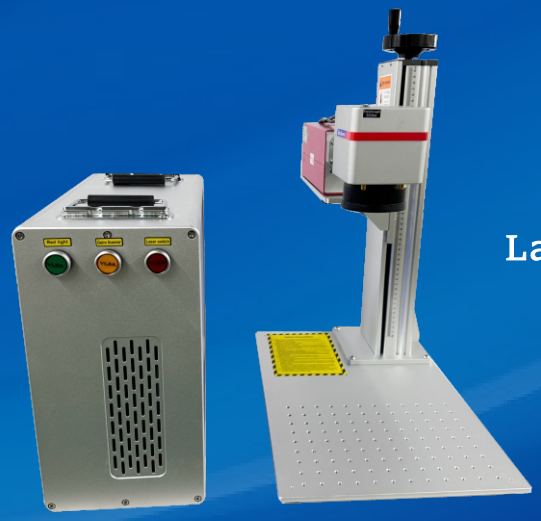

Laser Marking Machine

User manual

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Catalogue

1.Equipment operation safety protection

This product belongs to class IV laser products, which can produce dangerous diffuse reflection, which may cause personal injury or fire. Special care should be taken during use! Before installing, operating and maintaining the equipment, be sure to carefully read and understand the contents of this chapter. The operators must pass the system training before operating the equipment!

1. It is forbidden to look directly at any form of laser beam with naked eyes (including direct, specular and diffuse laser beams). The laser beam will directly enter the eyes, which may cause injury to the eyes and, in serious cases, may lead to blindness!

2. It is forbidden to directly contact the direct laser beam or the laser beam through specular reflection and diffuse reflection! During operation, do not extend your hands or other parts of your body into the processing area, otherwise you may cause skin burns!

3. When entering the laser processing control area, be sure to wear laser protective glasses! The corresponding protective glasses are selected according to different laser wavelength and irradiation amount.

4. It is forbidden to mark the mirror material with high reflectivity to prevent the mirror reflection of the output laser beam from damaging the equipment or operators!

5. During operation, do not place the path of the laser beam at the same height as the operator's eyes, but use a high temperature resistant light absorber
Stop the laser leakage for the baffle!

6. Laser processing of flammable and explosive materials and stacking of flammable and explosive materials and sundries around the equipment are prohibited! Flammable and explosive materials will cause fire or explosion when they encounter laser!

7. Do not cover the equipment with blankets, cloth and other textiles when the equipment is working, so as to avoid local overheating of the equipment and fire!

8. Repeated processing at the same position of materials is prohibited. Processing at the same position for a long time may cause fire!

9. Users are not allowed to disassemble or restructure the equipment by themselves! Safety accidents and equipment failures caused by non professional personnel dismantling, repairing and transforming the equipment do not belong to the scope of warranty!

10. Please do not use this equipment when there is vibration, impact or strong electromagnetic interference source! Vibration and electromagnetic interference will affect the machining accuracy and may damage the equipment!

2. Equipment Overview

Introduction

Laser marking machine uses laser beam to print permanent marks on the surface of various substances.
The main effects of laser marking machine are:
(1) The surface layer of the target material is evaporated by laser light energy to expose the deep layer of the material;
(2)Through the chemical and physical changes of surface materials caused by laser light, the required patterns and words are "engraved";
(3) Part of the material can be burned by laser light, so as to show the patterns and characters to be etched.

Application scope

UV laser marking machine is Mainly based on its unique low-power laser beam. It is especially suitable for the high-end market of ultra-fine processing. The surfaces of bottles for cosmetics, pharmaceuticals, food and other high-molecular materials are marked with fine effects and clear and firm markings. Better than ink coding and no pollution; flexible pcb board marking, dicing; silicon wafer micro hole, blind hole processing; LCD liquid crystal glass two-dimensional code marking, glass surface punching, metal surface coating marking, Plastic buttons, electronic components, gifts, communications equipment, building materials, and so on.

