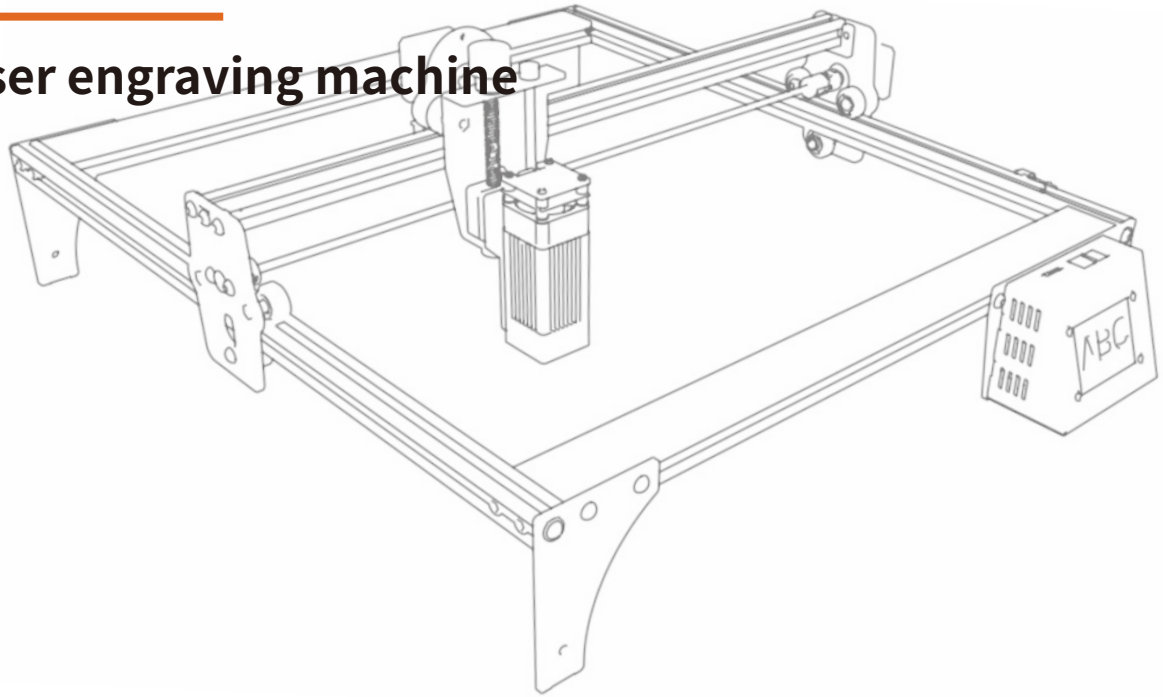
User manual

Desktop laser engraving machine



☑ English
☐ 中文

Thank you very much for purchasing our products
Please read this manual carefully before use
Please keep the manual properly

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1. Security guide

Before using the laser engraving machine, please read this safety guide carefully, it mentions situations that require special attention and includes warnings of unsafe practices that can cause damage to your property or even endanger your personal safety.

⚠ 1.1 Safety of laser

- Our laser engraving machine uses Class 4 laser product. The laser is so powerful that it can cause eye injuries and burn the skin.
- We have installed a shield on the laser. To a large extent, the shield filters out the diffuse light from the laser spot. However, it is still recommended to wear laser goggles when using the laser engraving machine.
- Do avoid exposing your skin to Class 4 laser beam, especially at close range.
- Teens must be supervised by parents while using the machine.
- Do not touch the laser engraving module while it is switched on.

⚠ 1.2 Fire safety

- The high intensity laser beam generates extremely high temperatures and heat due to it burns the substrate when it cuts.
- Some materials can catch fire during the cutting process, then creating gas and smoke.
- When the laser beam hits the material, usually, there will be a small flame. It will move with the laser and will not remain lit as the laser passes over it.
- Do not leave the machine alone during the engraving process.Do remember to clean the laser cutter of debris, scraps and flammable materials after use. Always keep a working fire extinguisher nearby.

- Safety against fumes or airborne contaminants: when you are using the laser engraving machine, fumes, vapors, particles are generated from the material (plastics and other flammable materials), there are potentially toxic. These fumes or airborne contaminants can be hazardous to health, so please use it in a ventilated place.

1.3 Safety of materials

- Do not engrave or cut materials with unknown properties.
- Materials Recommended: wood, wooden board, bamboo, leather, plastic, fabric, (kraft) paper, acrylic, felt, cork, cobble-stone, black alumina, non-reflective stainless steel, etc.
- Materials not recommended: reflective metal, precious stones, transparent materials, reflective materials, etc.

1.4 Safety of use

- Be sure to use the engraving machine only in horizontal position and ensure that it has been securely fixed to prevent fires caused by accidental shifting or dropping from the workbench during work.
- It is forbidden to point the laser to people, animals or any combustible object, whether it is in working condition or not.

2. Introduction

- The laser engraving machine can be used for engraving and cutting.
- The laser engraving machine uses a fixed-focus laser. Traditional laser is zoom laser and is required to look directly at the laser spot to find a proper size. The fixed-focus laser only needs a positioning block to get the best engraving focal length.
- The light shielding sleeve helps us block most of the bright light, if we look directly at them, firstly the retina will be damaged and your vision will be reduced, secondly it will cause visual fatigue, decreasing productive and leaning efficiency. Thirdly, the light can inhibit the production of melatonin, which affects the quality of sleep. The light shielding sleeve can help to protect you from this damage.
- The laser engraving machine has a laser approximately 5.5W of power, and it can cut some boards and engrave on non-reflective stainless steel.
- The laser engraving machine supports PWM control (Pulse Width Modulation), which makes the engraved image more detailed.

3. Software installation and use

- The laser engraving machine supports the most popular software LaserGRBL, LaserGRBL is an open-source, easy to use and powerful software, but unfortunately LaserGRBL only supports Windows (Win XP / Win 7 / Win 8 / XP / Win 10).
- Mac users can choose LightBurn, which is also an excellent engraver software, but this software needs to pay for $40. It also supports Windows.
- The laser engraving machine receives commands from the computer. It needs to stay connected to the computer, and Do not shut the engraver software down (LaserGRBL or LightBurn) during the engraving process. Since the calculations are done on the computer, the configuration of the computer will affect the speed and even the quality of the engraving.

- The following section will focus on the installation and use of LaserGRBL. For LightBurn, installation and configuration process will be briefly explained.

3.1 Instructions of LaserGRBL

3.1.1 Download

- LaserGRBL is one of the most popular DIY laser engraving software in the world, the download website of LaserGRBL is http://LaserGRBL.com/download/ .

3.1.2 Installation

- Double-click the software installation package to start the software installation, and keep clicking < Next > until the installation is complete.

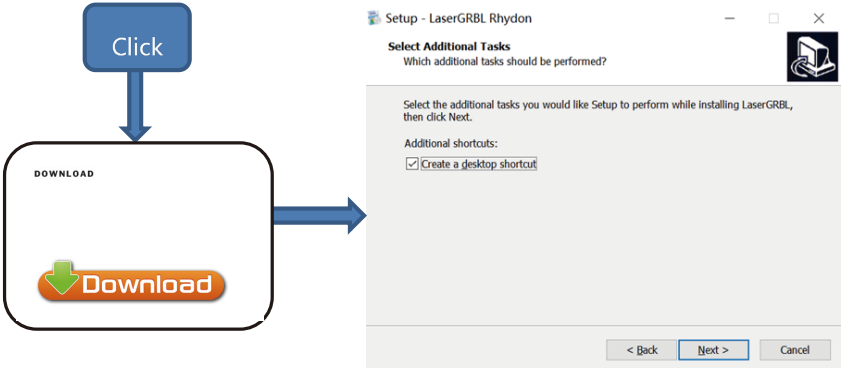


Figure 1 LaserGRBL Installation

- In addition, user can also download the laser engraving software customized by TronHoo, which has built-in text and image editing functions, and also comes with custom buttons. The download website of TronHoo' s laser engraving software is: https://www.tronhoo3d.com/download/ (The installation method is the same as LaserGRBL).

3.1.3 Custom buttons

The software supports users to import custom buttons, you can import custom buttons in the software according to your usage. We recommend the official custom buttons from LaserGRBL. Custom button s download website is http://lasergrbl.com/usage/custom-buttons/, the downloaded file of CustomButtons is shown as below:

Figure 2 Custom Buttons

- Next, we will import the custom buttons into LaserGRBL. In LaserGRBL, right-click on the blank space next to the bottom button (as shown in Figure 3) -> Import custom button, then select the custom button zip file downloaded before to import, keep pressing Yes (Y) until no window pops up.

Figure 3 Import & loading of custom buttons

- The installed software is shown as the following figure.

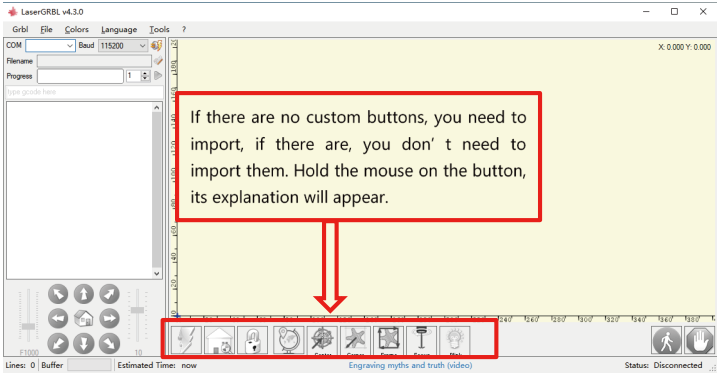


Figure 4 Interface of LaserGRBL

3.1.4 Connecting the laser engraver

(1) Connect the engraving machine to a computer with LaserGBRL installed.

(2) Plug in the power supply of the engraving machine.

(3) Open LaserGRBL.

(4) Select the correct port number and baud rate in the software - 115200, (In general, COM ports do not need to be selected manually, but if you have more than one serial device connected to the computer, it needs to do so, you can find the port of the laser engraving machine in the device manager of the Windows system, or you can simply try the port numbers displayed one by one).

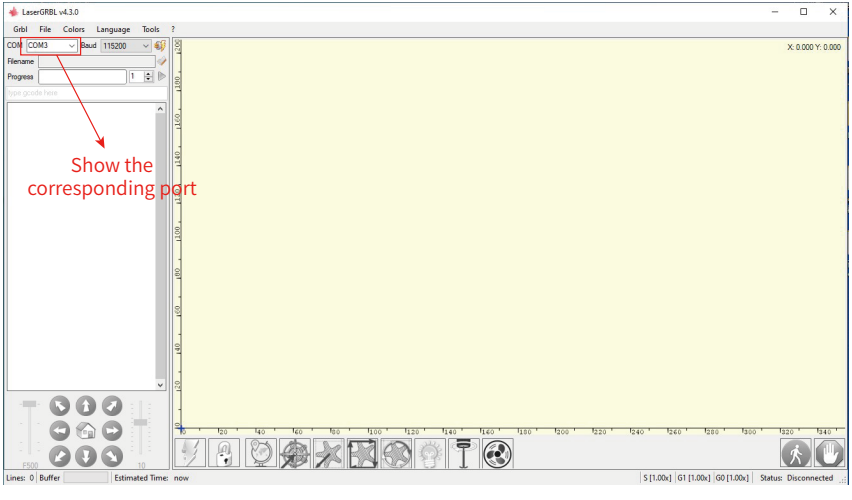


Figure 5 COM ports after connection

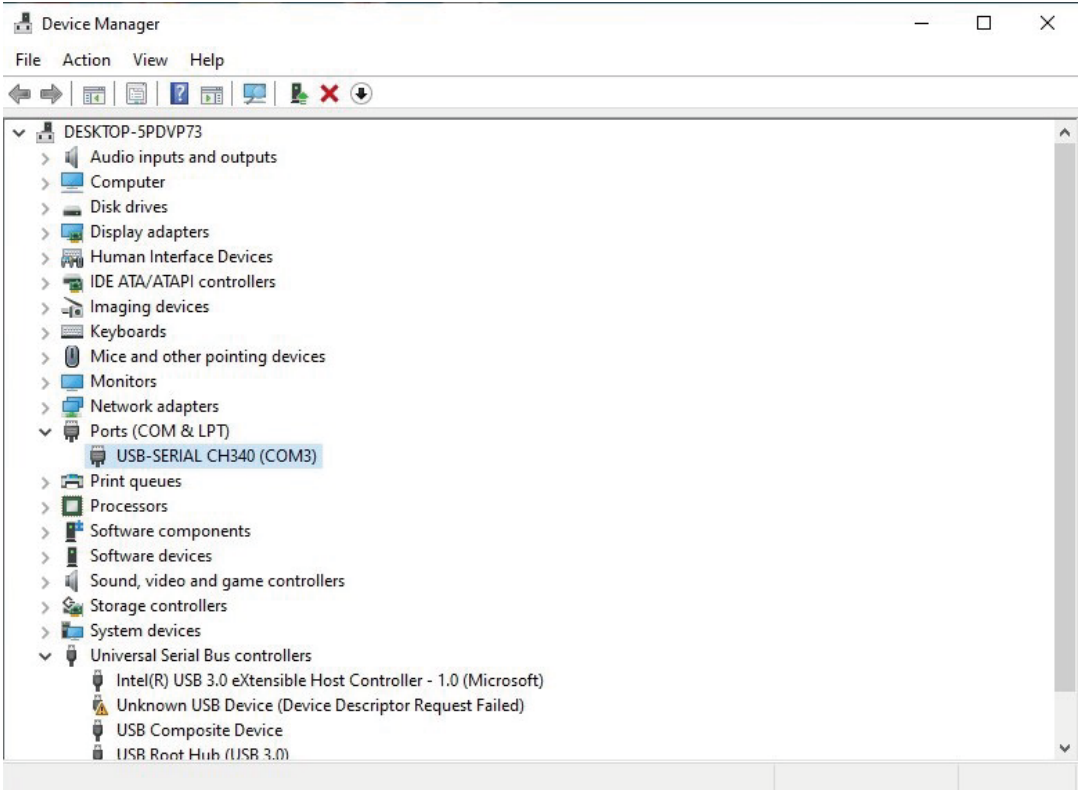


Figure 6 Check of COM ports

(5) First, install CH340 Driver. In LaserGRBL, click < Tools > -> < install CH340 Driver > to install the driver, and restart the computer after installation to connect.

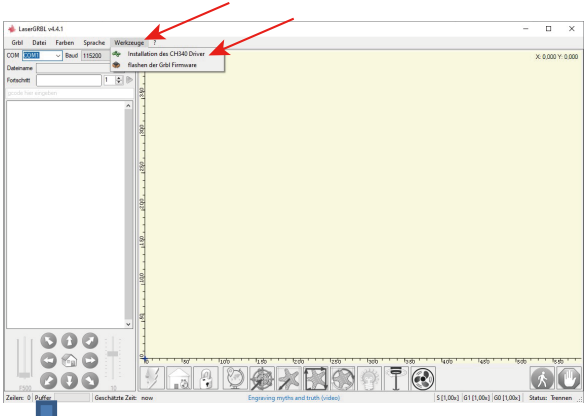


Figure 7 Driver installation

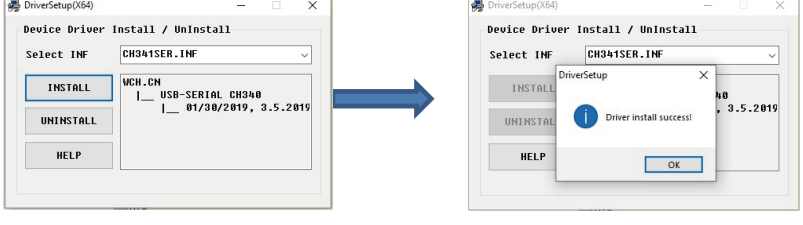


Figure 8 Driver installation

(6) Click on the lightning connection logo in the software. When the lightning logo changes to a red X, the connection is success.

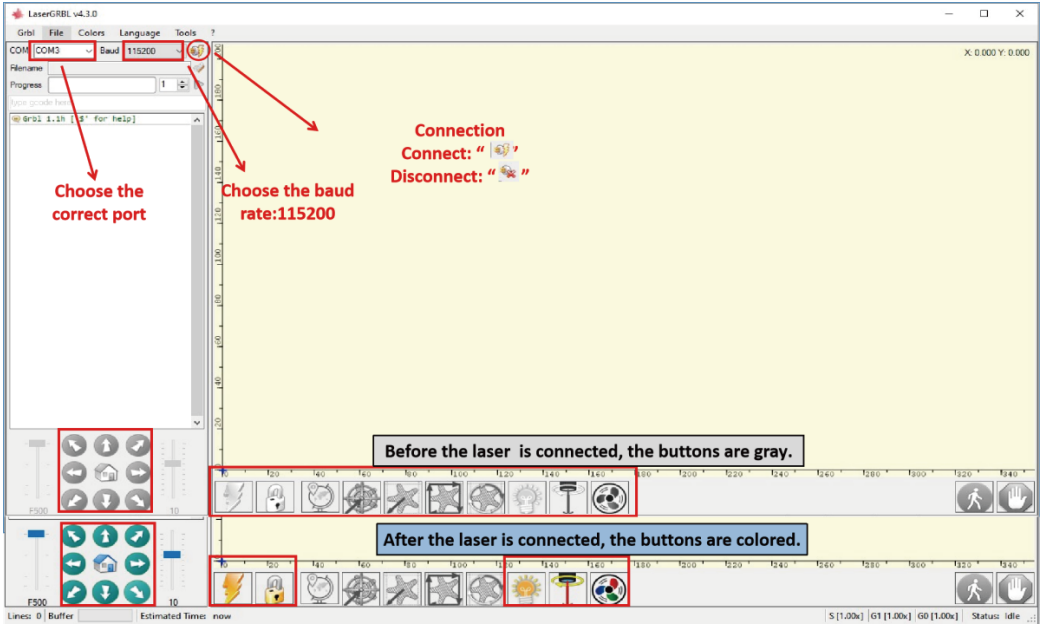


Figure 9 Connection of laser engraving machine

(7) Instructions of buttons.

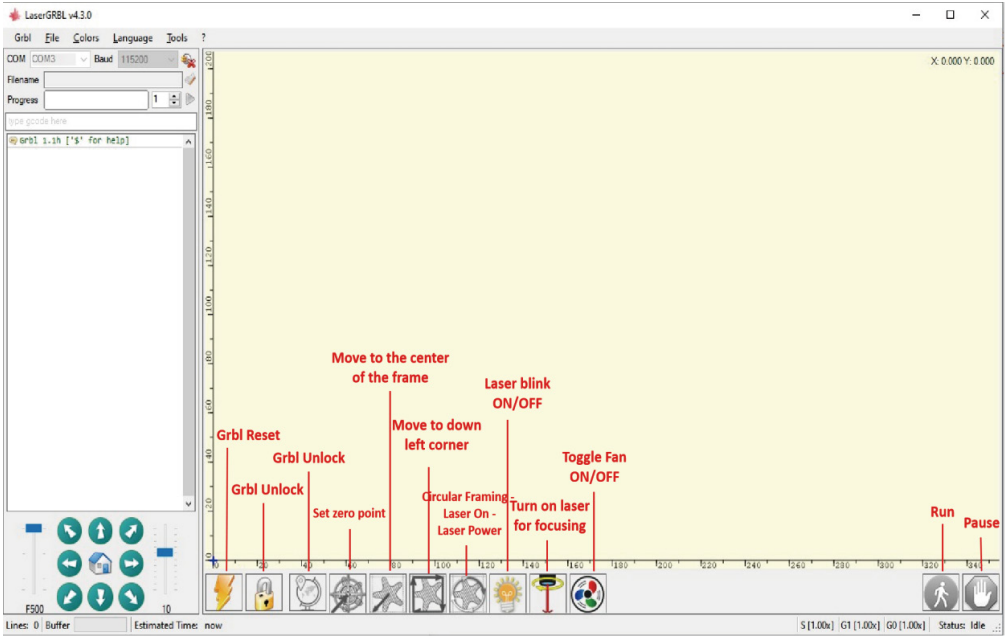


Figure 10 Instructions of buttons in LaserGRBL

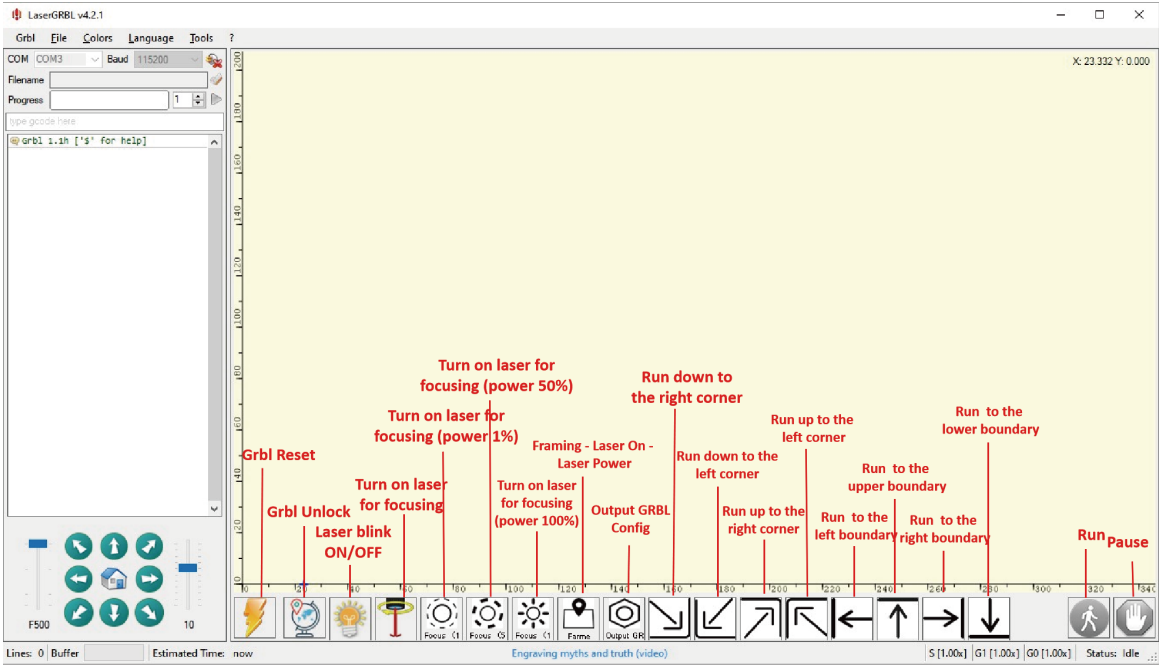


Figure 10.1 Instructions of buttons in the software customized by TronHoo

3.1.5 Parameter settings

(1) Selecting the engraving file: Open LaserGRBL, click <File> -> <Open File>, then select the images, LaserGRBL supports NC, BMP, JPG, PNG, DXF and other formats.

