



ECL SERIES LASER CODERS

USER MANUAL

Warning

This marking machine is a Class 4 laser product. During operation, it emits invisible pulsed infrared laser radiation with a wavelength between 9 and 11 microns and a power of up to 100 watts. Avoid exposing your eyes or skin to direct or scattered radiation.

Before operating and preparing to use this machine, it must be equipped with a Class 1 laser protection device to prevent accidental exposure to direct laser light or scattering.

If it is not controlled or adjusted in the manner or procedure specified in this manual, it may cause laser radiation hazard.

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1. Preface

The purpose of this manual is to provide the necessary information contained normal work, little troubleshooting, and maintenance. This manual is provided in each Laser system, which mainly for the operation and maintenance person who ever trained the technical guidance. Products described in this user manual are subject to continuous development, and reviews of this user manual will be made accordingly in subsequent editions or reissues. Please, read "SAFETY" chapter carefully before starting work, EC-JET will be pleased to receive any correspondence relating to this manual and the information contained herein; please write to us at the address below.

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2. Safety

2.1. Introduction

ECL laser marking systems comply with international standards and the relevant technical specifications. The codes comply with the advanced technical and approval safety requirements.

ECL laser marking system is to use the Class 4 laser beam to realize the packaging materials and products of automatic marking design and development.

The user must make sure that the following points:

1. The laser system usage must be in accordance with the Class 1 laser safety standards (EN60825) installed and protected.
2. The equipment is only used for the intended purpose.
3. The coders must always be operated in good, available environment, so all the safety device should be checked regularly to ensure the availability.
4. Personal protective glasses ready for the maintenance and repair personnel use requirements.
5. Use only suitable and approved through tools and equipment.
6. The relevant effective provisions and regulations must be prepared for the accident prevention and conscientiously abide by.
7. The coders can only be operated, maintained and repaired by the qualified and authorized person .
8. All operation, maintenance and repair personnel should receive regular corresponding operation safety and environmental protection guidelines, they should be familiar with the operation manual, especially the safety rules mentioned here.
9. Any safety and warning symbols in the coders system can not be removed , and must be maintained as a readable state.

2.2. Designated Purposes

The laser system is only applicable to the processing of the material surface, The material surface changed after heated by the strong irradiation Class 4 laser beam . The main application field of this system is to the product surface marking (shelf life, batch number, serial number and so on).

Because the laser beam emitted from the laser has a strong energy, if used improperly will cause personal injury and property damage. If the laser marking system for improper use, we will reject any claim for compensation. Always abide by the relevant technical specifications of the system.

For any resulting from non specified uses material damage or casualties, the manufacturer is not responsible for.

2.3. Safety Warnings and Cautions

Warning and Caution statements are provided within the text of this manual. These statements advise the reader of potential hazards, how to prevent them and how to safely use a product. A Warning statement always includes a related warning symbol.

1. Danger

the risk of a direct threat, if not to avoid it, will result in loss of life or serious injury

(Disability).

2. Warning

That is a possibility of a dangerous situation, if not to avoid it, will result in loss of life or serious damage Injury.

3. Caution

That is a possibility of a dangerous situation, if not to avoid it, it will cause injuries or slight loss Injury, this also applies to prevent property damage warning

4. Notice

That is a possible hazardous situation, if not to avoid it, will damage the product or in other objects around it.

5. Important

Application skills and other particularly useful information. It is not that dangerous or hazardous condition signal words.

6. Laser Beam

Laser beam injection and thus may be a dangerous situation. Please pay strict attention to follow the safety tips! If you don't obey the safety tips, will cause the skin or eyes of mild and severe injury, and property damage.

2.4. Laser Classification**Whole Laser System**

If the coder is installed correctly and used according to the operating instructions, the system becomes a Class 1 (I) laser system. Before the laser beam emitted from a laser light source to the surface of the product is in a fully shielded space, through this shield can prevent the accidental spill of laser beam.

Laser Source

The system becomes a Class 4 (IV) laser system during any procedure that requires the removal of covers, guards or safety interlocks. as Laser source (In this operation manual called laser) uses a CO2 laser with pulse or CW laser work. The laser is a class 4 laser device, it can generate an invisible (infrared) light to the eyes and skin extremely harmful beam. Pulse frequency can be adjusted between 50 Hz and 20 kHz, the actual pulse frequency depends on a variety of applications. Red laser used to simulate the location in or calibration purposes can be run without CO2 laser. Also in this case, the protective goggles must be worn, to prevent radiation of CO2 laser.

2.5. Hazards**2.5.1. Electrical Hazards**



WARNING: LETHAL VOLTAGE HAZARD. DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT WHEN ELECTRICAL POWER IS APPLIED. EXTREME CARE MUST BE TAKEN WHEN WORK IS DONE ON THE LASER CODER WHILE ELECTRICAL POWER IS APPLIED AND THE COVERS ARE REMOVED. THE CORRECT, STANDARD ELECTRICAL SAFETY PRECAUTIONS MUST BE TAKEN. THERE IS A DANGER OF INJURY OR DEATH FROM ELECTRIC SHOCK IF THIS SAFETY WARNING IS IGNORED



WARNING: THIS CODER MUST BE EARTHED/GROUNDED

2.5.2. Laser Hazards



WARNING: LASER HAZARD. THIS EQUIPMENT GENERATES INVISIBLE LASER LIGHT, WHICH CAN CAUSE SKIN BURNS AND SERIOUS EYE DAMAGE. LASER SAFETY GLASSES MUST BE WORN WHEN MAINTENANCE WORK IS PERFORMED ON AN UNGUARDED LASER SYSTEM AND ELECTRICAL POWER IS APPLIED. NEVER PUT ANY PART OF THE BODY IN THE LASER BEAM PATH WHEN ELECTRICAL POWER IS APPLIED AND THE SUPPLY UNIT KEYSWITCH IS TURNED TO THE ON ('1') POSITION. PERMANENT EYE DAMAGE CAN OCCUR IF THIS SAFETY WARNING IS IGNORED AND LASER LIGHT IS ALLOWED TO ENTER THE EYE

According to the potential risk of laser unit, the laser unit and its installation can be divided into seven kinds of laser protective grade: Class 1 the most secure, Class 4 the most harmful. These grades in the first part EN60825 have detailed definitions, the paper is as follows:

1. Class 1

The laser radiation may be visible, or may be invisible, but will not cause harm.

2. Class 1M

If you do not use other optical devices, laser radiation may be visible, or may be invisible and will not cause harm.

3. Class 2

The laser radiation are visible, if less than 0.25 seconds to the eye, will not cause harm.

4. Class 2M

The laser radiation are visible, if not use other optical devices, the radiation light to the eye time less than 0.25 second, will not cause harm.

5. Class 3R

The laser radiation may be visible, or may be invisible, and maybe cause harm to the eye.

6. Class 3B

The laser radiation maybe visible, or may be invisible, Although the spread of radiation (through the matte surface reflection) are harmless, but direct radiation eyes and skin, will cause harm.

7. Class 4

The laser radiation maybe visible ,or maybe invisible, both direct radiation and cover radiation are so harmful to eyes and skin, if meet the flammable material, can cause a fire.

The Laser beam generated from the coders is Class 4. and invisible.This high intensity radiation causes a local extreme heating and tissue burns, especially the eyes will be hurt because of the laser beam, resulting in deterioration of vision or blindness! the suitable laser protective glasses can prevent direct or diffuse, specular reflection beam.

A suitable protective glasses should have the following conditions:

1. should be set at a wavelength of CO2 laser range, CO2 laser with a wavelength of 10,6 μm (options 9,3 μm). Please note that the type of nameplate, be careful not to change the wrong! For other types of laser protective glasses, such as for Nd:YAG laser protective glasses,can not prevent the beam CO2 laser and provide adequate protection!
2. should be set within the range of laser power.
3. should not only for continuous laser but also for the pulse laser setting, pulse frequency can be adjusted between 50 Hz and 20 kHz. The actual pulse frequency depending on various applications.

Compared with the eyes, skin, although able to withstand high intensity of illumination, can cause tissue damage due to combustion according to the different irradiation duration and intensity of illumination . In order to protect the skin, please wear appropriate protective clothing. Please avoid making laser beam irradiates the skin or protective work clothing!

In the laser and / or the beam case open ,for system maintenance, calibration or repair work, all personnel in laser area must wear appropriate laser protective glasses!

Please do not look directly at the laser beam!

Red laser used to simulate the location in or calibration purposes can be run without CO2 laser. Also in this case because of the CO2 laser through software control off, according to laser protection standard, the laser protective glasses should be worn to prevent CO2. laser radiation.

2.6. Healthy and Environmental Hazards

2.6.1. Fire and Explosion Hazards



This equipment is not approved for use in flammable or explosive atmospheres;

General Fire Hazard

WARNING: FIRE HAZARD. THIS EQUIPMENT GENERATES A HIGH-ENERGY LASER BEAM THAT CAN SET FIRE TO FLAMMABLE MATERIALS. FLAMMABLE MATERIAL PUT IN THE DIRECT OR REFLECTED PATH OF THE BEAM CAN BE SET ON FIRE.IF THERE IS ANY DOUBT ABOUT THE REACTIVITY OF A MATERIAL, PERFORM A PROCESS TEST ON A SMALL PIECE OF THE MATERIAL.THERE IS A RISK OF FIRE IF THIS SAFETY WARNING IS IGNORED.

When a process test is performed on a material to test its reactivity, a second person must be present to perform the following safety functions:

- Turn off the mains electrical supply to the laser system if a fire occurs.

- Be ready with a fire extinguisher that is the correct type for the product under test. Do not use a water fire extinguisher on electrical equipment fires.

Lithium Battery Hazard



WARNING: LITHIUM BATTERY HAZARD. THIS EQUIPMENT USES A LITHIUM BATTERY. THE BATTERY CAN BECOME HOT AND EXPLODE IF A SHORT CIRCUIT IS APPLIED OR IF THE BATTERY IS FITTED WITH THE POSITIVE AND NEGATIVE POLES REVERSED. DO NOT BURN THE BATTERY OR SUBMIT IT TO TEMPERATURES MORE THAN 100 °C. DO NOT CHARGE THE BATTERY. LITHIUM BATTERIES MUST BE DISCARDED ACCORDING TO THE MANUFACTURERS INSTRUCTIONS. REFER TO THE MATERIAL SAFETY DATA SHEET FOR THIS PRODUCT FOR MORE INFORMATION. THERE IS A RISK OF BURNS, FIRE OR EXPLOSION IF THIS SAFETY WARNING IS IGNORED.

2.6.2. Toxic Waste Hazard



WARNING: TOXIC WASTE HAZARD. TOXIC WASTE MATERIAL AND HARMFUL BY-PRODUCTS CAN COLLECT WITHIN THE FUME EXTRACTION SYSTEM AND THE LASER HEAD. WEAR AN APPROVED RESPIRATOR AND THE CORRECT SKIN PROTECTION WHEN THESE ITEMS ARE SERVICED. THE CORRECT INDUSTRIAL HYGIENE PRECAUTIONS ALSO MUST BE TAKEN. THERE IS A RISK OF RESPIRATORY SYSTEM DAMAGE AND SKIN IRRITATION IF THIS SAFETY WARNING IS IGNORED.