Working principle

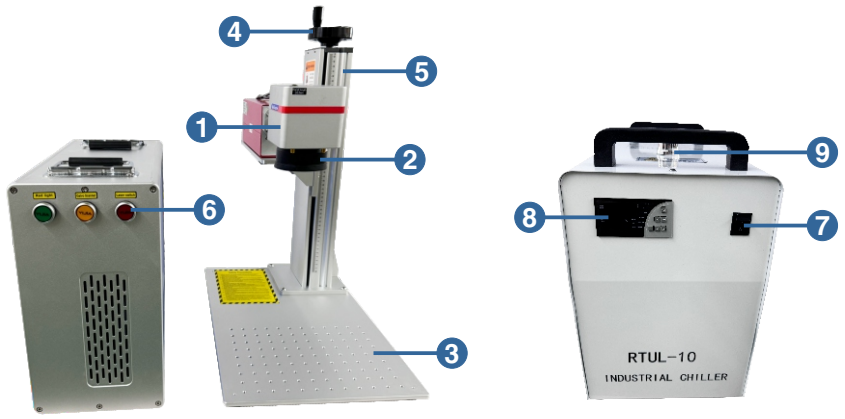
After the laser beam with the output wavelength of 355 ± 10nm is internally expanded, it is emitted onto the mirrors of the x-axis and y-axis galvanometer scanners. The galvanometer scanners swing rapidly under the control of the computer to scan the laser beam in the two-dimensional directions of plane X and y.Through the lens, the laser beam is focused on the surface of the processed object to form a fine and high-energy density spot. Each high-energy laser spot is ablated and carved on the surface of the object in an instant.

Through the continuous process controlled by computer, the pre arranged characters, graphics and other marking contents are permanently etched on the object surface.

Features

(1) Adopt doubling technique of intravenous frequency has greatly improve the stability of laser. Design on laser cavity adopts a series of optimization method, so as to ensure the beam quality as the fundamental mode.
(2) Narrower pulse width and smaller heat affection contribute to generate peak power. The higher the peak power is, the wider the adapting range of materials is. This implement perfect UV marking in some relatively hard material.
(3) Higher pulse stability, namely better pulse consistency of laser produces the same carving effect, so the UV marker is very suitable for precision uv marking. Higher pulse repetition frequency meets the need of quick marking and high production efficiency.
(4) High efficiency of the photoelectric conversion and long service life.
(5) The UV marker can support logos and graphs designed in DXF format from PLT, BMP, AI, JPG, etc.
(6) The UV marking machine can mark date, bar code and two-dimension code automatically.
(7) Superior performance, good stability, high conversion rate and low energy consumption

3. Equipment structure



1	Galvo head:The system composed of X Y galvanometer and driver is used for high-precision scanning and precise positioning of laser.
2	Focus lens:Used to focus the laser beam on the workpiece surface.
3	Workbench: Panel hole spacing 25 * 25mm, M6 threaded holes.
4	Lifting handle: Shake to adjust the height of the galvanometer.
5	Lift axis and scale.
6	Operation control switch: red light - galvanometer - laser.
7	Chiller switch.
8	Temperature display screen.
9	Water inlet.

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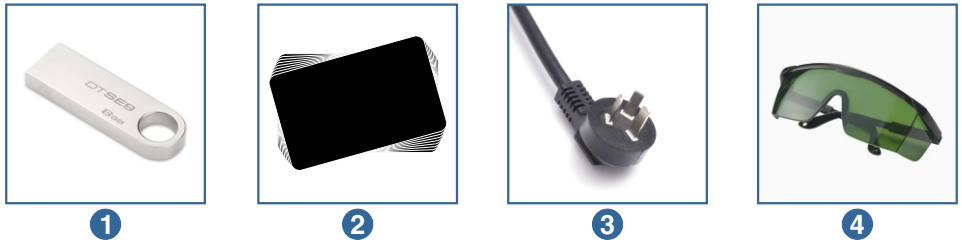
4. Attachment Introduction:



1	USB drive: Contains software, drivers, and factory parameters.
2	Test card: used for engraving testing.
3	Power cord: used for powering on equipment.
4	Goggles
5	Ruler: used to measure the height of the focal length.
6	Internal hexagonal wrench: used for equipment maintenance.
7	Foot switch: used for batch processing.
8	Positioning bars: fixed to the workbench for batch processing.
9	Screw
10	CHILLER
11	Water pipe
12	User manual: installation instructions

5. Installation steps

1. Remove the equipment from the packaging box.

(1-1)

(1-2)

2. Open the water inlet of the chiller (Figure 2-1 2-2) Inject purified water or mineral water, Observe the water level line behind the chiller and stop injecting water when the water level reaches the yellow position(Figure 2-3).

（2-1）

（2-2）

（2-3）

Attention: Don’t turn on the chiller when there’s no water available.

3 Connect: Foot switch, rotary shaft (If you have already purchased), and power cord (Figure 3-1)

（3-1）

4 Insert the water pipe into the water In/outlet of the laser (Figure 5-1) and the other end into the water In/outlet of the chiller. (Figure 5-2).

（5-1）

（5-2）

6 The chiller should be turned on first, and then the laser should be turned on. After turning on, it needs to be preheated for 2-3 minutes (the water temperature reaches 25 ° C) before it can work.

⚠ If it freezes in winter, please replace the water with antifreeze.

Replace the water every 2-3 months please.