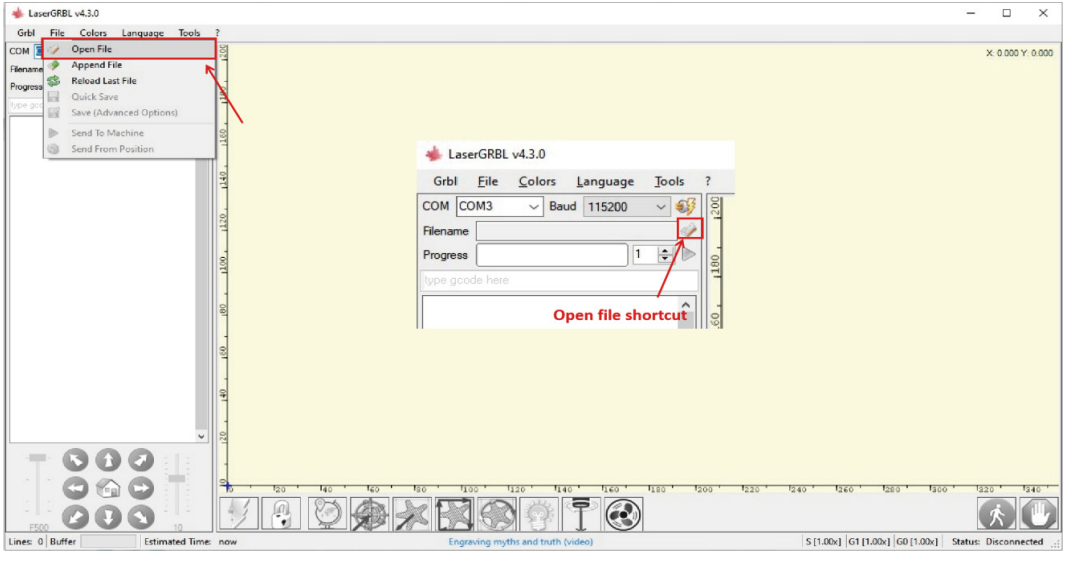


Figure 11 Open file

(2) Engraving parameter settings

LaserGRBL can adjust the brightness, contrast, white clip and other attributes of the target image, when adjusting the.

a) parameters of the image, the factual effect will be shown in the right preview window, and adjust it to your satisfaction.

b) It usually chooses "Line To Line Tracking" and "1bit BW Dithering" as engraving mode, "1bit BW Dithering" is more suitable for engraving grayscale graphics; If you are going to cut please select the "Vectorize" or "Centerline" mode so it will cut along thin line.

c) Engraving quality essentially refers to the line width of laser scanning, this parameter mainly depends on the size of the laser spot of the engraving machine Our laser engraving machine uses rectangular spot of 0 08*0 1mm the core energy area of the spot size is about 0.08*0.1mm, so it is recommended to use the engraving quality range of 5-8 lines/mm, different materials respond differently to the laser, so the exact value depends on the specific engraving material.

d) At the bottom of the preview window, the image can also be rotated, mirrored, cut, etc.

e) After completing the above settings, click next to the settings of engraving speed, laser and engraving size.

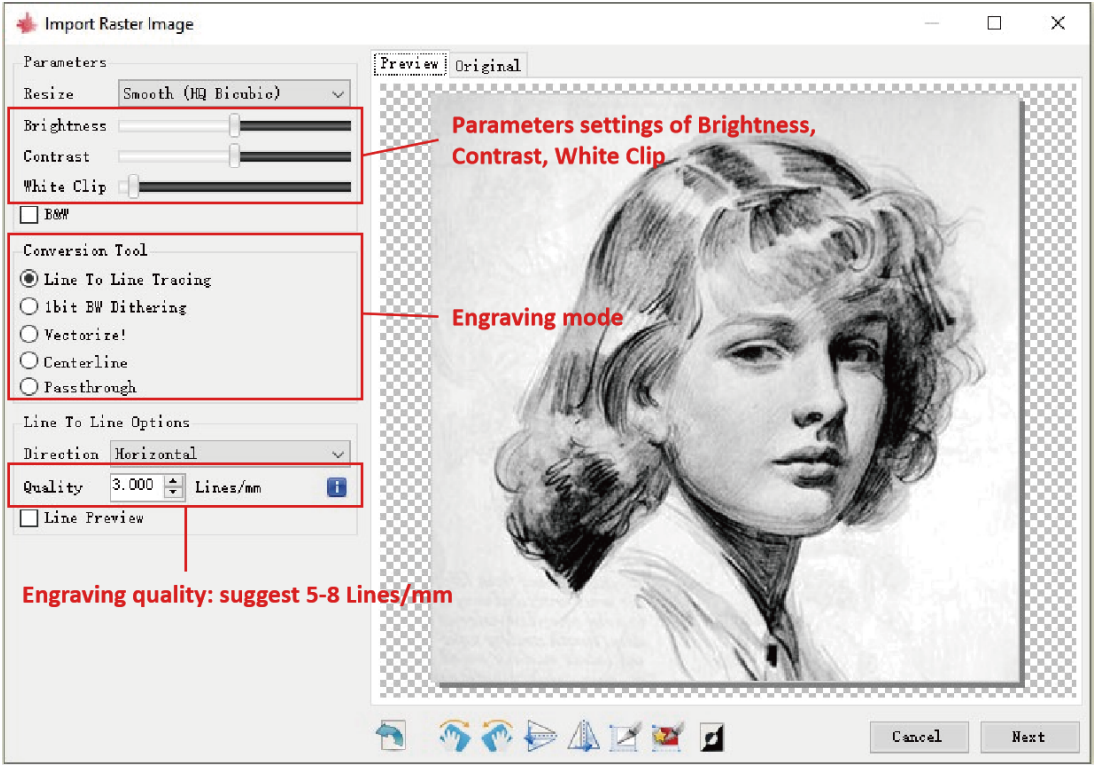


Figure 12 Introduction of parameter settings

(3) Engraving speed, engraving energy and engraving size setting

a) Please refer to the material reference table for the engraving speed. Choose different speeds according to the hardness of different materials. The engraving speed of different materials directly affects the engraving effect.

b) In the laser Options, there are two laser modes, M3 and M4. It is recommended to use M4 when engraving in the "1bit BW Dithering" mode, and M3 is recommended for other situations. If your laser only has M3, please check whether the laser mode is enabled in the GRBL configuration. For the description of GRBL configuration, please refer to the official description of LaserGRBL.

c) Choose different engraving energy according to different materials. We have attached engraving and cutting parameters of common materials at the end of the manual for your reference.

d) Finally, set the size, click on the < Create > button to complete the setting of all engraving parameters.

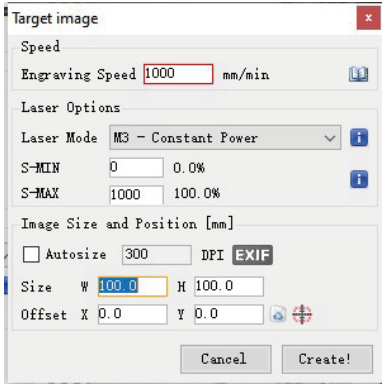


Figure 13 Setting of engraving speed, laser and engraving size

3.1.6 Positioning

(1) First reset the engraving machine to zero, click the set to zero button, the laser head of the laser engraving machine will return to zero three times to the left front; after the engraving machine is reset to zero, the default engraving position is to start from the left front zero point, and the engraving object needs to be placed along the zero point.

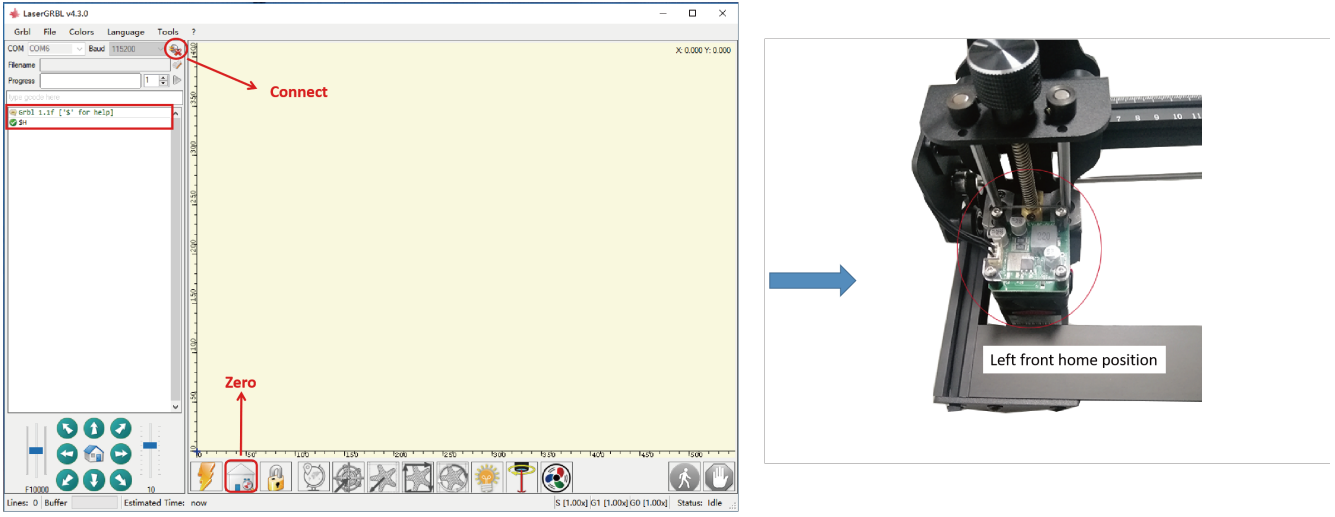


Figure 14 Laser reset

(2) Click the "contour scan" button, the laser head will start scanning the outer contour of the image. The contour scanned by the laser is the outer contour of the image on the computer. The position of the engraved object can be slightly adjusted again according to the position of the scanned outer contour. (Ps: You can adjust the position of the engraved item multiple times and click the preview button until the outer contour is the most ideal engraving position).

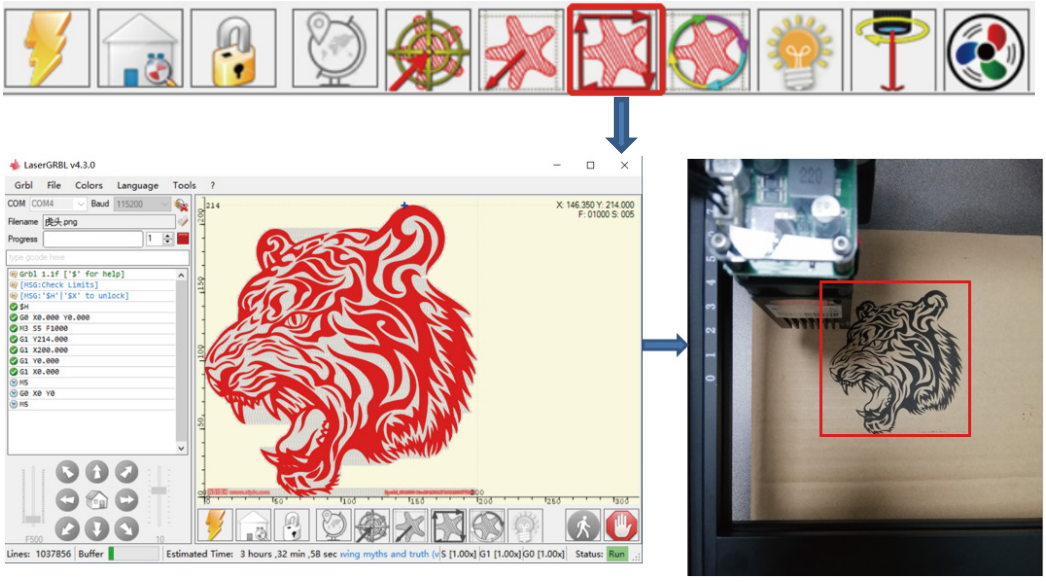


Figure 15 Preview of laser engraving area

3.1.7 Start and stop engraving/cutting

(1) Start engraving/cutting

After completing all the above settings, click the green button as shown in the figure to start engraving/cutting. Next to the start button, there is an editable number. This number is the number of times of engraving/cutting. LaserGRBL allows multiple consecutive operations on the same image. This function is especially useful for cutting.

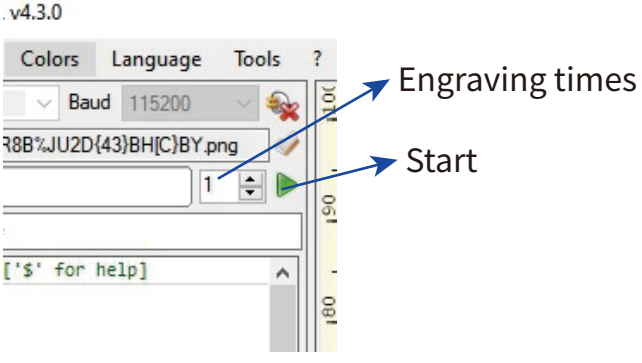


Figure 16 Start engraving/cutting

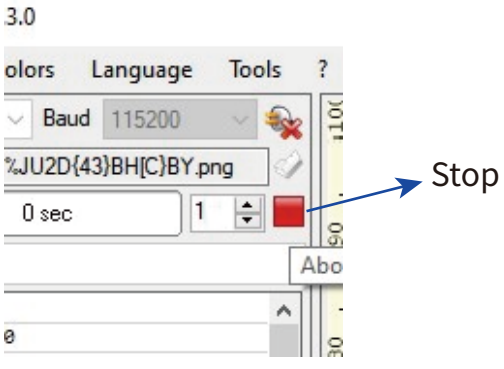


Figure 17 Start engraving/cutting

(2) Stop engraving/cutting

If you want to stop the engraving/cutting midway, you can click the stop button as shown in the figure to stop engraving/cutting.

3.2 Instructions of LightBurn

(1) User can download the software installation package from the LightBurn website: https://lightburnsoftware.com/pages/trial-version-try-before-you-buy .

Figure 18 LightBurn installation package

(2) Double-click the software installation package to install, and click "Next" in the pop-up window. (Note: LightBurn is a paid software. For a better experience, we recommend that you buy the original version. Here we will demonstrate the installation of the trial version).

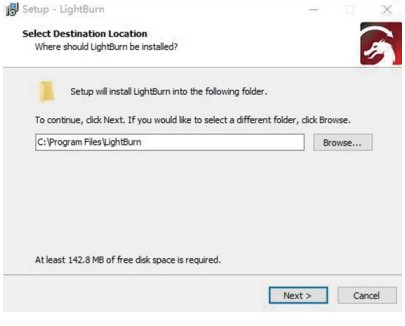


Figure 19 Choose installation folder

(3) Click to start a free trial.

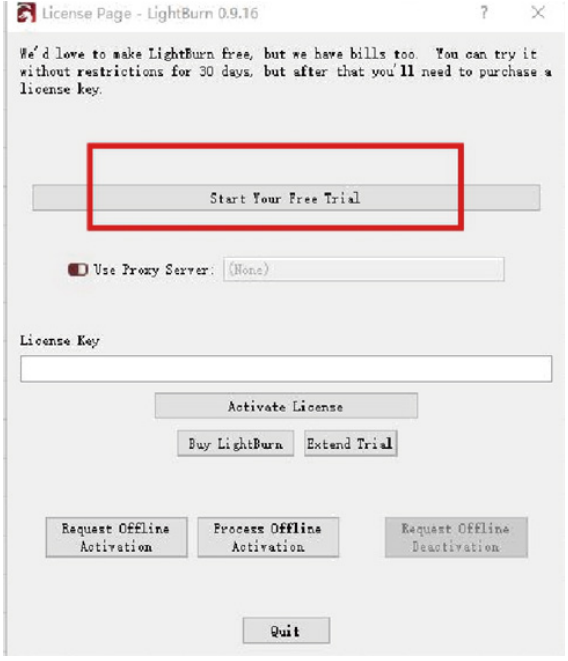


Figure 20 Start a free trial

(4) Click < Find My Laser >.

Figure 21 Find My Laser

(5) Click < Add Device >.

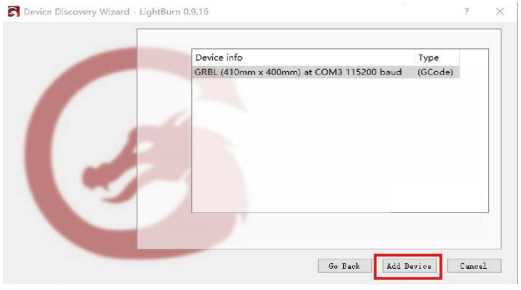


Figure 22 Add device

(6) Set the zero, usually set the zero at the front left, then the installation is complete.

Figure 23 Set the zero at the front left

(7) If the software is not connected to the engraving machine, we can select the port of the laser engraving machine as shown in the figure below.

