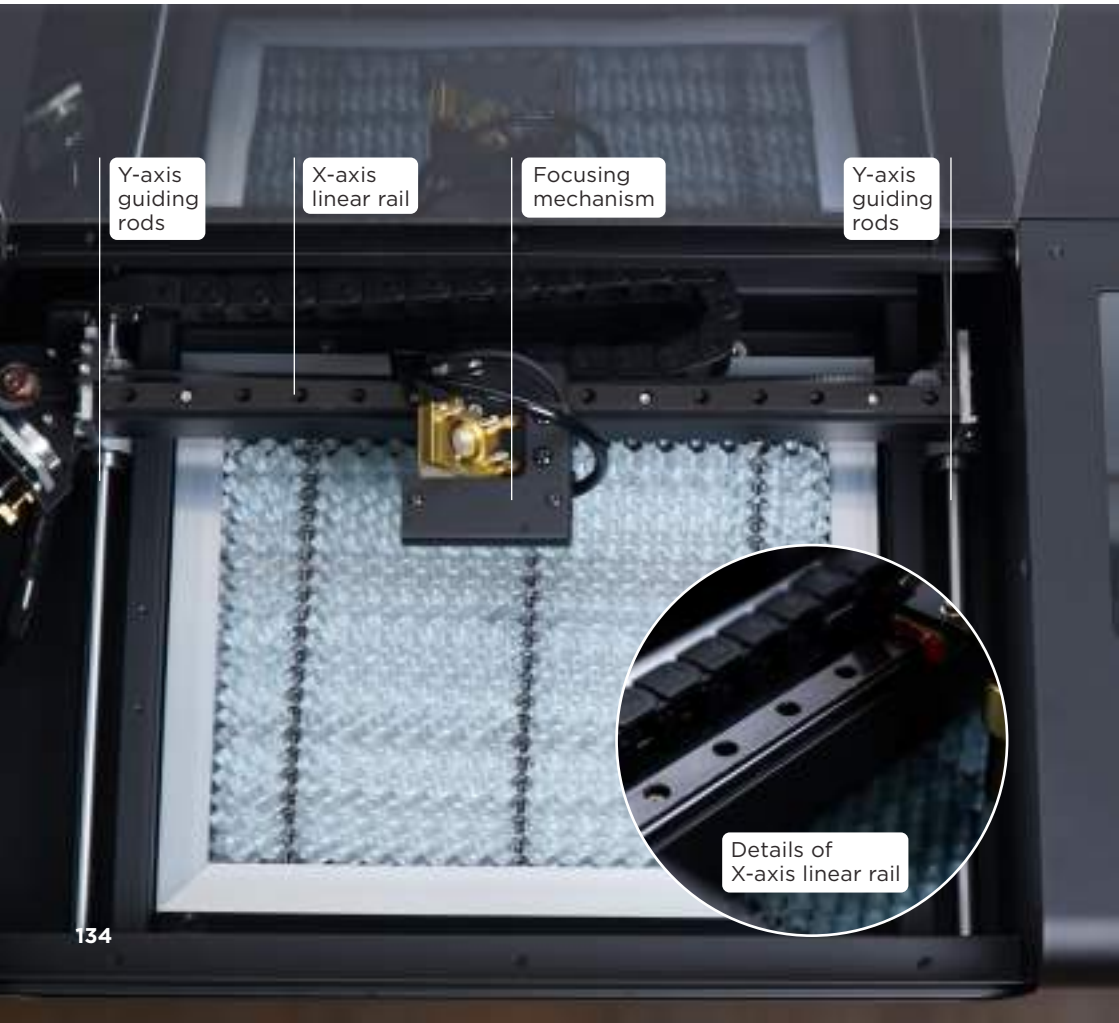
Lubricating

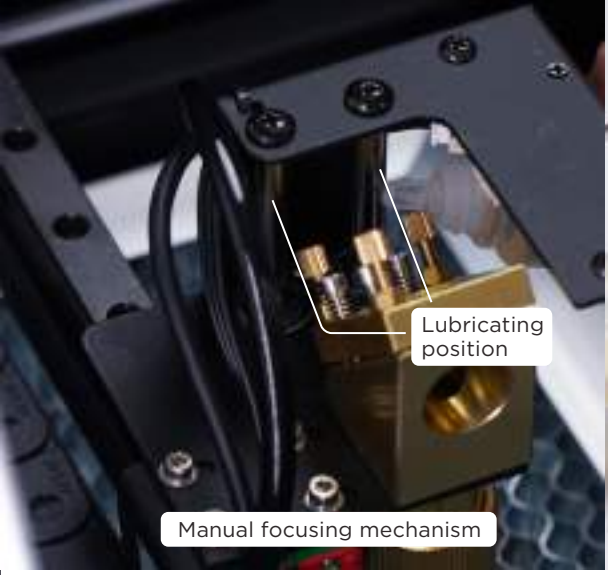
It is recommended to clean and re-lubricate once every 1 - 2 weeks.

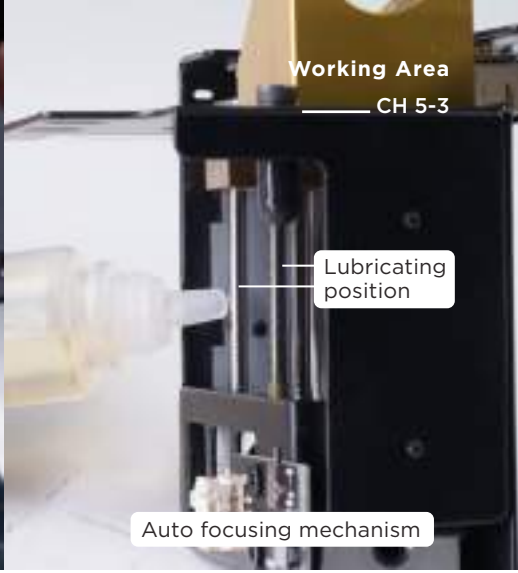
Maintenance Steps : Clean the Y-axis guiding rods, X-axis linear rail and focusing mechanism regularly to extend the service life of the parts.

Preparation Items : Self-Preparation : 1 | Paper towel or tissue paper, 2 | Cotton swab or brush
Included in the accessory box : 3 | Lubricating oil

1. Cleaning : Use paper towel or tissue paper to wipe the oil and dust on the Y-axis guiding rods, X-axis linear rail and focusing mechanism.





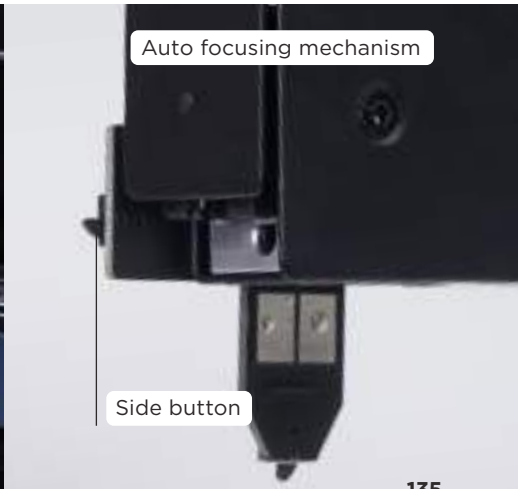


2. Oiling : Dip cotton swab or brush in the lubricating oil >

- **Y-axis guiding rods and X-axis linear rail :** Use at the Y-axis guiding rods on both sides of the working range > Apply evenly above and on both sides of the X-axis linear rail > Manually move the laser head left and right and forwards and backwards 3 - 5 times to distribute the lubricating oil evenly.
- **Focusing mechanism :** Apply at the top of the focusing mechanism.

  Manual focusing: Turn the nozzle fastening ring clockwise > Move the CO_2 laser module bracket up and down 3 - 5 times and tighten the nozzle fastening ring counterclockwise.

  Autofocus: Press and hold the side button to raise and lower the mechanism 3 - 5 times.



Honeycomb Table Cleaning

It is recommended to clean it once every 2 weeks.

Preparation Items : Self-preparation : 1 | Vacuum cleaner or brush, 2 | Paper towel or tissue paper, 3 | Air conditioner coil foaming cleaner

- **The mesh part of the honeycomb table is relatively sharp, so please be careful when holding.**
- **If the machine adopts the autofocus version, please press and hold the side button (as bottom right picture) to retract the laser head and then take out the honeycomb table to avoid hitting the probe.**
- **If the laser head cannot be moved, please click "MAINTAIN" on the screen > "Motors" to release the motors.**

Maintenance Steps:

1. **Take the honeycomb table out :** Move the laser head to the upper left of the working range > Reach the front of the machine, lift the honeycomb table up and pull it out. As shown in the picture above.
2. **Clean the honeycomb table :** Use a vacuum cleaner or brush to clean the large residue and dust > Spray the honeycomb table with the air conditioner coil foaming cleaner > Wait for the tar oil to soften, then wipe it with paper towel or tissue paper to remove the tar.
3. **Put the honeycomb table back :** Place the honeycomb table at a 45-degree angle into the chassis and lay it flat.

Chassis Cleaning

It is recommended to clean it once every 2 weeks.

Preparation Items : Self-preparation : 1 | Vacuum cleaner or brush, 2 | 75%-99% alcohol, 3 | Paper towel or tissue paper.

- **The mesh part of the honeycomb table is relatively sharp, so please be careful when holding.**
- **If the machine adopts the autofocus version, please press and hold the side button (as bottom right picture) to retract the laser head and then take out the honeycomb table to avoid hitting the probe.**
- **If the laser head cannot be moved, please click "MAINTAIN" on the screen > "Motors" to release the motors.**

Maintenance Steps:

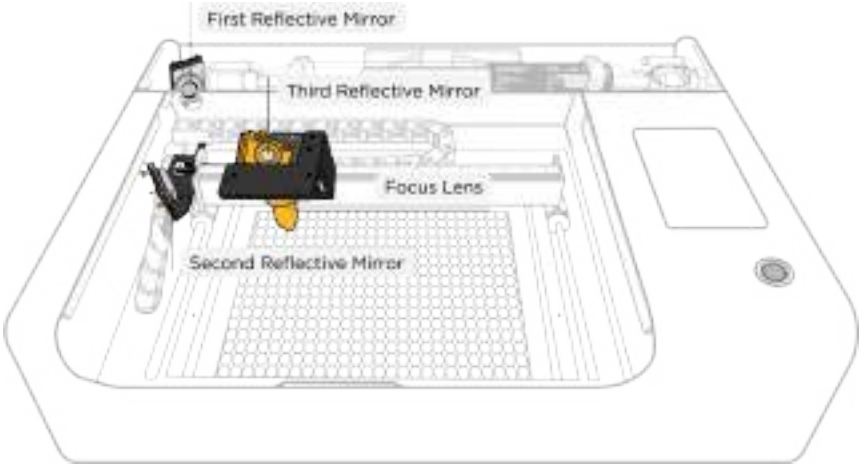
1. **Take the honeycomb table out :** Move the laser head to the upper left of the work ing range > Reach the front of the machine, lift the honeycomb table up and pull it out. As shown in the picture above.
2. **Clean the chassis :** Use a vacuum cleaner or brush to clean the large residue and dust, or directly loosen the 4 screws of the bottom cover to remove the bottom cover for cleaning > Spray the bottom of the chassis with alcohol evenly > Wipe it with paper towel or tissue paper after a minute to remove the tar.
3. **Put the honeycomb table back :** Place the honeycomb table at a 45-degree angle into the chassis and lay it flat.

Mirrors and Lens Cleaning

Depending on the frequency of usage and material,it is recommended to clean the mirrors and lens once every 1 - 2 weeks.

Maintenance Steps : If the engraving material is paper or wood, it is more likely to cause dust and tar oil to stick on the reflective mirrors. You can use cotton swabs with a small amount of alcohol to clean and wipe until the mirror surface is free of stains.

Preparation Items : 1 | Cotton swab, 2 | 75%-99% alcohol

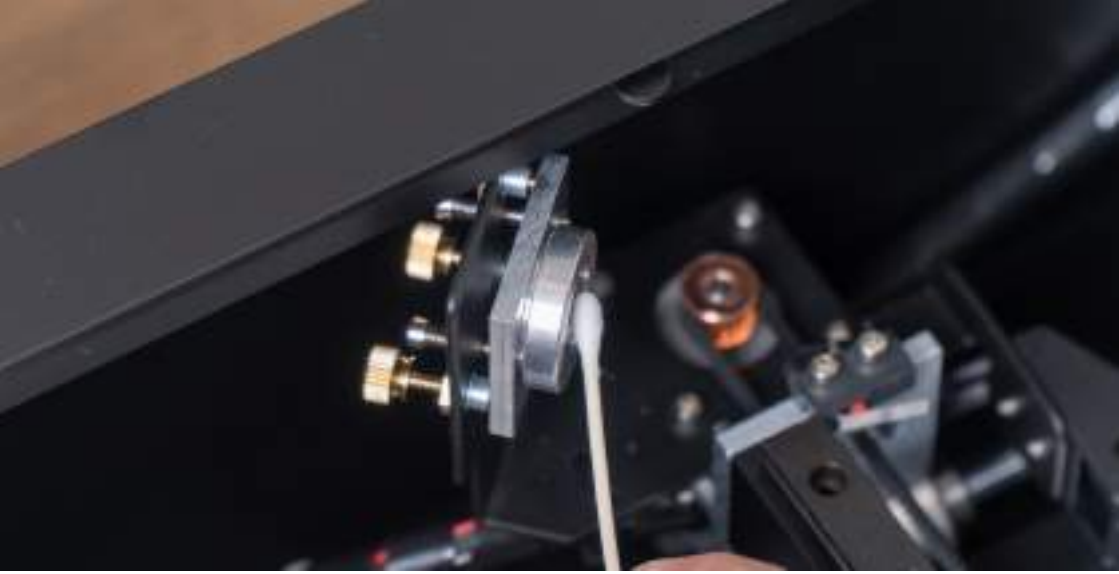


There are 3 reflective mirrors and 1 focus lens that need to be cleaned in beamo, and their positions are shown in the picture.

After cleaning, the mirrors and lens should not be left with water marks to avoid oxidation which may have an effect on the laser power, and should not be wiped excessively as well.

Maintenance Steps:

1. **Clean the first reflective mirror :** The first reflective mirror is located at the left side of the laser tube facing the chassis. You can open the back cover or wipe it from the front hole. As shown below.



2. **Clean the second reflective mirror :** The second reflective mirror is located on the left Y-axis guiding rod facing the chassis.

3. **Clean the third reflective mirror :** The third reflective mirror is in the golden triangular mirror holder which is on the X-axis linear rail.

4. **Clean the focus lens :** The focus lens is located under the third reflective mirror, inside the laser head.
   a. Remove the honeycomb table >

   b. Unscrew the nozzle fastening ring clockwise >

c. Remove the laser head, and turn the silver mounting cap counterclockwise (use a pair of needle nose pliers if needed) >

d. Take out the focus lens and then clean it.

5. **Put the focus lens back :** The lens has an orientation, the convex side faces up, the flat side faces down.
   (Hold the edge of the focus lens on your hand and look towards the focus lens, you can see yourself on the convex side and cannot see yourself on the flat side.)

If not installed according to the direction of the instruction, it may cause inaccurate focus, resulting in blurred engraving or inability to cut.

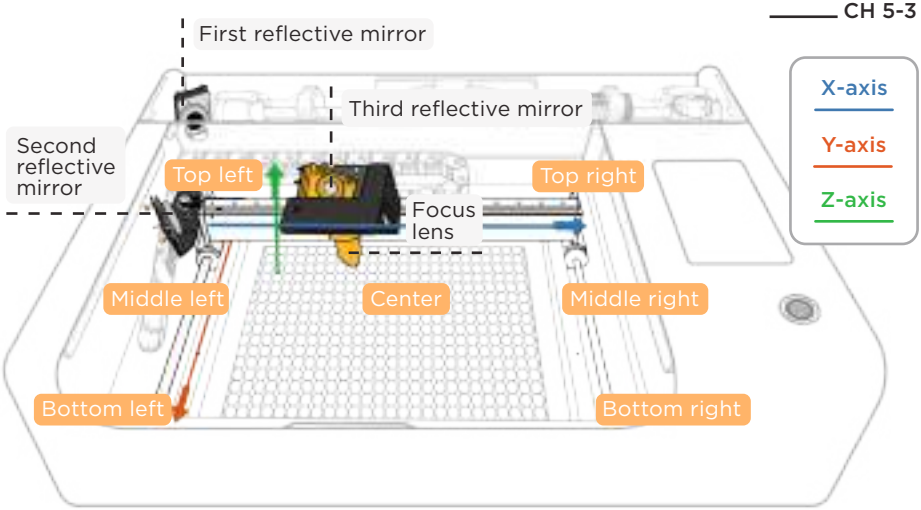
Optical Path Inspection

When first unboxing, after laser tube replacement, once every 1 month.

Notes : The optical path will be changed due to transportation and vibration of the working, so regular inspection is necessary to ensure the correct laser optical path, so that the machine can engrave evenly and cut normally.
Necessary inspection conditions : 1. The first time unboxing after long distance transportation. 2. After replacement of the laser tube. 3. For regular maintenance, it is recommended to check once a month.

Do not put your finger near the first reflective mirror and the aperture (circle outlet) to avoid skin exposure of laser hazard.

Preparation Items : Included in the accessory box : 1 | Double-sided tape



Inspection Steps :

1. **Get the laser spots in the two corners :** Hit the "MAINTAIN" of the machine > Select "Motors" > Move the laser head to the top left position > Put the double-sided tape on the laser head outlet > Close the door cover > Make sure the laser "Power" is the default x 1.00 > Click "Laser Pulse" > Open the door cover > Make sure the laser spot is a full circle > Move the laser head to the bottom right > Put the double-sided tape on the laser head outlet > Close the door cover > Click "Laser Pulse" > Open the door cover > Make sure the laser spot is a full circle. Get a total of 2 laser spots on the top left and bottom right.

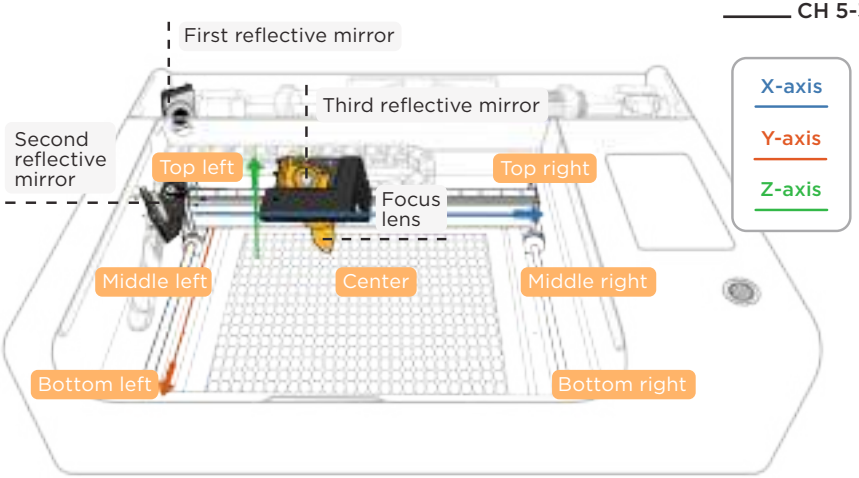
Unable to get a full circle at both corners, you need to go through the 【Maintenance】 Optical Path Alignment (p.148).

Optical Path Alignment

Once every 1 month

If the optical path is misaligned, the optical path should be realigned.
Signs of misaligned optical path : 1. engraved patterns will be deeper to lighter in a certain direction; 2. the cut section is not vertical after cutting.

Preparation Items : Included in the accessory box: 1 | 2.5mm hexagonal wrench, 2 | Torx screwdriver, 3 | Double head wrench, 4 | Double-sided tape



Alignment Instructions :

1. The Y-axis direction is related to the first reflective mirror. After the first reflective mirror is correctly adjusted, the laser spot got at bottom left position should coincide with that got at top left position. When adjusting the first reflective mirror, put the double-sided tape on the second reflective mirror.
2. The X-axis direction is related to the second reflective mirror. After the second reflective mirror is adjusted, laser spot got at middle right position should coincide with that got at middle left position. When adjusting the second reflective mirror, put the double-sided tape on the third reflective mirror.
3. The Z-axis direction is related to the third reflective mirror. After the third re flective mirror is adjusted, the laser spot should be in the center of the laser outlet. When adjusting the third reflective mirror, put the double-sided tape on the laser outlet.

1. Do not open the door cover and the back cover when laser pulsing is in progress, otherwise the laser will not emit light due to the protection mechanism.
2. When aligning the optical path, the “Power” can be set to x0.50 in the “MAINTAIN” page to avoid the laser spot being too large to judge the laser spot offset direction precisely. When the alignment is completed, the “Power” needs to be restored to the original power setting of x1.00 to avoid insufficient power during use.
3. If there is an abnormal cracking sound when starting the laser pulse, please dis connect the power and stop using it immediately. 【Troubleshooting】 No Laser Beam Output. (p.204)
4. Please use the Torx screwdriver to remove the 6 screws on the back cover and then remove the back cover.
5. Since there are threadlockers on the nuts of the first and second reflective mirrors fixing mirror adjustment screws, dropping a small amount of alcohol on those nuts is suggested to soften the threadlockers before turning the nuts.