When a laser beam marks any material, by-products are produced, like particles, vapour or fumes that can be hazardous to health. These by-products must be correctly removed from the work area by an extraction system built to remove harmful vapour and particles through a filter. If an extraction system is not available, EC-PACK can supply and install the necessary equipment. If more information is required, contact EC-PACK Technical Support or your local Distributor. Process by-products must be safely removed and discarded according to local Health and Safety Regulations, and is the responsibility of the customer. Additional precautions are required when products are coded that contain mixtures with ethanol or polyvinyl chloride (PVC), or other materials that can generate harmful by-products. If more information is required, or you are not sure if the coder is acceptable for your environment, contact your local Distributor

2.6.3. Zinc Selenide (ZnSe) and Thorium Hazards



WARNING: TOXIC MATERIAL HAZARD. ZINC SELENIDE AND THORIUM ARE TOXIC BY INHALATION OR INGESTION. THE DUST PARTICLES FROM DAMAGED OR BROKEN LASER LENSES ARE IRRITATING TO EYES AND THE RESPIRATORY SYSTEM. WEAR AN APPROVED RESPIRATOR, CHEMICAL SAFETY GOGGLES AND PROTECTIVE GLOVES WHEN BROKEN PIECES OF A LASER LENS ARE COLLECTED. REFER TO THE MATERIAL SAFETY DATA SHEETS FOR THESE PRODUCTS FOR MORE INFORMATION.

THERE IS A RISK OF IRRITATION OF THE RESPIRATORY SYSTEM AND EYES IF THIS SAFETY WARNING IS IGNORED.

The lenses in this equipment are made of zinc selenide (ZnSe) and the outer layer can contain thorium fluoride (ThF 4), which is a radioactive material. Thorium fluoride is an alpha-particle emitter with a range of approximately 150 mm in air. The alpha particles cannot go through plastic bags. The laser optical components are not hazardous in normal use, but inhalation or ingestion of ThF 4 from damaged components must be avoided. If the damaged lens or broken pieces touch the skin, completely wash the area with soap and water. If the lenses are damaged by laser burnout, inhalation of the fumes must be prevented and the following actions must be taken:

- Shut down the laser immediately.
- Wear an approved respirator, chemical safety goggles and protective gloves, and clean all contaminated parts of the laser coder with a damp cloth.
- Put all ZnSe pieces and contaminated cloths into sealable plastic bags and then into a tightly closed plastic box, and send the box to the recommended hazardous-waste company.

3. Technical Description

3.1. Working principle

Before using the ECL laser coding machine, user needs to know the composition and working method of the laser coding machine. ECL laser consists of three parts: control system, Optical system, and Detection system.

Control System: Control and power supply system, the input device (touch screen or remote network PC terminal)

Optical System: Laser head、Galvanometer、Expander mirror、Focal lens

Detection System: Sensor、encoder、video detection device for some special field.

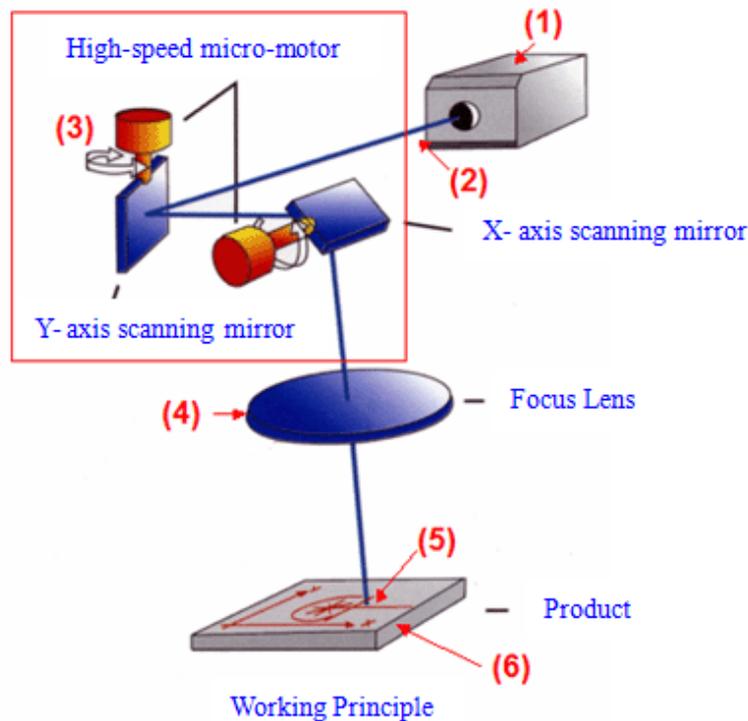


Figure 3-1 ECL laser coder structure

ECL laser coders structure shown in Figure 3-1: The work principle is as below:

1. The CO₂ laser resonator in the Laser Head (1) generates an infrared, invisible laser beam in pulses or a continuous wave (CW)(2). A two-lens telescope (between 2 and 3) expands the small diameter laser beam and transmits the beam to the Marking Head(3). Two galvanometer mirrors within the Marking Head rotate to move the laser beam, as vectors in the X and Y axes, over the surface of the product (substrate) (6). The laser output lens (4) focuses the deflected laser beam onto the substrate. The marking on the substrate occurs at the focal length of the lens (5) to draw the required image or code.

2. The calculation of the vectors and the control of the laser is performed by the Advanced Power Supply Unit.

3.2. Marking on product surface

The marking of the product surface is performed by the effect of very strong laser radiation

on the product material.

The laser beam is focused onto the product surface and increases the temperature of the top layer of the material. The increase in the temperature makes a mark on the product. Any of the following effects can cause the mark:

- A thermal or chemical change (for example a colour change).
- The removal of the surface layer.
- A physical change in the surface layer (for example the surface cracks or becomes a liquid).

The following illustration shows that the symbols and characters to be marked on the product are divided into vector strokes . Each vector stroke is again divided into smaller vectors. When the laser beam moves from one stroke to the next—a jump, the laser is turned off and the product is not marked.

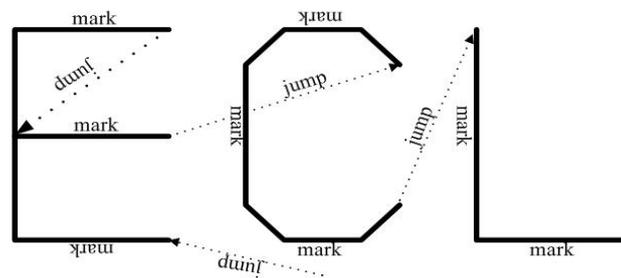


Figure 3-2 marking

3.3. Laser Parameters

The Setup parameters are adjusted to allow the coder to mark different materials. These parameters must be calculated and adjusted for each application to get the best marking Quality.

To set the correct parameters requires knowledge and skill, because the parameter settings depend on the many different applications and the materials to be marked.

ECL laser coders mainly include Marking Speed, Laser Frequency, laser power, Jump speed, jump delay, laser on delay, laser off delay, marking end delay and corner delay total 9 important parameters. This parameters manages via parameter set. Their descriptions are as below:

3.3.1. Marking Speed

Marking speed is a description of the laser beam "writing" speed on the object surface . According to the ECL series laser coder ECL types and different focus lens focal length, the maximum value is different, if you have any questions, please contact with our company maintenance personnel.

3.3.2. Laser Frequency

The laser frequency is to describe the pulse frequency of CO2 laser. The typical value are 5KHz, 10KHz and 20KHz, 20KHz maximum.

3.3.3. Laser Power

The laser frequency is a description of the output power of CO2 laser. The value range is 0% ~ 100% , in order to extend the service life of laser, suggested that it be set within 90%.

3.3.4. Jump Speed

Jumping speed described is a speed marking end of a vector graphics after the jump to the next vector graphics , the typical value is 2 times the marking speed.

3.3.5. Delay Parameter

Delay parameter contains jump delay, laser on delay, laser off delay, marking end delay and corner delay, The delay must be adapted to the definition of the jump and marking speed. If the delay is not optimized, the quality of marking results will reduce and marking time will prolong. In general, laser on delay and laser off delay length had no effect on the total scanning time.

Laser on delay and laser off delay optimization should be first, followed by marking control delay, namely the jump delay, marking end delay and corner delay. In the optimization of the laser delay time, it is very useful to set the jump delay and marking end delay for a high value.

Below we will by way of example to illustrate the effect of various marking delay to the marking quality:

1. Laser on delay too short

If the delay is too short in the laser, laser marking vector is beginning to open, Even if the galvanometer has not yet reached the desired angular velocity, the starting points vector are coking phenomenon, as figure 3-3.

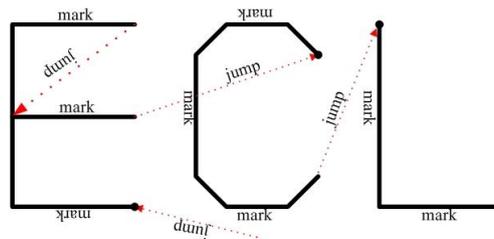


Figure 3-3 Laser on delay too short marking

2. Laser on delay too long

If the laser delay too long, in the marking vector at the beginning, laser open too late, the starting point is not marked, as figure 3-4.

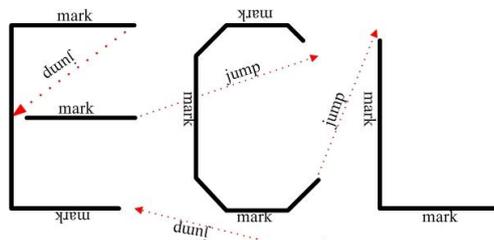


Figure 3-4 Laser on delay too long marking

3. Laser off delay too short

If laser off delay time too short, Although the galvanometer also did not go into the final position vector, but the laser is turned off after a straight line or broken line the last marking command, Led to the respective vector is not fully marking, as figure 3-5.

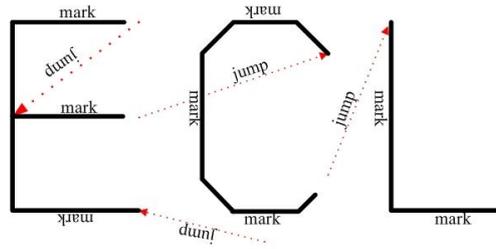


Figure 3-5 Laser off delay too short marking

4. Laser off delay too long

If the laser delay too long, straight line or broken line after the last marking command laser closed too late, Laser remains open, even if the galvanometer has stopped or moving has been very slow, the result is the end of each vector appear coking phenomenon as figure 3-6.

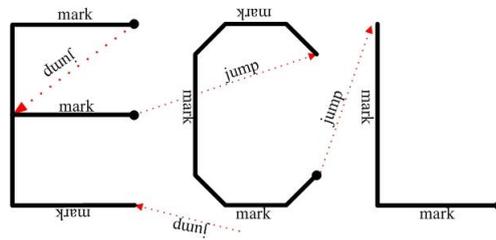


Figure 3-6 Laser off delay too long marking

5. Jump delay too short

If the jump delay is too short, jump, at this time the scanning head is not a good location, the first marking vector has begun, will appear oscillation effects of a running, as figure 3-7.

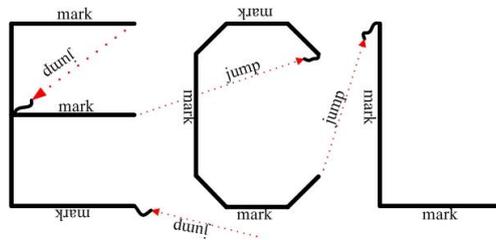


Figure 3-7 Jump delay too short marking

6. Jump delay too long

If the jump delay too long, no obvious influence. But marking time will be extended.

7. Marking end delay too short

If the marking end delay too short, The galvanometer has not yet reached the final line or polyline position, the jump command has been executed. At the end of marking vector pointing to the jump vector., as figure 3-8.

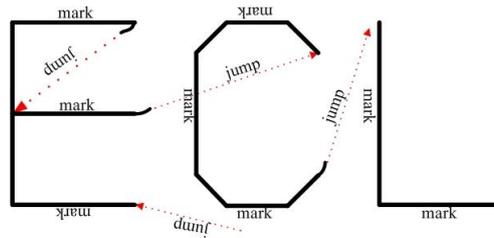


Figure 3-8 Marking finish delay too short marking

8. Marking end delay too long

If the marking end delay too long, No visible effect, but the marking time will increase.