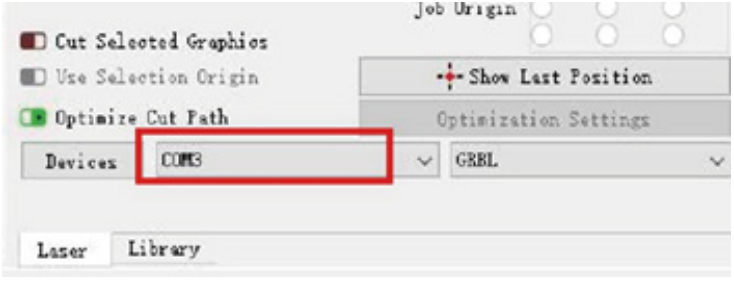


Figure 24 Select port

3.2.2 Basic operation

(1) Drawing graphics
(2) Adjust the size and position
(3) Double click to enter the setting option

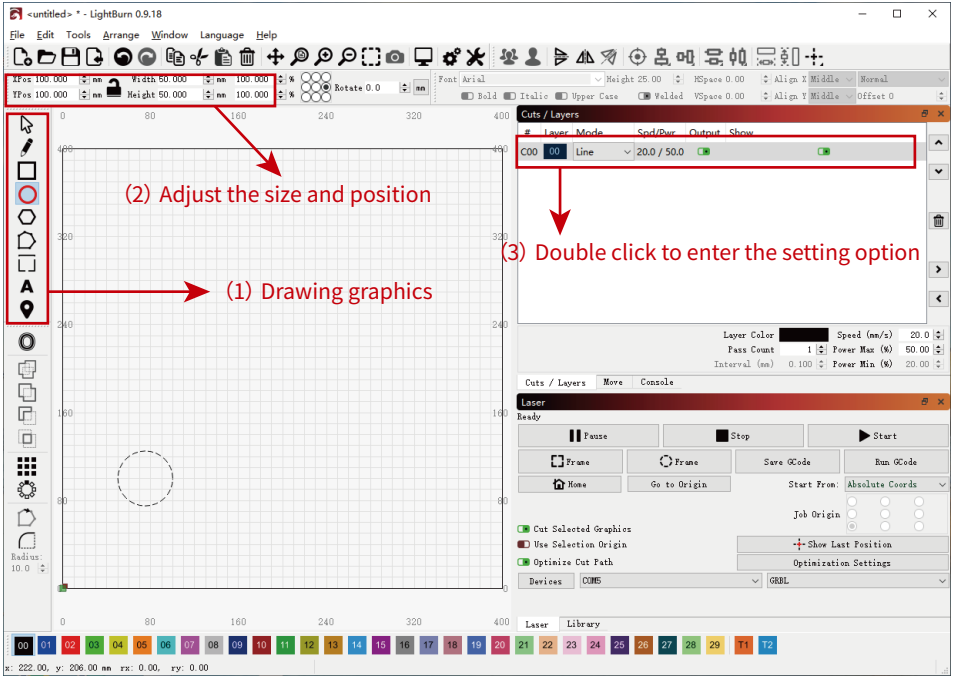


Figure 25 Basic operation

(1) Adjust the engraving/cutting speed
(2) Adjust engraving/cutting power
(3) Select the engraving/cutting mode
(4) Confirm

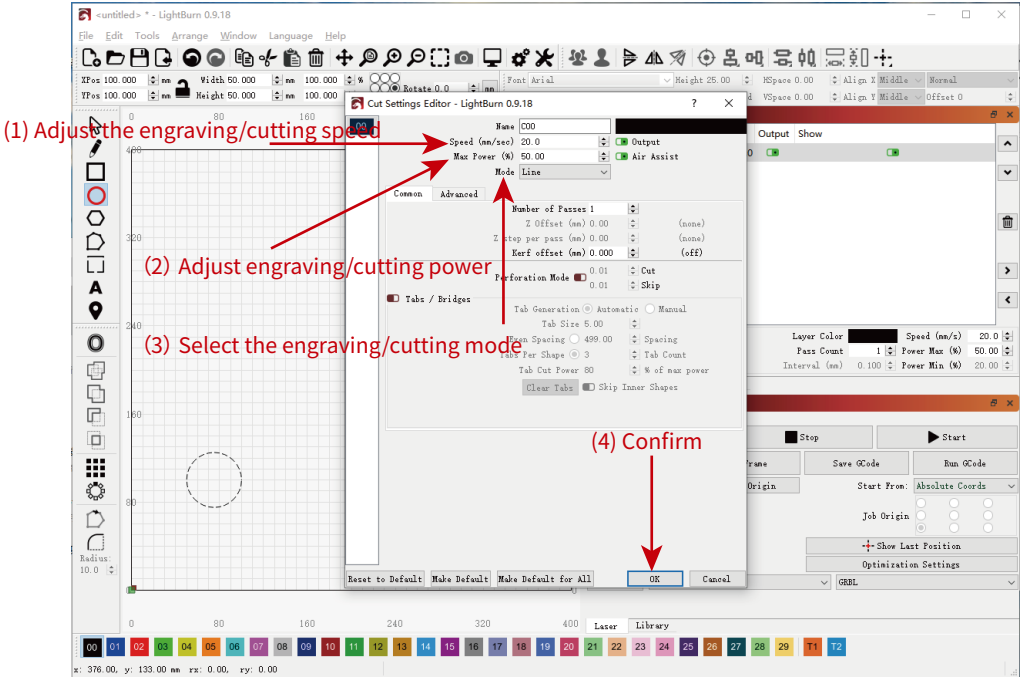


Figure 26 Basic operation

(1) Preview the engraving/cutting frame

(2) Start

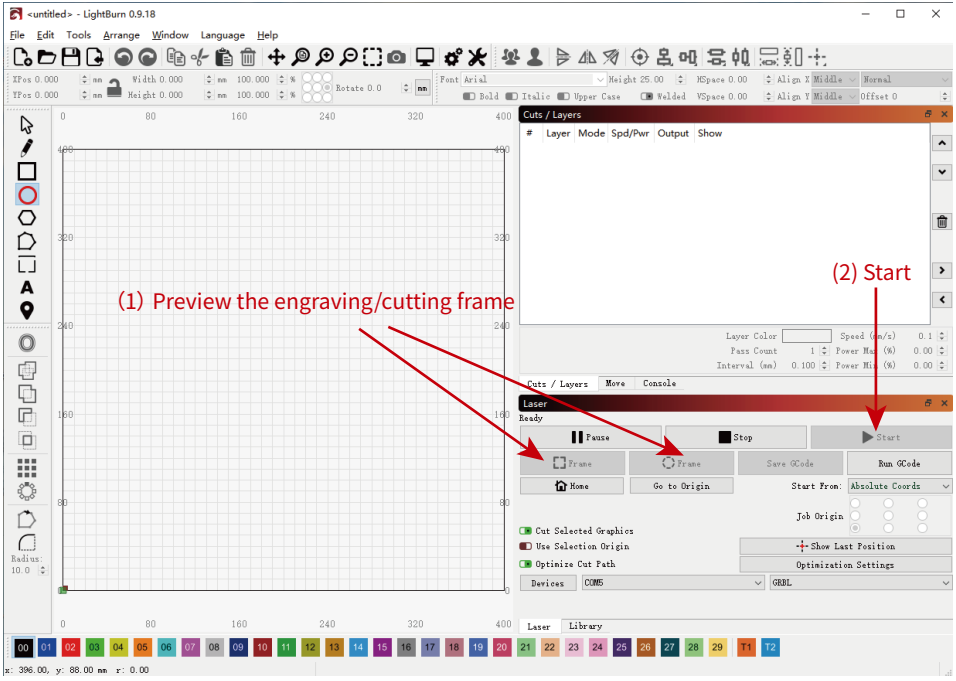


Figure 27 Basic operation

3.2.3 Function description

Cuts/Layers

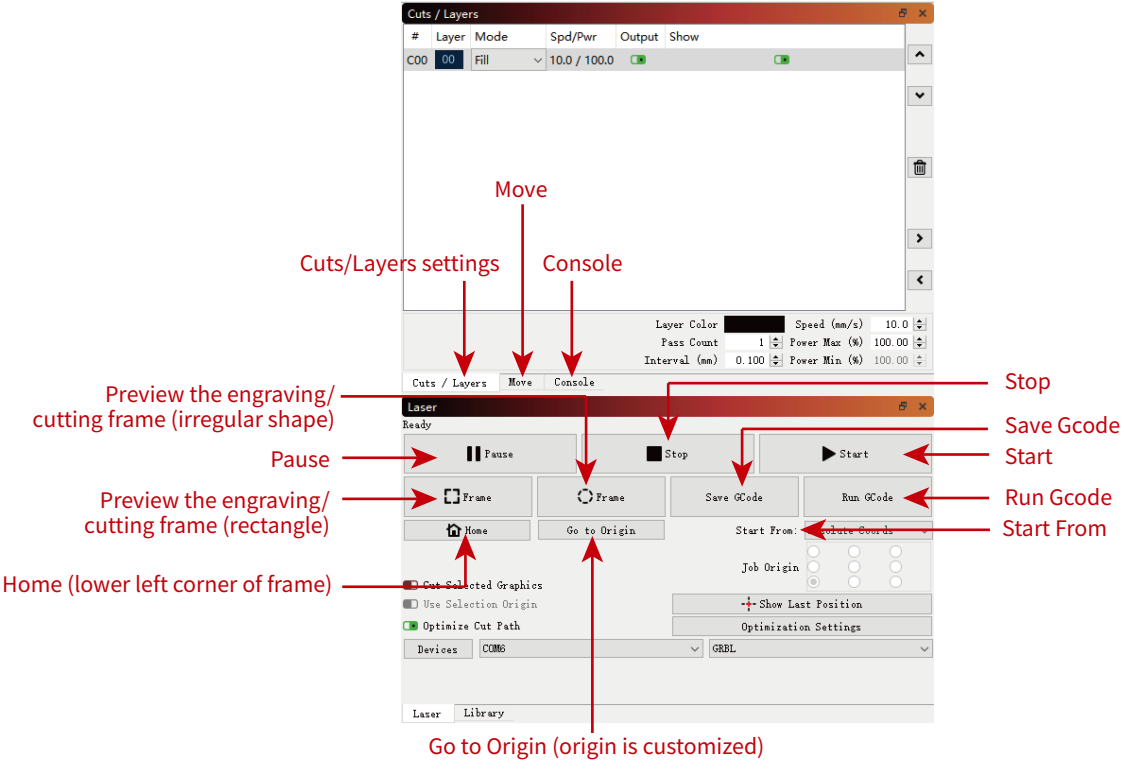


Figure 28 Cuts/Layers

Figure 29 Cuts/Layers

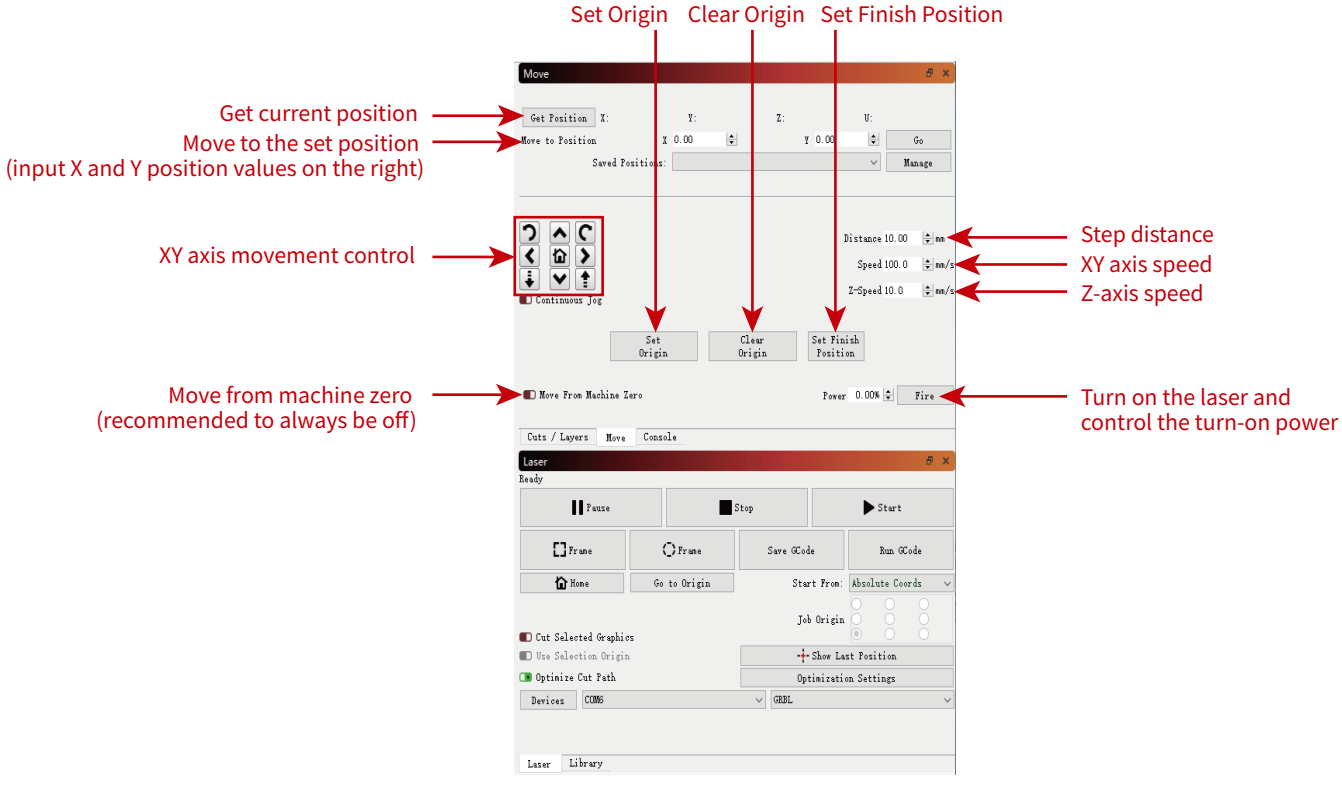


Figure 30 Move

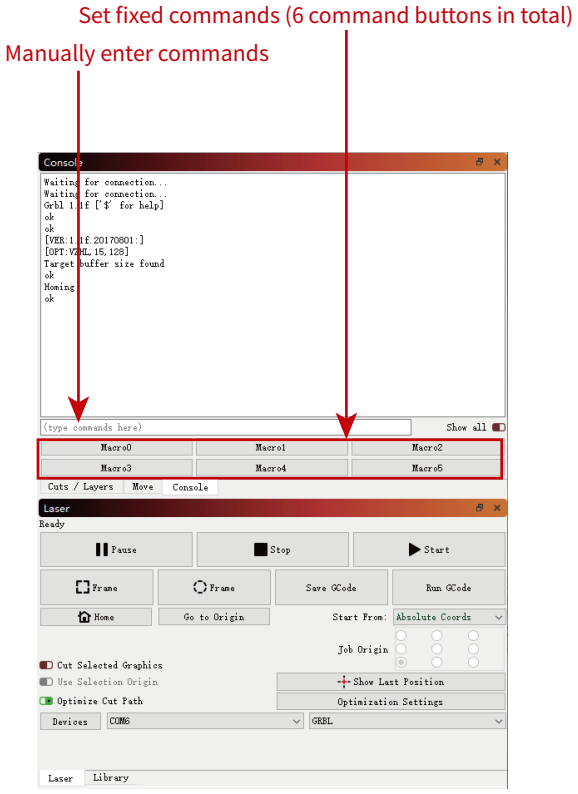


Figure 31 Function Description

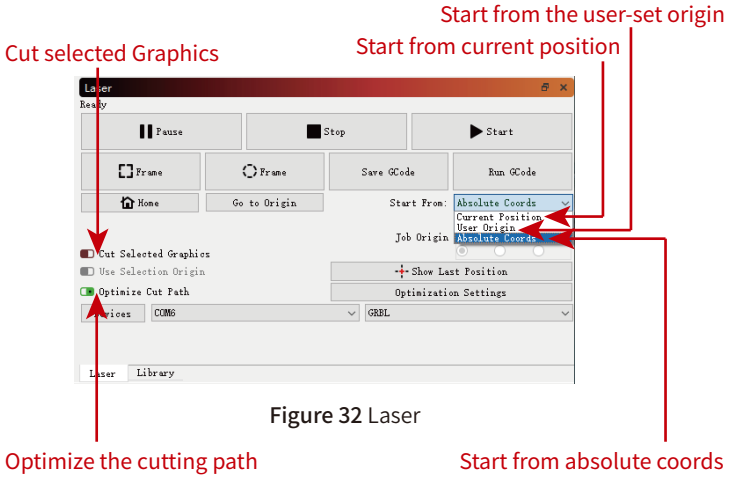


Figure 32 Laser

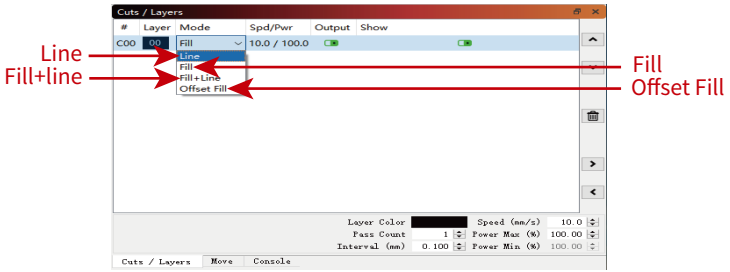


Figure 33 Function Description

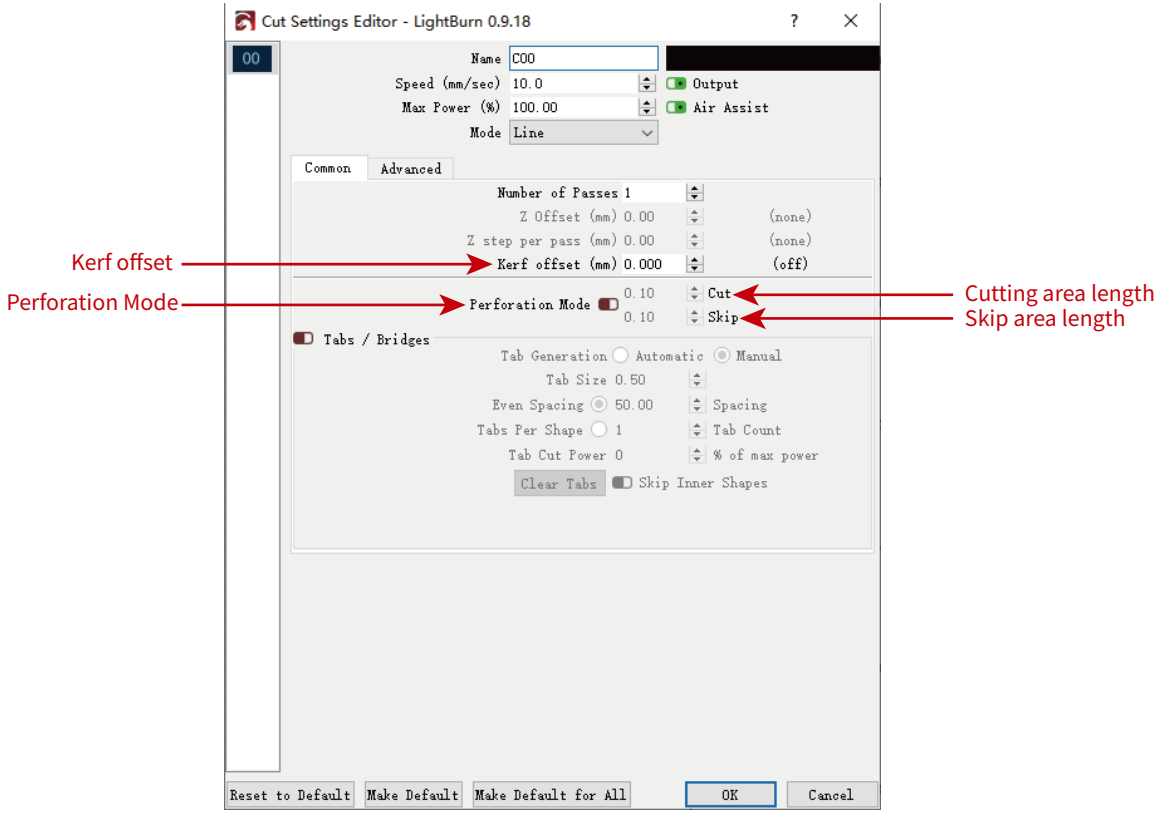


Figure 34 Function Description

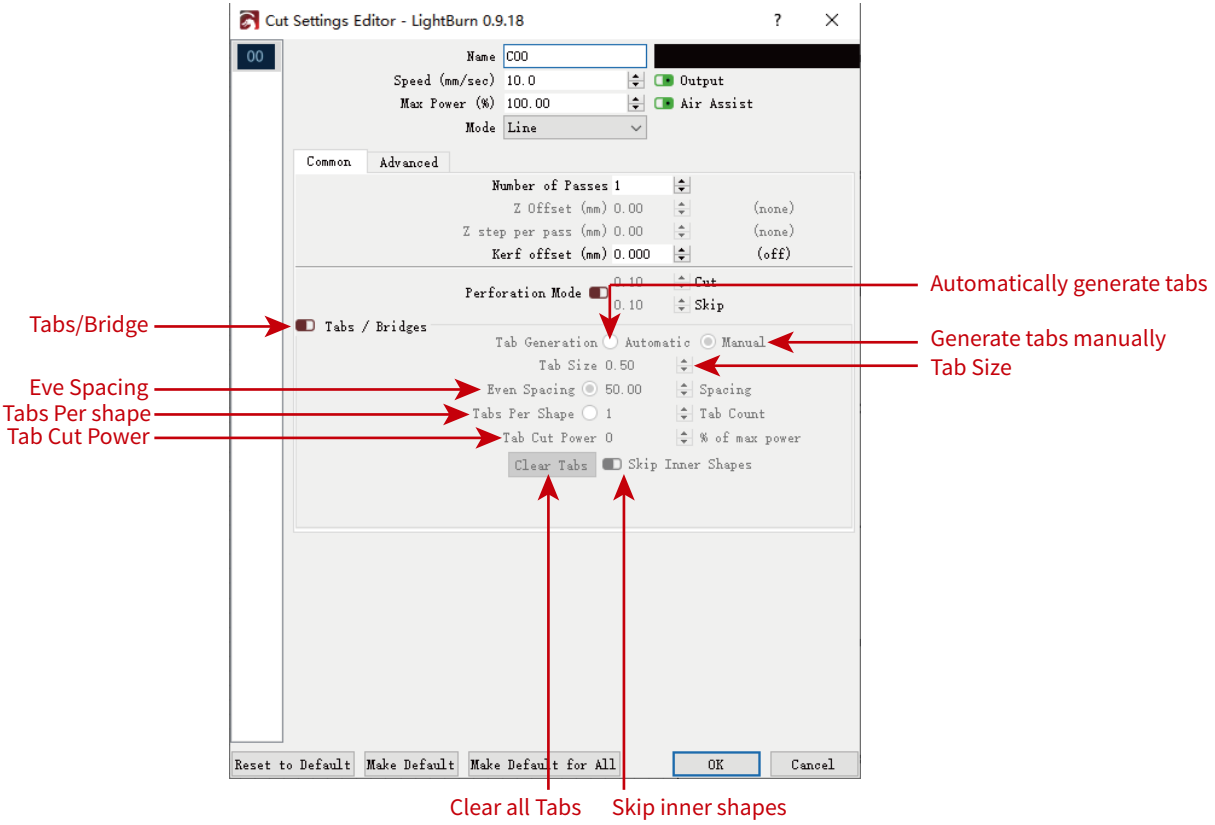


Figure 35 Function Description

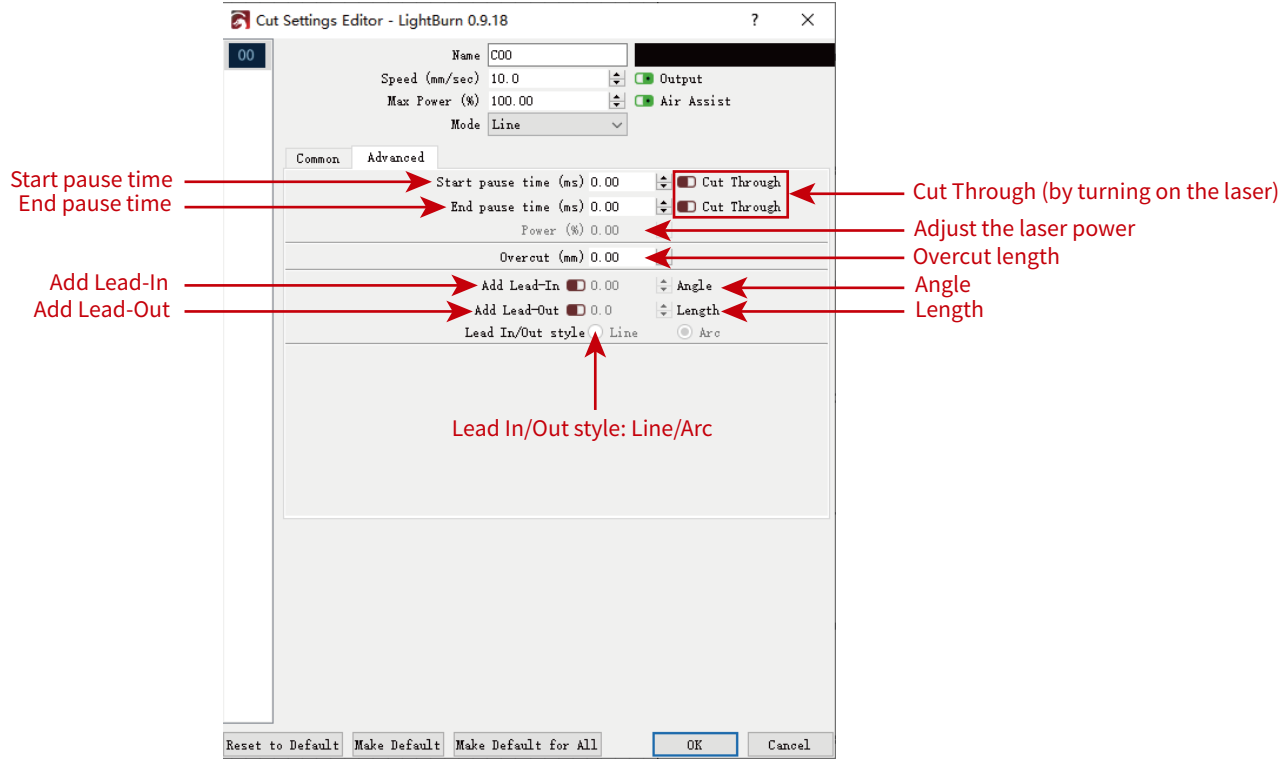


Figure 36 Function Description

4. Tips for use

(1) Please keep the laser head and the engraved object at a fixed focus distance. If the laser head and the engraved object are too close, it will scratch the engraved object, causing the engraved object to shift and cause the engraving to fail.