Alignment Steps:

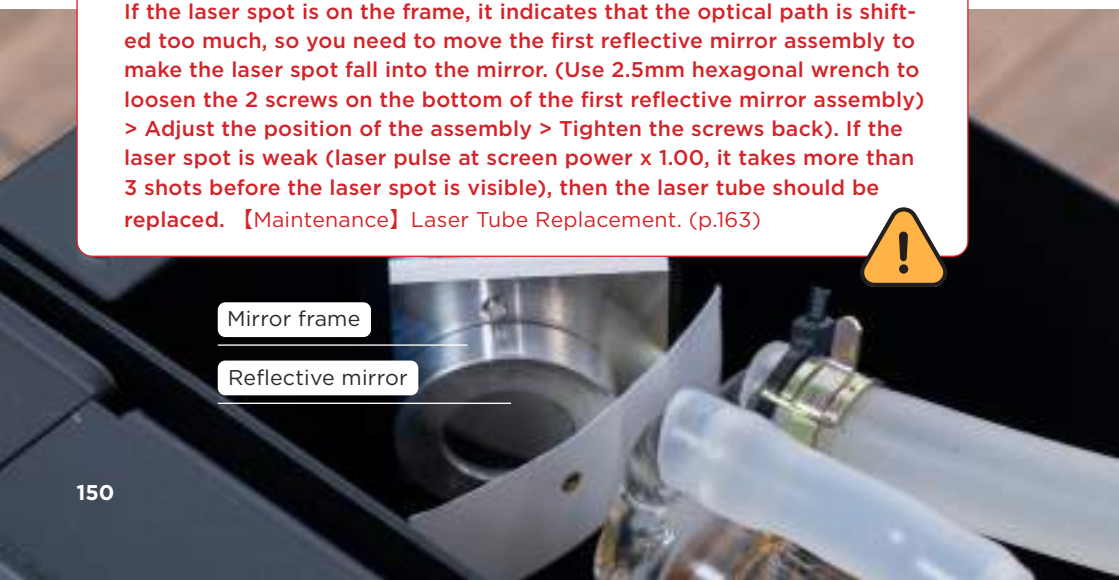
Laser tube

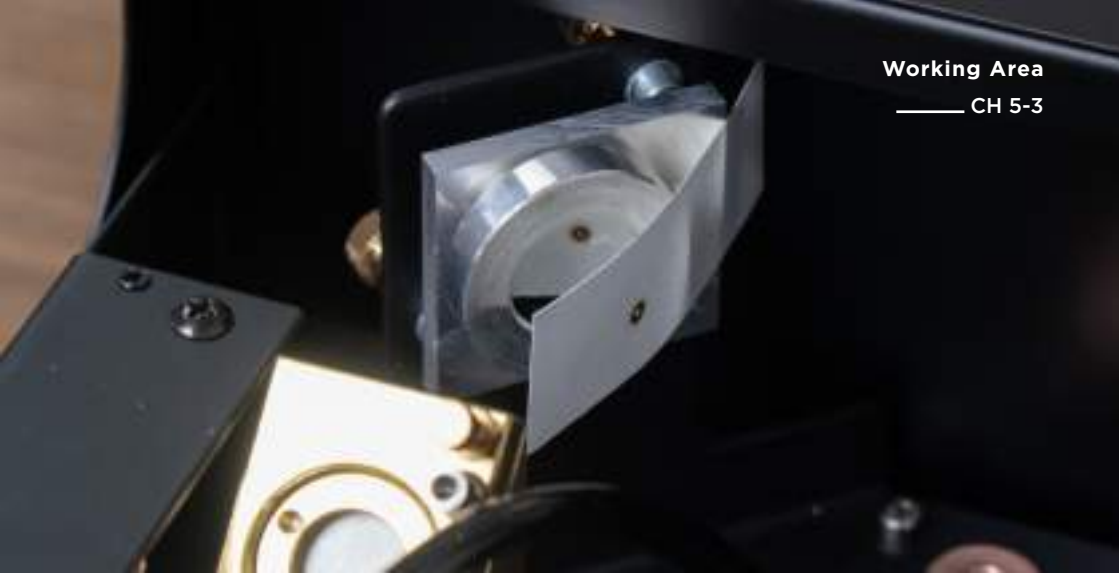
Target : To confirm the laser spot is on the first reflective mirror.

Method :

1. **Remove the back cover :** Please use a Torx screwdriver to remove the 6 screws on the back cover and then remove the back cover.
2. **Paste the tape :** Take a piece of double-sided tape and paste it on the round metal frame of the first reflective mirror.
3. **Obtain laser spot on the first reflective mirror :** Close the door cover and the back cover > Click the “MAINTAIN” on the screen > Click “Laser Pulse” > Open the back cover > Make sure the laser spot is within the mirror, avoiding the frame of the mirror.

If the laser spot is on the frame, it indicates that the optical path is shifted too much, so you need to move the first reflective mirror assembly to make the laser spot fall into the mirror. (Use 2.5mm hexagonal wrench to loosen the 2 screws on the bottom of the first reflective mirror assembly) > Adjust the position of the assembly > Tighten the screws back). If the laser spot is weak (laser pulse at screen power x 1.00, it takes more than 3 shots before the laser spot is visible), then the laser tube should be replaced. 【Maintenance】Laser Tube Replacement. (p.163)





First reflective mirror

Target : To make the bottom left spot coincide with the top left spot.

Method :

1. **Release the motors and paste the tape :** Click the “MAINTAIN” of the machine to finish the homing > Click "Motors" > Take a piece of double-sided tape and paste it on the metal frame of the second reflective mirror.
2. **Obtain the top left laser spot :** Move the laser head to the top left manually > Close the door cover and the back cover > Click “Laser Pulse” > Open the door cover > Confirm the laser spot position. You need to observe how the next (bottom left) laser spot moves.
3. **Obtain the bottom left laser spot:** Move the laser head to the bottom left manually > Close the door cover > Click “Laser Pulse” > Open the door cover > Confirm whether the bottom and top left are overlapped at the same position and avoid the reflective mirror frame. As shown in the picture above. If the laser spots are not completely overlapped, adjust the mirror adjustment screw behind the first reflective mirror according to the direction of laser spot movement, so that the bottom left laser spot position moves to the top left laser spot position.
4. **Adjust the first reflective mirror:** Remove the back cover > Drop a small amount of alcohol on the nut to soften the threadlocker > Use a double head wrench to loosen the nut without turning the mirror adjustment screw > Tighten or loosen the mirror adjustment screw according to the direction of laser spot movement (control direction explained later) > Repeat steps 2, 3, 4 until the bottom left laser spot overlap with the top left laser spot (if you can no longer determine the direction of laser spot movement, you need to reapply the double-sided tape) > After finishing the adjustment, tighten the nut without turning the mirror adjustment screw.

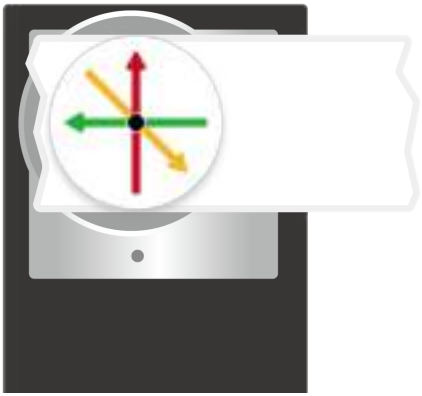
After confirming that the bottom and top left spots coincide and avoiding the reflective mirror frame, close and fasten the back cover, then adjust the second reflective mirror.

If there is no laser spot at the bottom left, please move to the middle left for correction first, and then change back to the top left and bottom left for correction after confirming that the middle left and top left points can be overlapped.

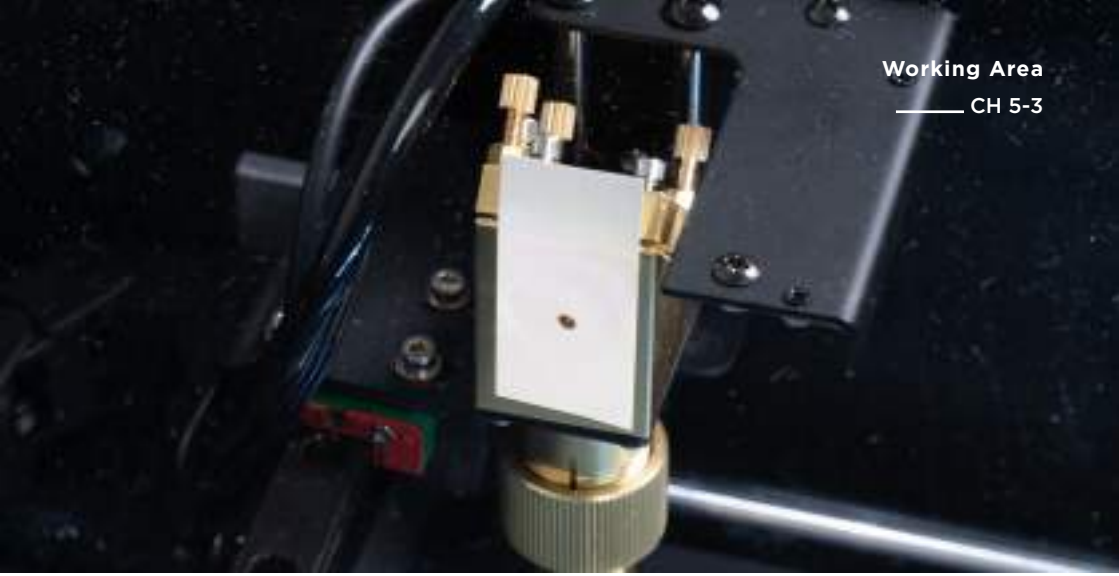
Tightening or loosening screw is equivalent to adjusting the angle of the reflective mirror.

- **When turning the yellow screw, the red and green screw link can be considered as the axis of rotation.**
  By tightening the yellow screw (clockwise), you can think of pushing the mirror from the upper left with the red and green as the axis, and the laser spot will move down to the lower right. Loosening the yellow screw (counterclockwise), you can think of the red and green as the axis to move the mirror backward in the upper left, and the laser spot will move up to the upper left.
- **When you turn the green screw, you can think of the yellow and red screw link as the axis of rotation.**
  By tightening the green screw (clockwise), you can think of the yellow and red as the axis to push the mirror from the upper right, and the laser spot will move to the left. Loosening the green screw (counterclockwise), you can think of the yellow and red as the axis to move the mirror backward in the upper right, and the laser spot will move to the right.
- **When turning the red screw, think of the yellow and green screw link as the axis of rotation.**
  By tightening the red screw clockwise, you can think of the yellow and green as the axis to push the mirror from the lower left, and the laser spot will move up. If you loosen the red screw (counterclockwise), you can think of the yellow and green as the axis to move the mirror backward in the lower left, and the laser spot will move downward.

The rotation directions of mirror adjustment screws of the first reflective mirror.



The moving paths of the laser spots on the double-sided tape on the second reflective mirror.



Second reflective mirror

Target: To make the middle right spot coincide with the middle left spot.

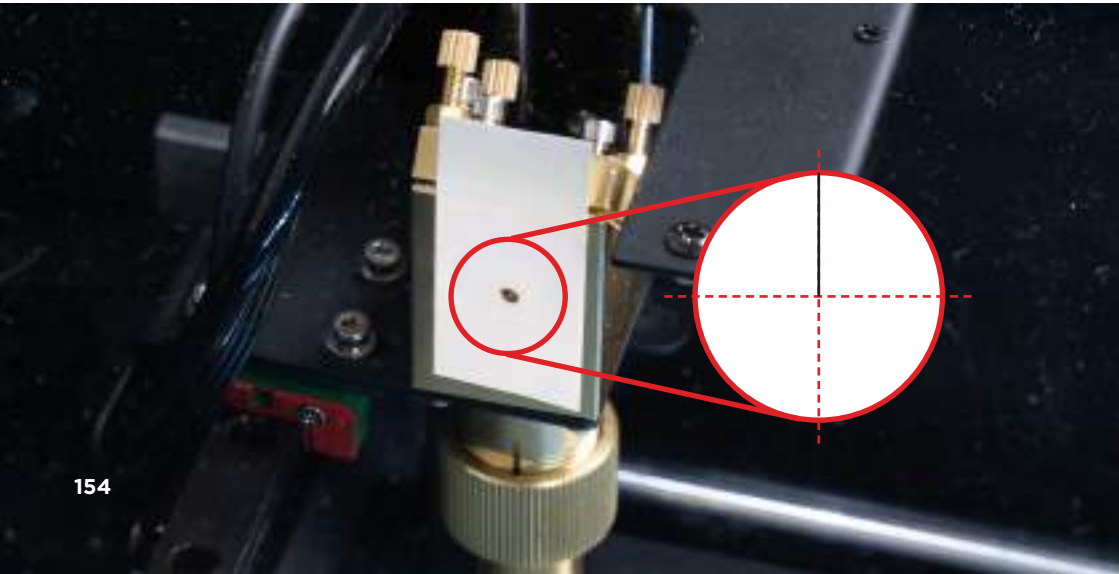
Method:

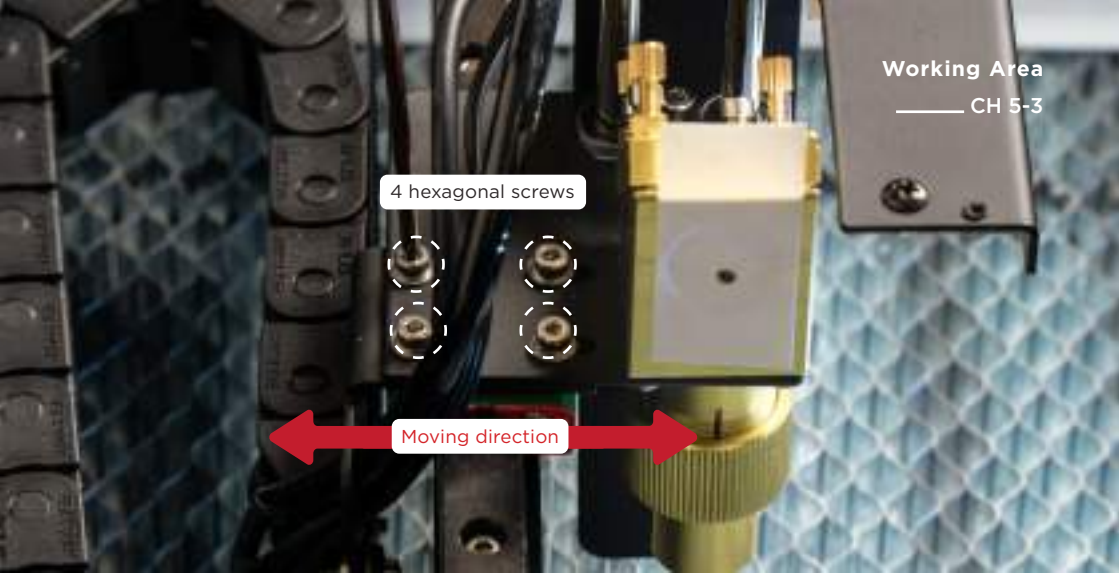
1. **Paste the tape :** Take a piece of double-sided tape and paste it on the round metal frame of the third reflective mirror.
2. **Obtain the middle left laser spot :** Move the laser head to the middle left manually > Close the door cover > Click “Laser Pulse” > Open the door cover > Confirm the laser spot position. You need to observe how the next (center) laser spot moves.
3. **Obtain the center laser spot :** Move the laser head to the center manually > Close the door cover > Click “Laser Pulse” > Open the door cover > Confirm whether the center and middle left overlap in the same position. You need to observe how the next (middle right) laser spot moves.
4. **Obtain the middle right laser spot :** Move the laser head to the middle right manually > Close the door cover > Click “Laser Pulse” > Open the door cover > Confirm whether the spots overlap in the same position. If they are not completely overlapped, adjust the mirror adjustment screw behind the second reflective mirror according to the direction of laser spot movement, so that the middle right laser spot position moves to the middle left laser spot position.
5. **Adjust the second reflective mirror :** Drop a small amount of alcohol on the nut to soften the threadlocker > Use a double head wrench to loosen the nut without turning the mirror adjustment screw > Tighten or loosen the mirror adjustment screw according to the direction of laser spot movement (control direction is explained later) > Repeat steps 2, 4 and 5 until the middle right laser spot overlap with the middle left laser spot (if you can no longer judge the direction of laser spot movement, you need to reapply the double-sided tape) > After finishing the adjustment, tighten the nut without turning the mirror adjustment screw.

The rotation directions of mirror adjustment screws of the second reflective mirror.

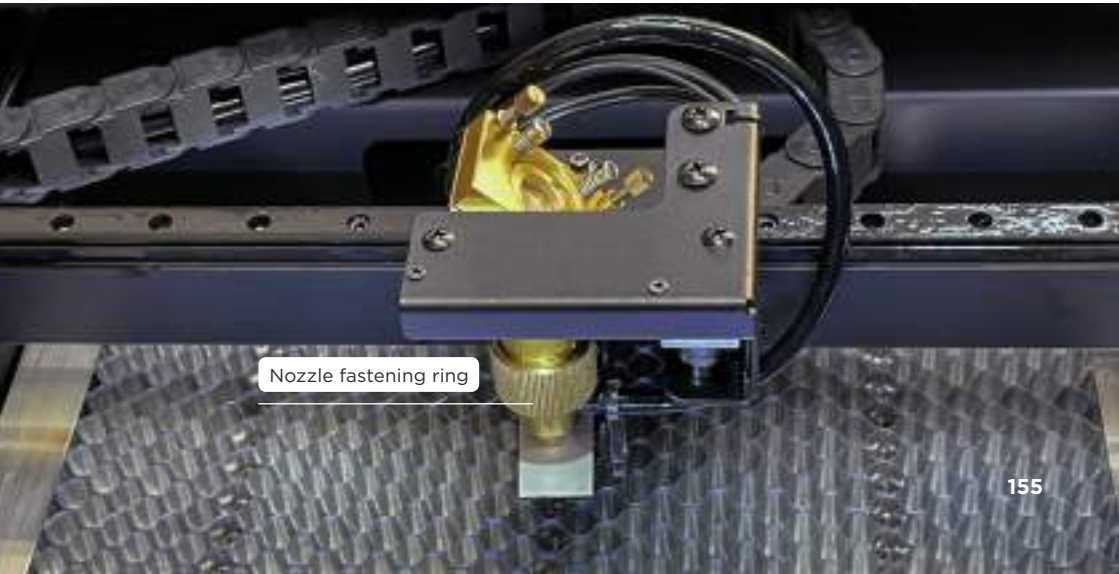
The moving paths of the laser spots on the double-sided tape on the third reflective mirror.

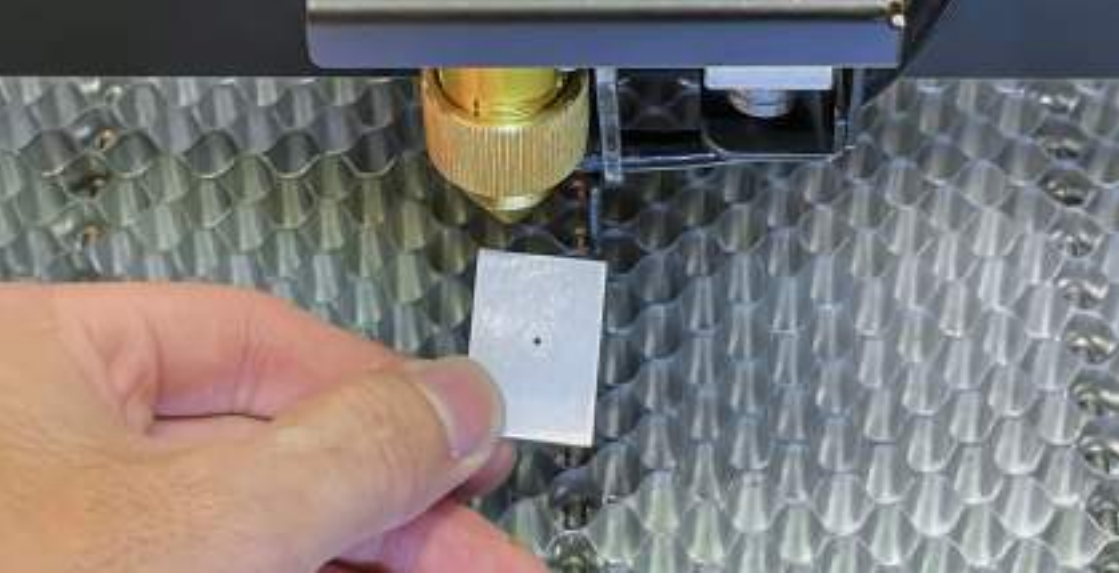
6. **Confirm the spots of the middle right and the middle left overlap :** Take a piece of double-sided tape and put it on the golden frame of the third reflective mirror > Repeat steps 2 and 4 to confirm the overlap of the middle right and middle left spots and avoid the reflective mirror frame, then fine-tune the laser head assembly position so that the overlapping spot is located on the perpendicular line of the round metal frame (black solid line area in the figure).





7. **Fine-tune the laser head assembly position :** Use a 2.5mm hexagonal wrench to loosen the 4 hexagonal screws on the X-axis linear rail that hold the laser head assembly in place > Move the laser head forward or backward depending on the position of the spot > Roughly tighten the 4 screws > Move the laser head to the center manually > Close the door cover > Click “Laser Pulse” > Open the door cover > Confirm that the spot is on the perpendicular line > Move the laser head to the chassis front > Click “Camera” and make sure the upper and lower edges of the camera are parallel to the machine chassis > Fix the 4 hexagonal screws of the laser head assembly. After confirming that the middle right and middle left spots are on the perpendicular line of the round metal frame, you can adjust the third reflective mirror.