9. Corner delay too short

If the corner delay too short, then the marking command in the polyline has been executed, but the galvanometer has not yet reached the marking end, Will lead to emergence of arc corner, as figure 3-9.

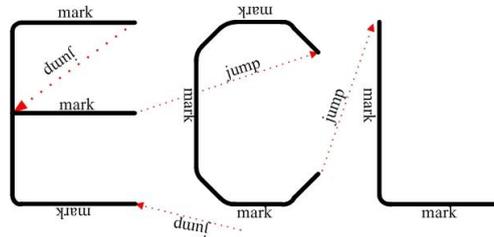


Figure 3-9 Turning point delay too short marking

10. Corner delay too long

If corner delay too long, the galvanometer while moving too slowly or even stop in subsequent marking command execution. Because the laser in these vectors is not closed, the coking phenomenon will happen, as figure 3-10.

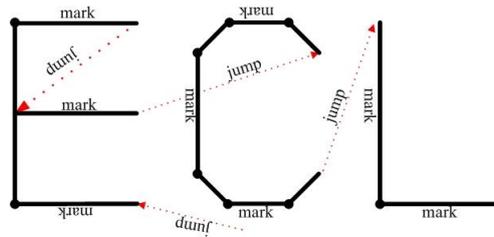


Figure 3-10 turning point delay too long marking



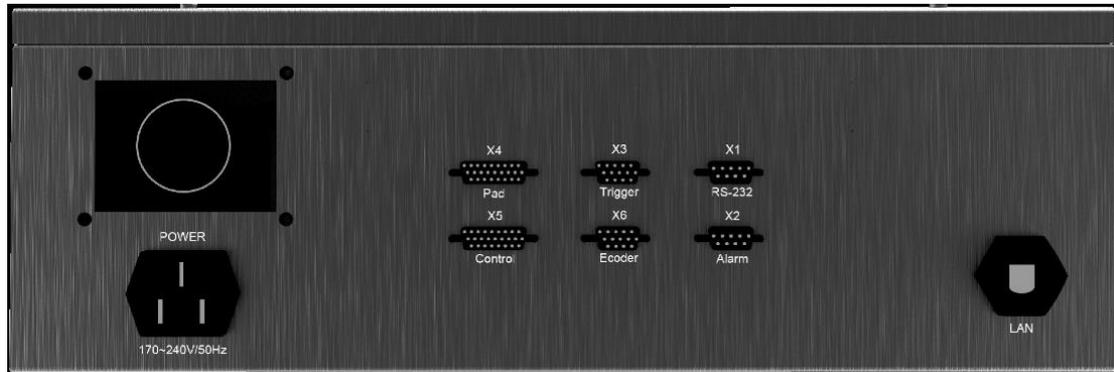
NOTICE : When setup the delay, please observe the following provisions:

1. Laser off delay time must be longer than the Laser on delay time. Otherwise, laser possible error control.
2. Marking end delay must be bigger than the difference between laser off delay and laser on delay.
3. Laser on delay and laser off delay must point 0.1um as unit, but jump delay, marking end delay and corner delay must point 10um as unit.

3.4 Electrical connection

The following cables are supplied with the product:

- Main power supply connection cable
- USB and Ethernet connection cable
- Interface plugs X1, X2, X3, X4, X5, X6



X1: RS-232

X2: Alarm light

X3: Product Detector

X6: Quadrature Pulse Axis Encoder

X4: Pad

X5: Control

USB: USB2.0 port

Ethernet: Ethernet interface

The following is a detailed description of each interface

X1 interface description, as shown in Table 1:

Pin number	Signal	Description
1	Unused	
2	TXD	send data
3	RXD	receive data
4	Unused	
5	Unused	
6	Unused	
7	RTS	request to send
8	CTS	clear send
9	GND	System ground

Table 1

X2 interface description, as shown in Table 2:

Pin number	Signal	Description
1	Warn_Green LED	System ready and marking indication LED control

		signal . It is off when the system is not ready; it flashes when the system is ready, flashing frequency is 500ms; and it's always on when the system enters the marking state.
2	Warn_Red LED	System warning and fault indication LED control signal. It is off when the system has no warning and fault information; it flashes when the system has warning information, the flashing frequency is 500ms; it's always on when the system is faulty, and it will be off when the warning information and fault information are processed.
3	Warn_BEEP	System warning and fault indication BEEP. It will output BEEP signal when fault occurs.
4	Warn_COM	Alarm signal output common terminal
5	Unused	
6	24V	24V power supply
7	24V	24V power supply
8	GND	System ground
9	GND	System ground

Table 2

X2 signal output equivalent relay structure, Warn_COM is the signal common terminal, as shown in Figure 3- 12 is the internal circuit diagram, the signal output terminal and the output common terminal are equivalent to the two ends of a switch.

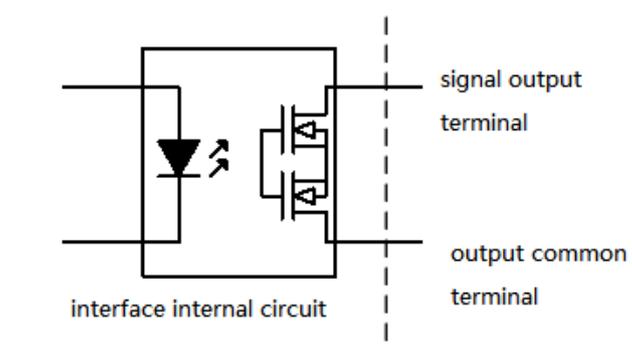


Figure 3- 12

X3 interface description, as shown in Table 3:

Pin number	Signal	Description
1	TRIGGER_P	Product detection input positive
2	TRIGGER_N	Product detection input negative
3	TRIGGER_EN_P	Product detection input enables positive
4	TRIGGER_EN_N	Product detection input enable negative

5	Unused	
6	24V	24V power supply
7	24V	24V power supply
8	GND	system GND
9	GND	system GND

Table 3

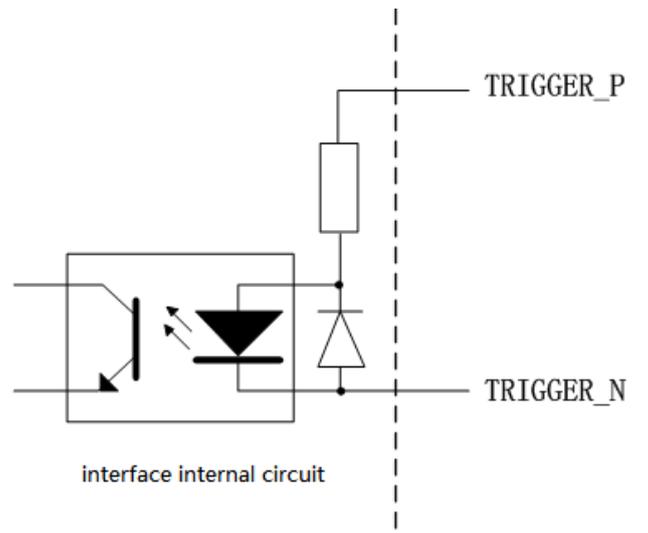


Figure 3- 13

Figure 3-13 shows the internal structure of the product detection input interface. When connecting the NPN sensor, the TRIGGER_P terminal is connected to the positive pole of the power supply (if the sensor power supply is supplied from this interface, TRIGGER_P is connected to this interface 24V), and the TRIGGER_N terminal is connected to the signal cable of the sensor. When connecting the PNP sensor, the TRIGGER_N terminal is connected to the negative pole of the power supply (if the sensor power supply is supplied from this interface, TRIGGER_N is connected to the GND), and the TRIGGER_P is connected to the signal cable of the sensor.

X6 interface description, as shown in Table 4:

Pin number	Signal	Description
1	EnCo_SA_P	Encoder A phase input positive
2	EnCo_SA_N	Encoder A phase input negative
3	EnCo_SB_P	Encoder B phase input positive
4	EnCo_SB_N	Encoder B phase input negative
5	unused	
6	24V	24V power supply
7	24V	24V power supply
8	GND	system GND
9	GND	system GND

Table 4

X5 interface description, as shown in Table 5:

Pin number	Signal	Description
1	SEL1	Condition marking input 1
2	SEL0	Condition marking input 0
3	SEL_COM	Condition marking input common terminal
4	START	Marking start signal, when this signal is high, it will set the system to enter the marking mode and wait for the trigger signal. If STOP is set high, then START is invalid.
5	CTL_OUTCOM	Control signal output common terminal
6	OUT_RESERVE	Reserved
7	MARKING	This signal is set high during the marking process.
8	SYSTEM_READY	Once the system is initialized and ready for operation, the SYSTEM_READY output is high, and the output is low when it's not ready.
9	READY_TO_MARK	If the start marking is successful, the output is high, otherwise it is low
10	SEL3	Condition marking input 3
11	INTERLOCK_IN	Interlock input
12	EXT_ERROR	Reserved
13	PROG_IN	Reserved
14	STOP	Marking stop signal. When this signal is high, the marking is stopped and the system is set to ready mode.
15	CTL_INCOM	Control signal input common terminal
16	GOOD	Reserved
17	ERROR	If an error occurs during the marking process (eg, the laser temperature is too high, the interlock is suddenly turned on, the external error input), the system will immediately stop and output high. The output will reset low on the next startup, but if the error is not excluded, the output is high.
18	BAD	Reserved
19	SEL2	Condition marking input 2
20	INTERLOCK_OUT	Interlock output
21	GND	system ground
22	GND	system ground
23	GND	system ground
24	GND	system ground
25	24V	24V power supply
26	24V	24V power supply

Table 5

There are two common terminals in this input interface: SEL_COM and CTL_INCOM. SEL_COM corresponds to four signals of SEL0, SEL1, SEL2 and SEL3. CTL_INCOM corresponds to other input signals. The internal circuit of the input pin is shown in Figure 3-14: the power supply is negative, and the signal input is connected to an external signal.

The output has a CTL_OUTCOM output common terminal, and the using method can refer to the X2 interface.

The two pins INTERLOCK_IN and INTERLOCK_OUT are used for the interlock function. Short circuit the two pins is normal, disconnecting is abnormal, and the software can set whether to enable the interlock function or not.

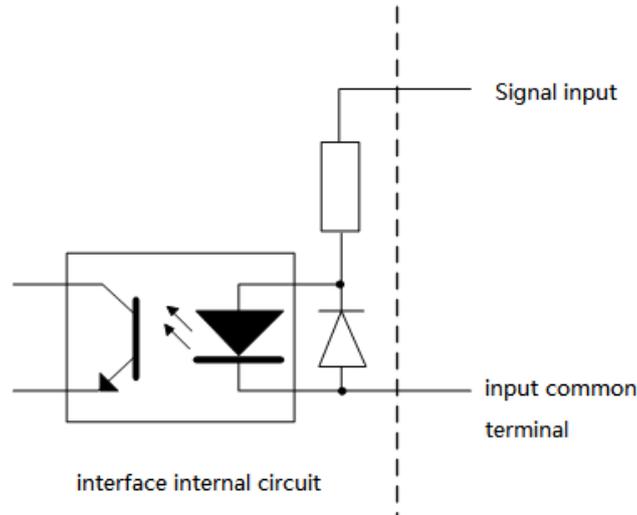


Figure 3-14

Note: To prevent connection errors, the system has different male and female plugs installed and clearly marked (X...).

When connecting the cables, make sure that the plugs are properly connected to prevent damage to the pins.

3.5 Boot preparation

Press the power button  to start the machine.

3.6 Start the laser machine

Press the laser power button  to power up the laser.