(2) The core spot of the laser is a rectangular spot of 0.08×0.1mm with a width of 0.08mm in the horizontal direction and a length of 0.1mm in the vertical direction. It is recommended to use the vertical orientation for delicately carved models.

(3) Precise positioning of images and engraving objects.

a)Move the laser head to the left front of the frame.

b)Use a ruler and pencil to draw a center point on the carved object.

c)The light shielding sleeve must be parallel to the edge of the engraved object.

d)Click the following two buttons in turn to move the laser so that the laser point moves to the center of the engraving. After positioning is complete, you can start engraving.

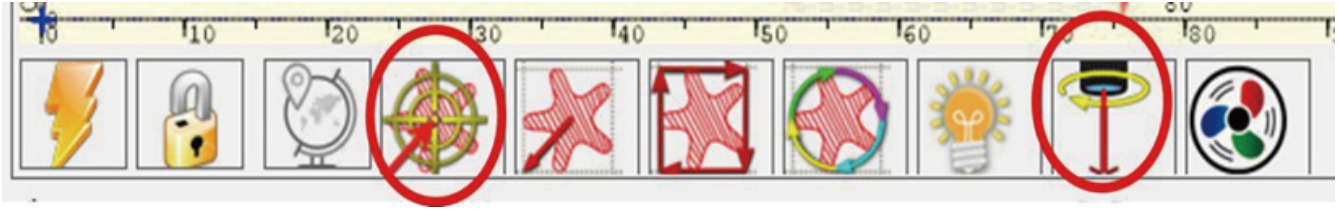


Figure 37 Centering

5. Recommended parameters for common materials

(1) Common materials and recommended engraving parameters

1.6W							
	Materia	Engraved	Power	Speed (mm/min)	Times	Laser options	Quality (lines/mm)
1	Kraft paper	YES	100%	1900	1	M4	8
2	Wooden board	YES	100%	1500	1	M4	7
3	Acrylic	YES	100%	1200	1	M4	5
4	Light-colored Felt	YES	100%	3500	1	M4	5
5	Dark Felt	YES	100%	3000	1	M4	5
6	Bamboo	YES	60%	2400	1	M4	8
7	Leather	YES	100%	1800	1	M4	5
8	Cork	YES	35%	3000	1	M4	8
9	Wood	YES	100%	1700	1	M4	8
10	Cobblestone	YES	100%	100	1	M4	8
11	Black alumina	YES	100%	20	1	M4	8
12	Non-reflective Stainless steel (Matte surface)	NO	X	X	X	X	X
13	Non-reflective Stainless steel (smooth surface)	NO	X	X	X	X	X

5W							
	Material	Engraved	Power	Speed (mm/min)	Times	Laser options	Quality (lines/mm)
1	Kraft paper	YES	100%	2300	1	M4	8
2	Wooden board	YES	100%	1600	1	M4	7
3	Acrylic	YES	100%	450	1	M4	5
4	Light-colored Felt	YES	60%	4000	1	M4	5
5	Dark Felt	YES	60%	5000	1	M4	5
6	Bamboo	YES	35%	2500	1	M4	8
7	Leather	YES	80%	2000	1	M4	5
8	Cork	YES	20%	4000	1	M4	8
9	Wood	YES	100%	3000	1	M4	8
10	Cobblestone	YES	100%	100	1	M4	8
11	Black alumina	YES	100%	200	1	M4	8
12	Non-reflective Stainless steel (Matte surface)	YES	100%	80	1	M4	15
13	Non-reflective Stainless steel (smooth surface)	YES	100%	50	5	M4	15

5W Compressed Spot							
	Materia	Engraved	Power	Speed (mm/min)	Times	Laser options	Quality (lines/mm)
1	Kraft paper	YES	100%	5200	1	M4	8
2	Wooden board	YES	100%	4000	1	M4	7
3	Acrylic	YES	100%	2400	1	M4	5
4	Light-colored Felt	YES	60%	4000	1	M4	5
5	Dark Felt	YES	60%	5000	1	M4	5
6	Bamboo	YES	35%	3500	1	M4	8
7	Leather	YES	80%	2500	1	M4	5
8	Cork	YES	20%	4500	1	M4	8
9	Wood	YES	100%	3000	1	M4	8
10	Cobblestone	YES	100%	600	1	M4	8
11	Black alumina	YES	100%	650	1	M4	8
12	Non-reflective Stainless steel (Matte surface)	YES	100%	300	1	M4	10
13	Non-reflective Stainless steel (smooth surface)	YES	100%	150	3	M4	10

10W Compressed Spot							
	Material	Engraved	Power	Speed (mm/min)	Times	Laser options	Quality (lines/mm)
1	Kraft paper	YES	60%	6000	1	M4	8
2	Wooden board	YES	100%	4500	1	M4	7
3	Acrylic	YES	100%	1100	1	M4	5
4	Light-colored Felt (1mm)	YES	60%	5000	1	M4	5
5	Dark Felt (2mm)	YES	60%	5500	1	M4	5
6	Bamboo	YES	35%	4500	1	M4	8
7	Leather	YES	40%	2500	1	M4	5
8	Cork	YES	20%	4500	1	M4	8
9	Wood	YES	100%	3000	1	M4	8
10	Cobblestone	YES	100%	1000	1	M4	8
11	Alumina	YES	100%	2500	1	M4	8
12	Non-reflective Stainless steel (Matte surface)	YES	100%	1500	1	M4	8
13	Non-reflective Stainless steel (smooth surface)	YES	100%	1200	5	M4	8

10W Compressed Spot							
	Materia	Engraved	Power	Speed (mm/min)	Times	Laser options	Quality (lines/mm)
14	Ceramic tile	YES	100%	300	1	M4	8

(2) Common materials and recommended cutting parameters

1.6W						
	Material	Cut	Power	Speed (mm/min)	Times	Laser options
1	Kraft paper (0.5mm)	YES	100%	180	1	M3
2	Kraft paper (1.0mm)	YES	100%	50	1	M3
3	Kraft paper (2.0mm)	YES	100%	50	3	M3
4	Wooden board (1.0mm)	YES	100%	120	1	M3
5	Wooden board (2.0mm)	YES	100%	60	3	M3
6	Wooden board (3.0mm)	YES	100%	50	6	M3
7	Acrylic (0.5mm)	NO	X	X	X	X
8	Acrylic (1.0mm)	NO	X	X	X	X
9	Acrylic (2.0mm)	NO	X	X	X	X
10	Light-colored Felt (1mm)	YES	100%	750	1	M3
11	Dark Felt (2mm)	YES	100%	150	1	M3
12	Bamboo (1.0mm)	YES	100%	120	1	M3
13	Bamboo (2.0mm)	YES	100%	420	1	M3

1.6W						
	Material	Cut	Power	Speed (mm/min)	Times	Laser options
14	Bamboo (3.0mm)	YES	100%	50	1	M3
15	Leather	YES	100%	400	1	M3
16	Cork	NO	X	X	X	X
17	Wood	NO	X	X	X	X
18	Cobblestone	NO	X	X	X	X
19	Black alumina	NO	X	X	X	X
20	Non-reflective Stainless steel (Matte surface)	NO	X	X	X	X
21	Non-reflective Stainless steel (smooth surface)	NO	X	X	X	X

5W						
	Material	Cut	Power	Speed (mm/min)	Times	Laser options
1	Kraft paper (0.5mm)	YES	100%	1700	1	M3
2	Kraft paper (1.0mm)	YES	100%	400	1	M3
3	Kraft paper (2.0mm)	YES	100%	100	1	M3
4	Wooden board (1.0mm)	YES	100%	1200	1	M3
5	Wooden board (2.0mm)	YES	100%	340	1	M3
6	Wooden board (3.0mm)	YES	100%	110	1	M3
7	Acrylic (0.5mm)	NO	X	X	X	X
8	Acrylic (1.0mm)	NO	X	X	X	X
9	Acrylic (2.0mm)	NO	X	X	X	X
10	Light-colored Felt (1mm)	YES	100%	2500	1	M3
11	Dark Felt (2mm)	YES	100%	400	1	M3
12	Bamboo (1.0mm)	YES	100%	650	1	M3
13	Bamboo (2.0mm)	YES	100%	420	1	M3

5W						
	Material	Cut	Power	Speed (mm/min)	Times	Laser options
14	Bamboo (3.0mm)	YES	100%	200	1	M3
15	Leather	YES	100%	1200	1	M3
16	Cork	NO	X	X	X	X
17	Wood	NO	X	X	X	X
18	Cobblestone	NO	X	X	X	X
19	Black alumina	NO	X	X	X	X
20	Non-reflective Stainless steel (Matte surface)	NO	X	X	X	X
21	Non-reflective Stainless steel (smooth surface)	NO	X	X	X	X

5W Compressed Spot						
	Material	Cut	Power	Speed (mm/min)	Times	Laser options
1	Kraft paper (0.5mm)	YES	100%	1700	1	M3
2	Kraft paper (1.0mm)	YES	100%	400	1	M3
3	Kraft paper (2.0mm)	YES	100%	100	1	M3
4	Wooden board (1.0mm)	YES	100%	1200	1	M3
5	Wooden board (2.0mm)	YES	100%	340	1	M3
6	Wooden board (3.0mm)	YES	100%	110	1	M3
7	Acrylic (0.5mm)	YES	100%	100	4	M3
8	Acrylic (1.0mm)	YES	100%	100	6	M3
9	Acrylic (2.0mm)	YES	100%	100	10	M3
10	Light-colored Felt (1mm)	YES	100%	2500	1	M3
11	Dark Felt (2mm)	YES	100%	400	1	M3
12	Bamboo (1.0mm)	YES	100%	650	1	M3
13	Bamboo (2.0mm)	YES	100%	420	1	M3

5W Compressed Spot						
	Material	Cut	Power	Speed (mm/min)	Times	Laser options
14	Bamboo (3.0mm)	YES	100%	200	1	M3
15	Leather	YES	100%	1200	1	M3
16	Cork	YES	100%	750	1	M3
17	Wood	YES	100%	500	1	M3
18	Cobblestone	NO	X	X	X	X
19	Black alumina	NO	X	X	X	X
20	Non-reflective Stainless steel (Matte surface)	NO	X	X	X	X
21	Non-reflective Stainless steel (smooth surface)	NO	X	X	X	X

10W Compressed Spot						
	Material	Cut	Power	Speed (mm/min)	Times	Laser options
1	Kraft paper (1.0mm)	YES	100%	750	1	M3
2	Kraft paper (2.0mm)	YES	100%	230	1	M3
3	Kraft paper (3.0mm)	YES	100%	100	1	M3
4	Kraft paper (3.0mm)	YES	100%	300	2	M3
5	Wooden board (2.0mm)	YES	100%	400	1	M3
6	Wooden board (3.0mm)	YES	100%	300	1	M3
7	Wooden board (5.0mm)	YES	100%	120	1	M3
8	Wooden board (10.0mm)	YES	100%	80	1	M3
9	Wooden board (10.0mm)	YES	100%	150	2	M3
10	Acrylic (0.5mm)	YES	100%	800	2	M3
11	Acrylic (1.0mm)	YES	100%	800	4	M3
12	Acrylic (2.0mm)	YES	100%	800	10	M3
13	Light-colored Felt (1mm)	YES	100%	3500	1	M3

10W Compressed Spot						
	Materia	Cut	Power	Speed (mm/min)	Times	Laser options
14	Dark Felt (2mm)	YES	100%	800	1	M3
15	Bamboo (1.5mm)	YES	100%	600	1	M3
16	Bamboo (3.5mm)	YES	100%	150	1	M3
17	Bamboo (6.5mm)	YES	100%	40	1	M3
18	Leather	YES	100%	1500	1	M3
19	Cork	YES	100%	600	1	M3
20	Wood	YES	100%	300	5	M3
21	Cobblestone	NO	X	X	X	X
22	Dark alumina	NO	X	X	X	X
23	Light-colored alumina	NO	X	X	X	X
24	Non-reflective Stainless steel (Matte surface)	NO	X	X	X	X
25	Non-reflective Stainless steel (smooth surface)	NO	X	X	X	X
26	Ceramic tile	NO	X	X	X	X

6. FAQ

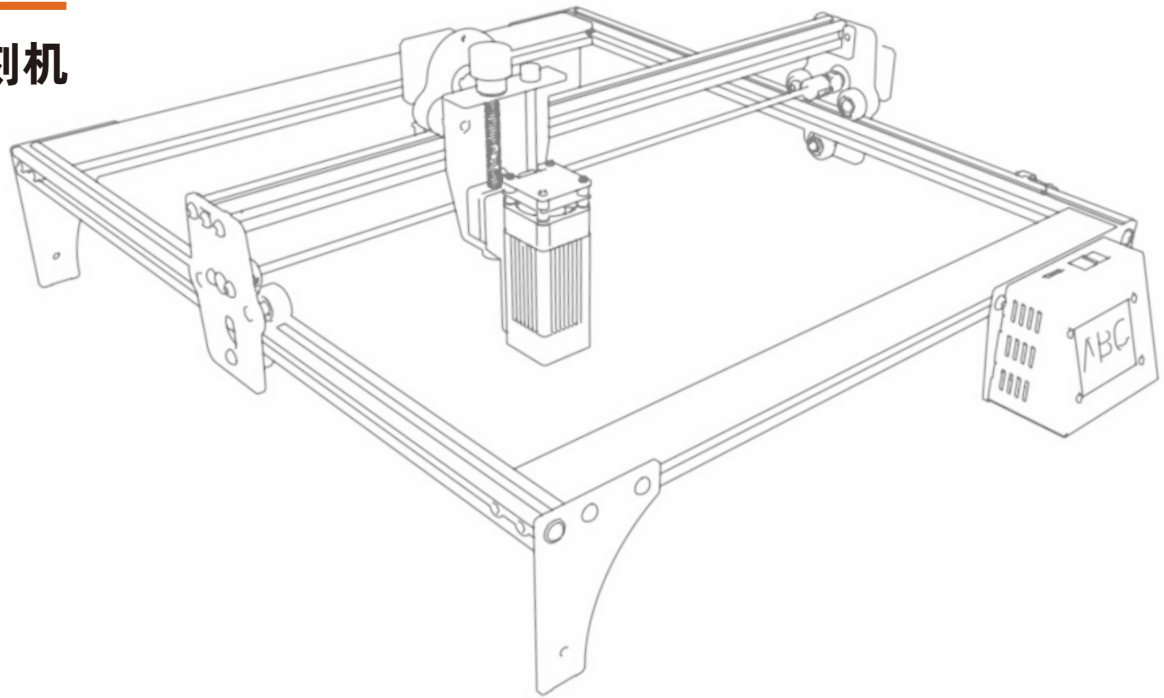
FAQ	Possible Causes	Solution
Where can I download the software?		https://lasergrbl.com/download/ https://lightburnsoftware.com/
The engraving machine cannot connect to LaserGRBL	Driver is missing, connection failed.	In LaserGRBL, click < Tools > -> < install CH340 Driver > to install the driver, and restart the computer after installation to connect.
	Multiple LaserGRBL software is opened repeatedly.	Please close LaserGRBL that is repeatedly opened.
	Incorrect port number.	Please choose the correct port number.
	Incorrect baud rate.	Please select the correct baud rate in the software - 115200.
	Data cable is not connected.	Please check whether the data cable is connected correctly.
	Computer USB port problem	Please try another USB port.

FAQ	Possible Causes	Solution
The engraving is not straight	Belt is not tight.	Please tighten the belt.
	Both ends of the belt screws are not locked.	Please tighten the positioning screws at both ends of the belt.
	The pulley is not locked and the laser head is shaking.	Please adjust the eccentric spacer under the bracket, and lock the eccentric spacer so that the bracket does not shake.
	Too much extension of the laser support causes the laser head to shake.	Raise the laser head as close to the top as possible to reduce the shake of the laser head
Why can't I engrave the image or the image is not clear?	Laser focus is not adjusted properly.	Please adjust the laser focus
	Engraving power is too low or engraving speed is too fast.	Please refer to the material reference table at the end of the manual to set engraving and cutting parameters.
	The imported image is not clear or the image processing is not ideal.	Please confirm whether the imported image is clear or the image processing is ideal.
	The engraving machine is not leveled and tilted.	Please check whether the engraving machine is leveled.
	There is dust or debris on the laser lens.	Please check whether there is dust or debris on the laser lens.

FAQ	Possible Causes	Solution
Can I engrave on curved objects?		Yes, but it is not recommended to engrave on objects with excessive curvature, which may cause distortion of the image.
How to improve the quality of engraving?		Please engrave with the parameters at the end of the manual as a reference.
		Please adjust the parameters gradually according to different materials to achieve the best results.