Third reflective mirror

Target: To make the laser spot hit the center of the laser outlet.

Method:

1. **Adjust the height of the laser head :** Turn the golden nozzle fastening ring off > Adjust the height of the laser head so that the focus probe touches the honeycomb table > Turn the focus probe back > Tighten the golden nozzle fastening ring.
2. **Paste the tape :** Take a piece of double-sided tape and put it on the laser head outlet > Gently press the double-sided tape to make a circle of laser head outlet indentation on the tape's adhesive surface.
3. **Obtain the center laser spot :** Move the laser head to the center manually > Close the door cover > Click “Laser Pulse” > Open the door cover > Make sure the laser spot is in the center of the laser outlet. If it is not in the center of the circle, you need to adjust the mirror adjustment screw behind the third reflective mirror according to the position of the spot.
4. **Adjust the third reflective mirror :** Use a double head wrench to loosen the nut without turning the mirror adjustment screw > Tighten or loosen the mirror adjustment screw according to the direction of the laser spot movement (the control direction is explained later) > Repeat steps 3 and 4 until the laser spot falls in the center of the beam outlet (if you can no longer judge the laser spot movement direction, you need to reapply the double-sided tape) > After finishing the adjustment, tighten the nut without turning the mirror adjustment screw.

The adjustment method is different from the first and second reflective mirror, because the position of the mount under the third reflective mirror is fixed, so when the screw is tightened, the mount will not move, but the reflective mirror will be ejected.

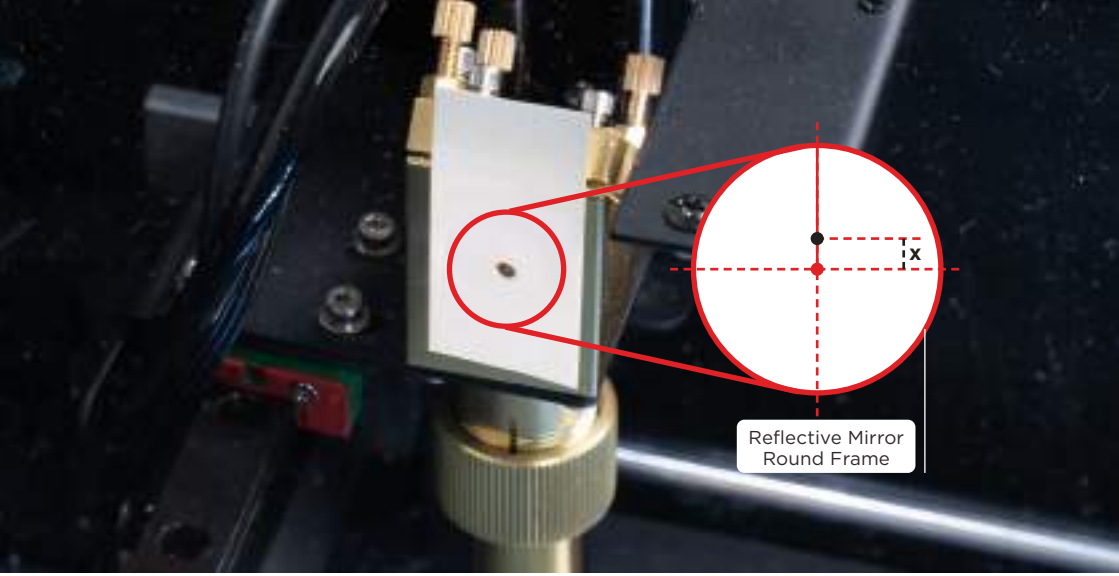
- **When turning the yellow screw, the red and green screw link can be regarded as the axis of rotation.**
  Tightening the yellow screw (clockwise), you can think of moving the mirror backward in the upper right with red and green as the axis, and the laser spot will move to the upper right. Loosening the yellow screw (counterclockwise), you can think of the red and green as the axis to push the mirror from the upper right, and the laser spot will move to the lower left.
- **When turning the green screw, the yellow and red screw link can be regarded as the axis of rotation.**
  Tightening the green screw (clockwise), you can think of moving the mirror backward in the upper left with the yellow and red as the axis, and the laser spot will move to the left. Loosening the green screw (counterclockwise), you can think of the yellow and red as the axis to push the reflective mirror from the upper left, and the laser spot will move to the right.
- **When turning the red screw, the yellow and green screw link can be regarded as the rotating axis.**
  Tightening the red screw (clockwise), you can think of moving the mirror backward in the lower right with the yellow and green as the axis, and the laser spot will move downward. Loosening the red screw (counterclockwise), you can think of the yellow and green as the axis to push the reflective mirror from the lower left, and the laser spot will move upward.

After completing the above adjustments, you can ensure that the laser beam output is uniform at any location in the working area to achieve normal working requirements. Please perform "Calibrate Camera" again before use. 【Beam Studio Tutorial】 Camera Calibration. (p.063)

If the laser beam output verticality is strictly required, you can further adjust the verticality of the optical path.

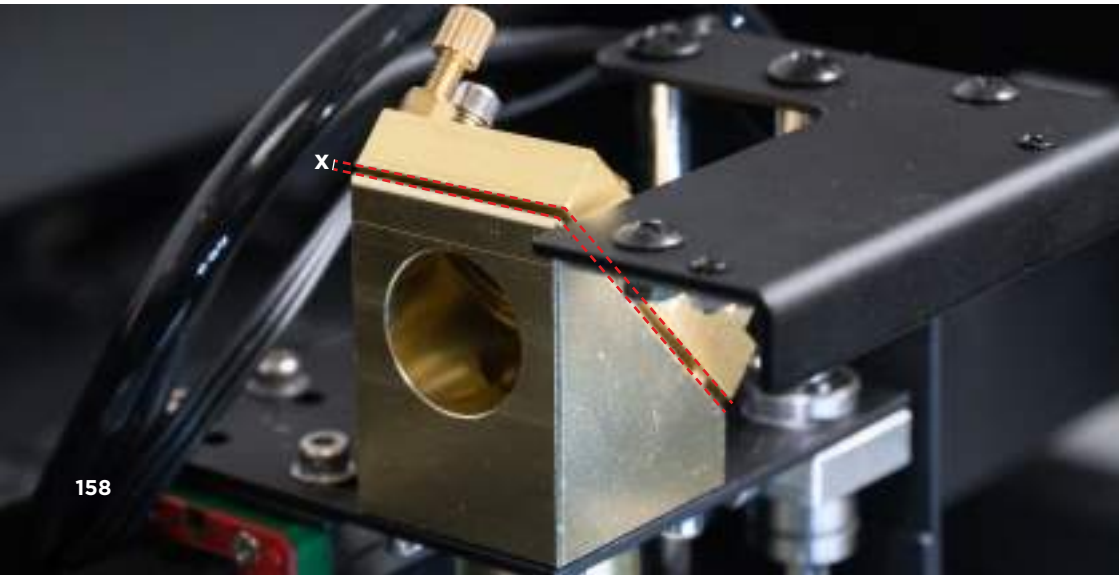
The rotation directions of mirror adjustment screws of the third reflective mirror.

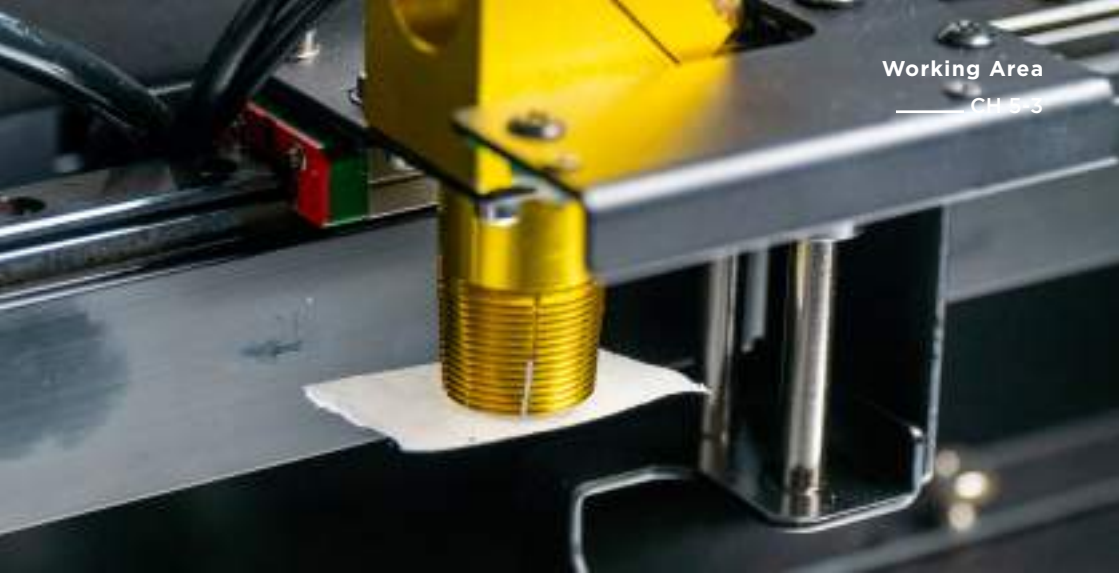
The moving paths of the laser spots on the double-sided tape on the laser head outlet.



Advanced adjustment : Verticality of the optical path (selective adjustment)
Target: To adjust the laser spots obtained from the golden nozzle fastening ring and from the laser head outlet to the center of the circles.
Method:

1. **Paste the tape :** Take a piece of double-sided tape and paste it flat on the golden frame of the third reflective mirror.
2. **Get the center laser spot :** Move the laser head to the center manually > Close the door cover > Click “Laser Pulse” > Open the door cover.
3. **Measure the center offset value :** Measure the distance between the center of the spot and the center of the frame, x (mm). The laser spot should be located at the top of the perpendicular line of the metal frame (as shown in the picture above). If the position is incorrect, please contact your reseller.





4. **Move the third reflective mirror :** Loosen the nut, use a double head wrench to loosen the nut holding the mirror adjustment screw > Adjust the 3 mirror adjustment screws so that the third reflective mirror and the triangular mirror holder are parallel and have x (mm) spacing (as shown below).
5. **Take the honeycomb table out :** Move the laser head to the upper left of the working range > Reach the front of the machine, lift the honeycomb table up and pull it out.
6. **Adjust the third reflective mirror :** Refer to the method of "third reflective mirror" and adjust the laser spot to the center of the laser outlet again.
7. **Paste the tape :** Unscrew the golden nozzle fastening ring and remove the laser head > Take a piece of double-sided tape and paste it flat on the laser head socket, gently press the double-sided tape so that there is a socket indentation on the adhesive side of the double-sided tape.
8. **Obtain the center laser spot :** Move the laser head to the center manually > Close the door cover > Click “Laser Pulse” > Open the door cover > Observe the spot position and move the third reflective mirror as appropriate.

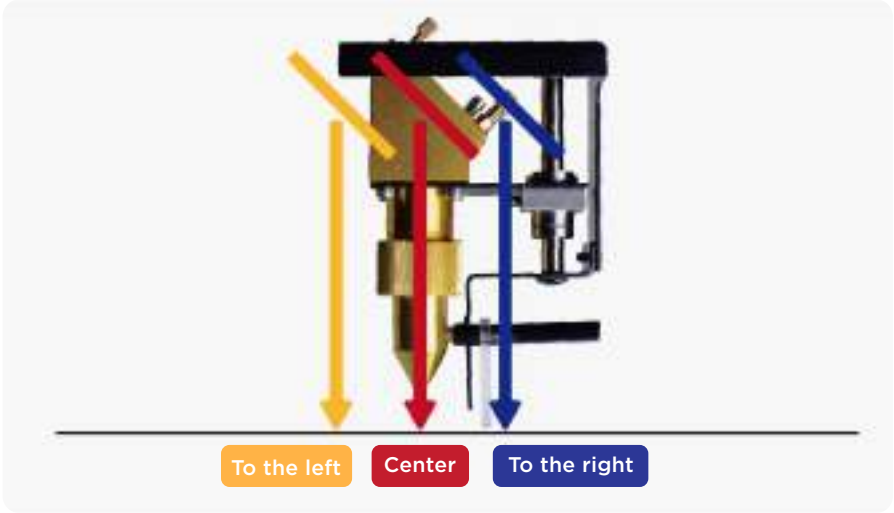
9. Move the third reflective mirror (as shown below) :

a. The laser spot is in the center of the laser head socket, which means the optical path is vertical and does not need to be adjusted.

b. If the spot is to the right, reduce the parallel gap of the reflective mirror and loosen the 3 mirror adjustment screws by half a turn, then repeat steps 6-9 until the spot is in the center of the laser head socket.

c. If the spot is to the left, increase the parallel gap of the reflective mirror and tighten the 3 mirror adjustment screws by half a turn, then repeat steps 6-9 until the spot is at the center of the laser head socket.

After the adjustment is completed, please run "Calibrate Camera" first and then use the camera preview. 【Beam Studio Tutorial】Camera Calibration. (p.063)



Door Cover Cleaning

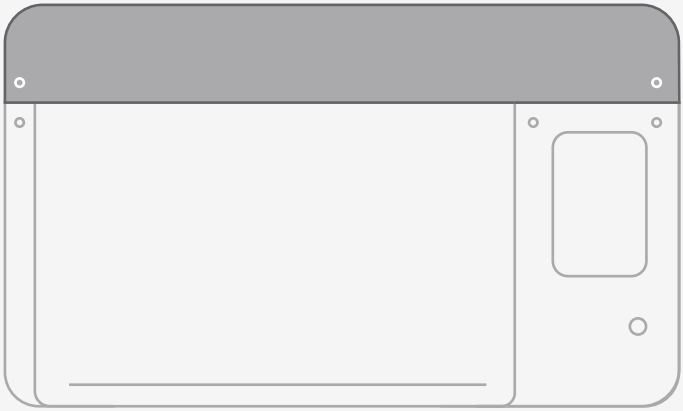
It is recommended to clean every 2 weeks.

Maintenance Steps : Spray a small amount of alcohol on the acrylic door and clean with a cleaning cloth. The amount of alcohol should not be too much to avoid cracking the door.

Preparation Items : Self-preparation : 1 | 75%~99% alcohol, 2 | Cleaning cloth

CH 5-4
Back Cover

The back cover includes the water pump, laser tube and ventilation fan.



Laser Tube Replacement

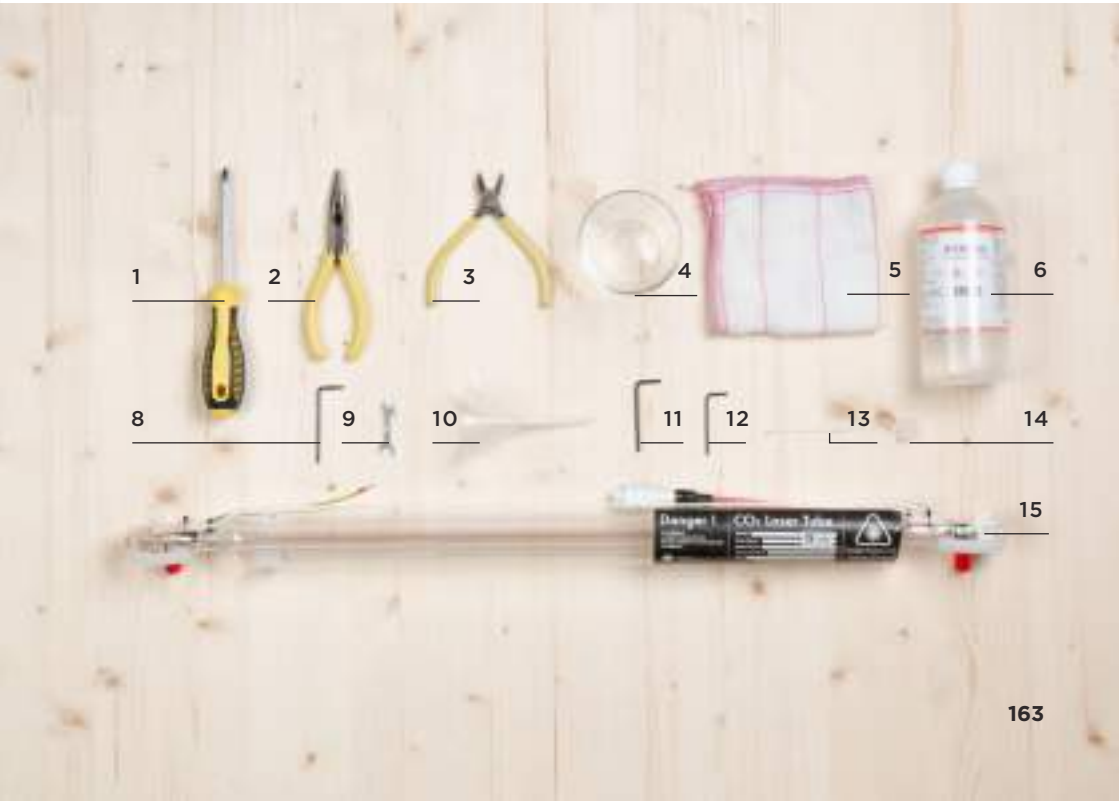
Depending on the power, hours of usage, room temperature, water temperature and other conditions.

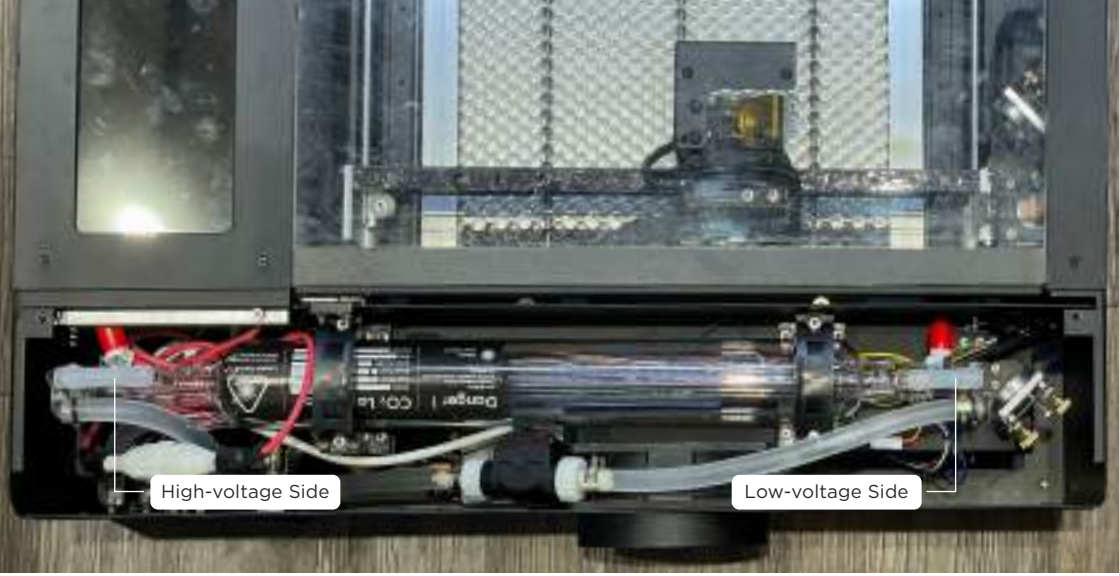
Replacement Needed :

1. The degradation of the laser tube. 2. The failure of the laser tube which has no laser beam output as well as generates a cracking sound. Laser tube are classed as consumables, the degradation is normal due to the use of power, storage time and other factors. The higher the power setting, the faster the laser tube degradation.

Preparation Items :

Self-preparation : 1 | Phillips screwdriver, 2 | Needle nose pliers, 3 | Diagonal pliers, 4 | Water container, 5 | Paper towel or rag, 6 | 75%-99% alcohol, 7 | Vacuum cleaner or high-pressure spray gun *If you have one, it is better.
Included in the accessory box : 8 | Torx screwdriver, 9 | Double head wrench, 10 | Funnel, 12 | 2.5mm hexagonal wrench
Included in the laser tube box : 11 | 3mm hexagonal wrench, 13 | Cable tie, 14 | Water pipe plug, 15 | Laser tube





1. Please unplug the power cord first, then replace the laser tube.
2. Please use the Torx screwdriver to remove the 6 screws on the back cover and then remove the back cover.
3. You can remove the dust from the back chassis first and then replace the laser tube. Use a vacuum cleaner or high-pressure spray gun to remove the dust from the back chassis, and then use a paper towel or rag with alcohol to wipe the dirty area and wait for the chassis to dry before proceeding with the next operation.
4. The laser tube has two ends. The high-voltage side is near the screen and the low-voltage side is near the reflective mirror.