3.7 Start marking

When the laser machine is in the ready state, touch the start marking button in the upper left corner of the touch screen or press the marking button on the control box , as shown in Figure 3-15. At this time, the turning on light indicates that the laser machine is in the marking state. When the laser machine receives the marking signal, it will mark the information needed.

Note: Please wear the protective glasses before starting the marking!

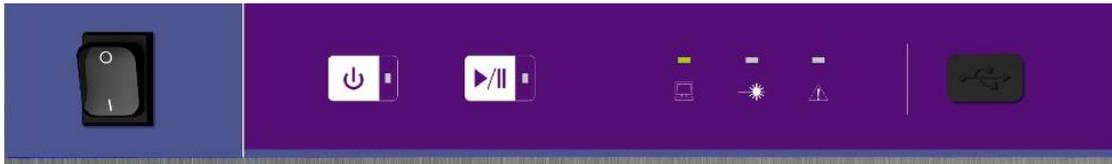


Figure 3- 15

3.8 Stop marking

When the laser machine is in the marking state, touch the stop button in the upper left corner of the touch screen (same as the marking button position), turn on the indicator light, and the laser will stop marking.

4. Software Operation

4.1. Login

1. When the machine is charged, press the power switch , wait for several seconds, it will show the main interface, as shown in figure 4-1, at present the laser power is not on. Press the power button , the laser is on, as shown in figure 4-2.

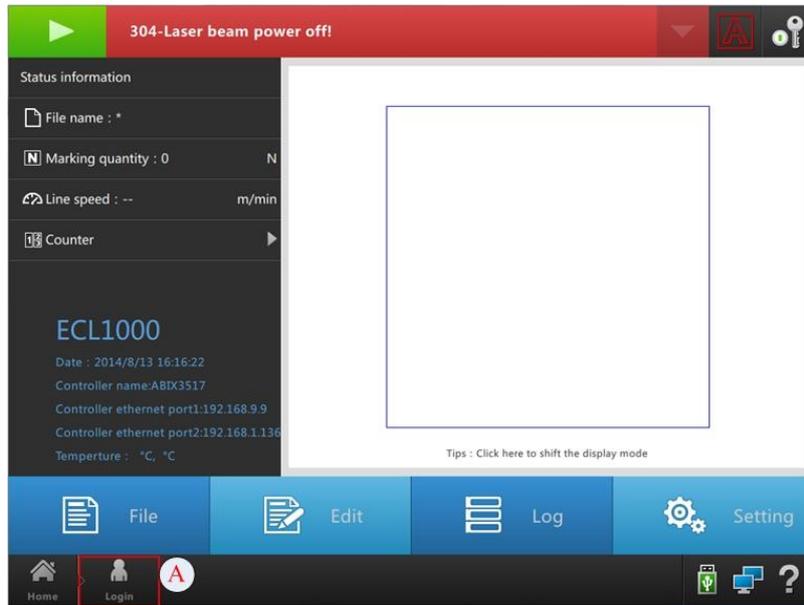


Figure4- 1

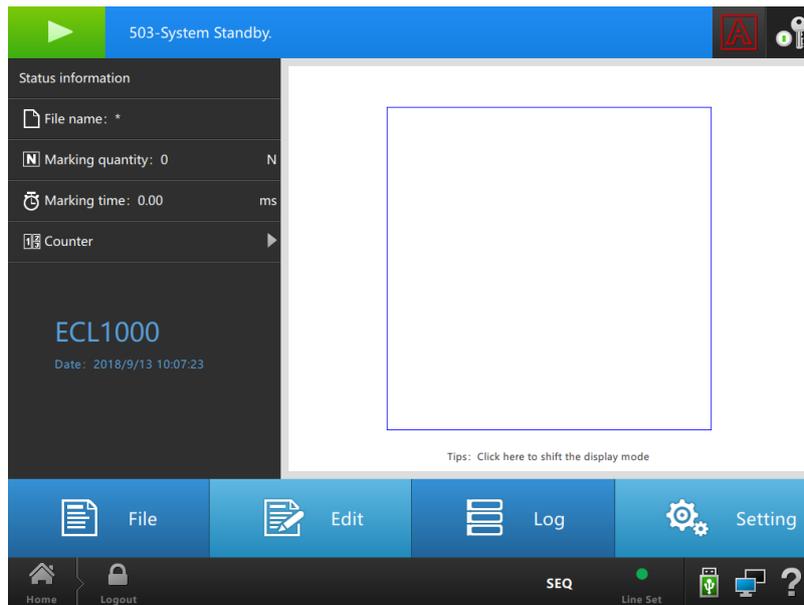


Figure4- 2

2. Click the login button, pop out the password box. Input the password and pop out the interface as shown in figure 4-3.

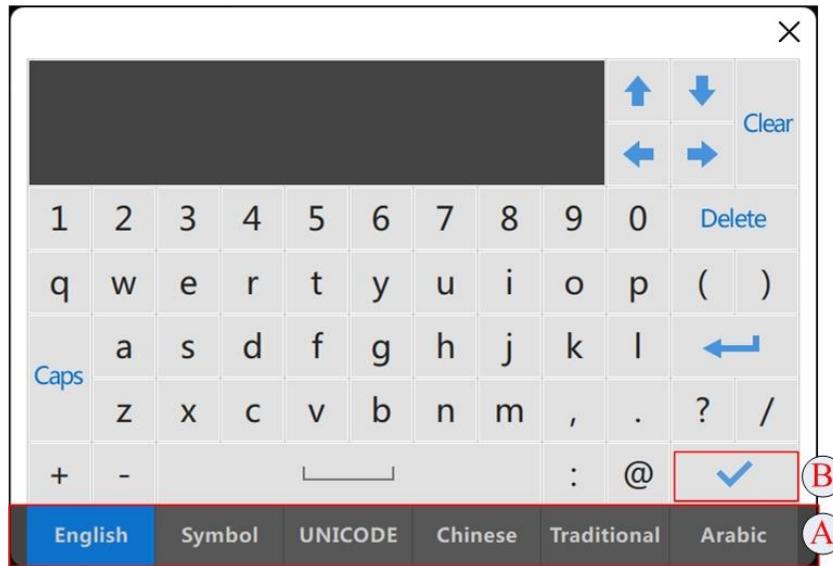


Figure4- 3

A shows a keyboard bar, when you enter a different content can select the appropriate keyboard input here, at this time we chose an English keyboard to enter the password admin (administrator user), after you have finished entering the password, click on the graph shown at B button (enter) to enter a password to complete

Note: When entering your password, we put users into five levels, user level are distributed as follows:

Admin: managers, the most advanced permissions user login password for admin, the most advanced users can do anything to the machine Modifications, use any of the features inside the machine, including modifying other users' passwords and permissions grade.

User1: operator to perform marking privileged user, login password for user1, managers can be the user permissions Modification.

User2: designer, design parameters of the laser system privilege user login password for user2, managers can modify the user rights

user3: laser system software update privileged user, login password for user3, the user can right manager limit to be modified.

user4: Ordinary users to browse the contents of marking being executed, but can not make any changes. Login password for user4.

All of the above are the default user login password and the default permissions, such as user demand, using the most advanced user login, and then you can modify other users' permissions

and passwords on their own. Recommends uniform use of the most advanced users (admin) login. Just enter the password when you log on to.

3. Click to login, the login operation to complete the software.

4.2. The main interface presentation.

As Figure4- 4:

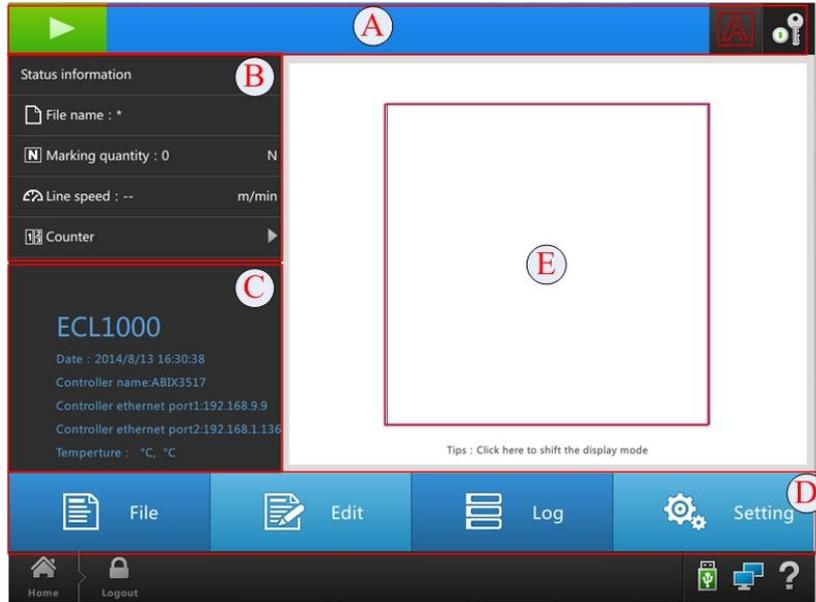


Figure4- 4

- | | | |
|---|---------------------------|--|
| A | Status Bar | Display system status, warning and error messages contain the marking start and stop control buttons, the right red light preview function and key switch button |
| B | Status information | Displays the current file execution workload when marking |
| C | Information | Show lasers serial number, device name, device model, the main control card current time Date (can be set to modify its settings --- lasers). Temperature |
| D | Function | Divided into four functions (File, Edit, Log, Setting) |
| E | Preview column | Show all content currently being edited. |

4.2.1. Status information

Displays the current file execution workload marking time, the status bar displays information about the current file name, perform a marking marking time, marking the number of the current line speed ,counter (The following is a counter function and description).

Click on the small triangle on the right side of the counter. Expand the counter shown in Figure4- 5 错误!未找到引用源。

Counter

Global print counter	328
Print counter	0
Product counter	0
Batch counter	0
Max.batch Quantity	0

Figure4- 5

Global print counter: The total number of the laser system from the start setting has been performed is displayed. This value can not be edited.

Print counter: Displays the total number of the currently selected marking work has been executed successfully. If you choose another job or restart the laser system, the counter is automatically set to 0. To change the value, select the value of the counter product, then enter the edit page editor to modify the value.

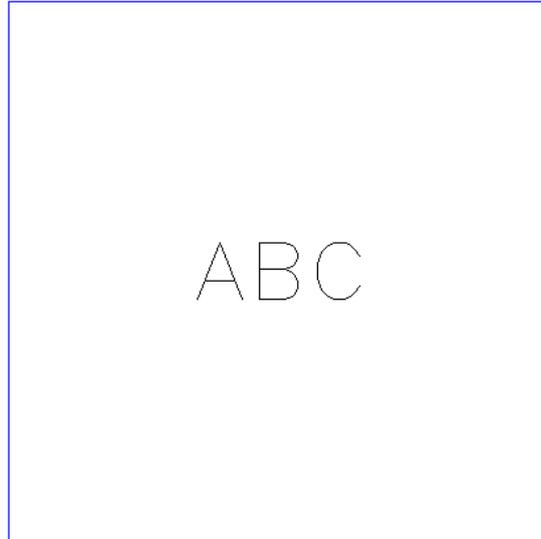
Product counter: Shows the currently selected work has been marking the number of products (trigger signal). If you choose another job or restart the laser system, the counter will be set to 0. (Note: The print counter value and the products counter must be the same ,if the two values are different, it means that the value was not marking all products (counter highert) or marking of certain products more than once (product counter lower).). Its setting method and print counter setting method are same.

Batch counter: The total number marking display the selected work has been performed. When the value reaches the "Max.batch Quantity" (see below), the laser system will stop. Marking time to edit the value (for example, to replace the product is not properly marking). If you choose another job or restart the laser system, the laser will automatically be set to 0. (Note: only defines the Max.batch Quantity, this counter is valid ;if the batch quantity is 0, you can not reset or edit the batch counter .its value setting method and print counter are same.