（6-1）

7 Press from left to right when starting the machine, and pop up from right to left when shutting down the machine.

（7-1）

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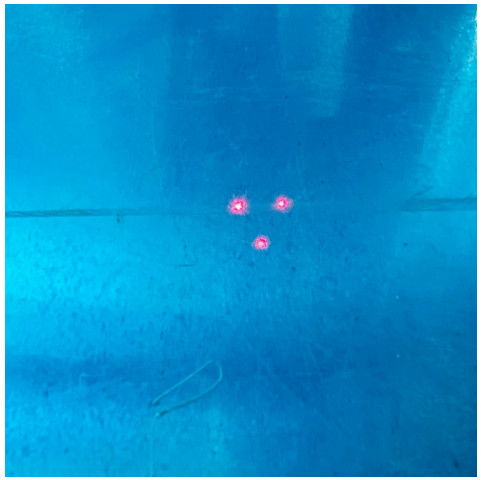
6. Adjust the focal length

Before starting carving, the height of the focal length must be adjusted firstly.

1 Method 1: Three red light focusing .

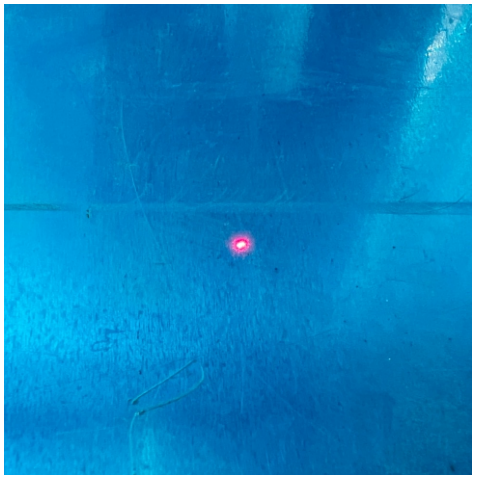
Press the red light switch at the top of the galvanometer (Figure 1-1),then three red light points (Figure 1-2) will appear below the lens. Shake the lifting axis (Figure 1-3) to aggregate the three red light points (shining on the product surface) into one point (Figure 1-4), which is the correct focal length.

(1-1)



(1-2)

(1-3)



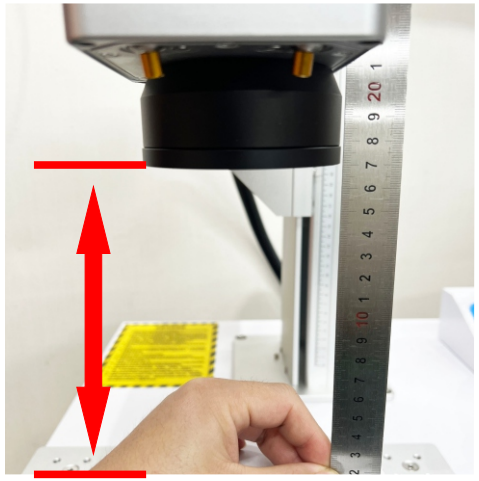
(1-4)

2 Method 2: Measure with a rule

The correct focal length value is marked on the front side of the galvanometer (Figure 2-1), and the lifting shaft (Figure 2-2) is shaken to make the lower edge of the field mirror reach the engraved object.The distance from the surface to maintain the focal length value (Figure 2-3).

(2-1)

(2-2)



(2-3)

⚠ Note: When the focal length is incorrect, the laser focal point is too thick, which can cause unclear or unresponsive marking.So it is necessary to adjust the focal length before working.