Replacement Steps :

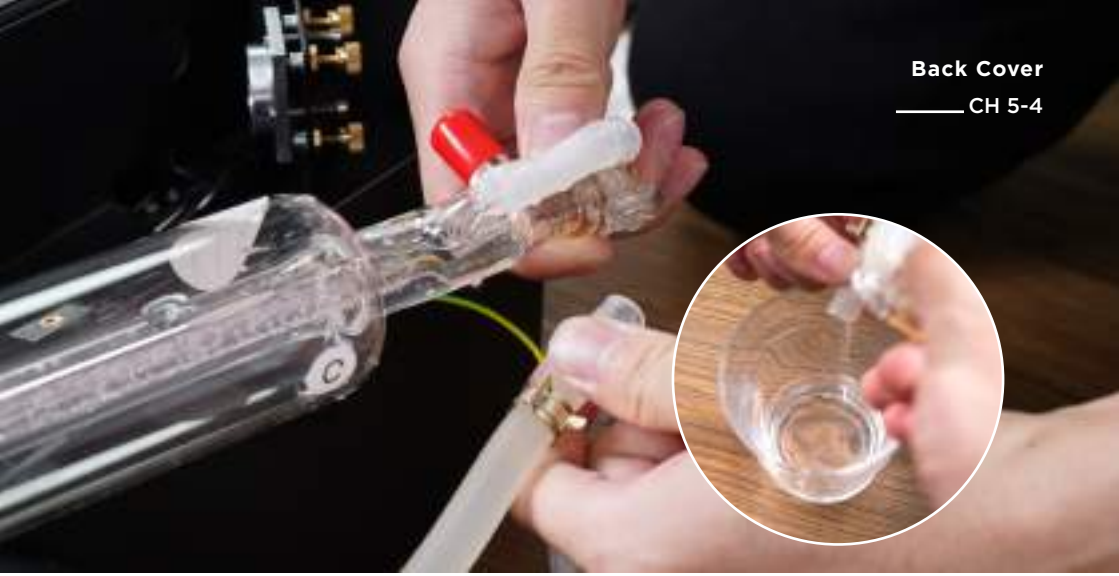
1. **Disconnect the laser tube wires :** Unscrew and disconnect the white connector on the high-voltage side > Press the white terminal and pull out the ground wire on the low-voltage side.

2. **Loosen the laser tube holders :** Use a 3mm hexagonal wrench to loosen a total of 4 screws on the laser tube holders.

3. Take the laser tube out to drain :

a. Use needle nose pliers to move the hose clamp from the low-voltage side toward the center of the water hose >

b. Use diagonal pliers to remove the cable tie holding the water hose > Move the laser tube out of the chassis >



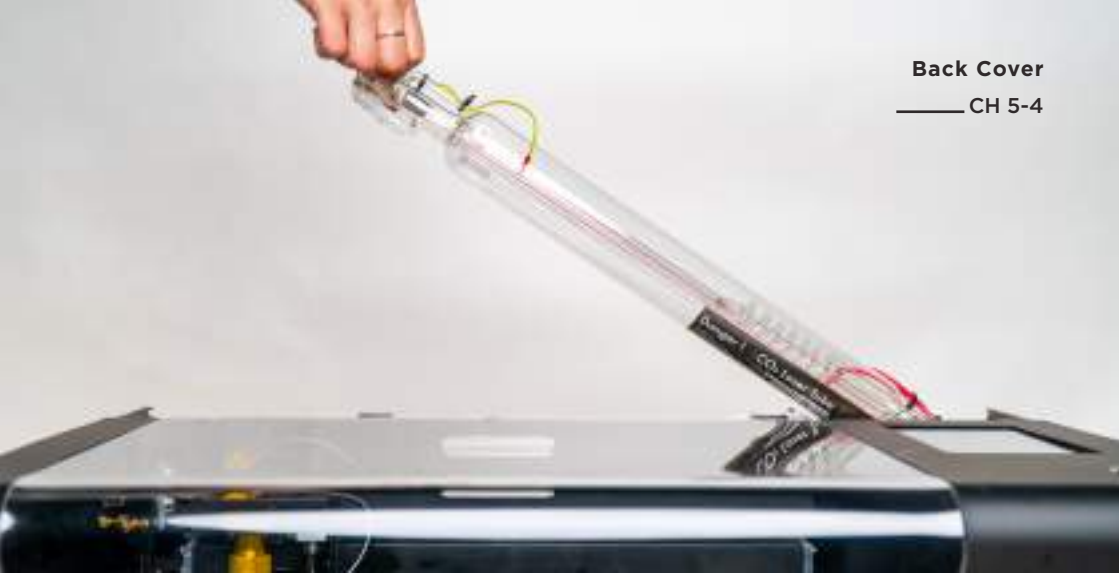
c. Aim the water hose on the low-voltage side at the water container, and then pull out the hose to drain the water (when the water outlet position of the low-voltage side is lower than that of the high-voltage side, the liquid will be discharged due to siphon principle) >

d. When the drainage is completed, clog the water outlet by a water pipe plug.

4. Remove the laser tube :

a. To avoid water leakage, place a rag or paper towel under the high-voltage side > Use diagonal pliers to remove the cable tie fixing the water hose >

b. Pull out the water hose on the high voltage-side and insert a water pipe plug >



c. Remove the laser tube completely.

Avoid contacting the machine parts with water. If water enters, dry the water, and wait for the air to dry before starting the machine.

5. Place the laser tube and water hose in :

a. Place the laser tube according to the picture >

b. Remove the water pipe plug on the high-voltage side and put the water hose on the glass tube > Remove the water pipe plug on the low-voltage side and put the water hose on the glass tube.

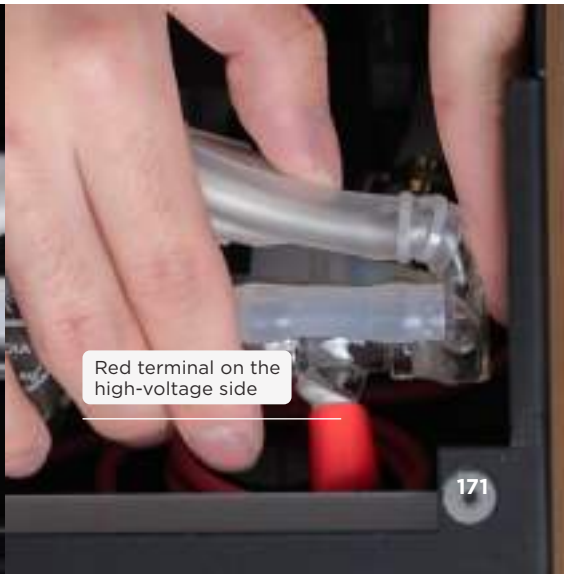
6. **Fix the water hose on the laser tube :** Fix the water hose at the high-voltage side on the glass tube with a cable tie > Tighten the cable tie and cut off the excess cable tie with a pair of diagonal pliers > Fix the water hose at the low-voltage side on the glass tube with a cable tie > Tighten the cable tie and cut off the excess cable tie with a pair of diagonal pliers > Put the metal hose clamp back.

- There is no metal hose clamp at the high-voltage side to avoid leakage of electricity that may cause a drop in engraving power or a possible electric shock if the grounding is not confirmed.
- Slowly release the metal hose clamps to avoid breaking the tube.

7. **Connect the laser tube wire :** Connect the white connector on the high-voltage side with a red wire back and tighten it > Press down the white terminal on the low-voltage side and insert the ground wire firmly > Release the white terminal and gently pull the ground wire to check if it is stable.

8. **Tighten the laser tube holders back :**

   a. Place the laser tube in position, leaving a finger distance between the head and tail ends > Rotate the red terminal on the high-voltage side towards the inside of the machine chassis > Make sure there is no folds or kinks of the water hoses



b. Use a 3mm hexagonal wrench to tighten a total of 4 screws on the laser tube holders > Gently shake the laser tube to make sure it will not shift left and right and forwards and backwards.

9. **Plug in the power cord and start the machine :** After confirming the installation is correct, you can plug in the power cord and start the machine.
10. **Activate the"Pump" :** After the machine is turned on, click "MAINTAIN" on the screen > Click "Pump" after the laser head is homed. Then the cooling water will start to enter the laser tube and the water level of the water pump will drop.
11. **Turn off the machine and unplug the power cord :** When the water level of the water pump is 1/4 left, turn off the machine and unplug the power cord before adding the water manually.

- **Please do not touch the area near the high-voltage side of the laser tube after plugging the power cord in to avoid electric shock.**
- **When using the "MAINTAIN" page, avoid touching the laser switch or putting your hand at the laser tube tail end. If the water pump cannot be activated, please contact your reseller.**
- **Please observe the water level carefully to avoid overflowing.**
- **Please use distilled water to avoid impurities affecting the water -cooling effect.**

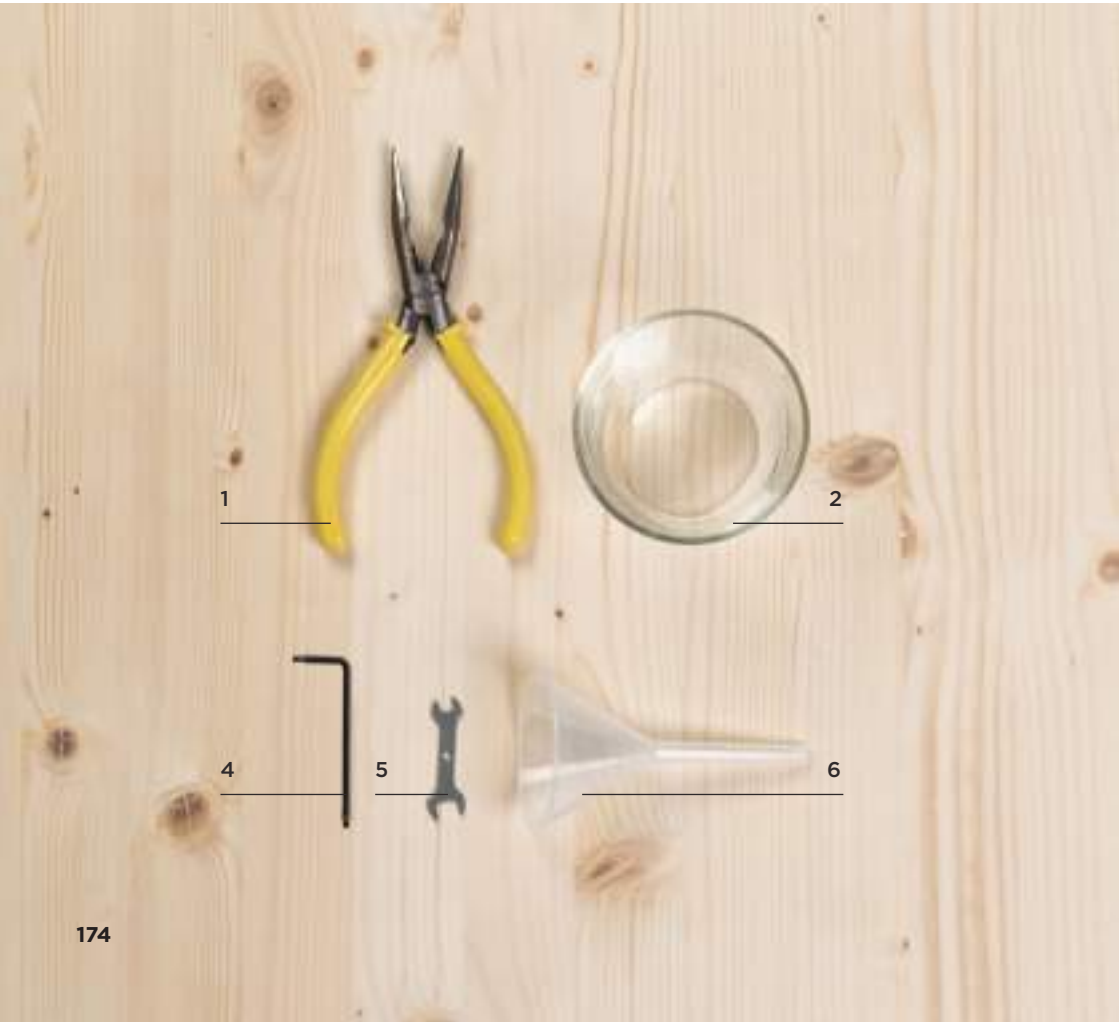
12. **Add water manually :** Use the double head wrench to open the water pump cap > Put in the funnel > Fill the water pump with distilled water.
13. **Tighten the water pump cap back :** Repeat steps 9 ~ 12 until the water pump level reaches 80% full and the water level no longer drops due to the adding into the laser tube, then use the double head wrench to tighten the water pump cap back to complete the laser tube replacement procedure.

- **It is recommended to fill the water to more than 80% full or press the water hose when adding water, so it is less likely to produce air bubbles.**
- **There should not be a large number of air bubbles inside the laser tube to avoid affecting the heat-dissipation efficiency.**

Water changing and adding | Once every 3 months

Notes : In order to avoid the breakage of the glass laser tube due to the heat gen erated during laser excitation, it is necessary to maintain the water-cooling effect with sufficient distilled water.

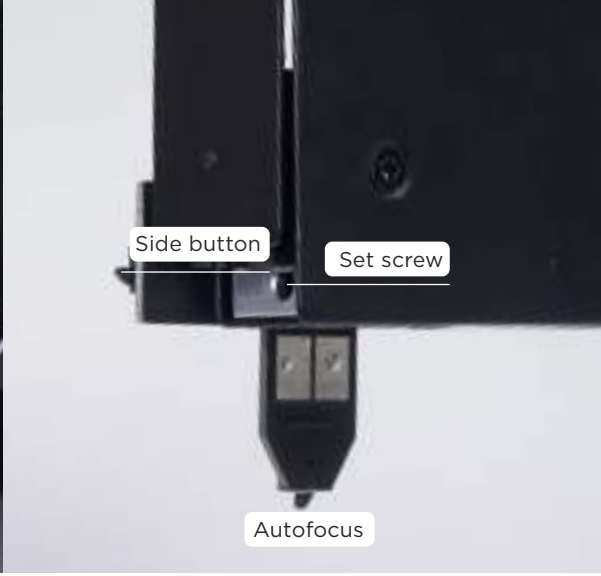
Preparation Items : Self-preparation : 1 | Needle nose pliers, 2 | Water container, 3 | Paper towel or rag
Included in the accessory box : 4 | Torx screwdriver, 5 | Double head wrench, 6 | Funnel



1. Please use the Torx screwdriver to remove the 6 screws on the back cover and then remove the back cover.
2. Too many air bubbles in the laser tube will affect the cooling efficiency, it is recommended to circulate the water and fill the water pump to more than 80% full or press the water hose when adding the water, so it is less likely to produce air bubbles.
3. It is recommended to replace the cooling water once every three months.
4. The mesh part of the honeycomb table is sharp, so please be careful with it.
5. As shown below. If the machine is the autofocus version, you need to press the side button to retract the laser head, and to avoid hitting the probe when taking out the honeycomb table.
6. If the laser head cannot be moved, please click “MAINTAIN” on the screen > “Motors” to release the motors.

Maintenance Steps:

1. **Take the honeycomb table out :** Move the laser head to the upper left of the working range > Reach the front of the machine, lift the honeycomb table up and pull it out.



2. Take the laser head out :

Manual focusing : Unscrew the nozzle fastening ring > Take the laser head down ward and forward out.

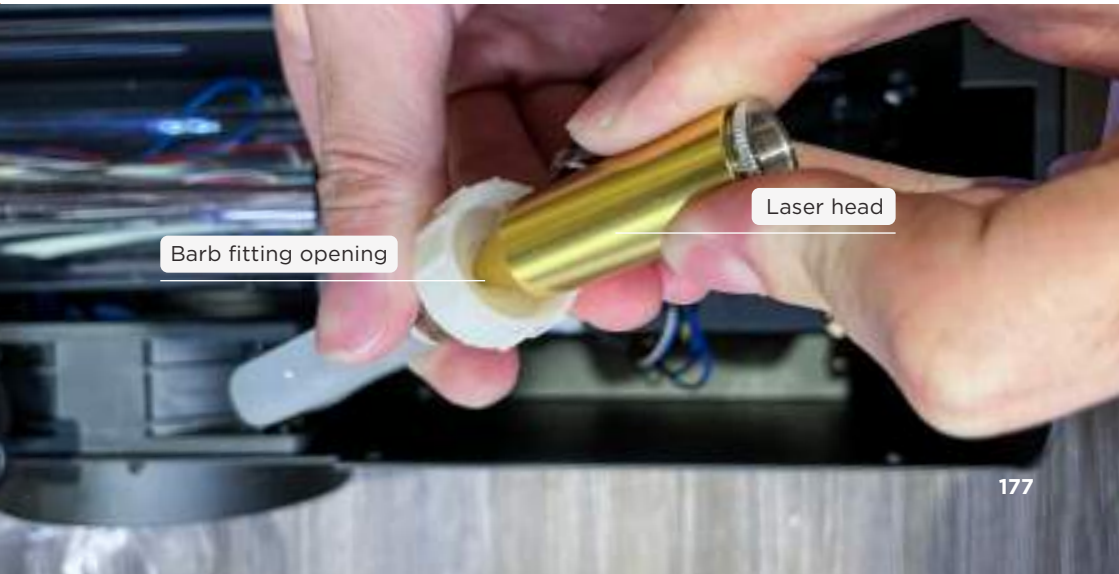
Autofocus : Press and hold the side button, move the laser head down to the bottom and release the button > Use 2.5mm hexagonal wrench to loosen the set screw on the left side of the laser head > Move the laser head down and out.

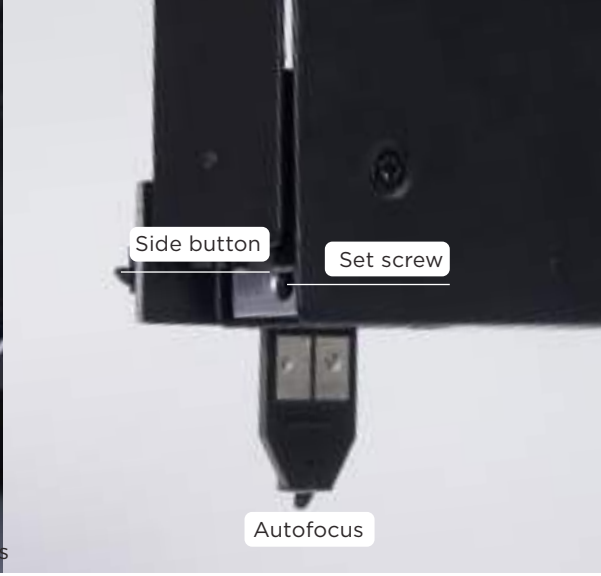
3. Unscrew the barb fitting and aim the laser head at it :

a. Unscrew the barb fitting near the low-voltage side (near the reflective mirror) on the flow sensor >

b. Place the flow sensor inside the water container > Lift up the water hose near the low-voltage side slightly to let some water flow out >

c. Aim the laser head outlet at the barb fitting opening. Be sure to ask someone to assist in holding the flow sensor above the water container to avoid spilling water after the air pump is activated





Autofocus

4. **"Air Pump" helps to drain the water :** Click the "MAINTAIN" on the screen > Click "Air Pump" to activate the air flow, the cooling water will be drained from the water hose near the high-voltage side > After emptying the water, click "Air Pump" to stop the air flow.
5. **Dry and install the laser head :** Use paper towels or a rag to dry the laser head >
   Manual Focusing : Put the laser head backward and upward > Tighten the nozzle fastening ring.
   Autofocus : Insert the laser head under the Autofocus add-on and push the black air hose to the top > Use 2.5mm hexagonal wrench to tighten the set screw on the left side of the laser head.
6. **Connect the barb fitting back :** Pre-turn the water hose by two turns to two and a half turns (the position of the hose clamp can be used as a reference) > Connect the barb fitting back to the flow sensor.

7. **Turn off the machine and unplug the power cord :** Turn off the machine and unplug the power cord before adding the water manually.
8. **Add water manually :** Use a double head wrench to open the water pump cap > Put in the funnel > Fill the water pump with distilled water.
9. **Plug in the power cord and start the machine :** Plug in the power cord and start the machine.
10. **Activate the"Pump" :** After the machine is turned on, click "MAINTAIN" on the screen > After the laser head is homed, click "Pump", then the cooling water starts to enter the laser tube, and the water level of the water pump drops. If the water pump does not work, please contact your reseller.
11. **Tighten the water pump cap back :** Repeat steps 7 ~ 10 until the water pump level reaches 80% full and the water level no longer drops due to the adding into the laser tube, then you can use a double head wrench to tighten the water pump cap back to complete the water change.

- **Please observe the rising water level carefully to avoid overflowing of water.**
- **Please use distilled water to avoid impurities affecting the water-cooling effect.**
- **Please do not touch the area near the high-voltage side of the laser tube after plugging the power cord in to avoid electric shock.**
- **When using the "MAINTAIN" page, avoid touching the laser switch or putting your hand on the tail end of the laser tube.**
- **It is recommended to fill up the water to more than 80% full or press the water hose when adding the water, so it is less likely to produce air bubbles.**
- **There should not be a large number of air bubbles inside the laser tube to avoid affecting the heat-dissipation efficiency.**
- **Check that the water hose should not be folded or kinked to avoid affecting the smoothness of water flow.**

Ventilation Fan Cleaning

It is recommended to clean once every 1 month.

Maintenance Steps : Remove the dust from the ventilation fan with a brush, then wipe the ventilation fan blades with alcohol.

Preparation Items : Self-preparation : 1 | Brush, 2 | 75%-99% alcohol.

CH 6
Trouble-shooting

CH 6-1

Trouble-shooting

This manual classifies the issues into three categories according to their contents, including hardware, software, and comprehensive issues. The test items and solutions for each problem are explained here in order.

FLUX > “Supports” > “Help Center” has more resources to help users with easy troubleshooting. If you cannot follow the guides from this manual or Help Center, you need to collect relevant information (troubleshooting records) and contact your reseller. *Please refer to 6-5 for the troubleshooting records and contact your reseller with all the items in order to solve the problem faster.