Max.batch Quantity: Displays the current work Max.batch Quantity value. This value can be edited when marking. If you choose another job or restart the laser system, the counter is automatically set to 0.

4.2.2. Preview Column

Preview all the information currently being edited, such as: adding an object (content for ABC, the name of Text), then in the preview box displays the contents of just edited in the editing function, as Figure4- 6:



Tips : Click here to shift the display mode

Figure4- 6

Click on the preview area below the tips, you can switch to display a preview area, as Figure4- 7

Element text reviewer



Figure4- 7

4.3. File

The main function is to store user files edited information to facilitate the user option the files saved before, as Figure4- 8:

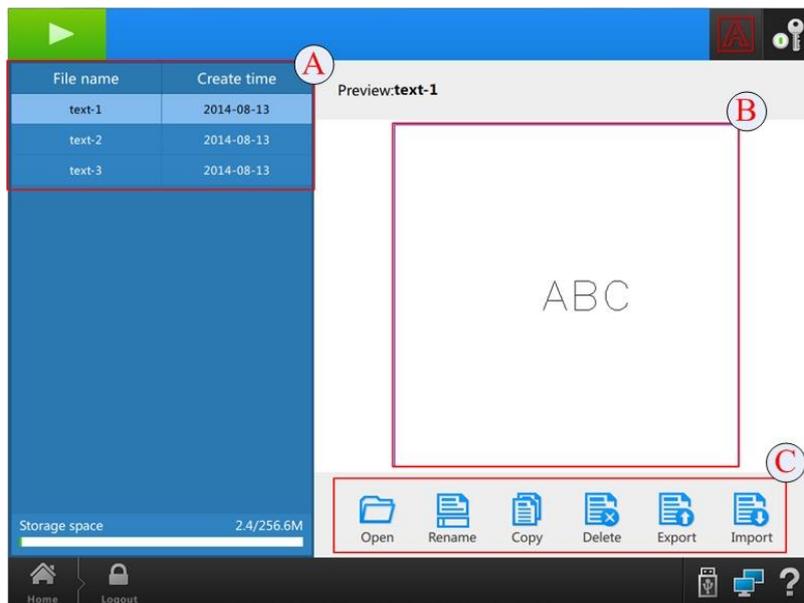


Figure4- 8

- A Property Bar Displays the name and time of the laser system to create all the files saved
- B Display Bar Displays the contents of the currently selected file
- C Control Bar For the currently selected file related operations(Open, Rename, Copy, Delete, Export, Import)
 - Open:** Select a file in the properties bar, click on the Open button, the file is opened
 - Rename:** Modify the file name. Click Rename, enter the name of the file you want to rename.
 - Copy:** To copy a file, let the original file has the same properties.
 - Delete:** Remove no need to save, errors or outdated and useless files.
 - Export:** Export file, you can export the selected individual files and export all files. When a separate export file, save the filename; when you export all the files, save the name of the folder.
 - Import:** Import“nmk”format file.

4.4. Edit

All the files are added, data editing, property settings, marking setting and so on,all completed in this one inside. Edit interface as Figure4- 9:

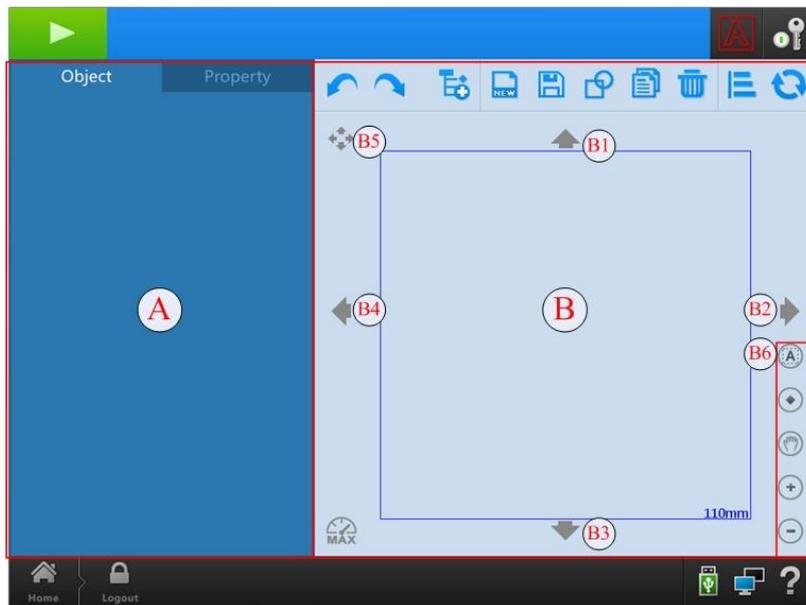


Figure4- 9

- A Object/Property
- B Edit bar

4.4.1. Object/Property

Object is the object name, property displays the relevant parameters of the object, the relevant functions are described in detail under the Add Features.

4.4.2. Edit

Added items, the content display and other functions in the operation of this block area. Relevant functions are as below:

- B1 Up-move button** Fine-tune the selected file to move up.
- B2 Right-move button** Fine-tune the selected file to the right.
- B3 Down-move button** Fine-tune selected file to move down.
- B4 Left-move button** Fine-tune the selected file to left
- B5 Move / distortion button** Switches B1, B2, B3, B4 function, these four buttons have two functions (move and distortion), when these four buttons to move the function, click B5 can replace the function become distortion function, this time the four button functions are: 4

When B5 Icon Type is  , B1, B2, B3, B4 corresponding function for the mobile. When B5 Icon Type is  .B1, B2, B3, B4 corresponding function of the deformation

- B1 Up- Stretch** Fine-tune the selected file to the upward stretch, pull up on the edge of the document, the lower edge remains unchanged.;
- B2 Right-Stretch** Fine-tune the selected file to the right tension, pull the right edge of the document to the right, the left edge remains unchanged.
- B3 Down compression button** Fine tuning the selected file to the downward compression, compression down to the upper edge of the file, the lower edge remains unchanged.
- B4 Left compression button** Fine-tune the selected file to the left compression, compress the right edge of the file to the left,the left edge remains unchanged.

4.4.2.1. Revocation



Return to the previous step.

4.4.2.2. Recovery



with "Revocation" operation is just the opposite, may be resumed once the action has been done.

4.4.2.3. Add



In a data file, you can add the contents “Character, Sequential No, Time,File read, Shift information, Arc Character, Dot,Line,Rotundity,Rectangle,1D barcode, 2D barcode,Graphic,Delay time” , as Figure4- 10:



Figure4- 10

- A Items need to be added
- B If need to insert variable,if yes, click this button,you can add Sequential No,Time,File read,Shift information,Random code. As Figure4- 11.

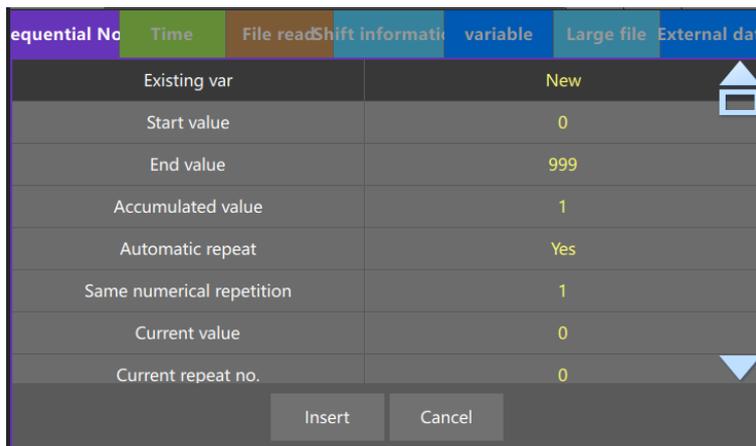


Figure4- 11

C Contents display

D Operation



cursor moves up



cursor moves down



cursor moves left



cursor moves right



Delete button



Edit button, Click this button to enter keyboard editing screen, select the appropriate keyboard to edit the content needs

E Edit bar, Edit the relevant property and parameter for the added contents.

4.4.2.3.1. Add Character

This feature can be added under ordinary character and insert variables

1. Add Character

When add character (Guangzhou yi da packing equipment co.,LTD), as Figure4- 12

Note: when adding the text and selecting the font, user can select different fonts according to requirements.

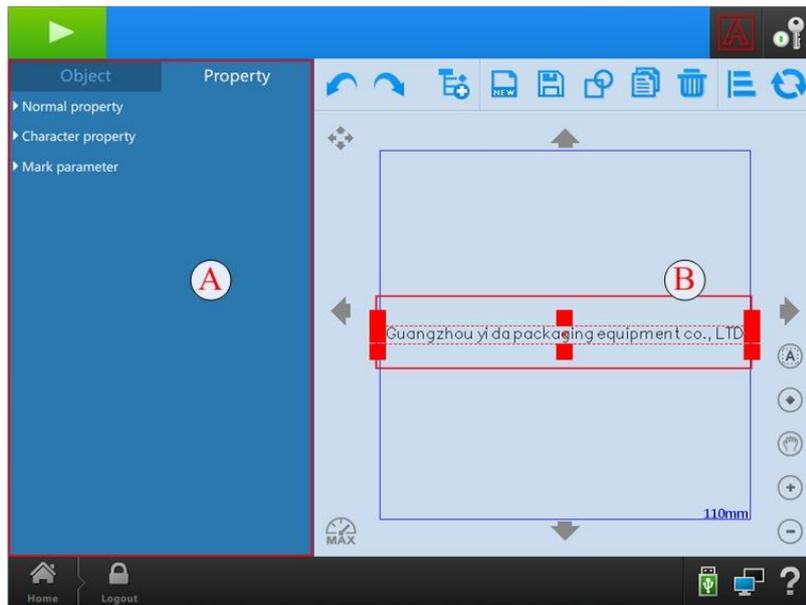


Figure4- 12

- A **Object/Property** Object: show the currently file name;Property: show the selected file property and parameter.
- B **Content display bar** Displays the currently edited all the content, presentation related property and parameters for the content as following:

Dimension location

Center X (mm) The object position in X axis

Center Y (mm) The object position in Y axis

Fix ratio select“**Yes**”, Changing the width, height corresponding with the change, to change the height, width corresponding with the change; select“**No**”,

Change the height, the width does not change, change the width and height will not change.

Width (mm) the whole object width
Height (mm) the whole object height

Distortion

Rotation degree (deg) the rotation degree of the whole object
Tilt degree (deg) the tilt degree of the whole object in content
Intersection spacing (mm) separate the lines intersect, avoid marking repeat point.