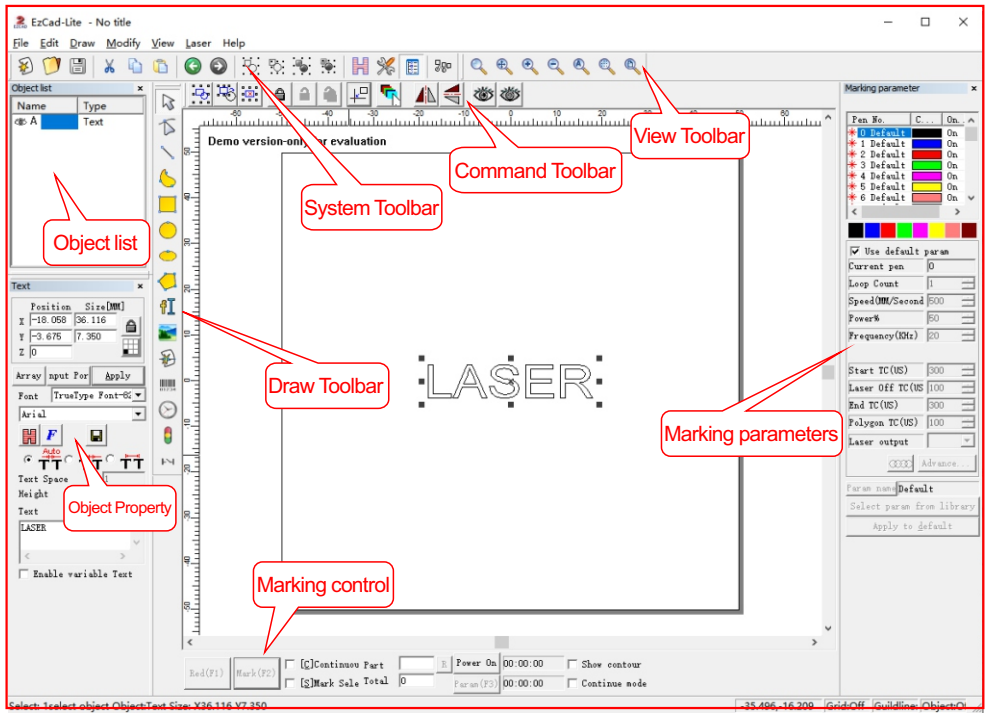
User manual

7. Software Function

Main functions of the software

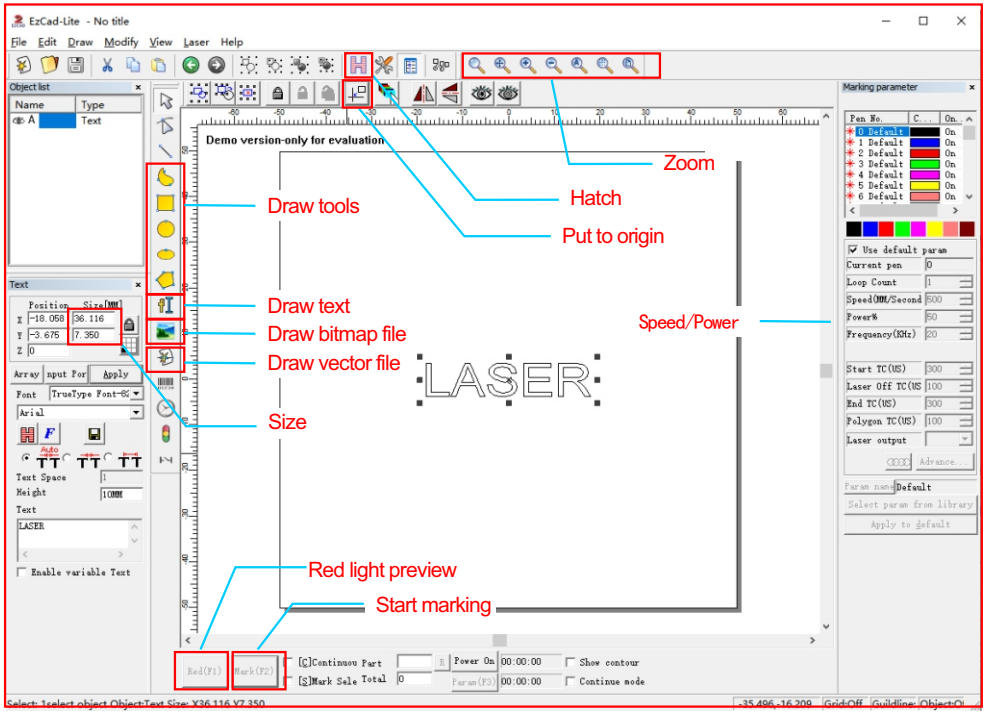
* Users can design their graphics freely.
* Various types of fonts are supported. Such as TrueType, SHX, JSF(Single line font defined by EzCad2), DMF(Dot Matrix Font), One-Dimensional bar code, Two-Dimensional bar code , and so on)
* Flexible variable text: changes the text real time while in laser processing. Excel datasheet is supported.
* Can through the serial port direct read text data
* Can through the network direct read text data
* Strong node editing function make the curve modification more easier
* The software can support 265 “pencils”, which used to draw graphic and can be set different processing parameters.
* Common types of images are supported. (bmp, jpg, gif, tga, png, tif…)
* Common vector images are supported. (ai, dxf, dst, plt…)
* Image processing (Grayscale, White / Black Transformations)
* Powerful hatching functions, such as support round hatch.
* More convenient IO operations and more easier to harmonize the auxiliary equipments.