用户说明书

桌面激光雕刻机



☐ English
☑ 中文

非常感谢您购买本公司产品。
使用之前请详细阅读本说明书。
请妥善保管本说明书。

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1.安全须知

在使用激光雕刻机之前，请仔细阅读安全须知，其中涉及需要特别注意的情形，并包括可能对您的财产造成损害甚至危及您的人身安全的不安全做法的警告。

⚠ 1.1 激光安全

- 本产品采用四级（Class IV）激光模组。激光威力大，会导致眼睛受伤和皮肤灼伤。
- 我们在激光模组上安装了激光罩，很大程度上屏蔽了来自激光光斑的余光。建议使用激光雕刻机时佩戴激光护目镜。
- 避免皮肤暴露在四级（Class IV）激光束下，尤其是近距离照射。
- 儿童必须在家长的监督下使用机器。
- 激光雕刻模组接通时，请勿触摸。

⚠ 1.2 消防安全

- 高强度的激光束在切割时会产生极高的温度，并且切割基板时会产生大量的热量。
- 一些材料在切割过程中会起火，在设备内部产生气体和烟雾。
- 当激光束射到材料上时，通常会产生一束小火焰。它会随着激光移动，当激光扫过时不会保持燃烧。
  在雕刻过程中，请勿离开机器。
- 请记得在使用后清洗激光雕刻残留的碎片、残渣和易燃材料。在附近始终放置一个可用的灭火器。对烟雾或空气污染物的安全性提示：请在通风场所使用，当使用激光雕刻机时，材料（塑料和其他易燃材料）会产生烟雾、废气、颗粒有潜在的毒性。这些烟雾或空气中的污染物可能危害健康。

1.3 材料安全

- 不要雕刻性质不明的材料。
- 推荐材料：木材、竹子、皮革、塑料、织物、纸板、不透明亚克力及玻璃。
- 不推荐的材料：反光金属、宝石、透明材料、反光材料等。

1.4 使用安全

- 只能在水平位置使用激光雕刻机，并确保激光雕刻机已被牢固固定，以防止在工作过程中意外从工作台上滑落而引起火灾。
- 无论其是否处于工作状态，禁止将激光指向人、动物或任何可燃物体。

2. 激光雕刻机简介

- 激光雕刻机既可用于雕刻，也可用于切割。
- 激光雕刻机采用的是定焦激光，传统的激光是变焦激光模组，要直视激光光斑找到合适的大小。由于激光器是一种定焦激光模组，只需要一张2mm的定焦片就可以得到最佳的雕刻焦距。
- 激光护罩帮助我们挡住了大部分的强光，如果我们直视它们，首先，会损害视网膜同时降低视力；其次，会引起视觉疲劳，降低生产和学习效率。再次，光线会抑制褪黑素的产生，影响睡眠质量。激光防护罩可以保护你免受这种伤害。同时，我们配备了护目镜，请在激光雕刻时佩戴护目镜，进一步保护我们的眼睛。
- 激光雕刻机拥有大约5.5W的激光功率，它可以很容易地切割一些木板，在不反光的不锈钢上雕刻。
- 本产品支持PWM控制（脉宽调制），使雕刻的图案更加细致。

3. 软件安装及使用

- 本产品支持最流行的LaserGRBL软件，LaserGRBL是一款开源、易用、功能强大的软件，但遗憾的是LaserGRBL只支持Windows操作系统（Win XP/Win 7/Win 8/XP/Win 10）。
- 对于Mac用户来说，你当然可以选择 LightBurn ，它也是一款出色的雕刻器软件，但这款软件需要支付约40美元左右的费用。这个软件也支持 Windows操作系统。
- 雕刻机需要通过安装在计算机上的雕刻软件（LaserGRBL 或 LightBurn）来控制雕刻机移动及运行指令，因此雕刻机需要保持与计算机连接，在雕刻过程中关闭雕刻软件或者拔除连接线会导致雕刻机运行异常。由于设备运行及操作控制必须在计算机上完成的，因此计算机的配置可能会影响雕刻的速度甚至雕刻质量。

3.1 LaserGRBL软件安装与使用

3.1.1 下载软件

- LaserGRBL是世界上最流行的DIY激光雕刻软件之一，LaserGRBL的下载网址为：http://LaserGRBL.com/download/

3.1.2 安装LaserGRBL（下载V4.3.0版本不用增加自定义按钮）

- 进入下载页面后点击软件下载，下载完成后打开软件安装，勾选“Create a desktop shortcut”创建桌面快捷方式，之后一直点击Next直至安装完成。

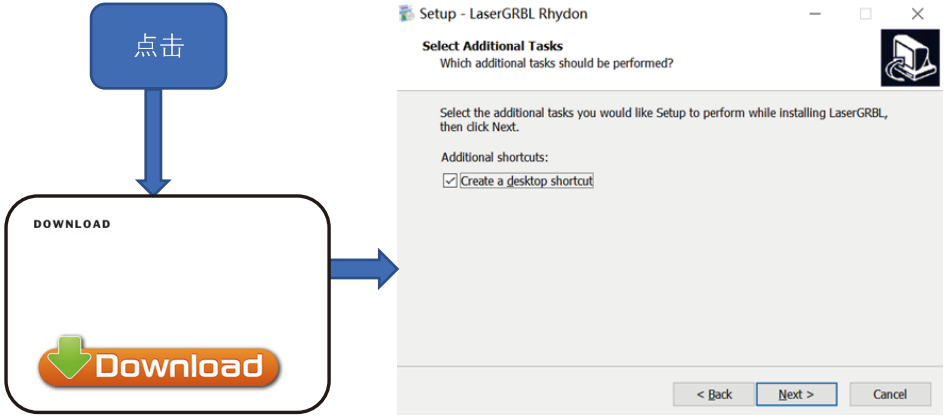


图 1 Laser GRBL 安装

- 另外，用户可以下载TronHoo自定义后的雕刻软件，内置了文本及图片编辑功能，同时添加了自定义按钮。TronHoo自定义后的雕刻软件下载地址为：https://www.tronhoo3d.com/download（安装方法与LaserGRBL一致）。

3.1.3 增加自定义按钮

软件支持用户添加自定义按钮，您可以根据自己的使用情况在软件中添加自定义按钮。我们推荐来自LaserGRBL的官方自定义按钮。自定义按钮下载地址为:http://lasergrbl.com/usage/custom-buttons/，下载后的自定义按钮图标显示如下：

图 2 自定义按钮包

- 接下来，我们将自定义按钮加载到LaserGRBL软件中。在LaserGRBL软件中，右键点击底部按钮旁边的空白处（如图3所示）-> 导入自定义按钮，然后选择之前下载的自定义按钮zip文件进行导入，一直点击Yes(Y)直到没有窗口弹出。

图 3 载入自定义按钮添加&加载

- 安装好自定义按钮后的软件如下图所示：

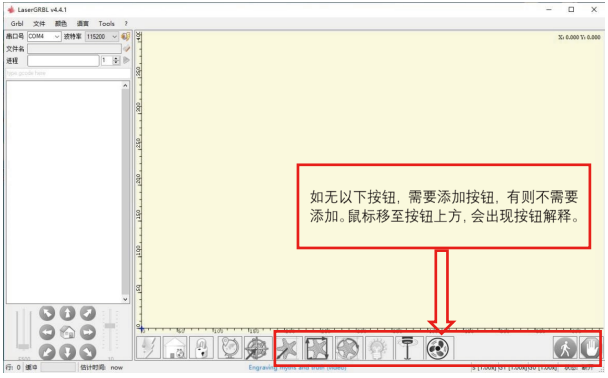


图 4 Laser GRBL安装完成后界面显示

3.1.4 连接激光雕刻机

(1) 用配备的数据线将雕刻机与安装有 Laser GBRL 软件的计算机相连；

(2) 接通雕刻机的电源；

(3) 打开 Laser GRBL 软件；

(4) 在软件中选择正确的端口号及波特率——115200，(一般情况下，COM 口不用手动去选择，但是如果你有多个串口设备连接计算机时，需要手动去选择，可在 Windows 系统中的设备管理器中找到激光雕刻机的端口，更简单的办法是把显示出来的端口号依次试一遍)。

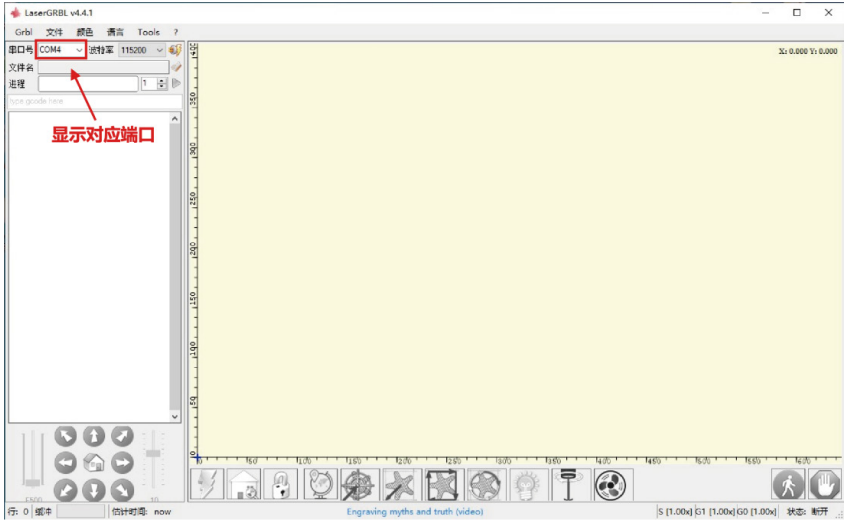


图 5 连接后显示对应端口

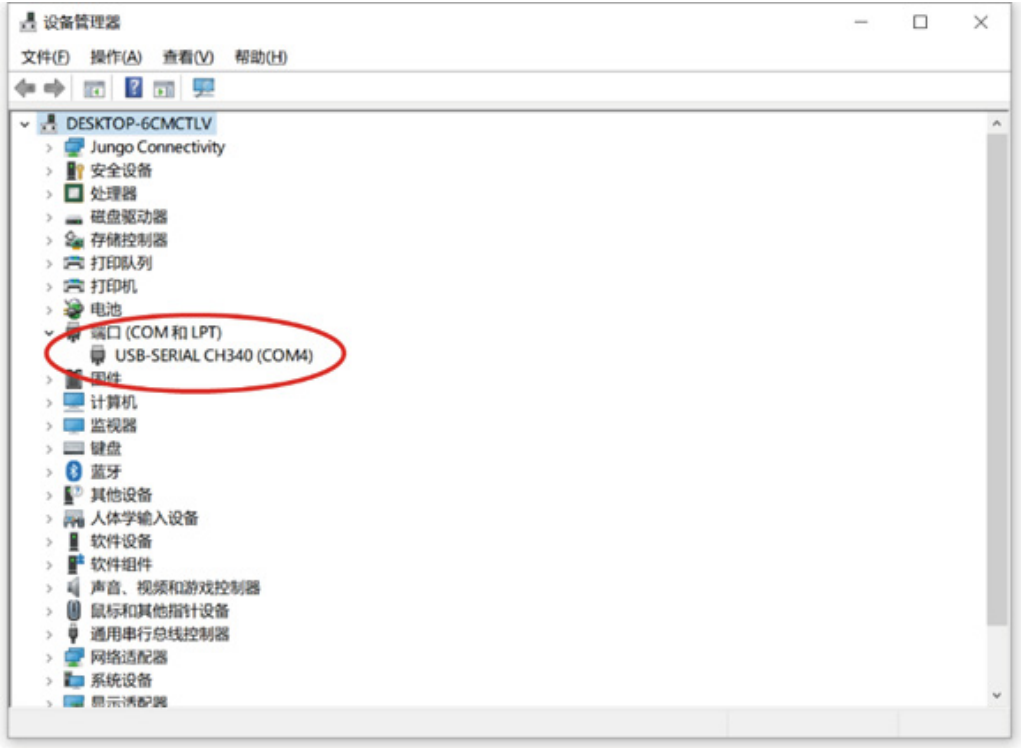

设备管理器
文件(F) 操作(A) 查看(V) 帮助(H)
DESKTOP-6CMCTLV
Jungo Connectivity
安全设备
处理器
磁盘驱动器
存储控制器
打印队列
打印机
电池
端口 (COM 和 LPT)
USB-SERIAL CH340 (COM4)
固件
计算机
监视器
键盘
蓝牙
其他设备
人体学输入设备
软件设备
软件组件
声音、视频和游戏控制器
鼠标和其他指针设备
通用串行总线控制器
网络适配器
系统设备

图 6 计算机查看端口

(5) 首先，安装驱动CH340 Driver，在 Laser GRBL软件中，依次点击“Tools”>“Install CH340 Driver”安装驱动；

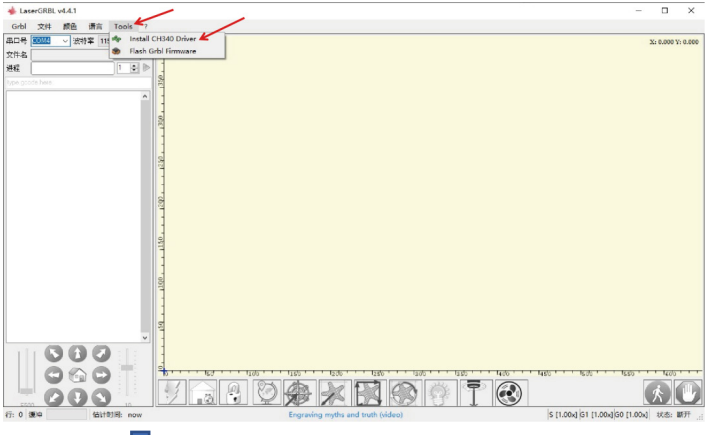


图 7 安装驱动

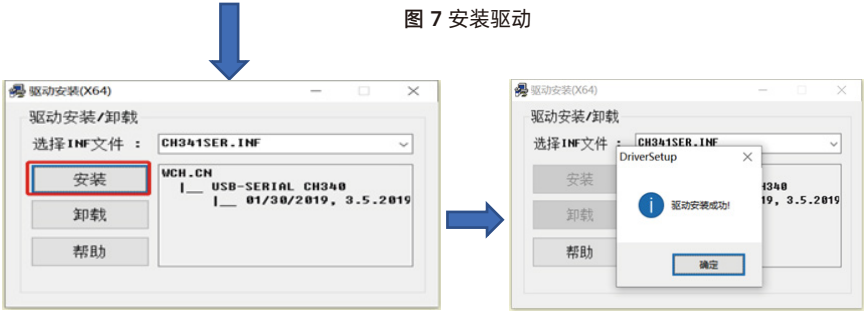


图 8 安装驱动

(6) 点击软件中的闪电连接标识，当闪电标识上多了红色的 X 时则表示连接成功。

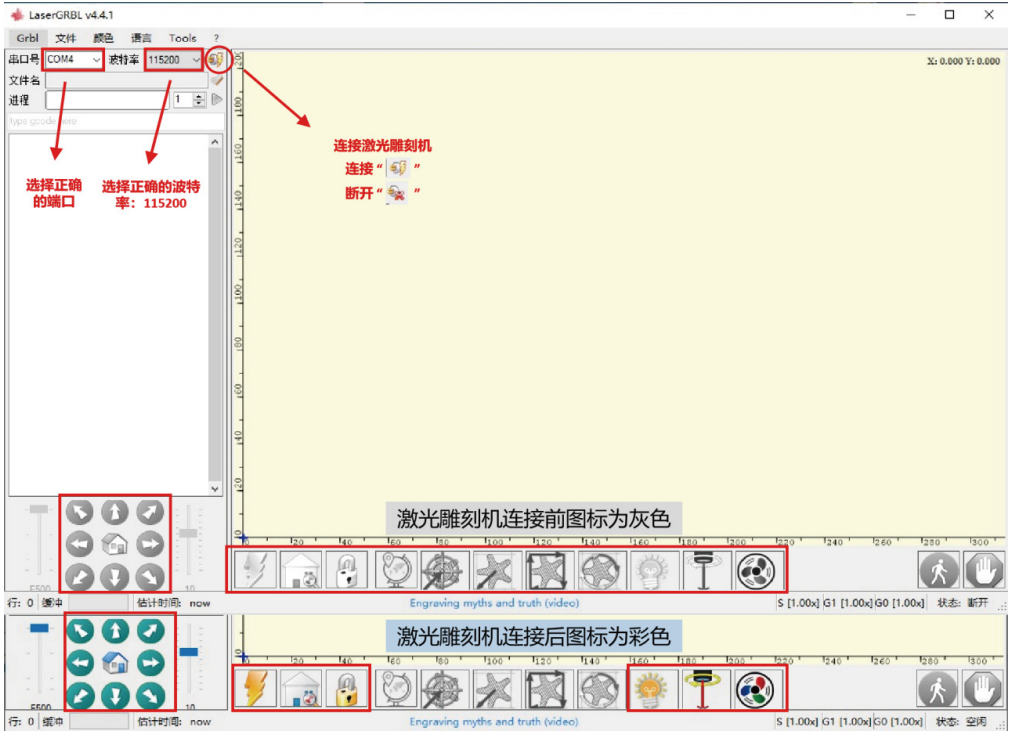


图 9 连接激光雕刻机

(7) 软件按键说明；

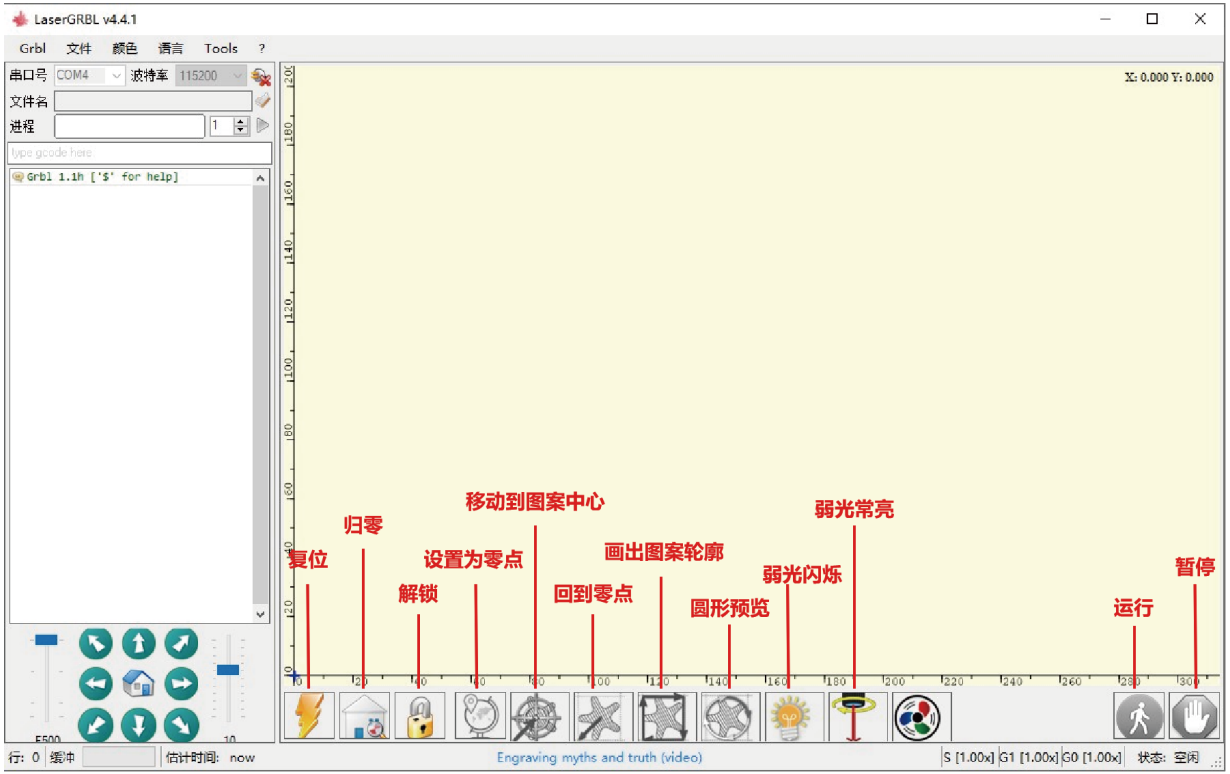


图10.1 软件按钮说明

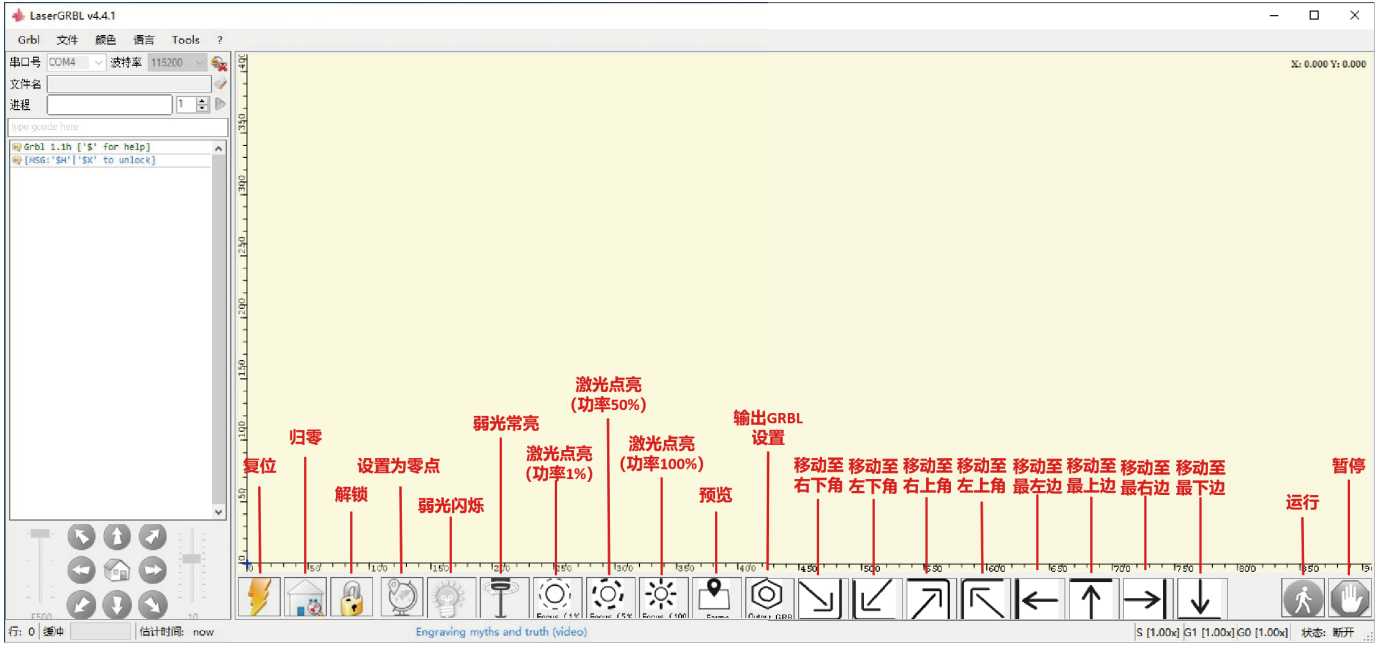


图 **10.2** TronHoo自定义软件按钮说明

3.1.5 设置雕刻参数

(1) 选择雕刻文件：打开 Laser GRBL 软件，依次点击“文件”>“打开文件”，然后选择您想要雕刻的图形进行雕刻，目前 Laser GRBL 支持 NC、BMP、JPG,、PNG,、DXF 等格式的文件。