Issue Category	Issue Content (Error Code)	Test Items
Hardware	#900 Cooler Off	Water hose, water pump, flow sensor
	#901 Door Opened	Door cover sensor magnet, magnetic reed switch
	#902 Overheated	Room temperature, water temperature, water pump
	#903 Bottom Cover Opened	Bottom cover fixing screw, bottom cover magnet, magnetic reed switchm rotary add-on magnet
	#904 Homing Failed	Click “MAINTAIN” on the screen to home
	Focus probe of manual focusing is cracked	-
	Material cannot be cut through	Focusing, power on the screen, reflective mirrors and focus lens, optical path, laser tube
	No Laser Beam Output	Laser tube
	Mirrors and lens are oxidized or broken	Reflective mirrors and focus lens
	Minor electric shocks from chassis	-
Software	Unable to Open Software Properly	Windows :Visual C++ Redistributable / macOS : Version
	Other Software Error Codes	-
Comprehensive	Connection Issue	MAC Address, IP address, “Test Network Settings”
	Camera preview screen stitching is inaccurate, Actual engraving position is different from camera preview position	Focus plane, camera calibration, SVG file
	Camera Preview Timeout or Failed to Connect	“Camera” in the MAINTAIN page
	Camera preview speed is too slow	Wi-Fi dongle, network environment
	Camera preview screen is blurry	Camera lens
	Camera preview screen is overexposed	Ambient lighting

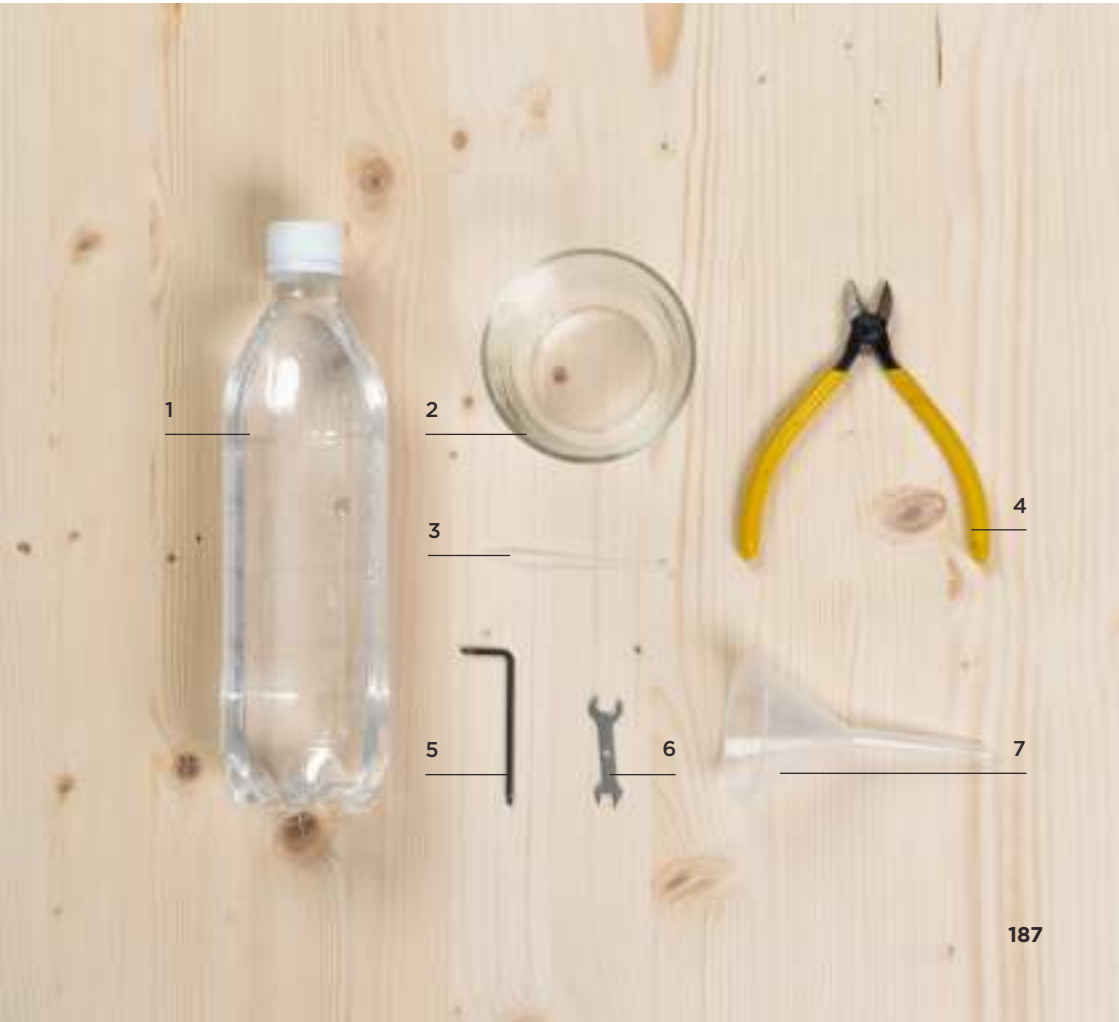
CH 6-2

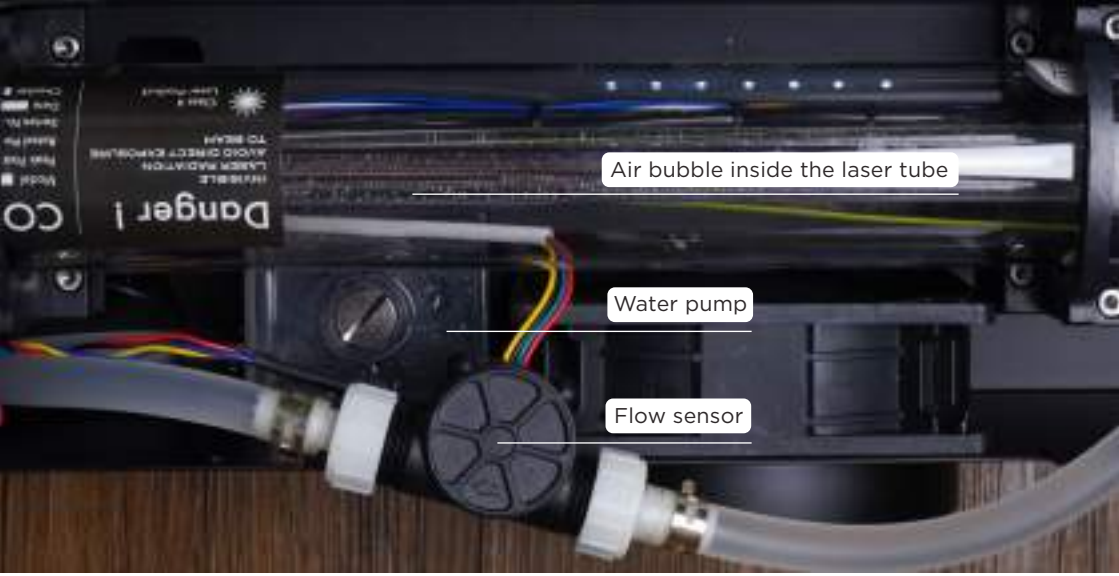
Hardware Issues

#900
Cooler Off

- Make sure that the firmware is version 3.4.0 or later.
- Remove the back cover after removing a total of 6 screws with a Torx screwdriver.

Preparation Items : Self-preparation : 1 | Distilled water, 2 | Water container, 3 | Cable tie, 4 | Diagonal pliers
Included in the accessory box: 5 | Torx screwdriver, 6 | Double head wrench, 7 | Funnel





Test Items:

1. **Click "Resume" button :** Try to continue working, if no error message appears again within one minute, then it can be used normally.
2. **No folds or kinks of the water hose :** If the water hose is obviously creased, press the area back to the cylinder shape > Use the cable tie to fix the position.
3. **The water pump should be at least 80% full :** If the water level in the water pump does not reach 80% full, water must be added 【Maintenance】 Water changing and adding. (p.174) > Press the water hose to discharge the air bubbles inside the laser tube as many as possible.
4. **Adjust and test the flow sensor :** Tilt the sensor slightly and tap it a few times to expel the air bubbles > Test the flow speed, which should be 1 ~ 2 L/min: Machine screen > "MACHINE" > "Hardware Settings" > "Test Flow Speed".
5. **Replace the cooling water :** If you have tried steps 1 ~ 4 and still have an error, please replace the cooling water 【Maintenance】 Water changing and adding. (p.174). It would be helpful if you can record a video at the same time.

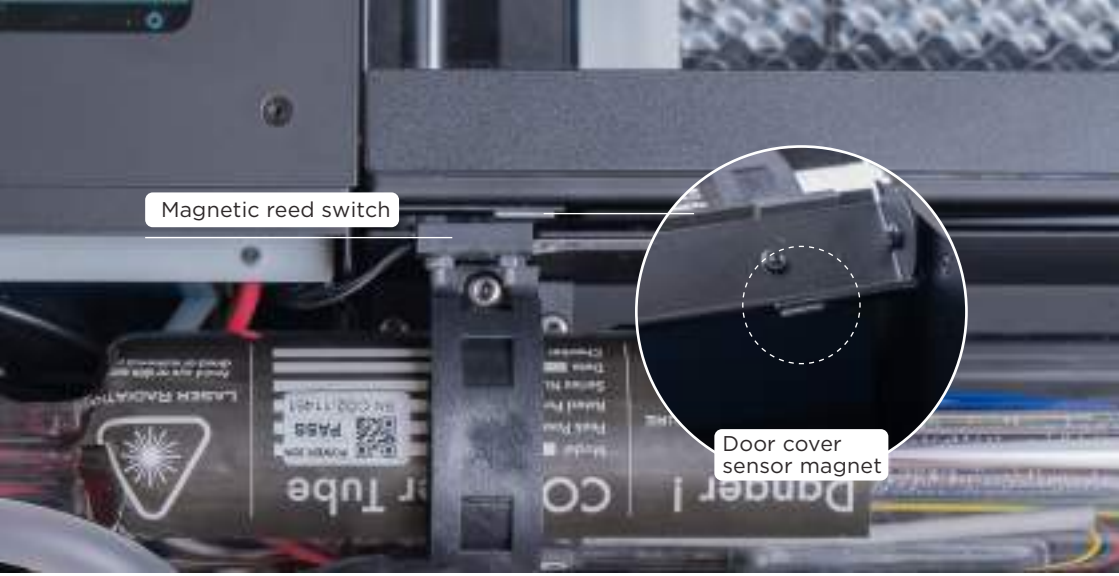
Troubleshooting Records:

1. **Photo :** Machine screen > "MAINTAIN" > Turn on the "Pump" and take pictures of :
   a. Water hose (bending at the connection)
   b. Laser tube (the number of bubbles and flowability)
   c. Water pump (water volume, water pump blue light should be constantly on)
   d. Flow sensor (placement, reading), as the right figure.
2. **Video :** The video of cooling water replacement should include the content of photos (water hose, laser tube, water pump, flow sensor) to ensure that the above components are working properly.

#901
Door Opened

Make sure that the firmware is version 3.4.0 or later.

Preparation Items : Self-preparation : 1 | Super glue, 2 | Magnet
Included in the accessory box : 3 | Torx screwdriver



Test Items:

1. **Check the door cover sensor magnet :** If the door cover sensor magnet is off but not lost, you can point super glue at the magnet base to glue the magnet back. If the magnet is lost, please contact your reseller.
2. **Test the magnetic switch :**
   a. Use a Torx screwdriver to remove 6 screws on the back cover, remove the back cover > Click "MAINTAIN" on the screen > Open and close the door cover continuously, observe whether the door cover symbol is displayed normally in the upper right corner.
   b. Take another magnet to cover the magnetic switch > Close the door cover > Observe if the door cover symbol is displayed closed normally in the upper right corner, as shown in the figure.

Troubleshooting Records :

1. **Photo :**
   a. Magnet (whether it is off)
   b. Door cover sensor magnet and magnetic reed switch area after closing the door cover
2. **Video :**
   a. Need to include the action of opening and closing the door cover and the change of the door cover symbol.
   b. Record the change of door cover symbol before and after taking a magnet to cover the magnetic reed switch.

#902 Overheated

Overheated warning temperature can be adjusted in "MACHINE" > "Hardware Settings" > "Water Temperature Threshold".
High water temperature will degrade the laser tube faster, so it is recommended to prevent the overheated warning by decreasing the room temperature instead of increasing the water temperature threshold.

Preparation Items : Self-preparation : 1 | Distilled water
Included in the accessory box: 2 | Funnel, 3 | Double head wrench, 4 | Torx screwdriver

Test Items:

1. **Room temperature should not be too high :**
   a. Keep the right side of the machine heat vent open and should not shade the bottom air intake.
   b. Room temperature above 30°C is not suitable for the use of CO_2 laser.
2. **Water temperature should not be too high :** The water temperature should be between 5°C-30°C.
   a. The starting temperature of water is low, or the machine has good heat dissipation ability, the continuous cutting time can be longer.
3. **Reduce the high-power operation time :**
   a. If the water temperature is too high due to continuous cutting, you should wait for the machine to dissipate heat and the water temperature to decrease before clicking “Resume” for operation. This will not affect the engraving result. A suitable pause in cutting will help to improve the heat dissipation and can effectively increase the continuous cutting time.
   b. Arrange engraving works between the cutting jobs so that the laser tube can have enough time to dissipate heat.
4. **The water pump should be at least 80% full :** More water will make the water temperature rise more slowly. If the water level in the water pump is less than 80% full, water should be added 【Maintenance】 Water changing and adding. (p.174) > Press the water hose to discharge the air bubbles inside the laser tube as many as possible. The water-cooling system of this model is a closed water circuit, if the water pump cap is covered, general use will not cause water evaporation, the water level of the water pump drops, if the water level decreases significantly within a week, please contact your reseller.

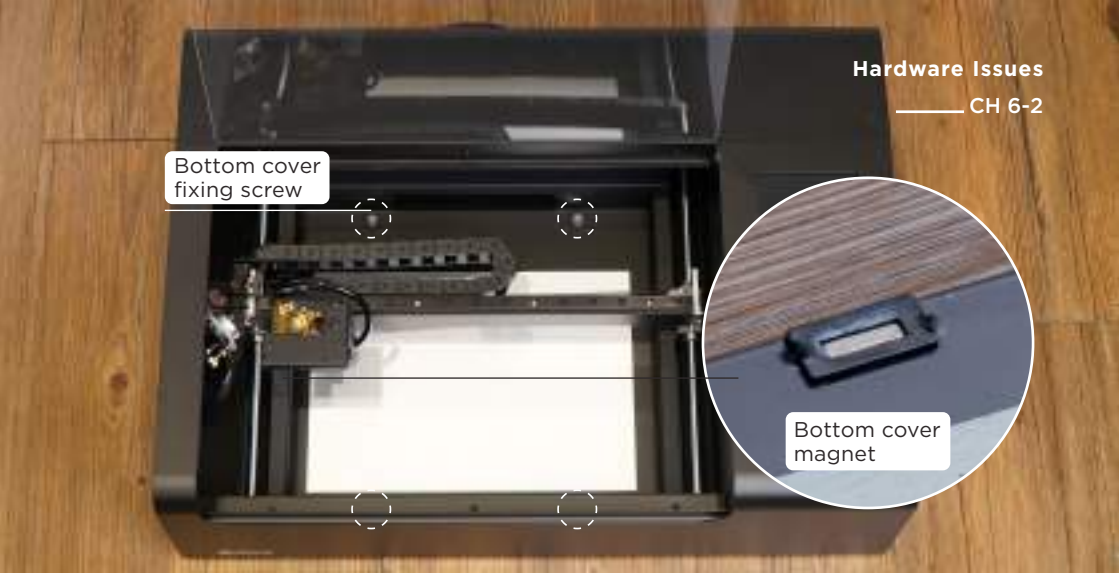
5. **Water cooling fans work normally :** Put the right half of the machine out of the table for testing > Press the “MAINTAIN” on the machine screen > Click “Pump”. After the water pump is turned on, you can reach underneath the machine and feel whether the two water cooling fans have normal air inlet (the air outlet is located on the right side of the machine and the air volume is too small to judge).

Troubleshooting Records :

1. **Photo :** Flow speed reading (should be greater than 1.0 L/min) (“MACHINE” > “Hardware Settings” > “Test Flow Speed”)

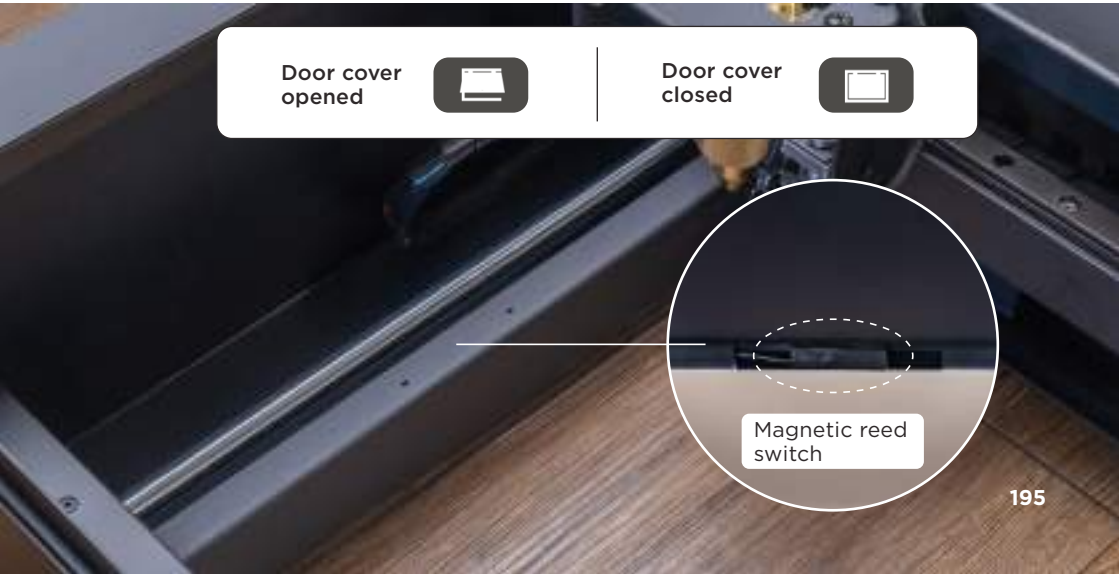
#903
Bottom Cover Opened

Preparation Items : Self-preparation : 1 | Super glue, 2 | Magnet



Test Items :

1. **Check the bottom cover fixing screw :** Remove the honeycomb table【Maintenance】Honeycomb Table Cleaning, step 1. (p.137) > Confirm whether the 4 fixing screws on the bottom cover are tight.
2. **Check the bottom cover magnet :** Unscrew the 4 screws on the bottom cover counterclockwise > Remove the bottom cover and make sure the magnet on the left side of the bottom cover is not disconnected or missing. If the magnet on the bottom cover is off but not lost, you can glue the magnet back on the magnet base with super glue. If the magnet is lost, please contact your reseller.
3. **Test the magnetic reed switch :** Unscrew the 4 screws on the bottom cover counterclockwise > Click “MAINTAIN” on the screen > Take another magnet to cover the magnetic reed switch > Close the bottom door cover > Observe the door cover symbol in the upper right corner to see if it is closed normally.



4. **Check the rotary add-on magnet :** If you are using a rotary add-on, please make sure the magnet on the rotary add-on is not missing. If the magnet is missing or damaged, please contact your reseller.

Troubleshooting Records:

1. **Photo :** Take pictures of
   a. Bottom cover magnet (whether it is off)
   b. Rotary add-on magnet (whether it is off)
2. **Video :** Test the magnetic reed switch, including the use of external magnet, and the change of the door cover symbol before and after tightening the bottom cover back.

#904 Homing Failed

Since the reason for "#904 Homing Error" is rather complicated, please provide the troubleshooting video to your reseller directly.

Troubleshooting Records :

1. **Video :** The complete homing process should be recorded.
   The screen should cover the whole machine. When the homing process starts, focus on recording the screen and sound at the top left of the machine. Manually pull the laser head to the center of the working range > click “MAINTAIN” on the screen, then the laser head will move up to the top and then move left to the far left to complete the homing. As shown in the picture.