1 Double click on the ezcad2 icon  to open the software.



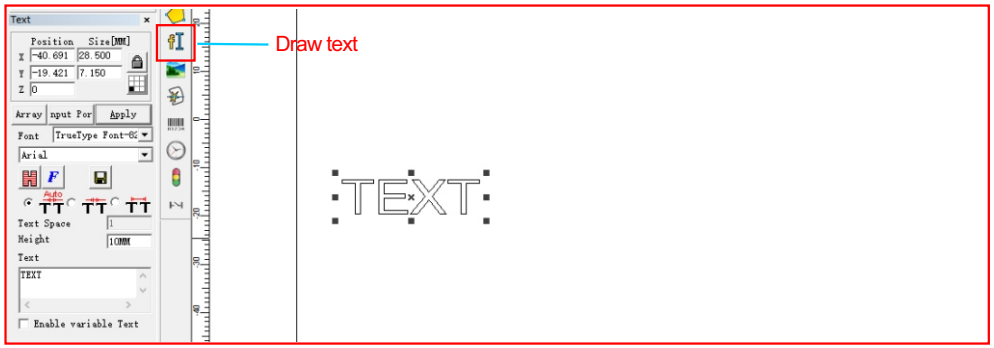
Main Interface

2 Frequently used tools.



3 Marking text.

Typing text directly in the workspace is supported in EzCad2, and many types of fonts are supported. To type text, users can select command “Text” in the Draw Menu or click icon. Under the command “Text”, users can set up a starting point at any position wanted in the workspace to type characters by left click mouse.



（3-1）

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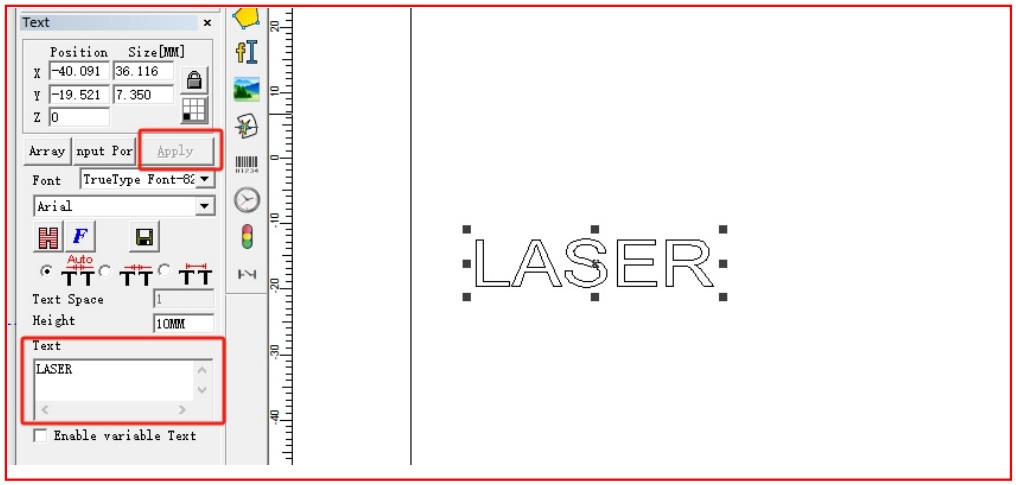
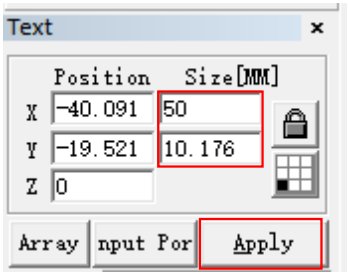
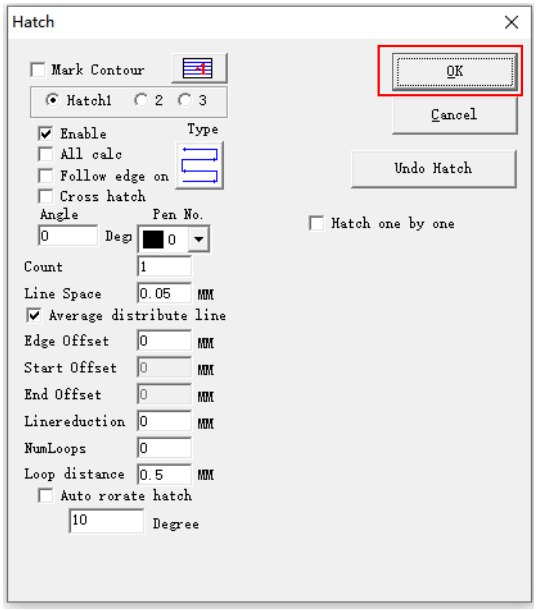
Input the content you want to carve, and click apply.