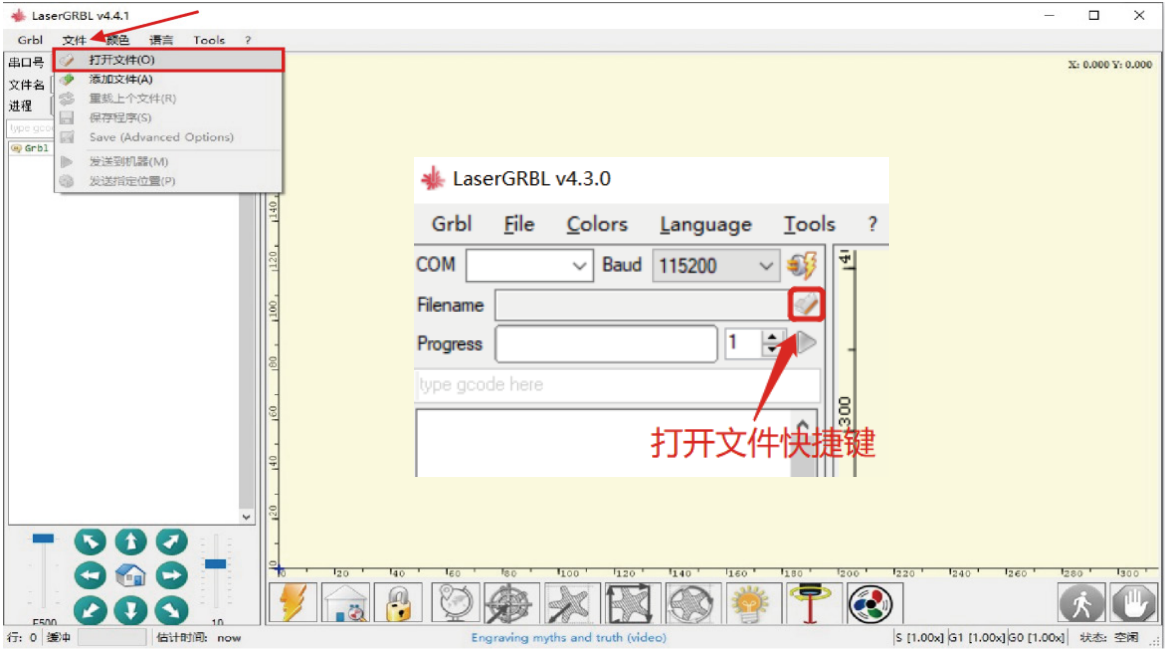


图 11 打开文件

⑵ 图片参数、雕刻模式、雕刻质量设置

a）Laser　GRBL可以调整目标图片的锐度、亮度、对比度、高光及其他属性，调整图片参数时可以在右侧的预览窗口看到事实的效果，调整到您认为满意的效果即可。

b）雕刻图案模式通常选择“线到线跟踪”和“1bit 抖动”，1bit 抖动更适合雕刻灰度图形；如果要进行切割材料，请选择矢量图或者中心线的雕刻模式，这样它会沿着细线进行切割。

c）雕刻质量本质上是指激光扫描的线宽，这一参数主要取决于雕刻机激光光斑的大小，雕刻机采用矩形光斑0.08*0.1mm，光斑大小的核心能量面积约为0.08*0.1mm，所以建议使用5-8行的雕刻质量范围，不同材质对激光照射的响应不同，所以准确的数值取决于具体的雕刻材质。

d）在预览窗口的底部，还可以对图像进行旋转、镜像、剪切等操作。

e）在完成以上设置后，点击下一步进入雕刻速度、雕刻能量和雕刻尺寸的设置。

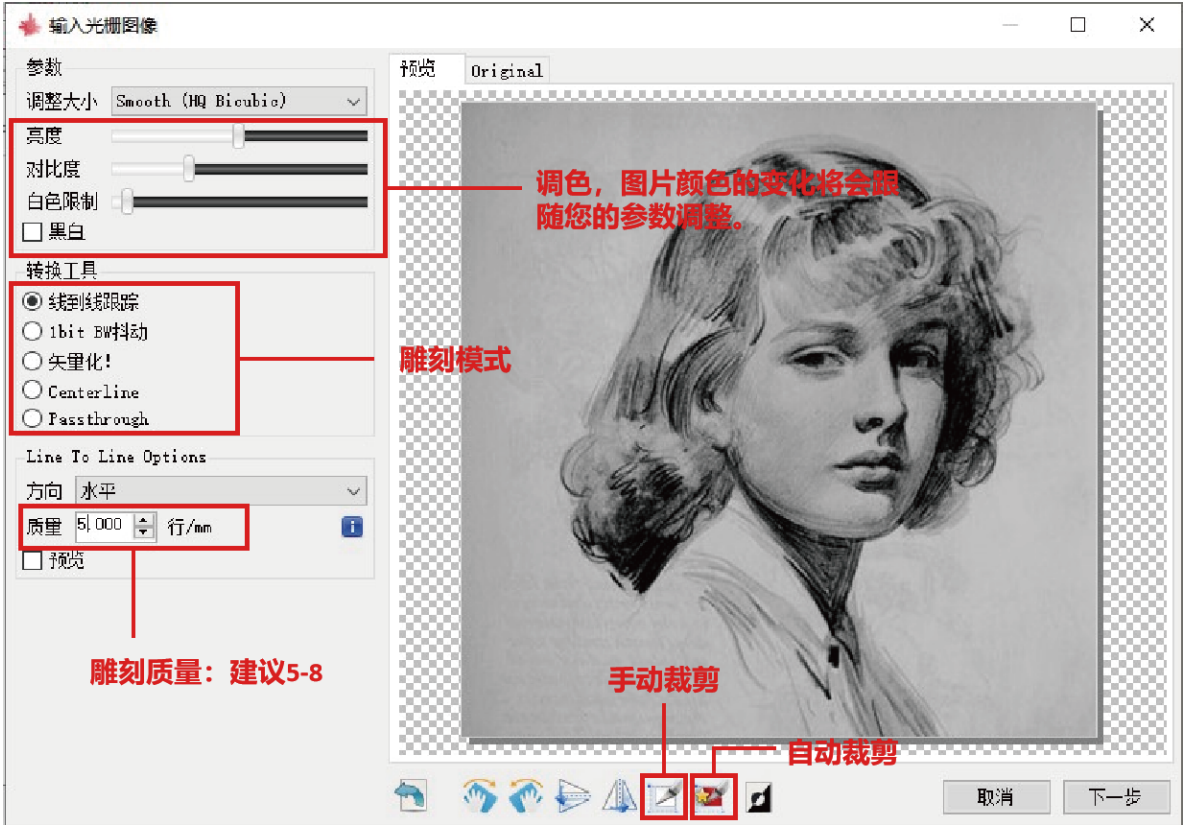

输入光栅图像
参数
调整大小
Smooth (HQ Bicubic)
亮度
对比度
白色限制
黑白
转换工具
线到线跟踪
1bit BW抖动
矢量化!
Centerline
Passthrough
Line To Line Options
方向
水平
质量
5.000
行/mm
预览
预览
Original
调色，图片颜色的变化将会跟随您的参数调整。
雕刻模式
雕刻质量：建议5-8
手动裁剪
自动裁剪
取消
下一步

图 12 图片处理

(3) 设置雕刻速度、雕刻能量和雕刻尺寸

a) 雕刻速度请参考材料参考表，根据不同材料硬度选择不同速度，材料不同雕刻速度快慢直接影响雕刻效果。

b) 在激光模式的选择中，激光开有两个模式，M3 和 M4，用“1bit 抖动”模式雕刻时建议使用M4，其他情况建议使用M3。如果您的激光只有M3，请检查 GRBL 配置里面是否启用了激光模式，关于 GRBL 配置的说明请参考 Laser GRBL 的官方说明。

c) 根据不同的材质选择不同的雕刻能量，我们在说明书的最后附上了常见材料的雕刻和切割参数供您参考。

d) 最后设置好您想要雕刻的尺寸大小，点击“创建”按钮就完成了所有雕刻参数的设置。

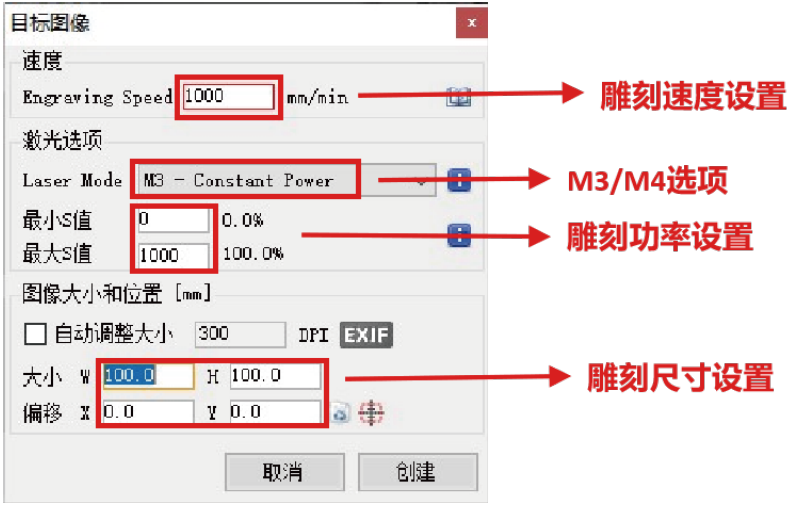


图 13 雕刻速度、功率及尺寸设置

3.1.6 激光模组归零&定位

(1) 先将雕刻机归零，点击设为零点按钮，激光雕刻机激光模组会往左前方回零3次；雕刻机归零后就默认雕刻位置是从左前方零点开始，需要将雕刻物体沿零点位置放置；

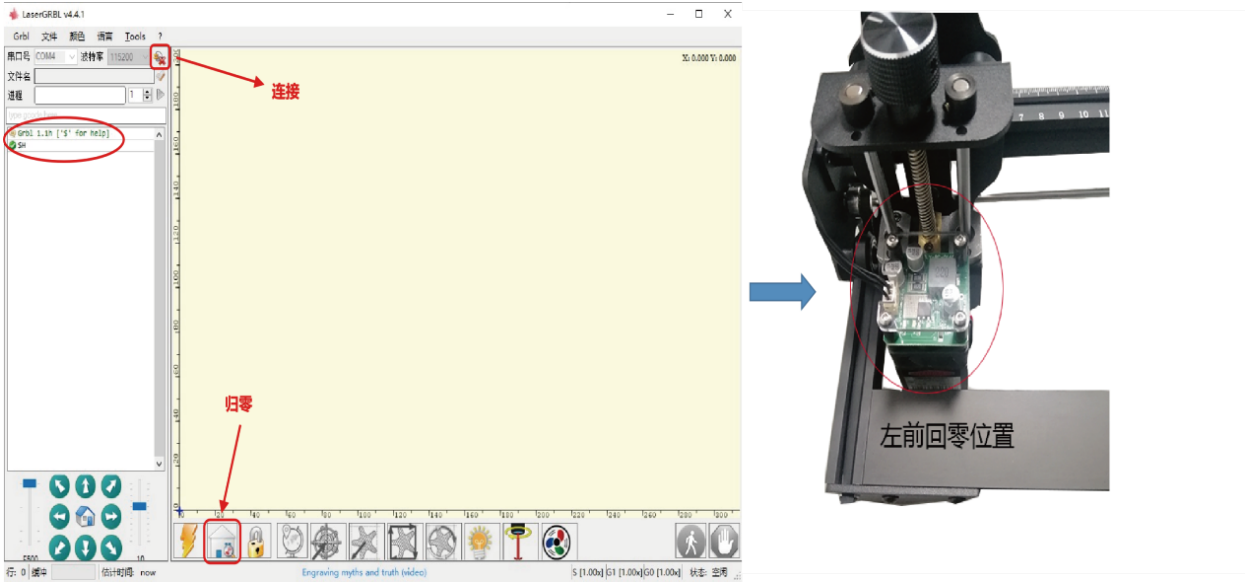
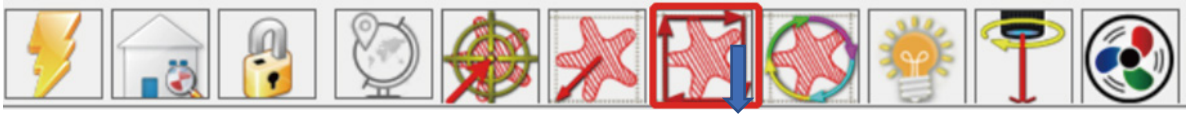


图 14 激光组归零

(2) 点击“轮廓扫描”按钮，激光模组将开始扫描图案的外轮廓，激光扫描的轮廓即是电脑上图片的外轮廓，可以根据扫描的外轮廓位置再次微调被雕刻物体的位置。(Ps:可以多次调整被雕刻物品位置点击预览按钮，直到外轮廓是最理想雕刻的位置)。



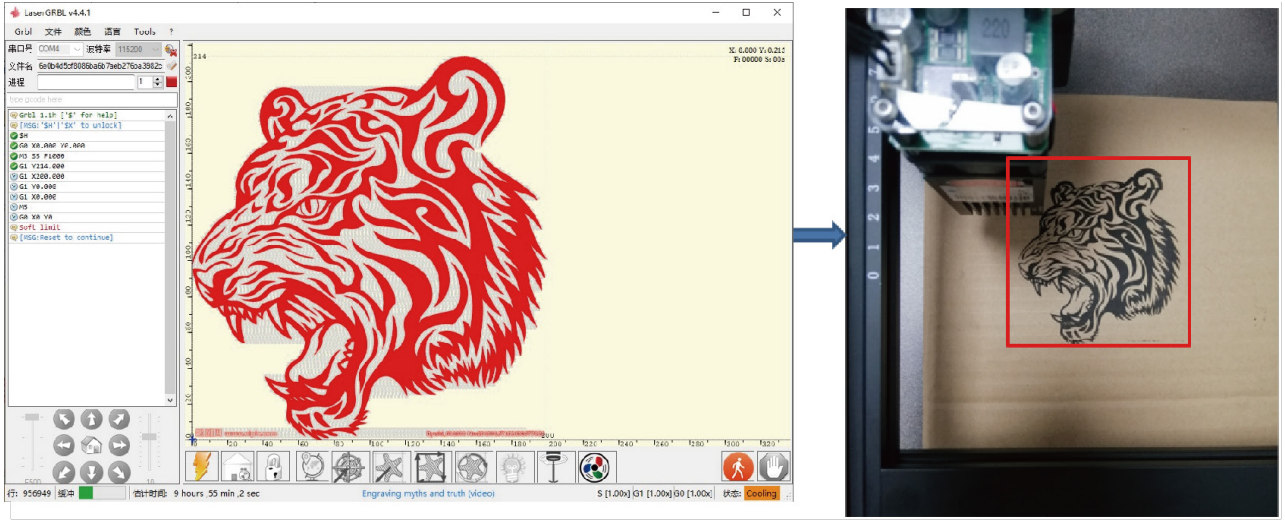


图 15 激光雕刻范围预览

3.1.7 开始&停止雕刻或切割

(1) 开始作业

在完成以上所有操作后，点击如图所示的绿色按钮可以开始雕刻，在开始按钮旁边有一个可以编辑的数字，这个数字是雕刻或者切割的次数，Laser GRBL允许对同一图形进行连续多次的雕刻或者切割，这个功能对于切割尤其有用。

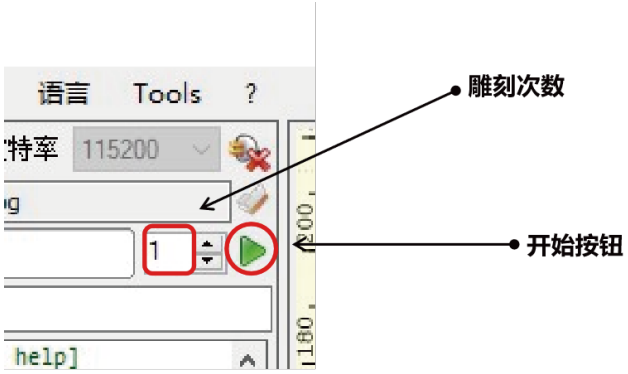


图 16 激光雕刻开始

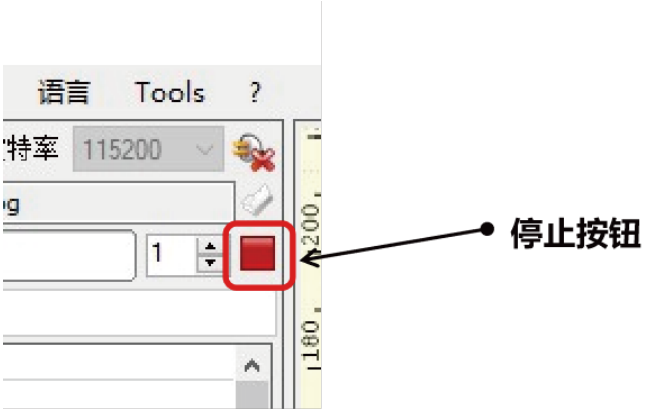


图 17 激光雕刻停止

(2) 终止作业

如果想要中途终止作业， 可以点击如图所示的终止按钮终止雕刻或者切割。

3.2 LightBurn软件安装与使用

(1) 我们可以从LightBurn网站下载软件安装包：https://lightburnsoftware.com/pages/trial-version-try-before-you-buy

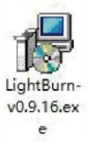


图 18 LightBurn 软件安装包

(2) 双击软件安装包进行安装，在弹出的窗口中点击“下一步”。(注：LightBurn是一款付费软件，为了更好的体验我们推荐大家购买原装，这里我们将演示试用版的安装)

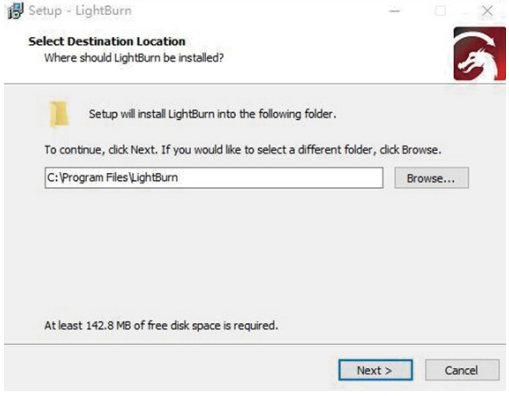


图 19 选择安装路径

(3) 点击开始免费试用

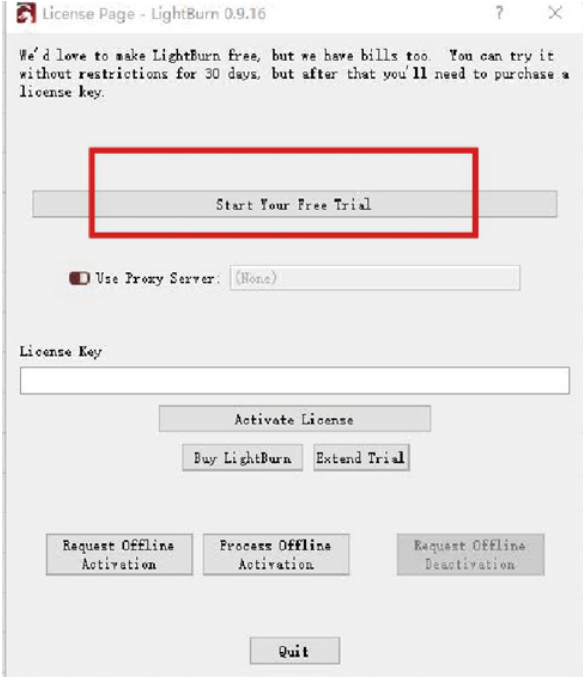


图 20 选择免费试用

(4) 单击查找我的激光

图 21 点击“找到我的激光”