Focus probe of manual focusing is cracked

Preparation Items : 1 | Acrylic with thickness from 3mm to 5mm, 2 | Needle nose pliers
Support Center : 3 | Focus probe cutting file (.dxf)

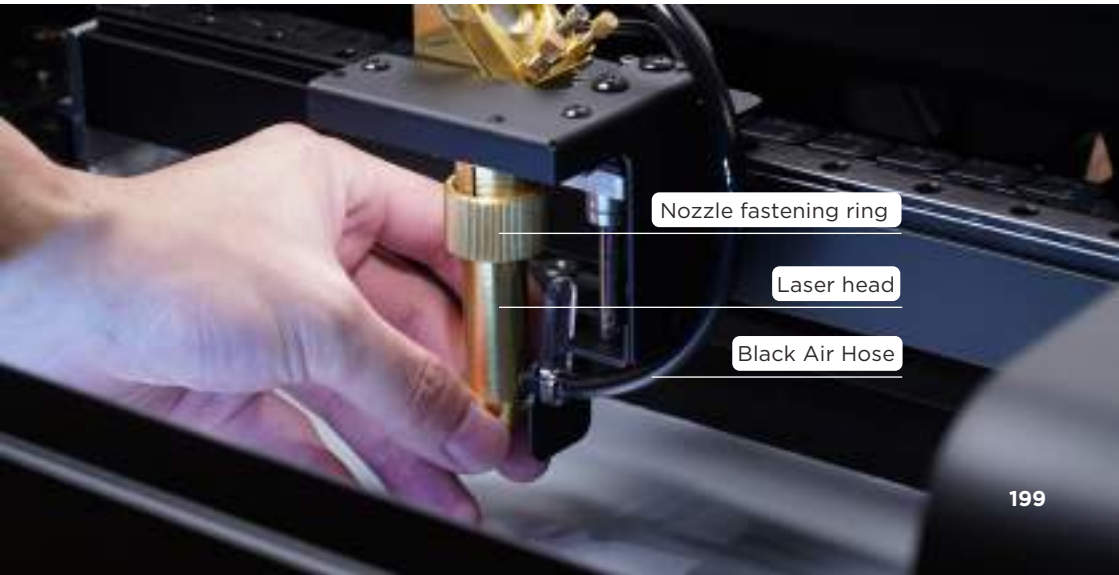
1

2

Operation Steps :

1. **Download the focus probe cutting file :** Go to the official website > “Supports” > “Help Center” and search for the focus probe cutting file > download the file.
2. **Cut the focus probe :** Put in the acrylic > Focus, so that the distance from the laser outlet to the acrylic is 12mm (about the thickness of 6 NT$10 coins) > Import the focus probe file into Beam Studio > Adjust the cutting parameters > Send out the work.
3. **Remove the air hose from the laser head :**
   a. Take out the honeycomb table as shown above. 【Maintenance】 Honeycomb Table Cleaning, step 1 (p.137) >

   b. Unscrew the nozzle fastening ring > Remove the laser head > Take out the laser head and the black air hose forward and downward.



c. Move the old focus probe back and away from the laser head.

d. Hold the black air hose at the back end of the pliers with a low density saw tooth and rotate the laser head counterclockwise to remove the air hose. Avoid deformation of the hose during the removal with the pliers.

Focus probe attached flat to the outside of the mount metal

4. **Replace the old focus probe with a new one :** Remove the old focus probe > Put the new focus probe into the black air hose.
5. **Put back the air hose on the laser head :**
   a. Rotate the laser head clockwise to combine the black air hose with the laser head.
   b. Place the laser head and black air hose upward and backward so that the hose is placed in the slot.
   c. Tighten the nozzle fastening ring > Move the focus probe toward the laser head so that it is flat against the outside of the bracket > Place the honeycomb table back 【Maintenance】Honeycomb Table Cleaning, step 3 (p.137).
6. **Check the air pump :** Click “Air Pump” on the screen > Place a piece of paper at the laser outlet and test whether the laser head is blowing air normally. If there is no air, please contact your reseller.

Troubleshooting Records :

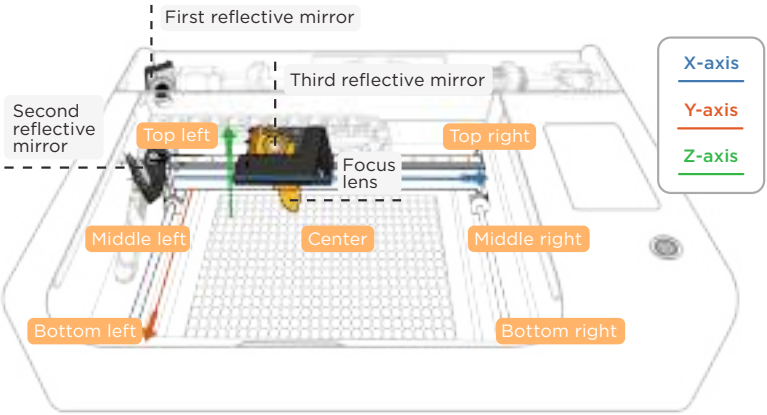
1. **Video :** Place a piece of paper at the laser outlet and record the laser head blow ing air. (Click “MAINTAIN” on the screen > “Air Pump”)

Material cannot be cut through

elf-Preparation Items: As described in the Test Items.

Test Items :

1. **Make sure the focus is correct :**
   Manual focusing : When the focus probe is turned down, it should just touch the surface of the engraving material.
   Autofocus : Double click the side button, the probe should just touch the surface of the engraving material and the distance between the laser head and the surface of the engraving material should be 12mm±1mm.
2. **Check the screen power setting :** The power on screen is preset to x1.00. If the software power and the screen power are multiplied by less than 17%, it is possible that there is no laser beam output.
3. **Make sure the mirrors and lens are clean and undamaged :** Clean the reflective mirrors and focus lens, please refer to 【Maintenance】Mirrors and Lens Cleaning (p.140).
4. **Make sure the optical path is not misaligned :**
   a. Put the double-sided tape on the first reflective mirror > Make sure the laser spot is on the first reflective mirror.
   b. Apply the double-sided tape to the second reflective mirror > Make sure the bottom left and top left laser spots overlap.
   c. Apply the double-sided tape to the third reflective mirror > Make sure the middle right and middle left laser spots coincide.
   d. Apply the double-sided tape to the laser outlet > make sure the laser spot is in the center.
   If the above conditions cannot be met, it means the optical path is misaligned and needs to be aligned 【Maintenance】Optical Path Alignment (p.148).
5. **Confirm that the laser tube is not degrading :** If you have confirmed 1-4 items but still cannot cut the engraving material, please contact your reseller.



Reflective mirror

Focus lens

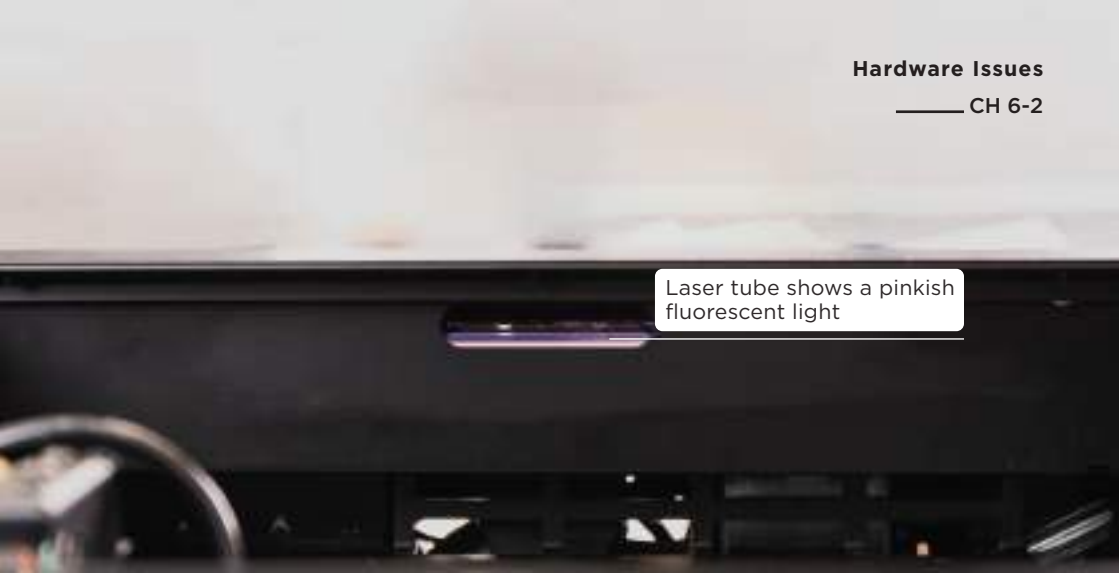
Troubleshooting Records :

1. **Photo :** Take pictures of
   a. 3 reflective mirrors (whether there are stains)
   b. Focus lens (whether there are stains)

c. Double-sided tapes on 3 reflective mirrors after optical path alignment (shapes and colors of laser spots)

No Laser Beam Output

Preparation Items : Self-preparation : 1 | 2.5mm hexagonal wrench
Included in the accessory box : 2 | Torx screwdriver, 3 | Double head wrench, 4 | Double-sided tape



Test Items :

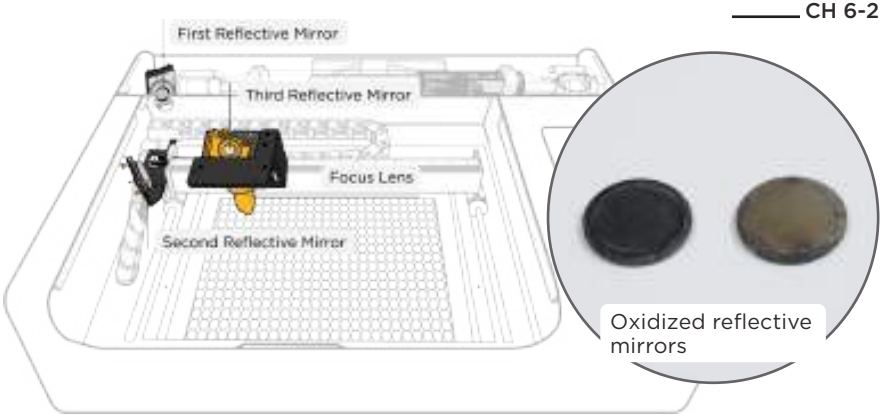
1. **Stop using the machine when there is an abnormal sound :** If the laser outlet does not show light and the laser tube makes a "cracking" sound during the use of the machine, it means that the laser tube is malfunctioning, please stop using it immediately to avoid overloading the power supply and causing damage to other parts.
2. **Observe whether there is light in the laser tube :** If there is no obvious noise but still no laser beam comes out, please observe whether there is a light from the laser tube. Go to the "MAINTAIN" page > Make sure the power setting is x 1.00 > Close the door cover > Click on "Laser Pulse" > At the moment of clicking, you should see a pinkish fluorescent light instantly from the laser tube observation hole. If there is fluorescence, it means the laser is operating normally, please refer to 【Maintenance】Optical Path Alignment (p.148). If there is no fluorescence, please contact your reseller.

Troubleshooting Records :

1. **Video :** Record the laser tube observation hole status at the moment of pressing "Laser Pulse" (whether there is pinkish fluorescence).
2. **Photo :** If there is pink fluorescence, please provide double-sided tapes on 3 reflective mirrors after optical path alignment (shapes and colors of laser spots).

Mirrors and lens are oxidized or broken

Preparation Items : Self-Preparation : 1 | Needle nose pliers
Included in the accessory box : 2 | Torx screwdriver



Test Items :

1. **Check if mirrors and lens are oxidized or broken :** If there are black spots, white spots, etc. on the surface of the first and second reflective mirror, or if there are serious scratches, and the stains cannot be removed by 【Maintenance】Mirrors and Lens Cleaning (p.140), or if the focus lens is deformed or broken due to external force, the mirrors and lens should be replaced.

Replacement Steps :

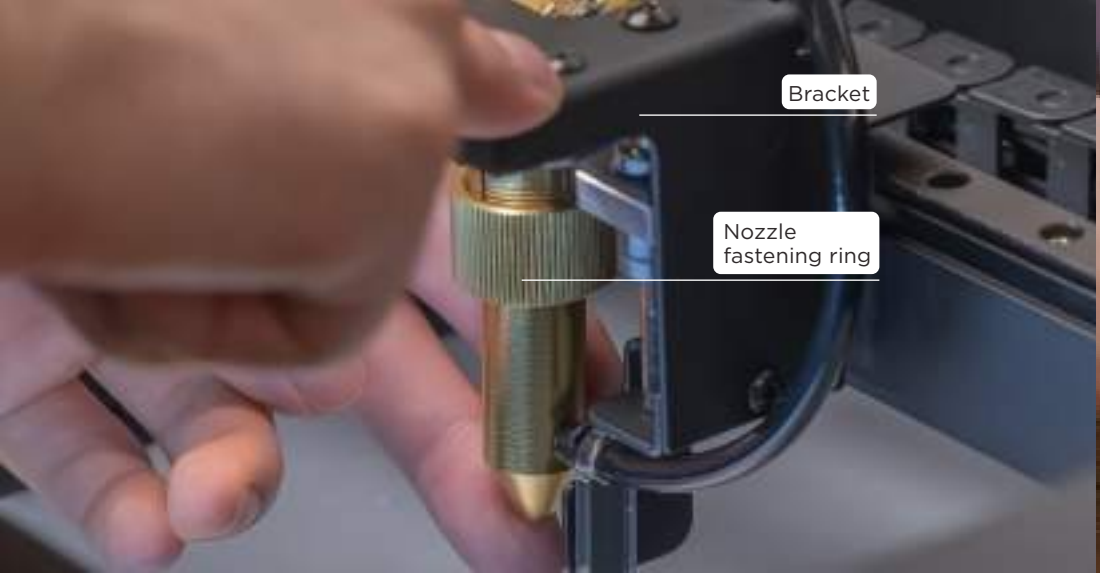
First reflective mirror :

a. Open the back cover: Please use a Torx screwdriver to remove the 6 screws on the back cover and then remove the back cover. 【Maintenance】Optical Path Alignment (p.148) >

b. Loosen the aluminum cover: Loosen the aluminum cover that fixes the mirror (face the mirror and turn counterclockwise), if it cannot be turned, use needle nose pliers to clamp the aluminum frame and turn again >

c. Replace the mirror: Take out the old mirror > Put the new mirror with the matte side facing the mirror holder (laser beam will hit the shiny side) >

d. Tighten the aluminum cover: Tighten the aluminum cover back to the mirror holder.



Second reflective mirror : After opening the door cover, follow the first reflective mirror steps b-d (the position of the second reflective mirror is indicated in the picture in p.201).

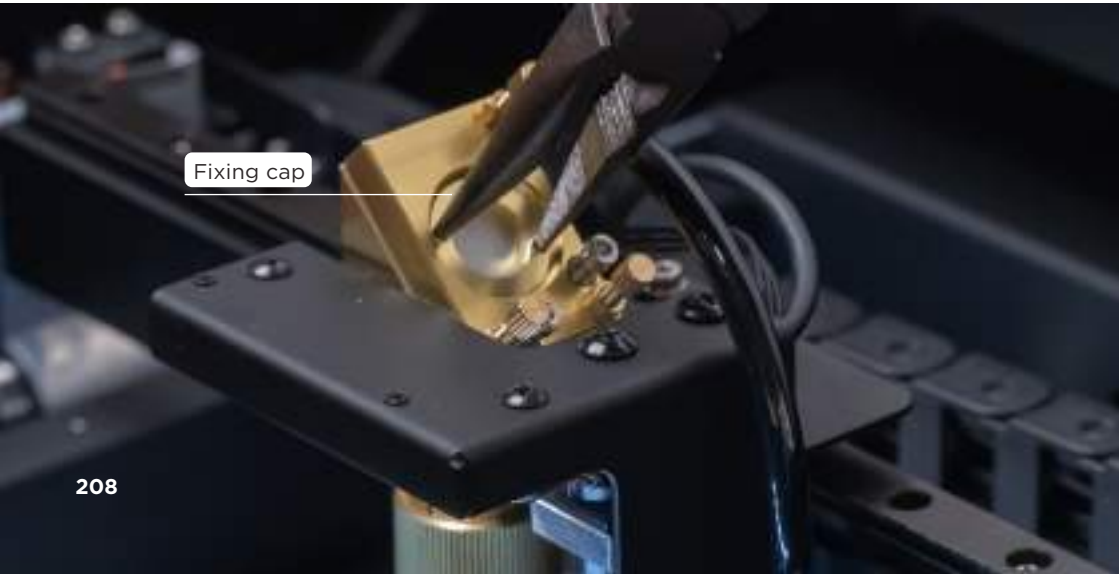
Third reflective mirror :

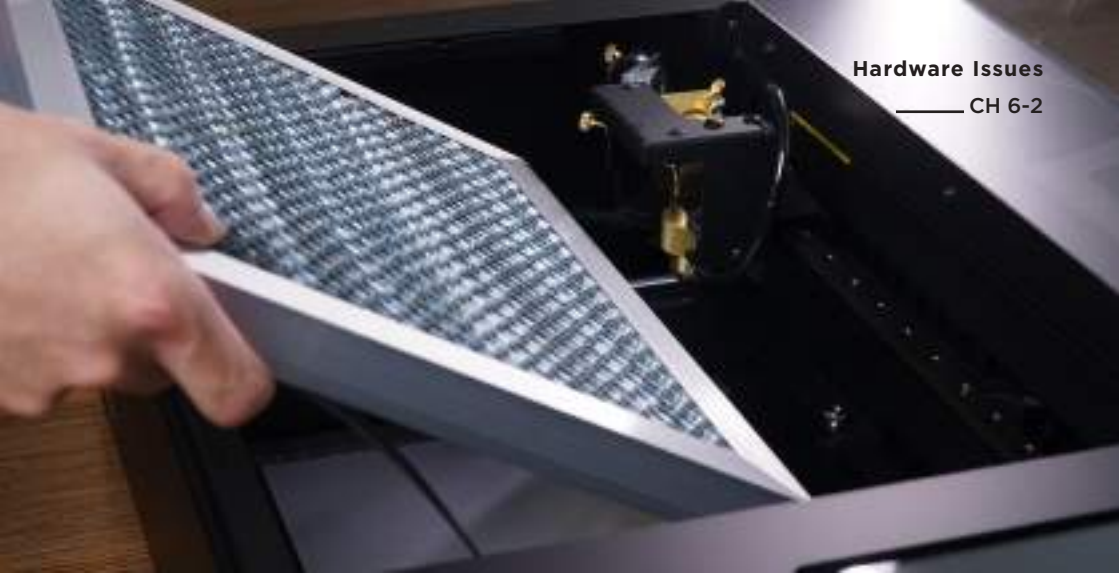
a. Move the bracket downward: As shown in the picture above, unscrew the nozzle fastening ring > Push the bracket down to the end so the subsequent steps will be easier to operate >

b. Loosen the fixing cap: Use the needle nose pliers to hold the two round points of the fixing cap of the mirror, and unscrew the fixing cap counterclockwise >

c. Replace the mirror: Take out the old mirror, you can pull out the mirror from the laser inlet area > Place the new mirror with the shiny side facing the mirror holder >

d. Tighten the fixed cap: Use needle nose pliers to hold the two round points of the fixing cap of the mirror, and tighten the fixing cap clockwise.





Focus lens:
a. Remove the honeycomb table【Maintenance】Honeycomb Table Cleaning, step 1 (p.137).

b. Loosen the fixing cap : Unscrew the nozzle fastening ring > Remove the laser head > Turn the silver mounting cap counterclockwise from the laser head, if it cannot be unscrewed, use needle nose pliers to assist >

c. Replace the lens: Remove the old lens > Put the new lens into the laser head with the flat side downward (hold the edge of the lens and look into the lens, you can see yourself on the convex side, but you cannot see yourself on the flat side) >
d. Tighten the fixing cap: Tighten the silver mounting cap clockwise > Put the laser head back into the laser head socket > Tighten the nozzle fastening ring.
e. Put the honeycomb table back 【Maintenance】 Honeycomb Table Cleaning, step 3 (p.137).

Troubleshooting Records :

1. **Photo :** Take pictures of
   a. 3 reflective mirrors (whether oxidized or broken)
   b. Focus lens (whether oxidized or broken)

Minor electric shocks from chassis

Everyone's sensitivity to electric current is different, that is, everyone will have different degrees of feelings about leakage. Due to the design mechanism of the laser tube, there will be a slight controlled leakage current for the tube to function properly, which is a normal phenomenon, do not worry too much. The laser cutting machine must be properly grounded while using. If it is properly grounded, there will be no leakage. If you touch the machine when it is operating, and you may feel a minor electric shock, it maybe the 3-prong outlet is not properly grounded, or the third prong is not fully grounded.

Preparation Items : Self-preparation : 1 | Phillips screwdriver, 2 | Ground wire, 3 | 3-prong adapter

Solution :

1. DIY grounding : Connect the machine's power cord to a 3-prong adapter > Connect the adapter's ground terminal to the building's metal piping to achieve an approximate grounding effect.

2. Wear shoes to use the machine : Avoid using the machine with bare feet, wearing shoes can reduce the risk of electric shock.

3. Plug the adapter into the outlet reversely : If you are unable to DIY, connect the power cord to the 3-prong adapter and plug it into the outlet in the opposite direction (rotate 180 degrees).

CH 6-3

Software Issues

Unable to Open Software Properly

Windows
If your computer pops up a not responding window when you open the software, please make sure you have installed Visual C++ Redistributable on your computer. Please install Visual C++ redistributable packages for Visual Studio 2015, 2017 and 2019.
macOS
Please update your system to macOS 10.14 (Mojave) or above. Some older versions of macOS may have support issues.

Other Software Error Codes

When the software is abnormal, error messages will pop up in your computer window. If you are unable to follow the steps below to resolve the software issues, please contact your reseller.

Steps to Follow :

1. **Record :**
   a. Record the current software and firmware versions.
   b. Explain the operation behavior (or recording) and take screenshots.
2. **Export a bug report :** Export a bug report when an error message pops up. (Menu > “Help” > “Bug Report”)
3. **Retry:** Reopen the software > Retry the behavior.
4. **Check the Help Center :** Go to official website “Supports” > “Help Center” to search for solutions. (https://support.flux3dp.com/hc/en-us)
5. **Update software and firmware :** Update software and firmware to the latest beta version > Retry the behavior.
6. **Record again :** As in step 1.
7. **Export another bug report :** As in step 2.