（3-2）

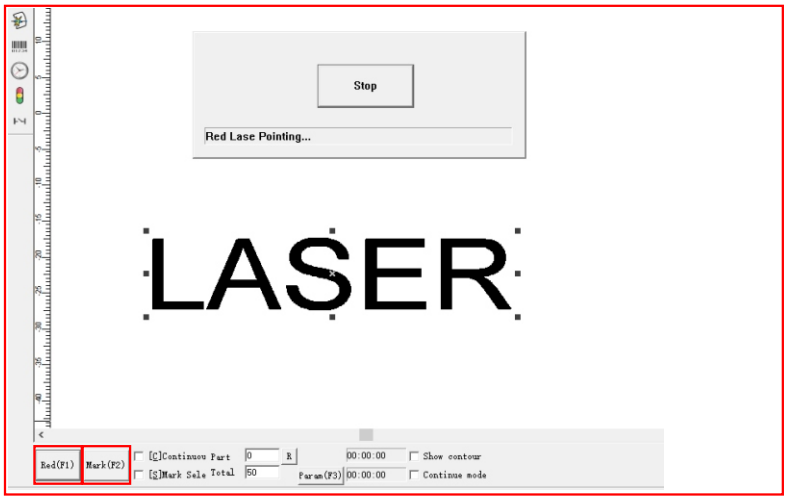
Enter the size and click Apply,Click the fill button and click OK to fill the text into a solid figure.





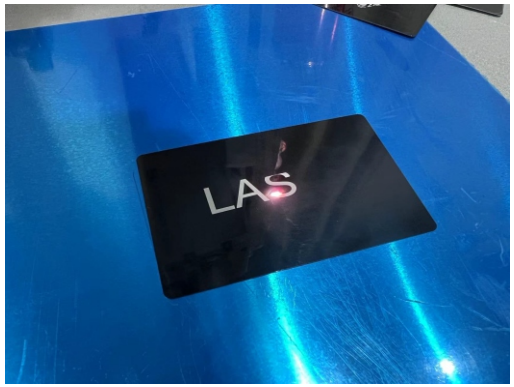
（3-4）

Click the Red F1, and a red preview box will appear on the workbench. Place the product you want to carve on the workbench, align the preview box with the carving area, and click the stop button.



（3-5）

Click Mark F2 and the equipment starts working.



(Making)

(Finish)

Normal operating procedures:

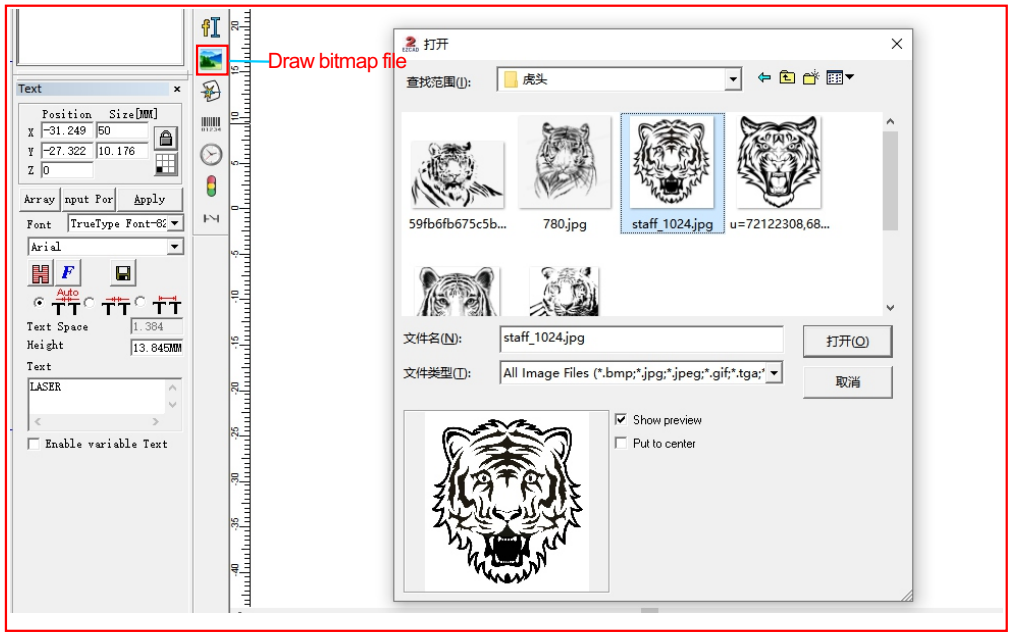
Turn on the chiller → Turn on the machine → Remove the lens cover → Adjust focal length → Enter content → Click Red F1 → Click STOP→Start marking (Mark F2)