Fill parameter

Filling method Frame, fill line, frame and fill line
Filling line spacing (mm) The spacing between the fill lines when filling objects
Fill line margin (mm) The distance between the start and end points of the frame when filling the line

Fill line starting angle (mm) Fill line and the X axis angle
Average distribution fill line Lines distributed averagely
Straight line indentation Reserved function
Number of boundary rings Number of times to fill the frame
Ring spacing (mm) Fill the spacing between the frames
Minimum skip distance (mm) Reserved function
Number of fill lines The number of fill lines
Fill line accumulating angle (deg) The angle formed by this fill line and the previous fill line
Vector length Works only on vector graphics (including minimum vector and maximum vector)

Object Name The name of the currently selected object

Text attribute

Font Name The name of the currently selected file font
Text height (mm) Currently selected character size
Spacing (%) The distance between characters and characters in the file
Line spacing (%) Same as the distance between lines in the file
Alignment Align the line and line in the file, left, centered, or right
Vector Text Convert a text document into vector text. example:

Add a text“ABC”, click to transfer the character to vector text,as Figure4- 13

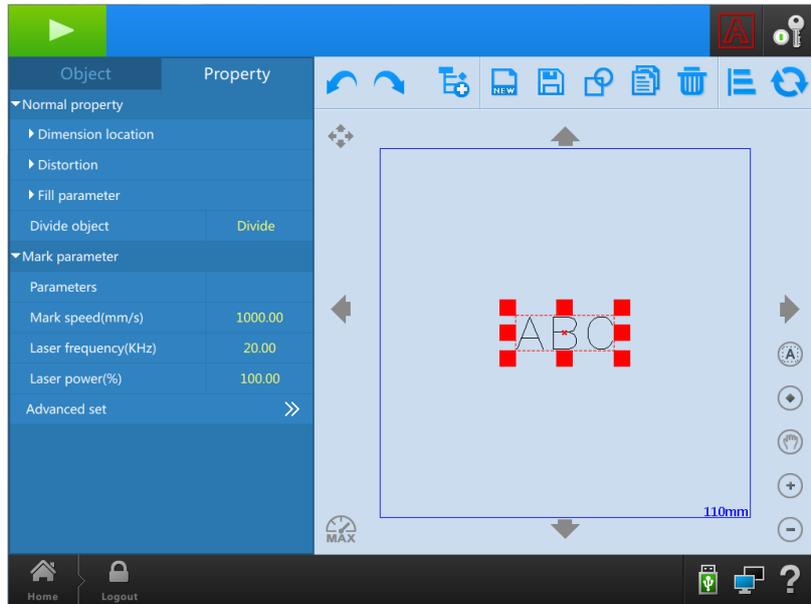


Figure4- 13

After the text is converted into a vector, the vector having only the text property
Divide object The entire vector text divide into a single vector, each vector will be automatically converted to vector text, as Figure4- 14:

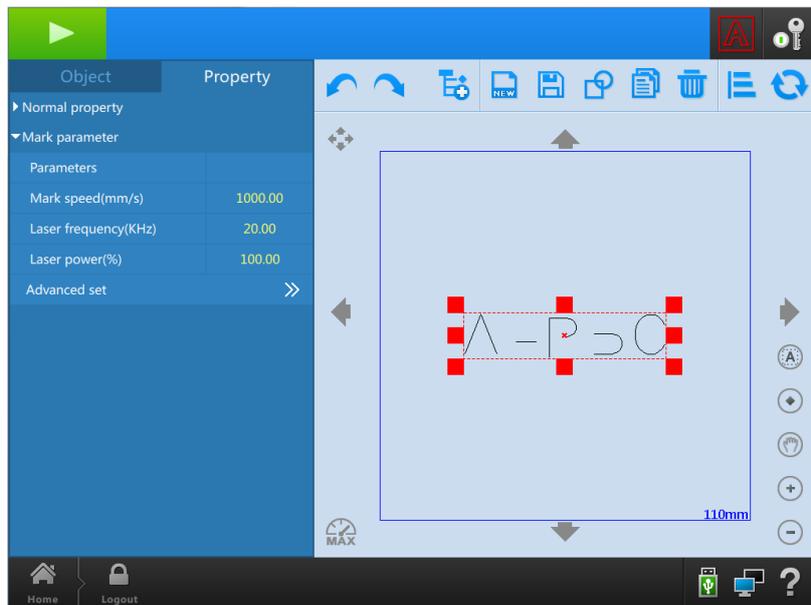


Figure4- 14

Group object After the divide,then has this function, the vector text beaten reassembled into a vector text

Marking parameter

Parameters

- Marking speed (mm/s)** Galvanometer scanning speed (ie target processing speed)
- Laser frequency (KHz)** unit is (KHz), Depending on the material to be marking the actual situation to be adjusted

Laser power (%) Set the laser power ratio, if marking materials are different, the percentage of laser power adjustment in accordance with the actual situation

Advanced set

Parameter

Marking speed (mm/s) Galvanometer scanning speed (ie target processing speed)
Jump speed (mm/s) the speed to jump to another vector graphic from marking end a vector graphics

Laser frequency (KHz) Laser frequency describes the CO2 laser pulse frequency to kilohertz (KHz) as a unit, as the marking material to make adjustments with the actual situation

Laser power (%) Laser power described in the CO2 laser output power. The range of 0% to 100%. Set the laser power ratio, if marking materials are different, the percentage of laser power adjustment in accordance with the actual situation

Enable marking Select Yes or No.

Jump delay (us) the delay time from one finished vector graphic jump to another one.

Laser on delay (us) The time from the laser system turn on to the laser exit.

Laser off delay (us) The time from the laser system off to the laser stop

Marking end delay (us) The delay time after the marking end

Corner delay (us) the delay time in the corner.

Variable corner delay

Min.jump delay (us) Min.jump delay time when the laser jump

Min.jump length (mm) Min.jump length when the laser jump

2. Insert variable

The operation interface as Figure4- 15:

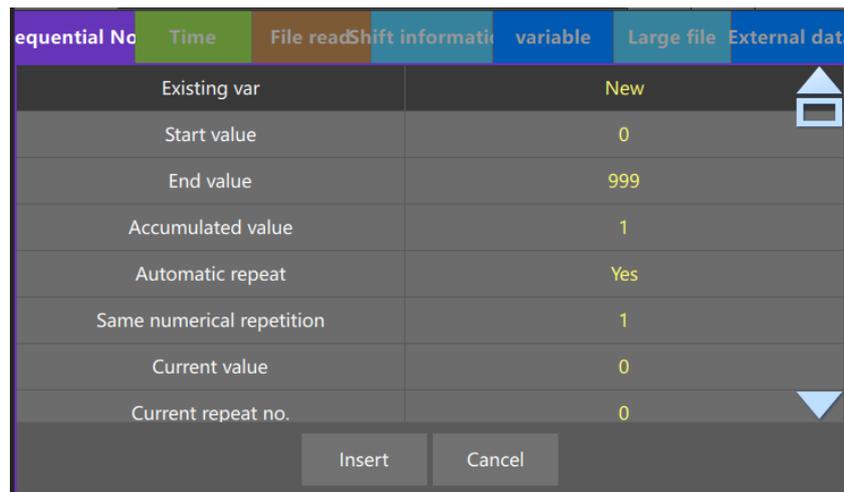


Figure4- 15

2.1 Add Sequential No.

Click the sequential No. button, the add sequential No. setting as shown in figure 4-16.

Sequential No	Time	File read	Shift informati	variable	Large file	External data
Existing var					New	
Start value					0	
End value					999	
Accumulated value					1	
Automatic repeat					Yes	
Same numerical repetition					1	
Current value					0	
Current repeat no.					0	
				Insert	Cancel	

Figure4- 16

- Start value** The first value of the sequential No.such as: Now the start value set to 0
- End value** The last value of the sequential No.such as: now the end value set to999
- Accumulated value** Basis last marking, the value need to be accumulated for this marking, set the cumulative value of 1, marking the last time the value is 0, then the value of this marking is 0 + 1, so this time marking value is 1
- Auto repeat** Repeat the same sequential number from the start value to the end value of the marking, select yes, then the sequential number will be repeated marking down, select No, then the serial number does not repeat
- Same numerical repetition** Sequential No.repeat times in some number.
- Current value** Displays the current marking to be performed value
- Current repeat no.** Displays the current repeat no. For the marking executed
- Number of Binary** Contains Binary,Octal,Decimal,Hexdasimal
- Bit width** Min character length in sequential No. The actual character length can be bigger or equal to the set length. For example : Let width is 3, the serial number is three characters in length, such as 000
- Placeholder** The symbol for character number stand by the sequential no.
- Multi-appoint** Example: Copy the same sequential number (000) up bar sequential number, select multi-appoint, as shown in Figure I. After performing marking, sequential number automatically changes, shown in figure II

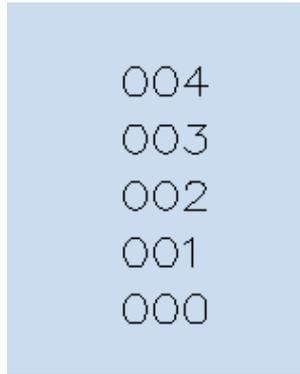


Figure 1

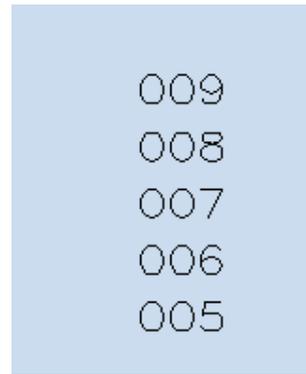


Figure 2

Comprehensive example above, the added sequential number set to 000, then the start value is 000, marking the second time to add the accumulated value 1, become 001. Finally the end value is 999, and then repeat marking the sequential number

2.2 Add Time

Click the Time button, the add time setting as shown in figure 4-17.

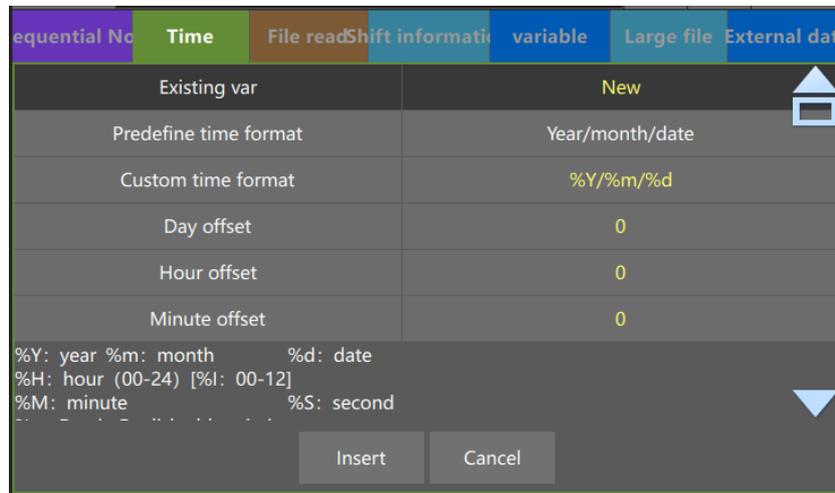


Figure4- 17

Predefine time format Laser system comes time format, click on the "Year / month / date" button to select the Time Format

Custom time format Users set their own time format, refer to figure 6-20 each symbol represents the meaning

- %Y Year
- %m Month
- %d Date
- %H Hour (00-24 hours) %I (00-12 hours)
- %M Minute
- %S Second
- %a english shorthand for week
- %b english shorthand for month
- %p morning, afternoon (AM,PM)
- %w one week, shows with number (0-6)

For example: If you want to add 2014 / 05 / 16 / 13 hours, the custom format is% Y /% m /% d% H, add time to the current laser system based on the time.As **错误!未找到引用源。** to show
 t h e a d d e d
 time.

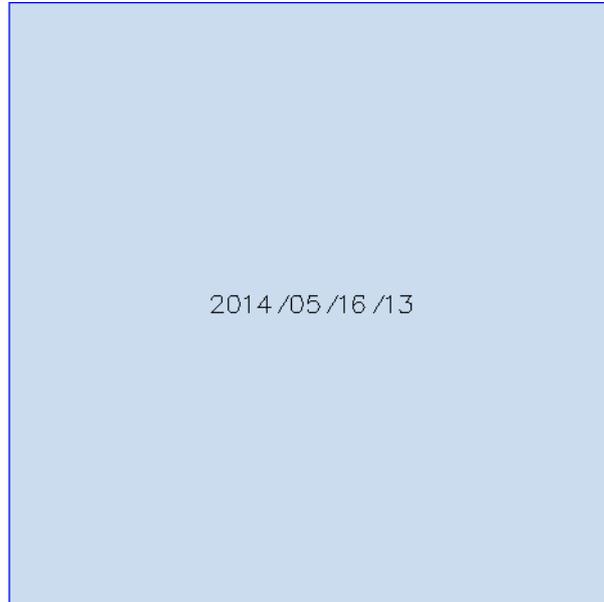


Figure4- 18

- Day offset** Refers to the increase or decrease the days number in the current time ,as day offset 1, then added to the actual time for the laser system plus one day based on the time; as an offset of -1, then the actual time for the added based on the laser system time minus 1 day.
- Hour offset** Refers to the increase or decrease the hours number in the current time ,as day offset 1, then added to the actual time for the laser system plus one hour based on the time; as an offset of -1, then the actual time for the added based on the laser system time minus 1 hour.
- Minute offset** Refers to the increase or decrease the minutes number in the current time ,as day offset 1, then added to the actual time for the laser system plus one minute based on the time; as an offset of -1, then the actual time for the added based on the laser system time minus 1 minute.