Troubleshooting Records :

1. The information collected in steps 1, 2, 6, and 7.
2. .beam files and image files, etc.

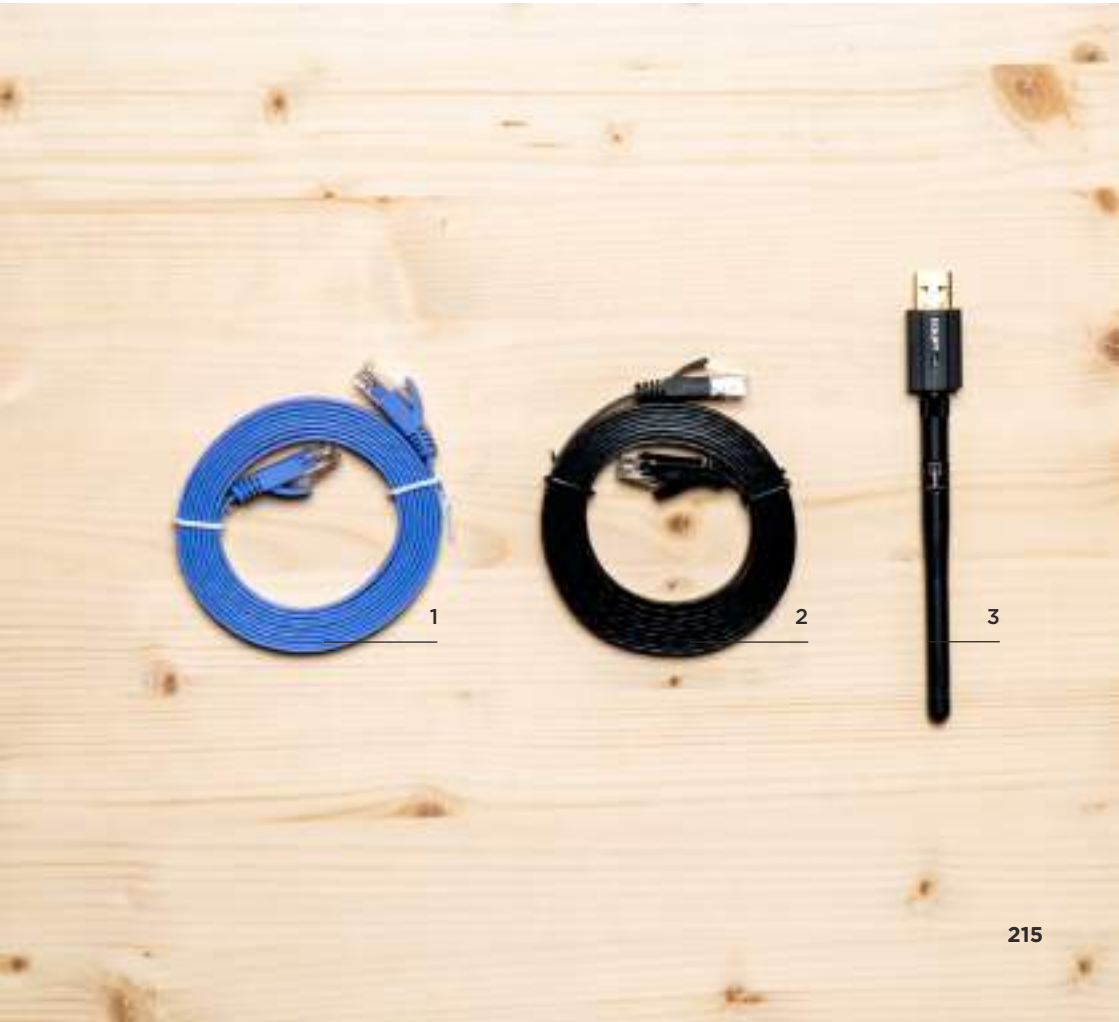
CH 6-4

Comprehensive Issues

Connection Issue

Make sure that the MAC Address in the "NETWORK" of the machine screen has a value, IP address starts with 192.168 and the network quality is good so that you can have a stable connection.

Preparation Items : Self-preparation : 1 | Ethernet cable (Wired Network*1 or 2, Direct Connection*1)
Included in the accessory box: 1 | Ethernet cable, 2 | Wi-Fi dongle



Test Items :

1. There is a value for MAC Address in the "NETWORK" page :

a. Wi-Fi :

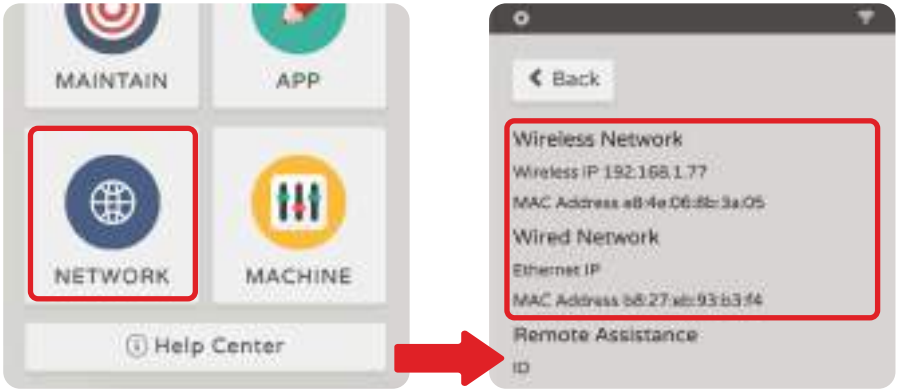
Screw the Wi-Fi dongle firmly > Fold the dongle antenna up 90 degrees and insert it into any USB socket on the back of the machine > Click "NETWORK" on the machine screen > Check whether MAC Address under Wireless Network has a value, as shown below. If there is a value, then please go directly to the 2nd test item. If there is no value, please insert the Wi-Fi dongle into another USB socket for use. If neither socket shows the MAC address, please contact your reseller.

b. Wired Network : (machine - router – computer, take 2 ethernet cables as an example):

One RJ45 ethernet cable connects the machine to the router and the other RJ45 ethernet cable connects the router to the computer > Click "NETWORK" on the machine screen > Verify that MAC Address under Wired Network has a value, as shown below. If there is a value, please go directly to the 3rd test item. If there is no value, please try to replace the network cable or contact your reseller.

c. Direct Connection (machine-computer) :

A RJ45 ethernet cable is connected to the machine and the computer on both ends > Enable Internet connection sharing 【Start】2-5.3 Direct Connection (p.055), Windows setting as 1, c, MacOS setting as 2, c~e > Click "NETWORK" on the machine screen > Check if the MAC Address under Wired Network has a value, as shown below. If there is a value, then you can go directly to the 3rd test item. If there is no value, please try to change the network cable or contact your reseller.



2. **"Connect to WiFi":** "Connect to WiFi" > Select the Wi-Fi you want to use > Enter the Wi-Fi password and press "Confirm".
   a. If the Wi-Fi name is not displayed :
   Make sure the Wi-Fi channel is 2.4Ghz, the machine does not support 5Ghz.
   b. If Wi-Fi name is displayed, but you cannot connect to it :
   Check the Wi-Fi encryption type, it should be WPA2 or None (no password). The encryption type can be set by your computer, but be aware that not all routers support WPA2.
   c. Unable to connect to iPhone hotspot :
   Make sure the phone hotspot name should not have special characters or non-English characters. If the phone system is iOS 13, keep the hotspot page open when the machine connects to the hotspot; if the connection fails, turn off the hotspot for about 10 seconds, then reopen the hotspot and try to connect again.

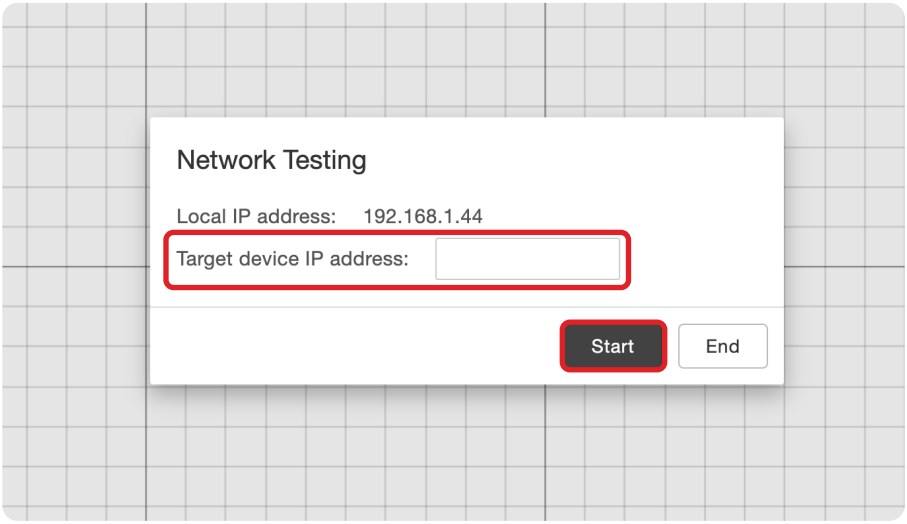
3. **Confirm the beginning of IP address :**

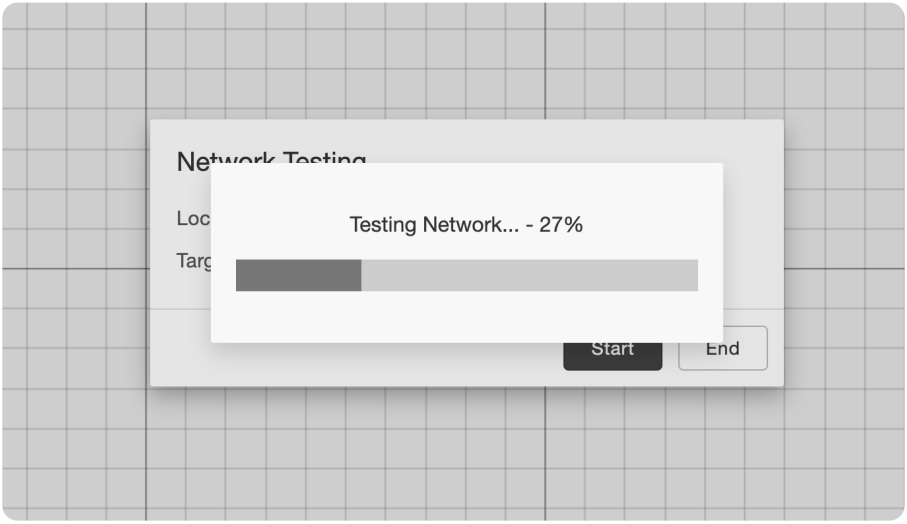
   a. Wi-Fi :
   Make sure the "Wireless IP" of the machine starts with 192.168.
   b. Wired Network :
   Verify that the "Ethernet IP" of the machine starts with 192.168.
   c. Direct Connection :
   Verify that the "Ethernet IP" of the machine starts with 192.168.
   d. If the IP address starts with 169.254 :
   If the IP address starts with 169.254, it means that the network interface card did not obtain the IP address automatically. And usually this is because the router does not have DHCP service enabled or the DHCP service is malfunctioning. Please contact your internet service provider to turn the DHCP function on.

4. **Fill the IP address of machine in Beam Studio:** Fill the IP address starting with 192.168 in the software.
   a. Windows :
   Menu > "File" > "Preferences" > Machine IP Address > Apply.
   b. macOS :
   "Beam Studio" > "Preferences" > Machine IP Address > Apply.
   c. Linux :
   "Beam Studio" > "Preferences" > Machine IP Address > Apply.

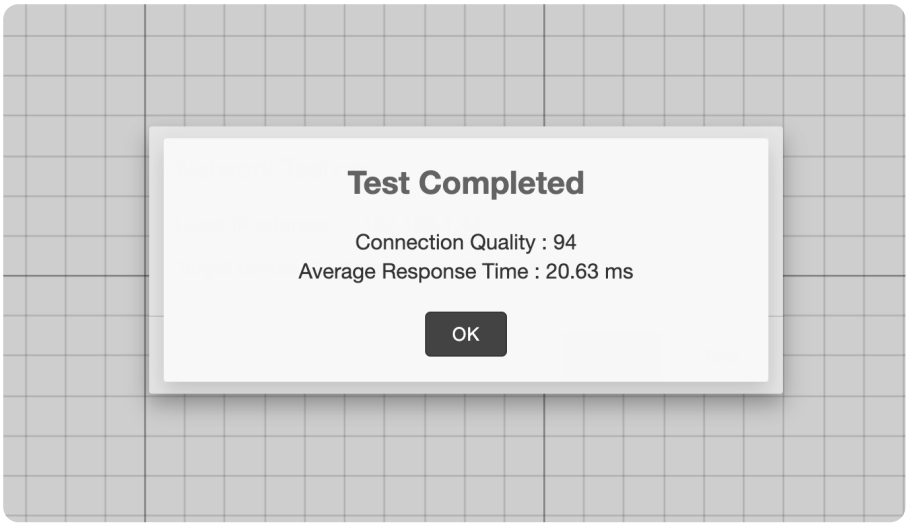
5. **Test the connection stability :** If the software still cannot find the machine after filling the IP into the software, please confirm the connection stability.
   a. Menu > "Machines" > "Test Network Settings" >

b. Fill in the IP of the machine you want to use in "Target device IP address" > "Start" >



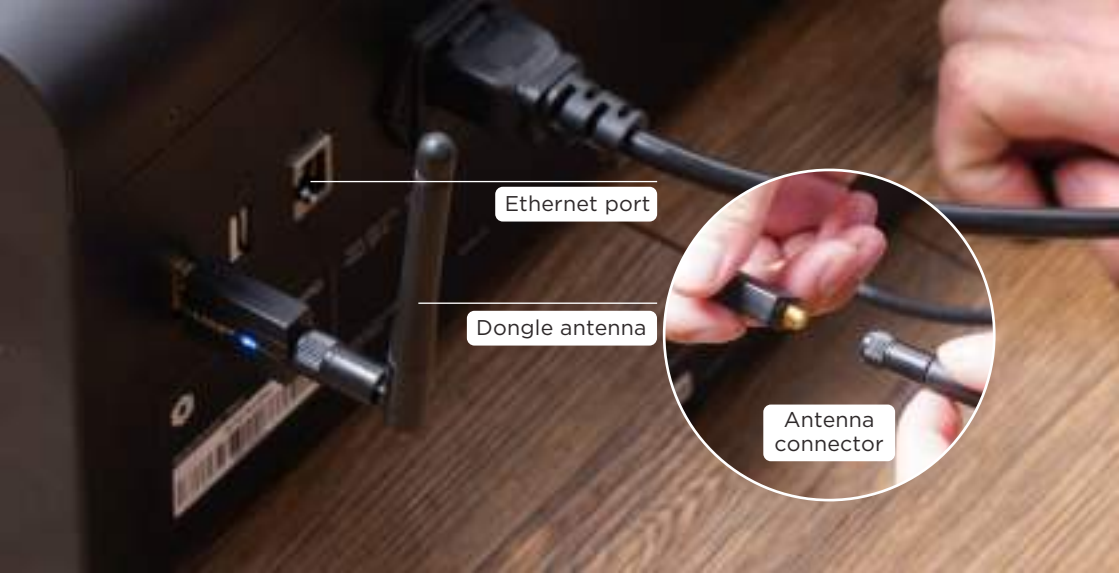


c. The test data includes Connection Quality and Average Response Time >



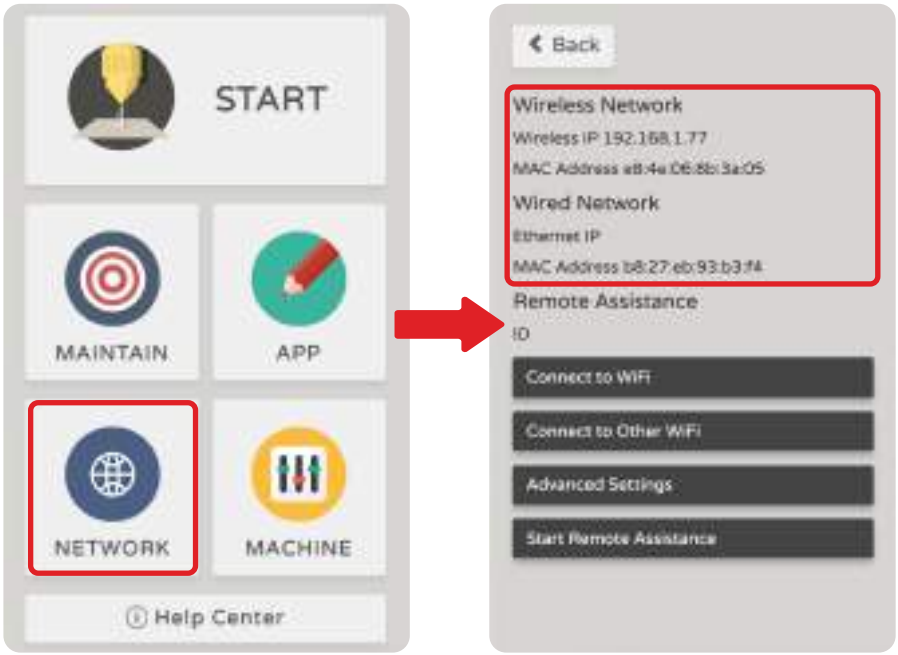
After Beam Studio version 1.4.2, Connection Quality > 70 and Average Response Time < 100ms means the connection is stable. If the connection is stable but the software cannot find the machine, please update the software and fill in the IP in “Preferences” > Machine IP Address. If the connection is not stable, please check the Wi-Fi signal strength and whether the computer and the machine are using the same network.

If you have other connection problems, please refer to “FLUX > Supports > Help Center > Beam Studio > Connection” for other instructions.



Troubleshooting Records :

1. **Photo :** Connect the Wi-Fi dongle or ethernet cable > Turn on the machine > Click "NETWORK" and take pictures of :
   a. Antenna (connector, angle) or etherne port
   b. Wireless Network MAC Address, Wired Network MAC Address
   c. Wireless IP, Ethernet IP
   d. Screenshot of the result of “Test Network Settings”



Camera preview screen stitching is inaccurate, Actual engraing position is different from camera preview position

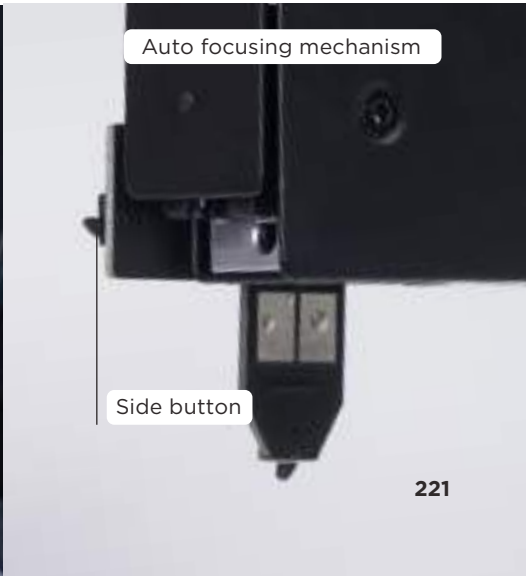
Accurate focus and calibration can make the preview picture stitching more accurate and make the engraving position consistent with the preview position.

Test Items :

1. **Confirm the correct plane of focus :**

Manual Focusing : When the focus probe is turned down, it must touch the surface of the engraving material, and every time you change the material of different thickness, you need to adjust the height of the laser head to ensure the correct focus.

Autofocus : Double click the side button on the side of the autofocus add-on above the engraving material to allow the laser head to automatically reach the correct plane of focus. When engraving, if the focus is not correct, the laser beam will be thicker than the laser beam with correct focus.



Thicker object : When the object is thicker or when the rotary add-on is used, the side of the object may be captured by the camera, and only the objects on the plane of focus can be stitched together, and the picture out of focus and inaccurate stitching caused by the height difference is normal. Be sure to focus on the surface of the engraving material and the highest point of the engraving material when using the rotary add-on.

2. Complete camera calibration (left picture) :

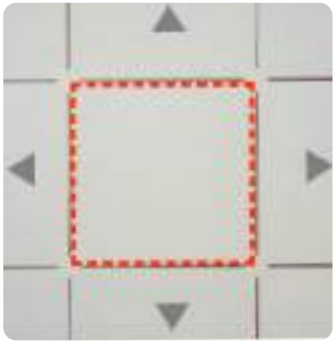
After exposing to shock and vibration of transportation, optical path alignment, and Reset to Factory, etc., all need to be recalibrated. The calibration steps are as described in 【Beam Studio Tutorial】 Step 2 (p.063).

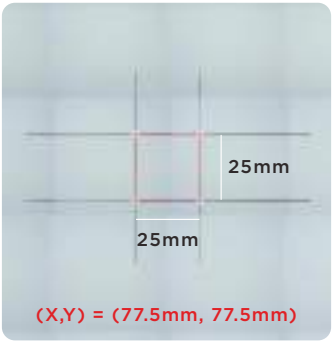
There are two calibration objectives:

a. The red square must be located in the center of the calibration window.

b. The outside of the red square must be aligned with the center square of the grid lines

3. Confirm the calibration result (right picture): Draw a square at (X,Y) = (77.5mm, 77.5mm) with a width W and height H of 25mm and make sure the square overlaps with the center square of the grid lines. If it does not fit, refocus the paper and recalibrate the camera.