User manual

4 Marking Bitmap.

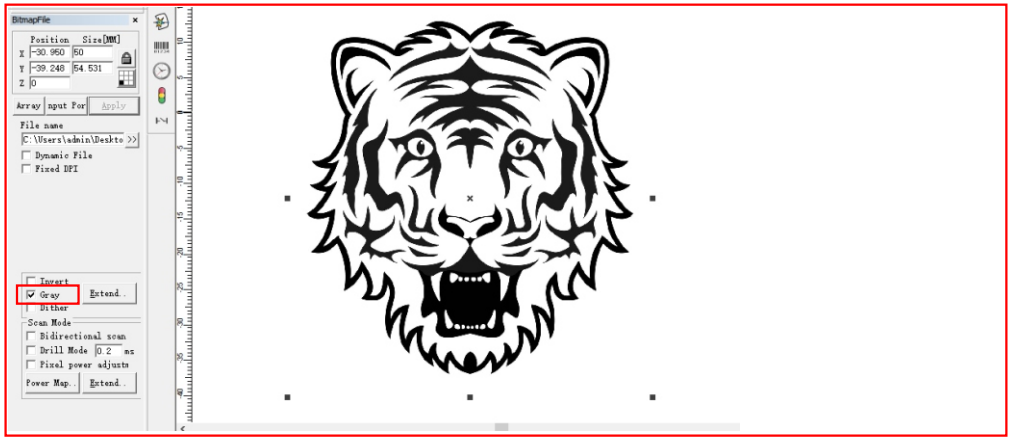
To add a photo, users may select command “Bitmap” in the Draw Menu or click icon in the Toolbar.Then the system will pop a dialog box as Figure 4-1 shows to open a graphic file.

The current supported graphic file formats are: Bmp,Jpeg, Jpg,Gif,Tga,Png,Tiff, Tif,



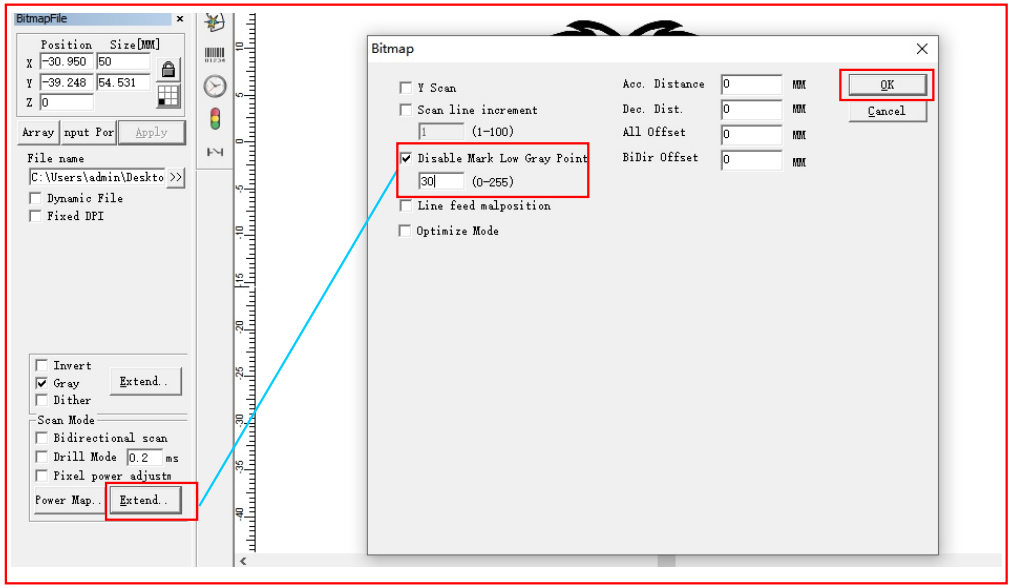
（4-1）

General gray only select 'grayscale'



（4-2）

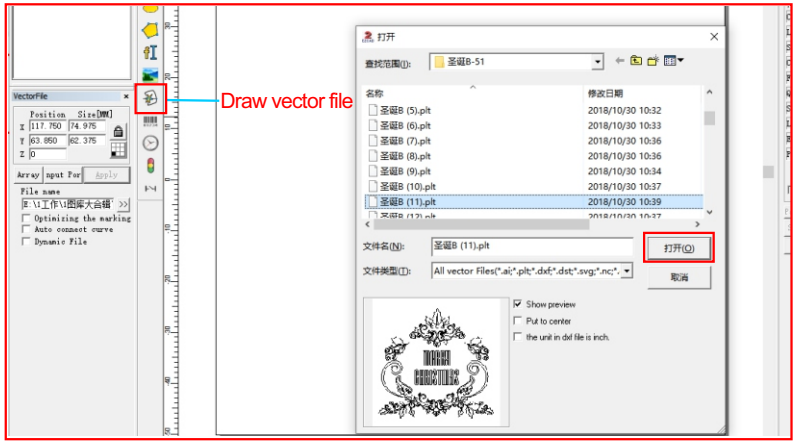
Normal operation only involves carving the black part of the patternIf the black parts are also carved, click on the "Extend" button in the bottom left corner of the software and select "Disable mark low gray point” to set appropriate grayscale values to solve the problem (Figure 4-3).