(5) 单机添加设备

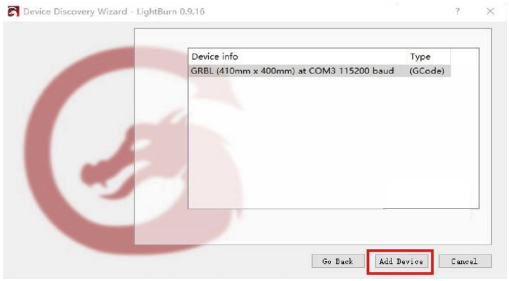


图 22 点击GRBL(410*400mm),点击添加设备

(6) 设置原点，通常将原点设置在左前方，安装完成

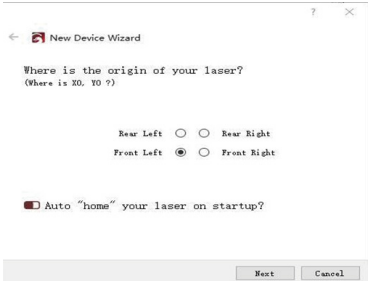


图 23 在左前方设置原点

(7) 如果软件没有连接到雕刻机上，我们可以像下图一样选择激光雕刻机的端口。

图 24 选择端口

3.2.2 基本操作

1. 绘制图形
2. 调整大小， 摆放位置
3. 双击进入设置选项

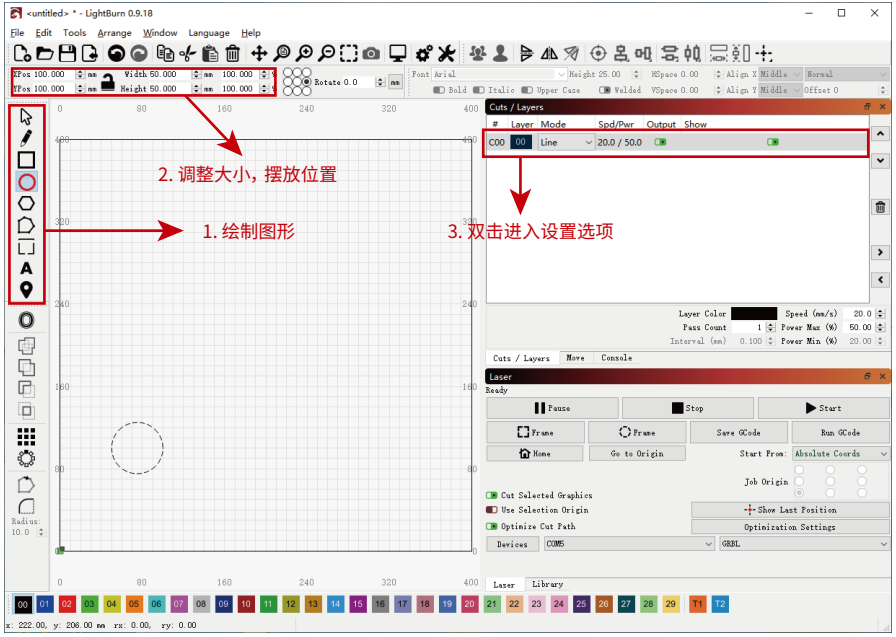


图 25 基本操作

1. 调整雕刻/切割速度
2. 调整雕刻/切割功率
3. 选择雕刻/切割模式
4. 确定

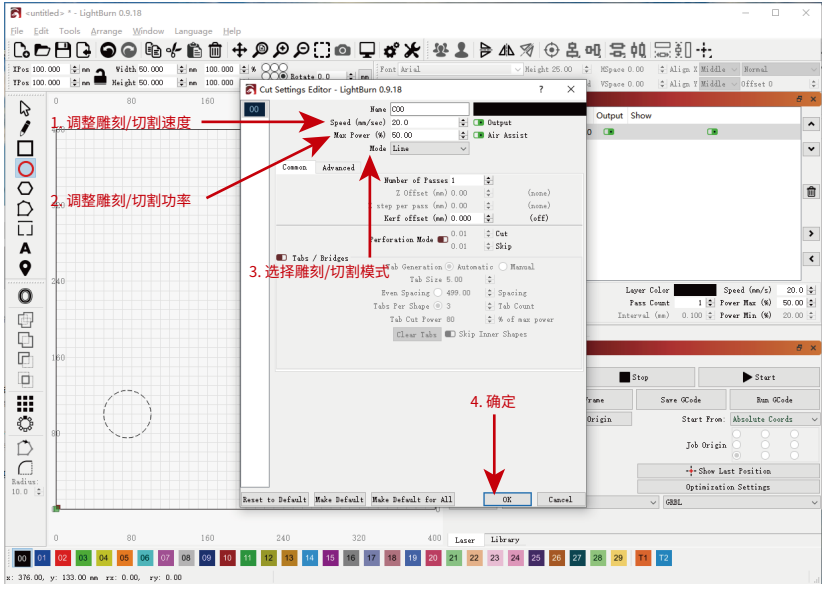


图 26 基本操作

1. 预览雕刻/切割范围边框

2. 开始

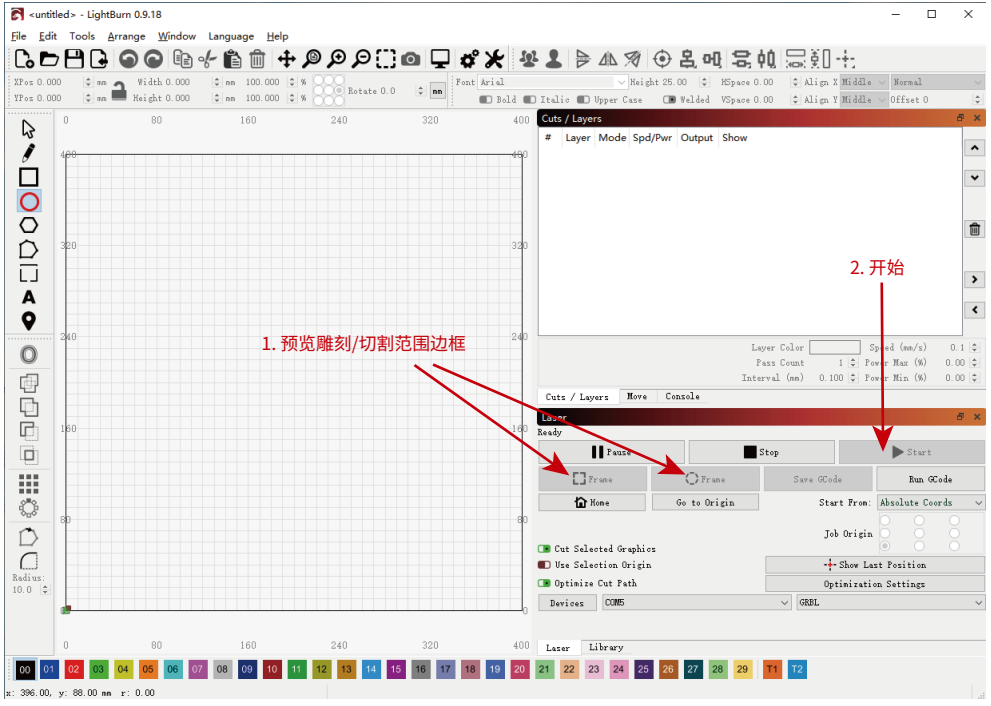


图 27 基本操作

3.2.3 功能说明

主页面功能

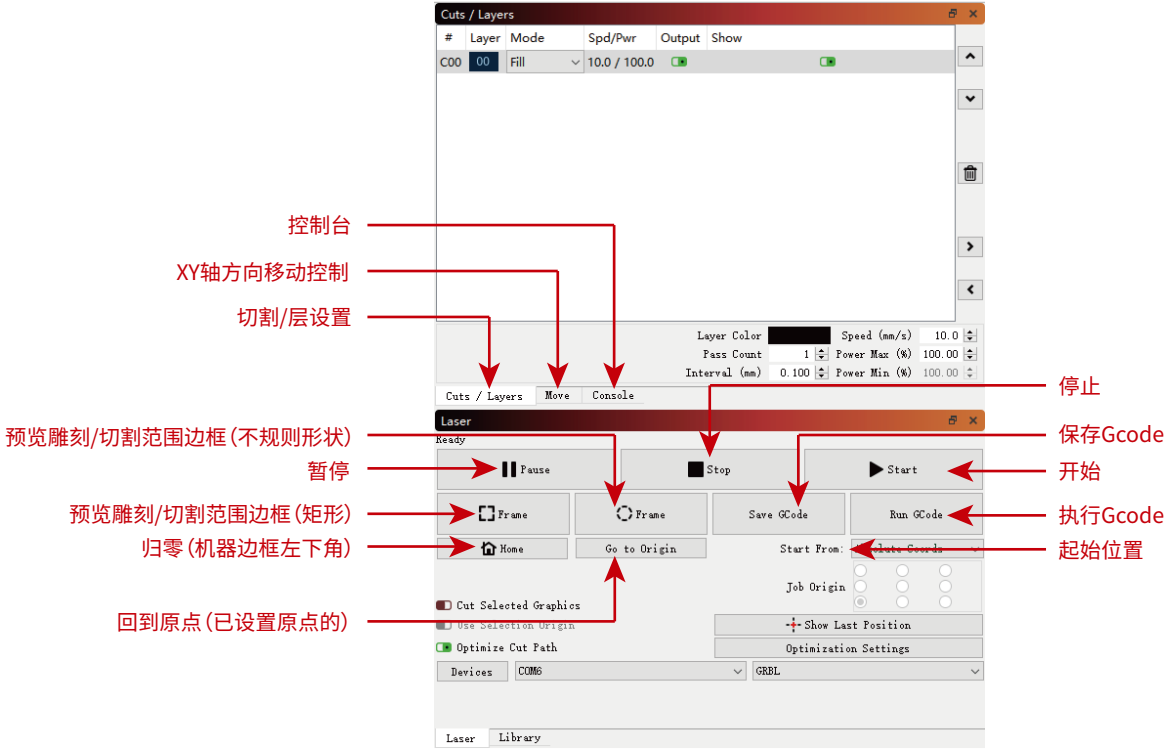


图 28 主页面功能

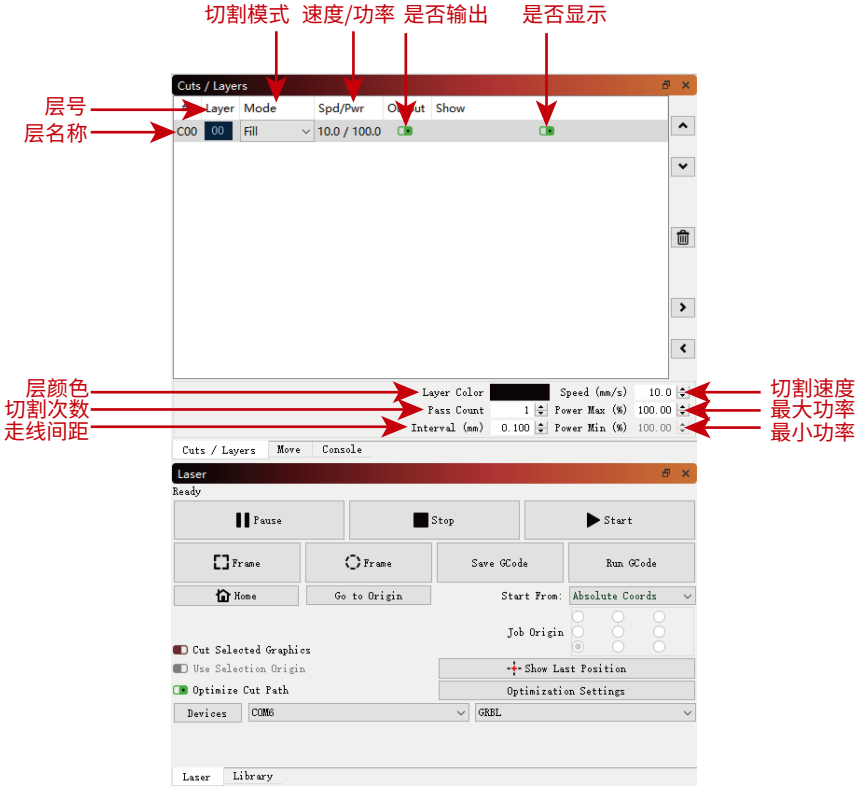

切割模式
速度/功率
是否输出
是否显示
层号
层名称
Cuts / Layers
Layer
Mode
Spd/Pwr
Output
Show
C00
00
Fill
10.0 / 100.0
层颜色
切割次数
走线间距
Layer Color
Pass Count
1
Interval (mm)
0.100
Speed (mm/s)
10.0
Power Max (%)
100.00
Power Min (%)
100.00
切割速度
最大功率
最小功率
Cuts / Layers
Move
Console
Laser
Ready
Pause
Stop
Start
Frame
Frame
Save GCode
Run GCode
Home
Go to Origin
Start From:
Absolute Coords
Job Origin
Cut Selected Graphics
Use Selection Origin
Show Last Position
Optimize Cut Path
Optimization Settings
Devices
COM6
GRBL
Laser
Library

图 29 主页面功能

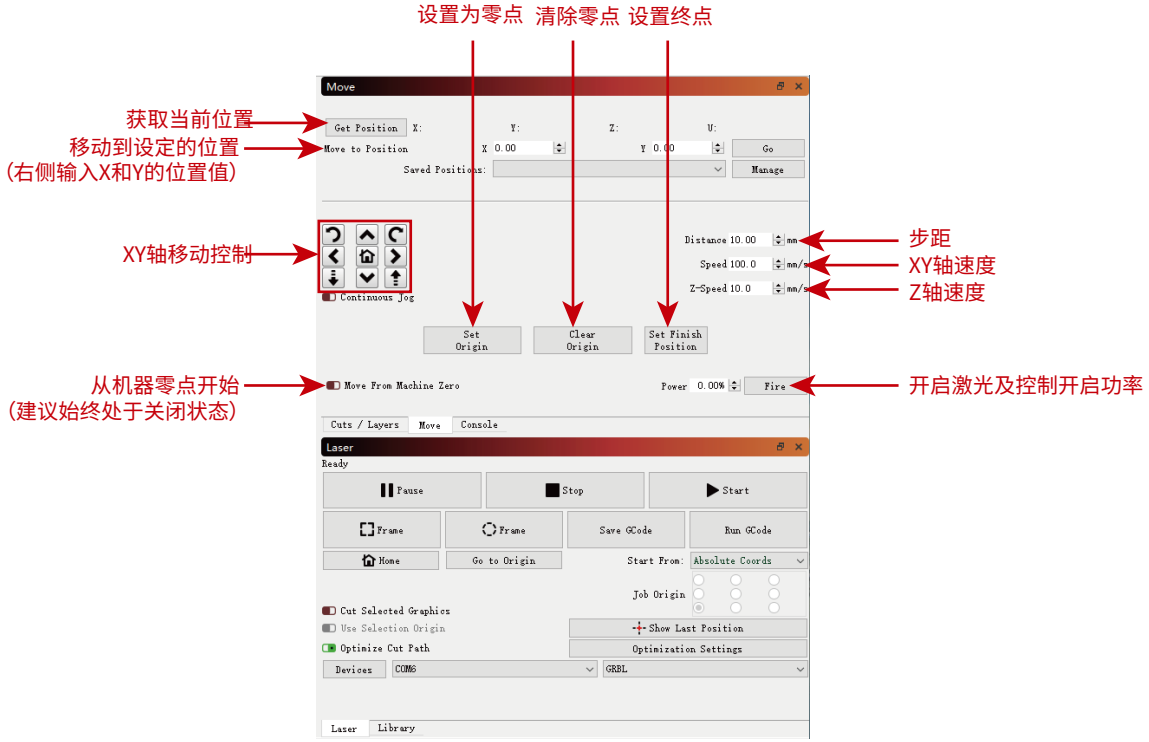

设置为零点
清除零点
设置终点
获取当前位置
移动到设定的位置
(右侧输入X和Y的位置值)
XY轴移动控制
从机器零点开始
(建议始终处于关闭状态)
步距
XY轴速度
Z轴速度
开启激光及控制开启功率
Move
Get Position
Move to Position
Saved Positions:
Go
Manage
Distance 10.00
Speed 100.0
Z-Speed 10.0
Continuous Jog
Set Origin
Clear Origin
Set Finish Position
Move From Machine Zero
Power 0.00%
Fire
Cuts / Layers
Move
Console
Laser
Ready
Pause
Stop
Start
Frame
Frame
Save GCode
Run GCode
Home
Go to Origin
Start From:
Absolute Coords
Job Origin
Cut Selected Graphics
Use Selection Origin
Optimize Cut Path
Show Last Position
Optimization Settings
Devices
COM6
GRBL
Laser
Library

图 30 移动页面功能

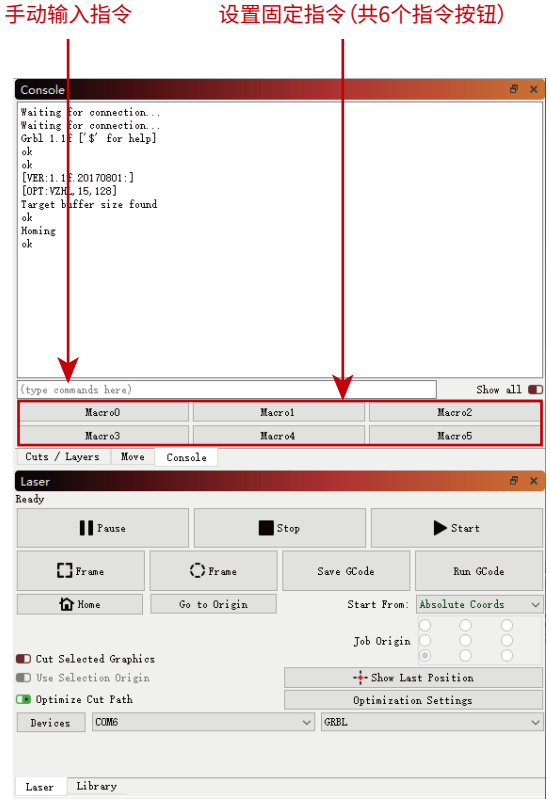


图 31 功能说明

图 32 激光页面功能

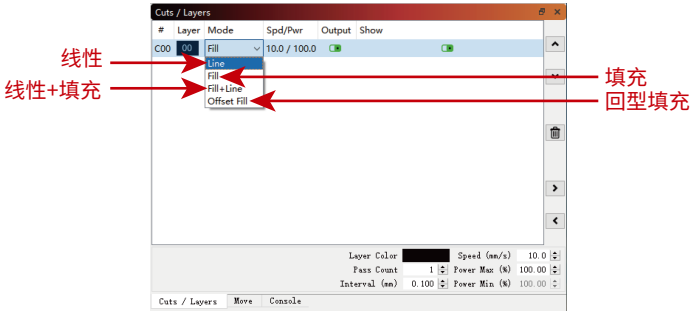


图 33 功能说明

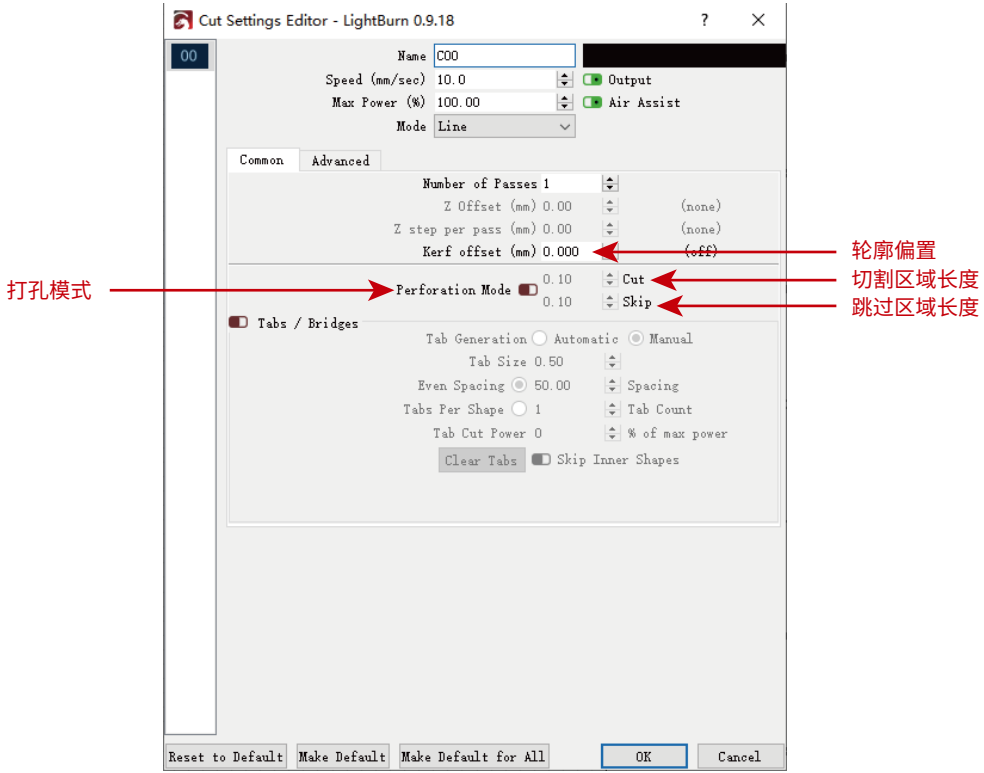

Cut Settings Editor - LightBurn 0.9.18
00
Name C00
Speed (mm/sec) 10.0
Max Power (%) 100.00
Mode Line
Output
Air Assist
Common
Advanced
Number of Passes 1
Z Offset (mm) 0.00 (none)
Z step per pass (mm) 0.00 (none)
Kerf offset (mm) 0.000 (off)
Perforation Mode
0.10 Cut
0.10 Skip
Tabs / Bridges
Tab Generation Automatic Manual
Tab Size 0.50
Even Spacing 50.00 Spacing
Tabs Per Shape 1 Tab Count
Tab Cut Power 0 % of max power
Clear Tabs
Skip Inner Shapes
Reset to Default
Make Default
Make Default for All
OK
Cancel
打孔模式
轮廓偏置
切割区域长度
跳过区域长度