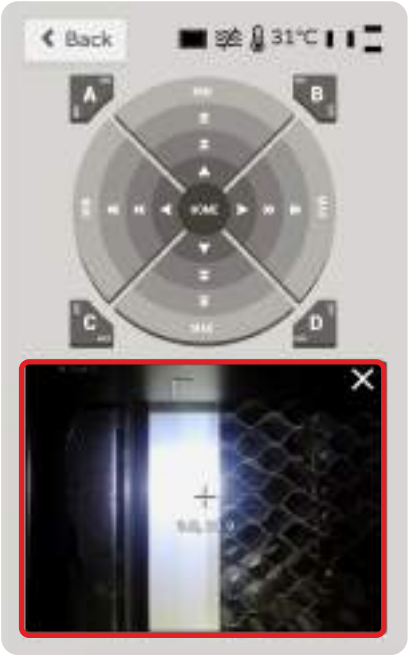
Troubleshooting Records :

1. **Image file :** If there is still a discrepancy between the result and the preview position after using SVG file and confirming the correct plane of focus and accurate camera calibration, please provide the SVG file to the your reseller and let the engineering team assist.

Camera Preview Timeout or Failed to Connect

Troubleshooting Records : The reason for not being able to use the camera may be related to hardware or software, so please directly provide the troubleshooting video to your reseller for evaluation.

1. **Video :** The screen should cover the whole machine, focusing on recording the machine screen. Click "MAINTAIN" > "Motors" > "Camera" > Open the door cover > Slowly move the laser head around the working range for 3 rounds and observe whether there is a picture on the screen, as shown in the picture, if the picture is white, please contact your reseller. (Note that the camera updates the screen every 3 seconds.)



Camera preview speed is too slow

Test Items :

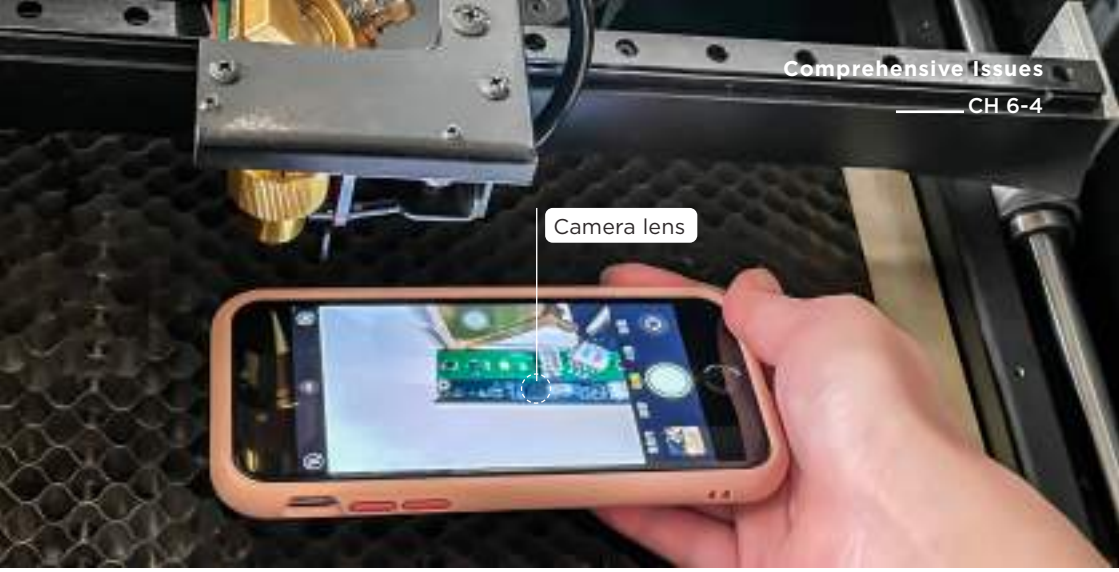
1. **Wi-Fi dongle is not loose :** Make sure the Wi-Fi dongle at the back of the machine is not loose, and the antenna connector has been tightened.
2. **Shorten the distance between the machine and the hotspot :** Shorten the distance between the machine and the wireless network source (router or hotspot), or try to use wired connection. If the above items do not solve the problem of slow camera preview speed, please refer to "Camera Preview Timeout or Failed to Connect" or contact your reseller.

Camera preview screen is blurry

Test Items :

1. **Check the cleanliness of the camera lens :** Click "MAINTAIN" on the screen > "Camera" > check the cleanliness of the lens from the screen panel.

Preparation Items : Self-preparation : 1 | Cotton swab, 2 | 75%-99% alcohol



Operation Steps :

1. **Clean the camera lens :** Use a cotton swab with a small amount of alcohol to clean the camera lens > Then use a dry cotton swab to dry the lens.
2. **Confirm the camera screen :**
   a. Click "MAINTAIN" > "Camera" > confirm the lens is clean from the screen panel.
   b. Use the software Beam Studio camera preview function to confirm that the camera preview screen is clean.

Camera preview screen is overexposed

Test Items :

1. **Confirm that the environment is free of strong light interference :**
   a. Check that there is no strong light above the machine, such as track lights, flurescent lamps, etc.
   b. Make sure the machine is not placed in a place in harsh sunlight.

Preparation Items : Self-preparation : 1. dark fabric or cardboard.

Operation Steps :

1. **Remove or shield the strong light source :**
   a. Cover the acrylic door cover above the engraving material with a dark fabric or cardboard.
   b. Turn off the indoor light source above the machine.
2. **Retry the camera preview :** Make sure that the camera preview screen is back to normal.

CH 6-5

Contact Customer Service

The contents of this chapter are subject to actual use.

FLUX > “Supports” > “Help Center” has more resources to help users with easy troubleshooting. If you are unable to troubleshoot a problem according to this manual or Help Center, please provide the following items to your reseller.

The following information is subject to actual use :

Name :
Telephone :
email :
Address :
Purchasing platform : For non-FLUX official website purchasers, please provide a photo of the order details.
Operating system : Windows / macOS / Linux
Software version : Windows: Menu > “Help” > “About Beam Studio”.
macOS: Menu > “Beam Studio” > "About Beam Studio”.
Firmware version : Machine screen, “MACHINE” > Firmware Version.
Laser tube usage hours : Machine screen, “MACHINE” > Laser Tube Usage.
Machine serial number : Please provide a photo of the sticker on the back of the machine.
Troubleshooting Records : Please provide photos or videos according to the Troubleshooting Records in this chapter.

Contact your reseller to get a prompt support!

Contact FLUX :
Private message to Facebook fan page : https://www.facebook.com/flux3dp.tw
email : support@flux3dp.com

Help center

CH 7

Warranty

The contents of this chapter are subject to actual use.

During the production process, FLUX Technology Inc. (hereinafter as, “we, us, our, FLUX”) examines FLUX products strictly to ensure the quality and reliability of the products before delivery to the customer. Nevertheless, under certain circumstances, products may not perform as expected. If any problem occurs, please first make sure you have followed the setup instructions on the FLUX Help Center. Then, please contact your reseller, or FLUX technical support, in the case of directly purchasing from FLUX Inc. website, to diagnose the problem.

Scope of Warranty

1. FLUX Inc. warrants only the hardware (excluding accessories and consumable parts) against defects in materials and workmanship when used as instructed in the manual. *Consumable parts include reflective mirrors, focus lenses, and vent hoses.
2. We offer a non-transferable limited warranty that covers products purchased from an authorized FLUX retailer against defects in materials or workmanship.
3. Customers must provide machine serial number and related information as proof of purchase. *Prior to returning any products, customers must receive an approval of shipping from our authorized reseller via email or phone. We will not accept any unapproved returned goods.
4. During each product’s warranty period, the following procedures might occur (1) sending parts to customer and tutorials for repair, (2) Approved return of the product to our authorized local reseller for (i) repair with new or refurbished parts, (ii) replacement with a new or refurbished product if:
   - The product was properly used according to the manufacturer’s intended purpos es and instructions.
   - The product was not damaged due to acts of nature, such as lightning, flood or fire.
   - The product’s casing was never disassembled without permission.

   *Note : Particles, scratches, unevenness, or other appearance issues which do not affect the function of the machine, are not covered by the warranty and cannot be replaced.
5. Under the specified warranty period, our authorized local reseller may recall and repair your products and absorb the local shipping fee (international shipping is not included) without charging you.
6. Original packaging is required to claim warranty; shipping in any other packag ing will not be accepted. We advise you to keep the original packaging for possible return. If there is a need for an original package, please contact our authorized local reseller for detailed purchase information.

Warranty Period

Warranty period starts at the time of customer receipt of products.
Please see the chart below for the warranty periods of the products.

Product	Warranty Period
beamo / Beambox Compact / Beambox Pro (Laser Tubes excluded)	**12 months**
30W / 40W / 50W Laser Tube	**3 months**
beamo Rotary / Beambox Rotary / Autofocus / Diode Laser Module / Beam Air	**12 months**

Post Warranty Support or Repairs

1. We continue to provide tech support via phone, email, and other online methods even when product warranty expires.
2. After the warranty period, all the costs, including but not limited to replacement parts, shipping charges, and testing fees are the responsibility of the customer.
3. Our authorized reseller will provide a quote for those possible items before recalling your products.

CH 8
Disclaimer

Disclaimer

1. FLUX Inc. does not warrant against normal wear and tear, items consumed or expended by their normal use, product misuse, or accidental damage.

2. FLUX is not liable under this warranty if any damages or defects caused by :
   (1) Improper (contrary to the stated purpose and scope of use described in relevant documentation) use of Products or Add-ons;
   (2) External force;
   (3) External water or moisture inside;
   (4) Lightning strike, overvoltage, electric power or an electromagnetic field.
   (5) Unauthorized change, correction and modification. Modification of the hardware or accessories, including but not limited to replacing parts, making permanent cosmetic changes to the machine, replacing the software or firmware, or other unauthorized changes voids this warranty policy.
   (6) Irresistible factors like earthquake, wars, fire, deluge and others natural or man-made calamities.
   (7) Damaged by improper storage conditions, operation, application and transportation.

Appendix 1

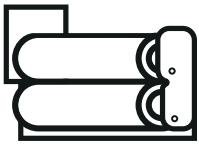
Appendix 1-1

Add-on Introduction

With the use of different Add-on combination, the engraving materials can be diversified.

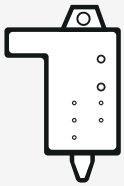
Note: Add-ons may not be available for specific regions/countries.

Rotary



Cylindrical object engraving

Autofocus



Reduced focus step with multiple cuts for deeper cuts

Add-on Contents

Rotary*1
Signal cable*1

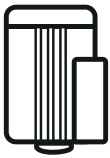
Autofocus module*1
2.5mm hexagonal wrench*1

Calibrate Camera

×

Calibrate Camera

Diode laser module

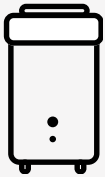


Delicate and shallow engraving
Specific types of stainless steel processing

Diode laser module*1
Orange acrylic door cover*1
Door cover sticker*1
Focusing block*1
Positioning plate*1
(for manual focusing)

Calibrate Diode Laser Module

Beam Air



Dust, tar and odor filtering

Beam Air*1
Pre-filter*4
Power cord*1
USB-A - USB-B cable*1
Clamp*1

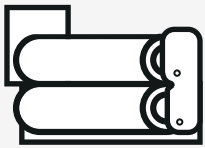
×

Appendix 1-2

Add-on Compatibility

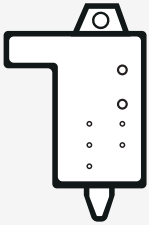
Rotary, diode laser module and autofocus can be matched with each other as shown in the table :

Rotary



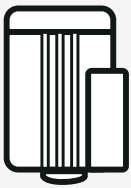
+

Autofocus



+

Diode laser module



Appendix 2

Appendix 2-1

Design Software Recommen-dations

Adobe Illustrator

Vector graphics editor by Adobe Inc.

Adobe Photoshop

Raster graphics editor by Adobe Inc.

Affinity Design

Vector graphics editor for Windows and macOS by Serif Ltd

Autodesk AutoCAD

Computer-aided design (CAD) and drafting software application by Autodesk, Inc.

Sketch

Vector graphics editor for macOS by Sketch B.V.

SketchUp

3D modeling program for architects, urban planners, filmmakers, game developers, and related professionals

SolidWorks

Solid modeling CAD for Windows by SolidWorks

Corel Draw

Vector graphics editor by Corel Corporation

Rhinoceros

3D computer graphics and CAD application, abbreviated Rhino3D

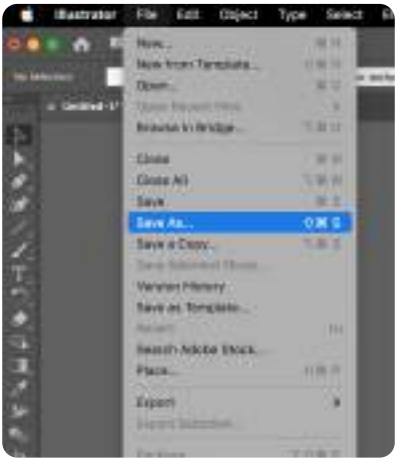
Beam Studio supports the following file formats :
SVG / PNG / JPG / DXF / PDF / AI
Version Support :
Beam Studio supported operating system versions

Exporting Adobe Illustrator SVG files :

If you are used to designing graphics in Adobe Illustrator and would like to export SVG files for use in Beam Studio, please refer to the following steps to export files to avoid incompatibility or non-support issues when importing into Beam Studio :

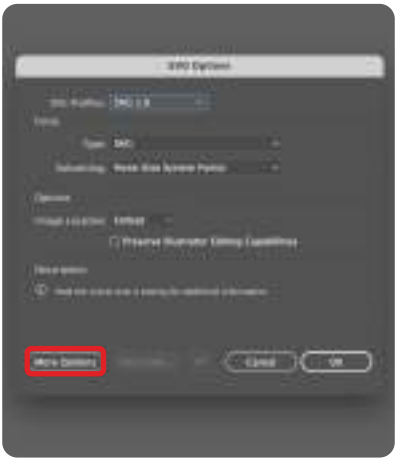
I. Make sure the strokes are center-aligned before drawing :
Window - Stroke, set “Stroke” as “Align Stroke to Center”.

II. Save the file:
1. Click “File” > Click “Save As...”.

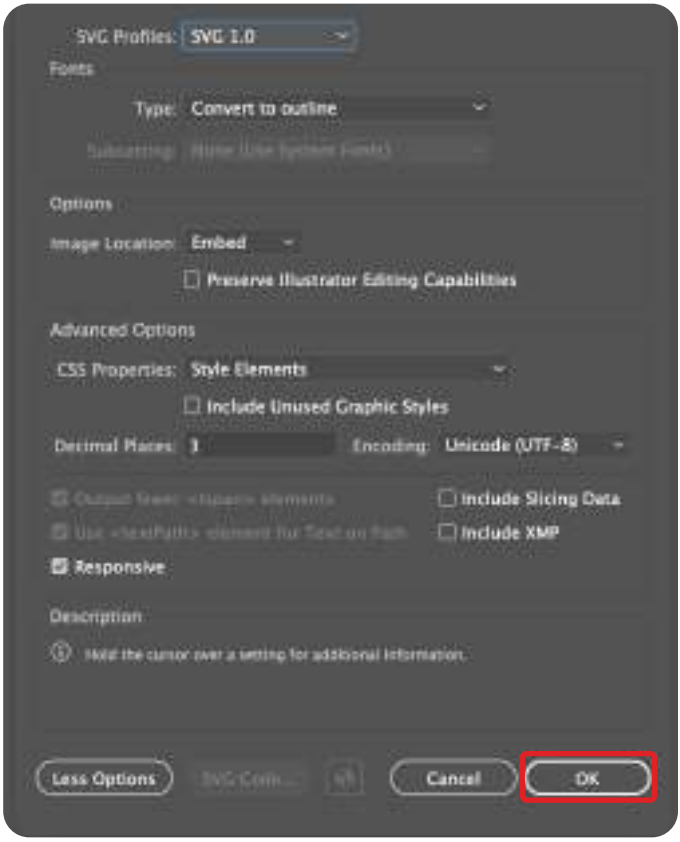


2. Select "SVG (svg)" > Click "Save".

3. When the "SVG Options" window pops up, click "More Options" in the lower left corner.



4. Please follow the screen below to set the SVG Options > Click "OK" to finish saving the file.



III. Importing files into the software :

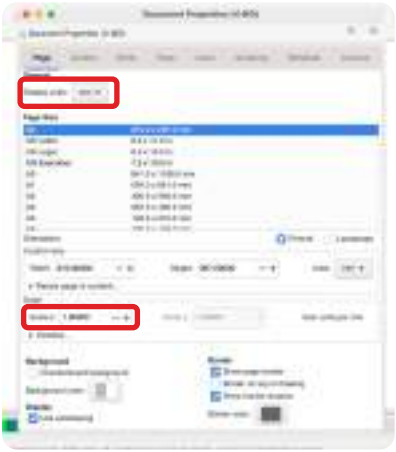
Import SVG files by dragging and dropping them into the Beam Studio window, or by clicking the "Picture" button on the left side of the Beam Studio toolbar.

Exporting Inkscape SVG files :

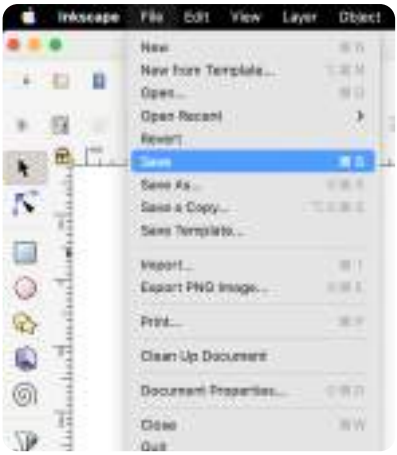
If you are used to using Inkscape to design graphics and willing to export SVG files for use in Beam Studio, please refer to the following steps to export files to avoid incompatibility or unsupported problems when importing into Beam Studio :

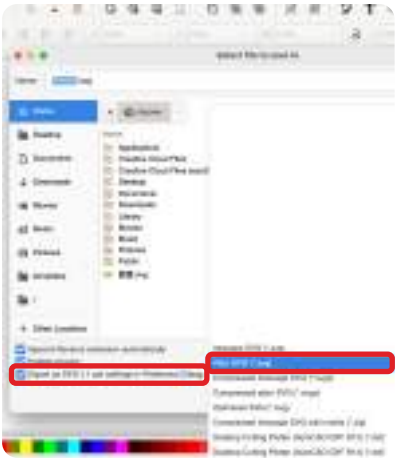
I. Check the version of Inkscape : "Inkscape" > "About Inkscape", it should be version 1.0 or above.

II. Set the document properties before sketching : "File" > "Document Properties", set the Scale to 1.0 and the Units to mm.



III. Save the file : Click "File" > "Save As..." > Select "Plain SVG (*.svg)" > Check the box to export as SVG 1.1 > "Save".





IV. Importing files into the software : Drag and drop files into the Beam Studio window or click the "Image" button on the left side of the Beam Studio toolbar to import SVG files. If you import SVG 1.1, a reminder window will pop up, click "OK" to continue using the software.

Appendix 2-2

Design Inspiration

Inspirations :

Pinterest Idea Board : https://pse.is/JXRR5
Ponoko 150 Laser Engraving Ideas : https://pse.is/HQARL

Search for "laser engraving" on Pinterest.com for more ideas

Graphic Resources :

The Noun Projects (free vector graphics) : https://thenounproject.com/
Freepik (free vector graphics) : http://freepik.com/

Wood Crafts & Paper Crafts :

DXF Projects (wood crafts) : https://dxfprojects.com/
Canon Creative Park (paper crafts) : http://cp.c-ij.com/sc/index.html
Paper-replika (paper crafts) : http://paper-replika.com/

Free Fonts :

Font-Bear (Japanese and Chinese characters) : https://fontbear.net/
Dafont (English characters) : https://www.dafont.com/

Appendix 3

Appendix 3

Maintenance Checklist

To download the form, please go to "FLUX > Supports > Help Center" > Search : Maintenance Checklist, download and print the checklist.

Maintenance Checklist provides the key points to be checked by users at different times, please follow the instructions of 【Maintenance】(p.124) for maintenance procedures.

Even if the machine is used sparingly, necessary maintenance items should still be maintained on time to ensure the machine health. Leaving the machine unused for a long time may accelerate the aging, regular use and proper maintenance is the way to avoid the machine from being out of action.

Maintenance Checklist

Area	Maintenance Content	Key Points to be Checked
Panel	Screen cleaning	Clean the dust and grease off the panel.
Working Area	Honeycomb table cleaning	Remove the residue and tar oil from the mesh of honycomb table.
	Chassis cleaning	Remove the residue and tar oil from the chassis and bottom cover.
Back Cover	Water changing and adding*	Add water and fill the water pump to more than 80% full without a large amount of air bubbles.
	Ventilation fan cleaning	Remove the dust from the ventilation fan blades.
Working Area	Lubricating*	Clean the Y-axis guiding rods, X-axis linear rail and focusing mechanism, and relubricate them.
	Door cover cleaning	Clean the grease off the door cover.
	Mirrors and lens cleaning*	Clean the 4 mirrors and lens. Make sure they are not oxidized or left with water marks.
	MAINTAIN page*	Check the status display and switches except for the "Laser Pulse".
	Optical path inspection*	Make sure the laser spots got at two corners (top left and bottom right) are full circles, otherwise Optical Path Alignment has to be conducted.

* : Necessary maintenance

Date											
1st month				**2nd month**				**3rd month**			
W1	**W2**	**W3**	**W4**	**W5**	**W6**	**W7**	**W8**	**W9**	**W10**	**W11**	**W12**
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beamo user manual

Title | beamo User Manual
Publication | FLUX Inc.
Edition | May 2023
Address | 9F, No. 465, Sec. 6, Zhongxiao E. Rd.,
Nangang Dist., Taipei, Taiwan
Tel | (+886)2-6605-7055
Website | flux3dp.com

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