（4-3）

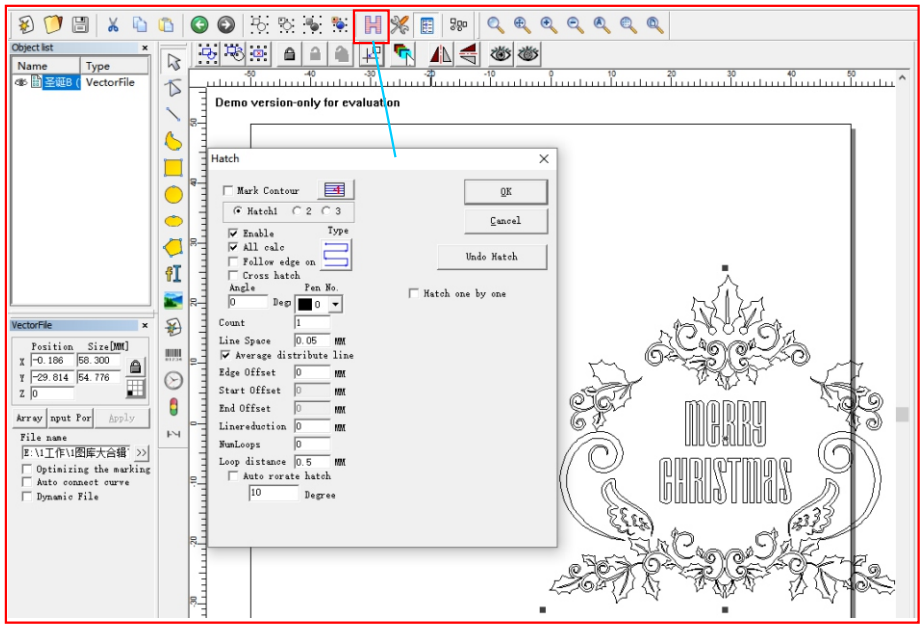
5 Marking vector file.

To input a vector file, users can select command “Vector File” in Draw Menu or click icon There will be a dialog box pop up to ask for the vector file to be inputted.



（5-1）

Select the imported vector image, fill it, and then start engraving.



（5-2）

6 Common process parameters (for reference only)

No.	Technological requirements	Line space	Speed	Q pulse width	Other
1	Metallic materials	0.02	500mm/s	1	
2	Glass	0.02	300mm/s	1	The focal length height must be accurate.
3	Wood	0.02-0.04	300mm/s	1-5	
4	Plastics	0.05-0.1	1000-1500mm/s	10-20	
5	Leather	0.05	800mm/s	5-10	
6	Stone	0.02	200mm/s	1	

- Line space: It refers to the distance between adjacent lines of the fill line. The smaller the value, the denser the fill line, the deeper the carving depth, and the slower the efficiency. Conversely, the shallower the depth, and the faster the efficiency.
- Speed: represents the marking speed of the current processing parameters. The larger the value, the faster the speed, the higher the efficiency, and the shallower the engraving depth.
- Q pulse width: represents the laser intensity of the current processing parameters, with the laser being strongest at 1 and weaker at larger values.

8.Maintenance and troubleshooting

Laser marking machine is mainly composed of electronic devices, precision instruments and optical devices, which has high requirements for use environment and daily maintenance.

1 Precautions during maintenance of the machine.

1. When the machine is not working, cut off the power supply of the marking machine and computer.
2. When the machine is not working, cover the field lens to prevent dust from polluting the optical lens.
3. The circuit of the machine is in high voltage state during operation. Non professional personnel shall not repair it when starting it to avoid electric shock.
4. In case of any fault of the machine, the power supply shall be cut off immediately.
5. When the equipment is used for a long time, the dust in the air will be adsorbed on the lower surface of the focusing lens. If it is light, the power of the laser will be reduced and the marking effect will be affected. If it is heavy, the optical lens will overheat and burst. When the marking effect is poor, carefully check whether the surface of the focusing lens is polluted.

If the focus lens surface is contaminated, remove the focus lens and clean its lower surface.

When removing the focus lens, be careful not to damage or fall. At the same time, do not touch the focus lens with your hands or other objects. The cleaning method is to use long fiber cotton swab or lens paper to invade absolute ethanol, gently scrub the lower surface of the focusing lens, and replace the cotton swab or lens paper every time.

6. During the operation of the marking machine, do not move the marking machine to avoid damaging the machine.
7. Do not stack or put other items on the marking machine, so as not to affect the heat dissipation effect of the machine.