图 34 功能说明

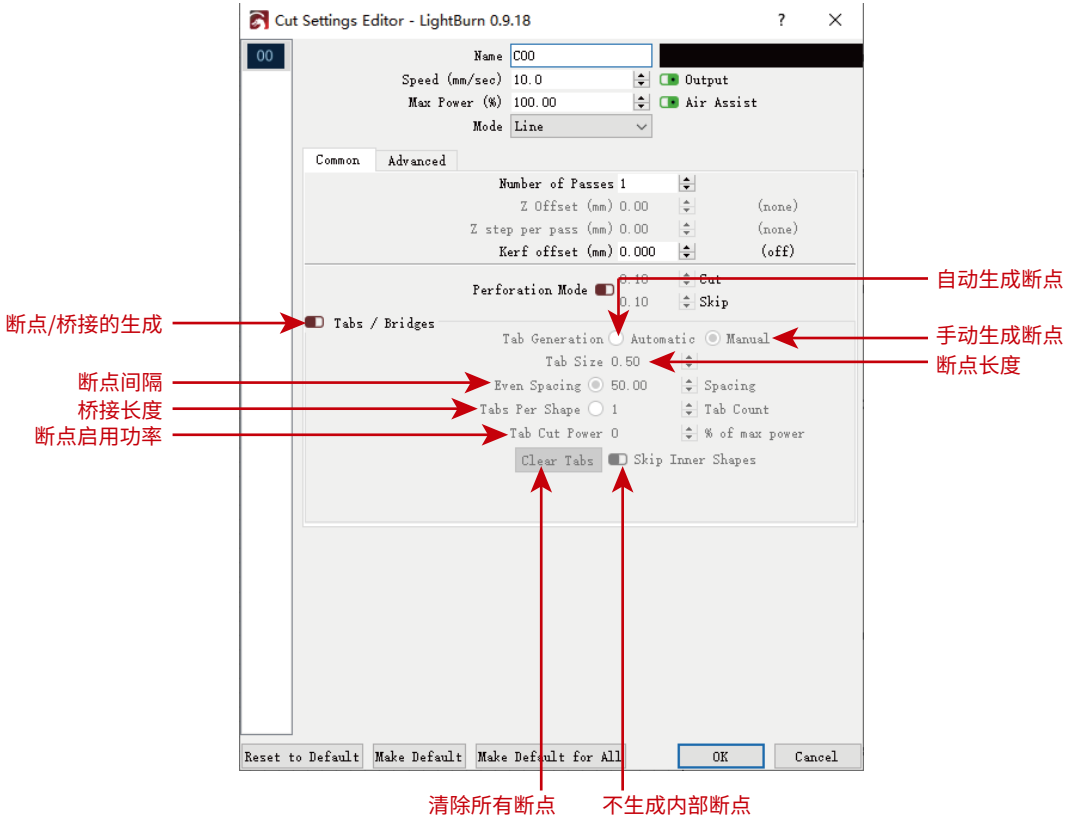

Cut Settings Editor - LightBurn 0.9.18
00
Name C00
Speed (mm/sec) 10.0
Max Power (%) 100.00
Mode Line
Output
Air Assist
Common
Advanced
Number of Passes 1
Z Offset (mm) 0.00
(none)
Z step per pass (mm) 0.00
(none)
Kerf offset (mm) 0.000
(off)
Perforation Mode
0.10
Cut
0.10
Skip
Tabs / Bridges
Tab Generation
Automatic
Manual
Tab Size 0.50
Even Spacing
50.00
Spacing
Tabs Per Shape
1
Tab Count
Tab Cut Power 0
% of max power
Clear Tabs
Skip Inner Shapes
Reset to Default
Make Default
Make Default for All
OK
Cancel
断点/桥接的生成
断点间隔
桥接长度
断点启用功率
自动生成断点
手动生成断点
断点长度
清除所有断点
不生成内部断点

图 35 功能说明

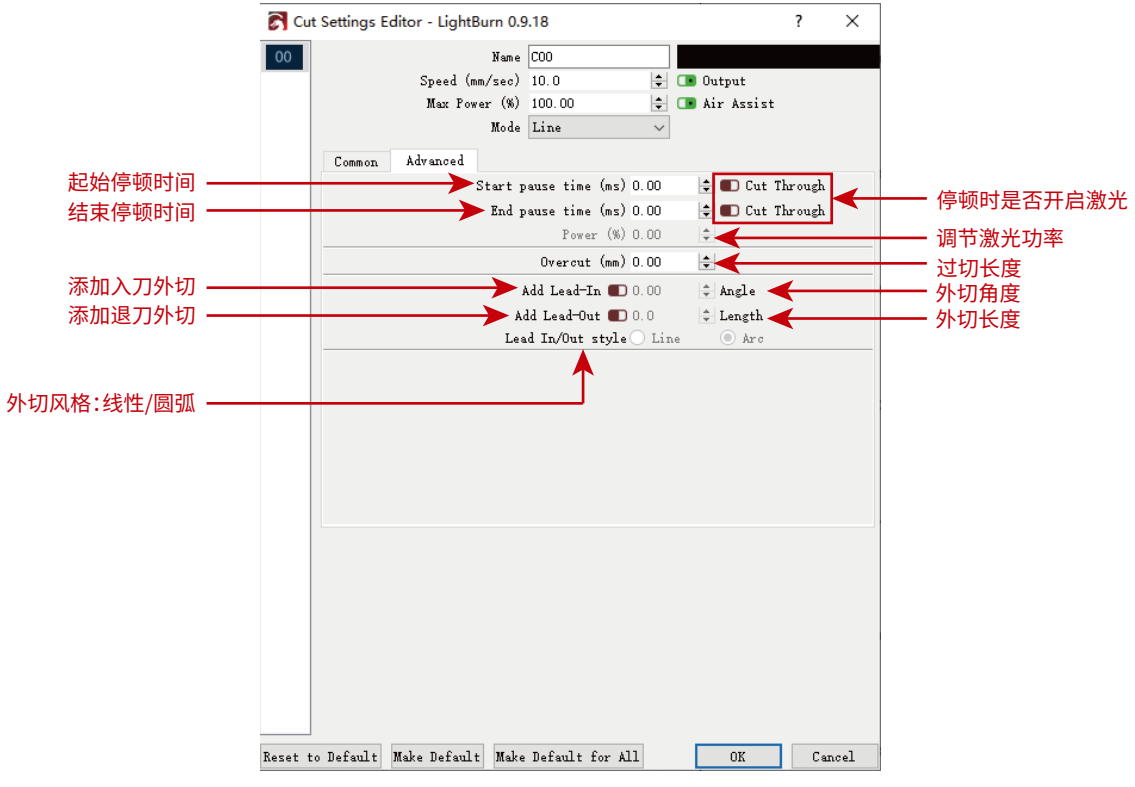

起始停顿时间
结束停顿时间
添加入刀外切
添加退刀外切
外切风格:线性/圆弧
停顿时是否开启激光
调节激光功率
过切长度
外切角度
外切长度
Cut Settings Editor - LightBurn 0.9.18
00
Name C00
Speed (mm/sec) 10.0
Max Power (%) 100.00
Mode Line
Output
Air Assist
Common
Advanced
Start pause time (ms) 0.00
End pause time (ms) 0.00
Power (%) 0.00
Overcut (mm) 0.00
Add Lead-In 0.00
Add Lead-Out 0.0
Lead In/Out style Line Arc
Cut Through
Cut Through
Angle
Length
Reset to Default
Make Default
Make Default for All
OK
Cancel

图 36 功能说明

4. 使用机器的技巧

(1) 请将激光模组与被雕刻物体保持定焦距离，激光模组与被雕刻物体过近，会剐蹭被雕刻物体，导致被雕刻物体移位，致使雕刻失败。

(2) 激光器的核心光斑为0.08×0.1mm的矩形光斑,其水平方向宽度为0.08mm,垂直方向长度为0.1mm。雕刻精致的模型建议使用垂直方向。

(3) 图案和雕刻对象的精确定位。

a.将激光器移到框架的左下方。

b.用尺子和铅笔在雕刻的物体上画一个中心点。

c.保护罩必须平行于雕刻物体的边缘。

d.依次点击以下两个按钮移动激光，使激光点移动到雕刻的中心。定位完成，就可以开始雕刻了。

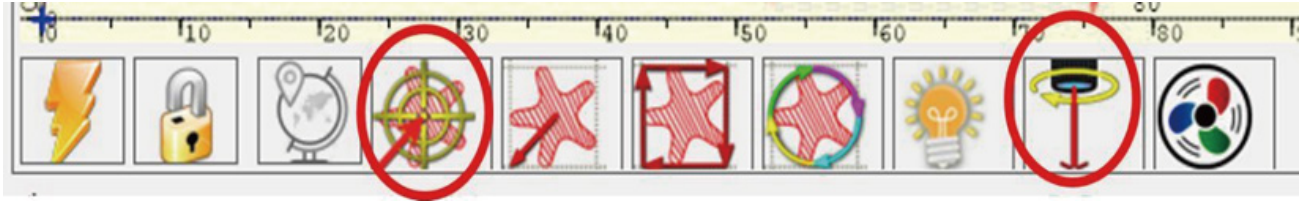


图 37 中心点定位

5. 常用材料和推荐的雕刻&切割参数

5.1常用材料和推荐的雕刻参数

1.6W							
	材料种类	能否雕刻	功率	速度 (毫米/分钟)	次数	激光选项	质量 (行/毫米)
1	牛皮纸	能	100%	1900	1	M4	8
2	木板	能	100%	1500	1	M4	7
3	亚克力	能	100%	1200	1	M4	5
4	浅色毛毡	能	100%	3500	1	M4	5
5	深色毛毡	能	100%	3000	1	M4	5
6	竹子	能	60%	2400	1	M4	8
7	皮革	能	100%	1800	1	M4	5
8	软木	能	35%	3000	1	M4	8
9	实木	能	100%	1700	1	M4	8
10	鹅卵石	能	100%	100	1	M4	8
11	氧化铝(黑色)	能	100%	20	1	M4	8
12	不锈钢(磨砂)	否	X	X	X	X	X
13	不锈钢(光面)	否	X	X	X	X	X

5W							
	材料种类	能否雕刻	功率	速度 (毫米/分钟)	次数	激光选项	质量 (行/毫米)
1	牛皮纸	能	100%	2300	1	M4	8
2	木板	能	100%	1600	1	M4	7
3	亚克力	能	100%	450	1	M4	5
4	浅色毛毡	能	60%	4000	1	M4	5
5	深色毛毡	能	60%	5000	1	M4	5
6	竹子	能	35%	2500	1	M4	8
7	皮革	能	80%	2000	1	M4	5
8	软木	能	20%	4000	1	M4	8
9	实木	能	100%	3000	1	M4	8
10	鹅卵石	能	100%	100	1	M4	8
11	氧化铝(黑色)	能	100%	200	1	M4	8
12	不锈钢(磨砂)	能	100%	80	1	M4	15
13	不锈钢(光面)	能	100%	50	5	M4	15

5W 光斑压缩							
	材料种类	能否雕刻	功率	速度 (毫米/分钟)	次数	激光选项	质量 (行/毫米)
1	牛皮纸	能	100%	5200	1	M4	8
2	木板	能	100%	4000	1	M4	7
3	亚克力	能	100%	2400	1	M4	5
4	浅色毛毡	能	60%	4000	1	M4	5
5	深色毛毡	能	60%	5000	1	M4	5
6	竹子	能	35%	3500	1	M4	8
7	皮革	能	80%	2500	1	M4	5
8	软木	能	20%	4500	1	M4	8
9	实木	能	100%	3000	1	M4	8
10	鹅卵石	能	100%	600	1	M4	8
11	氧化铝(黑色)	能	100%	650	1	M4	8
12	不锈钢(磨砂)	能	100%	300	1	M4	10
13	不锈钢(光面)	能	100%	150	3	M4	10

10W 光斑压缩							
	材料种类	能否雕刻	功率	速度 (毫米/分钟)	次数	激光选项	质量 (行/毫米)
1	牛皮纸	能	60%	6000	1	M4	8
2	木板	能	100%	4500	1	M4	7
3	亚克力	能	100%	1100	1	M4	5
4	毛毯(1mm)浅色	能	60%	5000	1	M4	5
5	毛毯(2mm)深色	能	60%	5500	1	M4	5
6	竹子	能	35%	4500	1	M4	8
7	皮革	能	40%	2500	1	M4	5
8	软木	能	20%	4500	1	M4	8
9	木头	能	100%	3000	1	M4	8
10	鹅卵石	能	100%	1000	1	M4	8
11	氧化铝	能	100%	2500	1	M4	8
12	不锈钢(磨砂)	能	100%	1500	1	M4	8
13	不锈钢(光面)	能	100%	1200	5	M4	8

10W 光斑压缩							
	材料种类	能否雕刻	功率	速度 (毫米/分钟)	次数	激光选项	质量 (行/毫米)
14	瓷砖	能	100%	300	1	M4	8

(2) 常用材料和推荐的切割参数

1.6W						
	材料种类	能否切割	功率	速度 (毫米/分钟)	次数	激光选项
1	牛皮纸 (0.5mm)	能	100%	180	1	M3
2	牛皮纸 (1.0mm)	能	100%	50	1	M3
3	牛皮纸 (2.0mm)	能	100%	50	3	M3
4	木板 (1.0mm)	能	100%	120	1	M3
5	木板 (2.0mm)	能	100%	60	3	M3
6	木板 (3.0mm)	能	100%	50	6	M3
7	亚克力 (0.5mm)	否	X	X	X	X
8	亚克力(1.0mm)	否	X	X	X	X
9	亚克力 (2.0mm)	否	X	X	X	X
10	毛毡 (1mm) 浅色	能	100%	750	1	M3
11	毛毡 (2mm) 深色	能	100%	150	1	M3
12	竹子 (1.0mm)	能	100%	120	1	M3
13	竹子 (2.0mm)	能	100%	420	1	M3

1.6W						
	材料种类	能否切割	功率	速度 (毫米/分钟)	次数	激光选项
14	竹子(3.0mm)	能	100%	50	1	M3
15	皮革	能	100%	400	1	M3
16	软木	否	X	X	X	X
17	实木	否	X	X	X	X
18	鹅卵石	否	X	X	X	X
19	氧化铝(黑色)	否	X	X	X	X
20	不锈钢(磨砂)	否	X	X	X	X
21	不锈钢(磨砂)	否	X	X	X	X

5W						
	材料种类	能否切割	功率	速度 (毫米/分钟)	次数	激光选项
1	牛皮纸 (0.5mm)	能	100%	1700	1	M3
2	牛皮纸 (1.0mm)	能	100%	400	1	M3
3	牛皮纸 (2.0mm)	能	100%	100	1	M3
4	木板 (1.0mm)	能	100%	1200	1	M3
5	木板 (2.0mm)	能	100%	340	1	M3
6	木板 (3.0mm)	能	100%	110	1	M3
7	亚克力 (0.5mm)	否	X	X	X	X
8	亚克力(1.0mm)	否	X	X	X	X
9	亚克力 (2.0mm)	否	X	X	X	X
10	毛毡 (1mm) 浅色	能	100%	2500	1	M3
11	毛毡 (2mm) 深色	能	100%	400	1	M3
12	竹子 (1.0mm)	能	100%	650	1	M3
13	竹子 (2.0mm)	能	100%	420	1	M3

5W						
	材料种类	能否切割	功率	速度 (毫米/分钟)	次数	激光选项
14	竹子(3.0mm)	能	100%	200	1	M3
15	皮革	能	100%	1200	1	M3
16	软木	否	X	X	X	X
17	实木	否	X	X	X	X
18	鹅卵石	否	X	X	X	X
19	氧化铝(黑色)	否	X	X	X	X
20	不锈钢(磨砂)	否	X	X	X	X
21	不锈钢(磨砂)	否	X	X	X	X

5W 光斑压缩						
	材料种类	能否切割	功率	速度 (毫米/分钟)	次数	激光选线
1	牛皮纸 (0.5mm)	能	100%	1700	1	M3
2	牛皮纸 (1.0mm)	能	100%	400	1	M3
3	牛皮纸 (2.0mm)	能	100%	100	1	M3
4	木板 (1.0mm)	能	100%	1200	1	M3
5	木板 (2.0mm)	能	100%	340	1	M3
6	木板 (3.0mm)	能	100%	110	1	M3
7	亚克力 (0.5mm)	能	100%	100	4	M3
8	亚克力(1.0mm)	能	100%	100	6	M3
9	亚克力 (2.0mm)	能	100%	100	10	M3
10	毛毡 (1mm) 浅色	能	100%	2500	1	M3
11	毛毡 (2mm) 深色	能	100%	400	1	M3
12	竹子 (1.0mm)	能	100%	650	1	M3
13	竹子 (2.0mm)	能	100%	420	1	M3

5W 光斑压缩						
	材料种类	能否切割	功率	速度 (毫米/分钟)	次数	激光选项
14	竹子(3.0mm)	能	100%	200	1	M3
15	皮革	能	100%	1200	1	M3
16	软木	否	100%	750	1	M3
17	实木	否	100%	500	1	M3
18	鹅卵石	否	X	X	X	X
19	氧化铝(黑色)	否	X	X	X	X
20	不锈钢(磨砂)	否	X	X	X	X
21	不锈钢(磨砂)	否	X	X	X	X

10W 光斑压缩						
	材料种类	能否切割	功率	速度 (毫米/分钟)	次数	激光选项
1	牛皮纸(1.0mm)	能	100%	750	1	M3
2	牛皮纸(2.0mm)	能	100%	230	1	M3
3	牛皮纸(3.0mm)	能	100%	100	1	M3
4	牛皮纸(3.0mm)	能	100%	300	2	M3
5	木板(2.0mm)	能	100%	400	1	M3
6	木板(3.0mm)	能	100%	300	1	M3
7	木板(5.0mm)	能	100%	120	1	M3
8	木板(10.0mm)	能	100%	80	1	M3
9	木板(10.0mm)	能	100%	150	2	M3
10	亚克力(0.5mm)	能	100%	800	2	M3
11	亚克力(1.0mm)	能	100%	800	4	M3
12	亚克力(2.0mm)	能	100%	800	10	M3
13	毛毯(1.0mm)浅色	能	100%	3500	1	M3

10W 光斑压缩						
	材料种类	能否切割	功率	速度 (毫米/分钟)	次数	激光选项
14	毛毯(2.0mm)深色	能	100%	800	1	M3
15	竹子(1.5mm)	能	100%	600	1	M3
16	竹子(3.5mm)	能	100%	150	1	M3
17	竹子(6.5mm)	能	100%	40	1	M3
18	皮革	能	100%	1500	1	M3
19	软木	能	100%	600	1	M3
20	木头	能	100%	300	5	M3
21	鹅卵石	NO	X	X	X	X
22	氧化铝(浅色)	NO	X	X	X	X
23	氧化铝(深色)	NO	X	X	X	X
24	不锈钢(磨砂)	NO	X	X	X	X
25	不锈钢(光面)	NO	X	X	X	X
26	瓷砖	NO	X	X	X	X

6. 常见问题

常见问题	可能原因	解决方案
软件在哪里下载?		https://lasergrbl.com/download/ https://lightburnsoftware.com/
雕刻机无法连接软件(这里指的是Laser-GRBL软件)	缺少驱动程序,无法连接	在LaserGRBL软件中,点击“工具”>“安装CH340驱动程序”安装驱动程序,安装完成后重新启动计算机即可连接。
	多个LaserGRBL软件重复打开	关闭重复打开的LaserGRBL软件。
	端口号不正确	选择正确的端口号
	波特率选择不正确	待选波特率:115200。
	数据线未连接	检查数据线是否正确连接。
	计算机的USB端口问题	尝试其他USB端口。

常见问题	可能原因	解决方案
刻字线不直	皮带不紧	
	皮带螺钉两端未锁紧	拧紧皮带两端的定位螺钉。
	滚轮未锁定，支架摇晃	调整托架下方的偏心螺母，锁紧偏心螺母，使托架不晃动。
	激光器支架延伸太多导致激光器抖动	抬高激光器，使其尽可能靠近顶部，以减少激光器摆动。
雕刻不出图案或图案不清晰？	激光焦距没调好	调整激光焦距。
	雕刻功率太小或者雕刻速度过大	参考材料参数调整雕刻功率。
	导入图片不清晰或处理不理想	确认导入图片是否清晰，图片处理是否理想。
	雕刻机没有放平导致倾斜	检查雕刻机是否放平。
	激光孔有灰尘或杂物	检查激光孔是否有灰尘或杂物。

常见问题	可能原因	解决方案
可以在凹面或者球面的物体上雕刻吗?		可以,但是不建议在曲率过大的物体上雕刻,可能会导致图案扭曲变形。
如何提高雕刻质量?		参考说明书中提供参数进行雕刻。
		根据不同材料雕刻效果来逐次微调,直至获得最佳参数。