2.3 File read

Click the file read button, the file read setting as shown in picture 4-19.

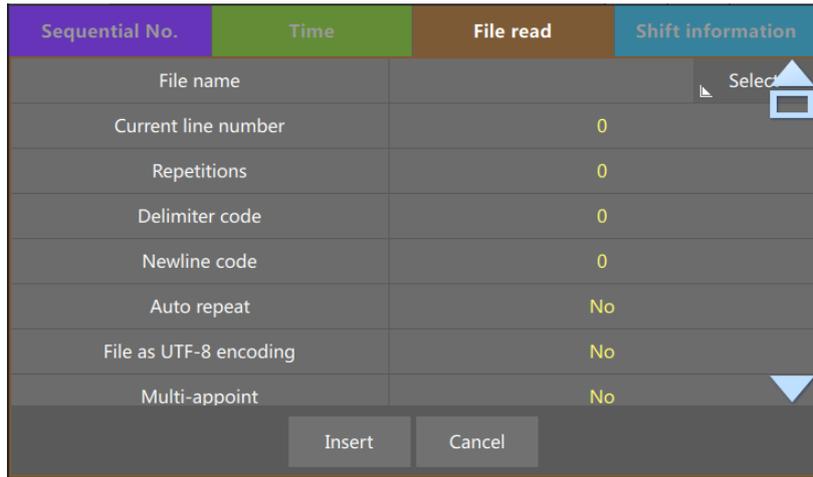


Figure4- 19

File name	The currently selected file
Current line number	The current marking line number
Repetitions	Set the current line number repeated times.
Delimiter code	Reserved
Newline symbol	Reserved
Auto repeat	Set whether the current file is automatically repeated.
File as UTF-8 encoding	A text file encoding format
Multi-appoint	If you need to mark several objects at the same time, and several objects are reading the same text file, in order to ensure that the content of each object is different,it must be selected as YES.

1. Click file name, click Select, then next interface pops up,as Figure4- 20

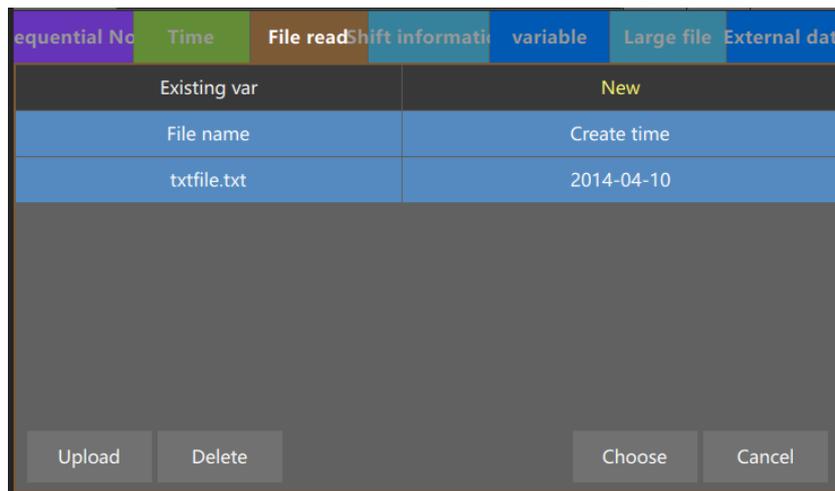


Figure4- 20

2. Select the current laser systems existing text file, click on the text file you want to add, and then click Select,then click Insert. Example: select Figure4- 20 text file (txtfile.txt), one-click to select, insert,Reading of the text file is completed. If users want to upload a text file yourself, click the Upload button in Figure4- 20 , insert the USB device, and then select

the user-created text file, click OK to complete the text file Uploads.

2.4 Add Shift information

Click the shift information button, the shift information setting as shown in figure 4-21.

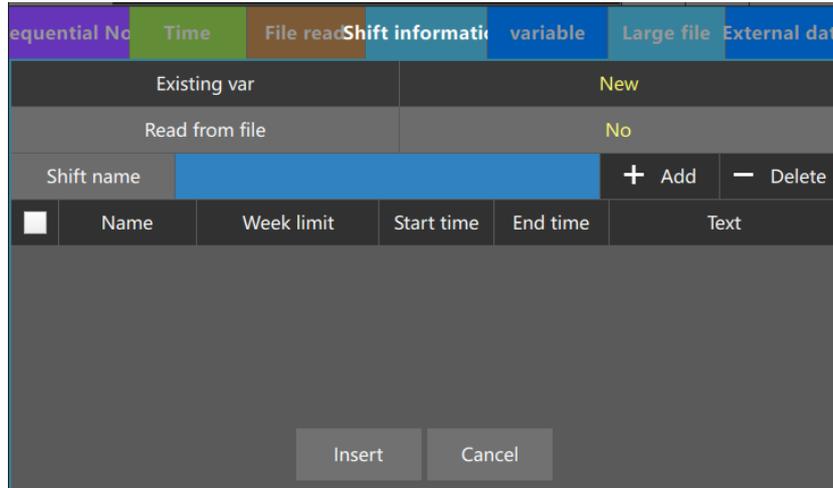


Figure4- 21

- Read from file Read external file, support csv format
- Shift name Refers to the total name of the shift information to be added currently.
- Add The added shift information is shown in Figure 4-22.

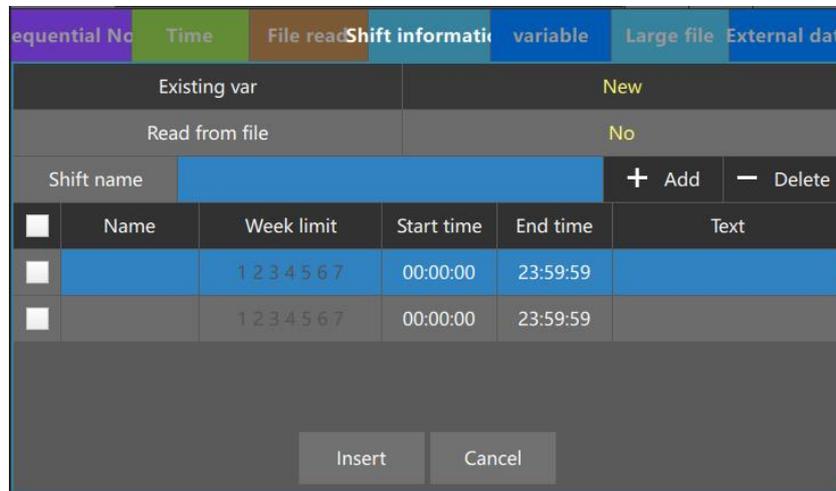


Figure4- 22

- Name** each shift information name
 - Week limit** The selected day to mark,as week limit is 3, means only mark on Wed, any other time no marking.
 - Start time** shift information to start marking time
 - End time** shift information to end marking time
 - Text** text for current shift information
- Delete a shift of information, you must select the shift you want to delete, then click Delete

2.5 Add variable

Click the variable button, as shown in figure 4-23.

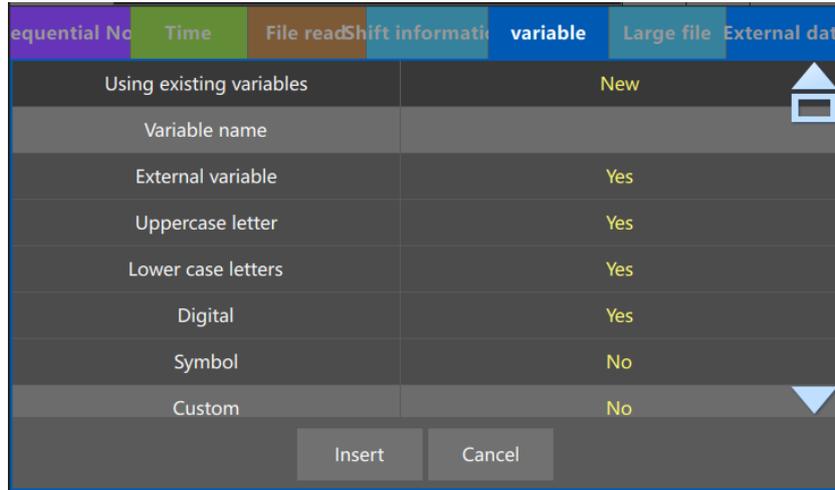


Figure4- 23

Using existing variable	You can reuse the existing variable template If you want to use the new variable, click New.
Variable name	Current variable name
External variable	External data
Uppercase letters	Whether the variable contains in uppercase letters
Lowercase letters	Whether the variable contains lowercase letters
Number	Whether the number contains a number
Symbol	Whether the variable contains a symbol
Custom	Custom character
Custom character	Custom character
Loop generation	Whether to loop to generate characters
Bit width	number of characters
Generated number	Generated variable number each time marking
Exclude characters	Exclude unwanted characters
Multiple references	Reserved

2.6 Adding large files

Reserved function

2.7 Adding external data

Reserved function

4.4.2.3.2. Add Arc character

Arc character interface as shown in Figure4- 24:



Figure4- 24

- Font** Font to be applied in current inserted content
- Font size (mm)** Font size of inserted content
- Center X (mm)** In the center position of X-axis
- Center Y (mm)** In the center position of Y-axis
- Radius X (mm)** Radius of arc character in X-axis
- Radius Y (mm)** Radius of arc character in X-axis
- Datum degree** Changing the datum degree, with the rotation of the entire arc text
- Distribution mode** Character spacing and Distribution angle
 - Character spacing:** To the distance between words to arrange
 - Distribution angle:** The entire arcuate angle, such as 360 degrees, 360 degrees is representative of the arc
- Distribution value** distribution parameter
- Reverse distribution** Counterclockwise arc text and text arranged in the vertical direction subversion
- Character counterclockwise** Counterclockwise arc text distribution

For example: add arc character (Guangzhou yi da packaging equipment co.,LTD) ,the parameters are as below:

Font	(P) -hztxt
Font size	5
Center X (mm)	0
Center Y (mm)	0
Radius X (mm)	20
Radius Y (mm)	20
Datum degree	90
Distribution mode	distribution angle
Distribution value	360
Reverse distribution	NO

Character counterclockwise NO
As shown in Figure4- 25:

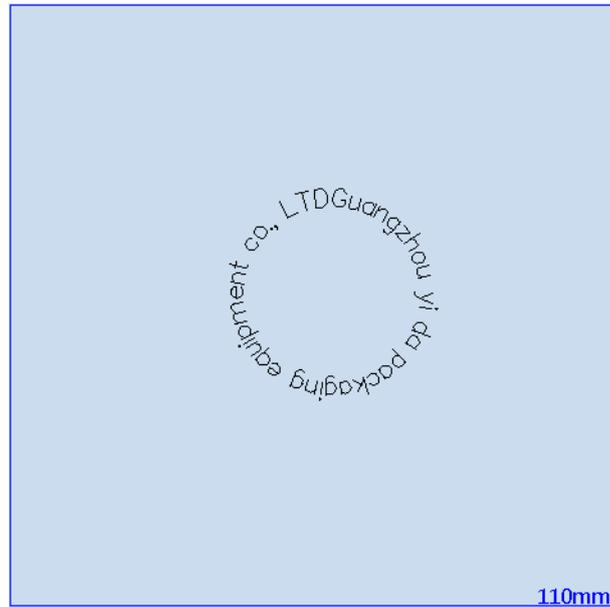


Figure4- 25

Change Datum degree to 0, will become Figure4- 26:



Figure4- 26

4.4.2.3.3. Add Dot.

dot property setting as shown in Figure4- 27:

Figure4- 31

barcode contents 123 123
 barcode type optional barcode type
 barcode height the height of the barcode
 border type type off the border: No Border, Edge, Bind, Box
 as shown in the following pictures

Edge: add border on the left and right sides of the barcode:



original



Edge

Bind: add border on the up and down sides of the barcode



original



Bind

Box: add border on the four sides of the barcode



original



Box

border height the height of the boarder
 border space the value of border space
 show text whether to show the barcode text or not
 barcode reverse whether to reverse the barcode or not
 font the font type of the barcode text
 font size the font size of the barcode text
 character pitch the character pitch of the barcode text
 X text offset X the text offset value on X Axial
 Y text offset Y the text offset value on Y Axial

aspect ratio the aspect ratio of the text
 when all the attributes are set,click add, as shown in figure 4-32

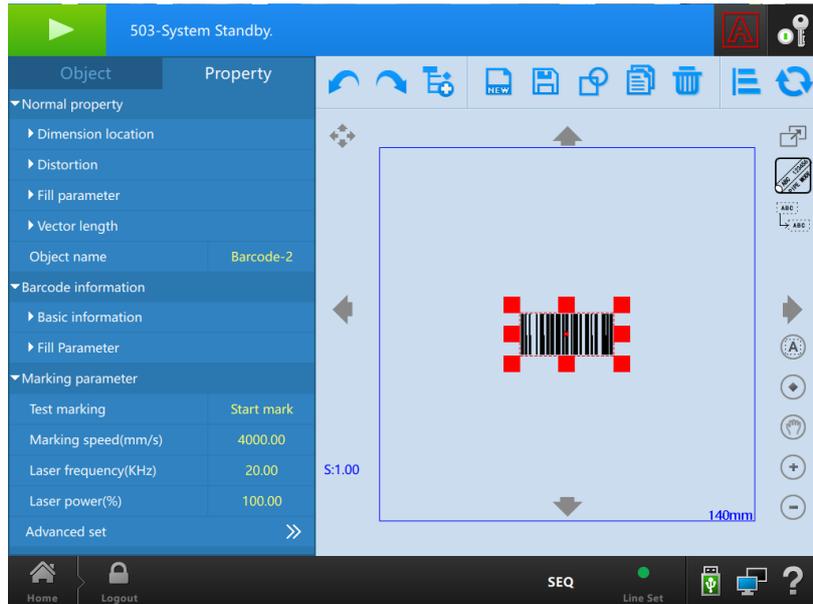


Figure4- 32

Click the filling parameter of the barcode, select the filling type: line, rectangle, dot matrix, standard, circle, fold line. One dimension code usually select standard filling type, and then change the filling type in the filling parameter(filling line) and the filling pitch.

Note: when marking barcode on the white material and the barcode is black, it will be no need to set reverse and border. When marking the barcode on black material, and barcode is white. It must set the Edge(border on the left and right sides) and reverse in the basic information. The width of the border must be the thickest strip.

4.4.2.3.8. Add 2D barcode

Add 2D barcode attribute as shown in figure 4-33

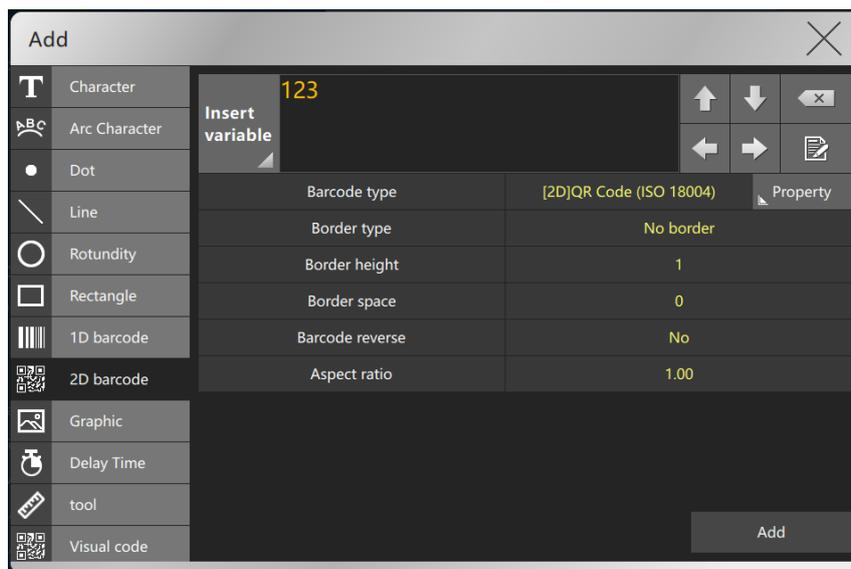


Figure4- 33

Barcode type	Select the bar code type, commonly used in the international (QR Code, Date Matrix)
Border Type	Select the border type of the QR code, and select the frame only when need to be reversed.
Border width	outer frame width
Border space	reserved
Barcode reverse	when the QR code is printed on the white material, and the QR code is black. Then there is no need to set the reverse and the border; when the QR code is printed on the black material, the QR code is white, and the barcode must be set the border (surrounding border) and reverse in the basic information.
aspect ratio	1:1 ratio

Add 2D barcode attribute as shown in figure 4-33

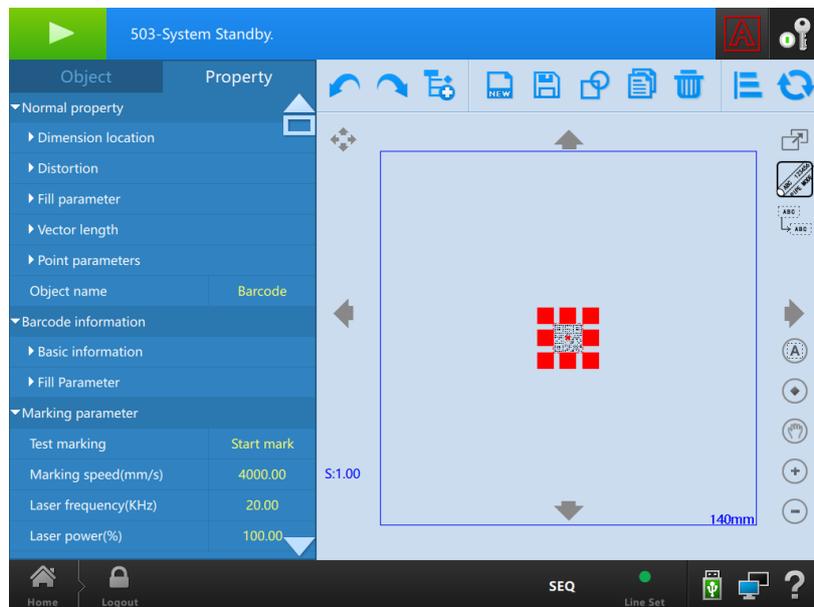


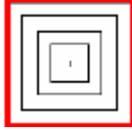
Figure4- 34

Click the filling parameter in the barcode information to select the filling type: line, rectangle, dot matrix, standard fill, circle, fold line. Usually, user needs to select standard filling, circle filling or dots filling. It is according to the material and customer requirements to make the selection, and then modify the filling mode (filling line) and filling pitch in the filling parameters of the general attributes.

The same property setting as 1D barcode, but 2D barcode can fill, as shown as below:



Line, fill in line way within each unit area;



Rectangle, fill in rectangle from outside to inside within each unit area;



Points, fill in points within each unit area;



1 Spot Per Cell, fill in spot per cell within each unit area.

Fill line spacing That same unit distance between the laser spot, the larger the value, the fewer points the laser light within the same unit, and vice versa more.

Fill line margin Distance from the center of the laser spot and unit boundaries, the larger the value, the less the same unit laser light points, and vice versa greater.

4.4.2.3.9. Add Graphic

Graphic adding interface as shown in Figure4- 35:

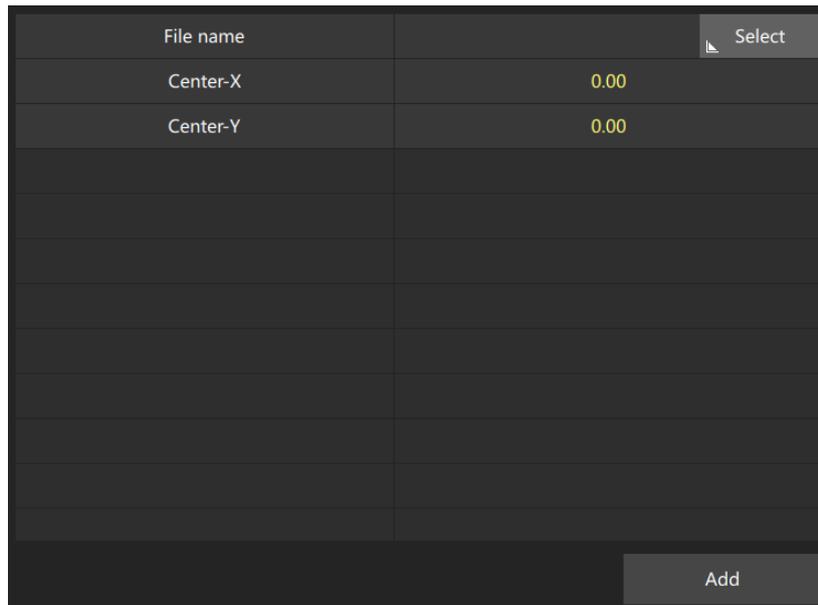


Figure4- 35

- File name** Graphic name
- Center-X** Graphic position in X axis
- Center-Y** Graphic position in X axis
- Select** select an exsiting graphic in laser system, click Add , as shown in Figure4-36,Add the exsiting graphic (EC-Pack.png)

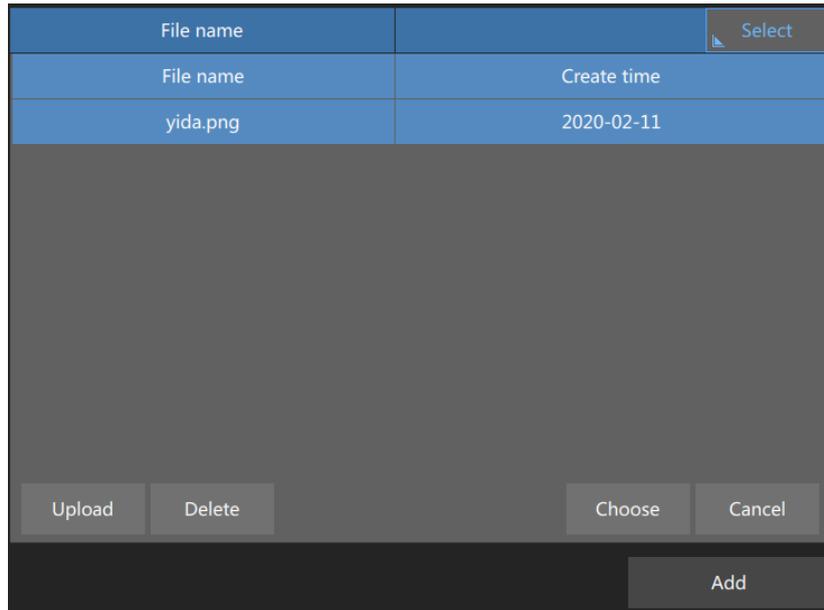


Figure4- 36

The added graphic as shown in Figure4- 37 :

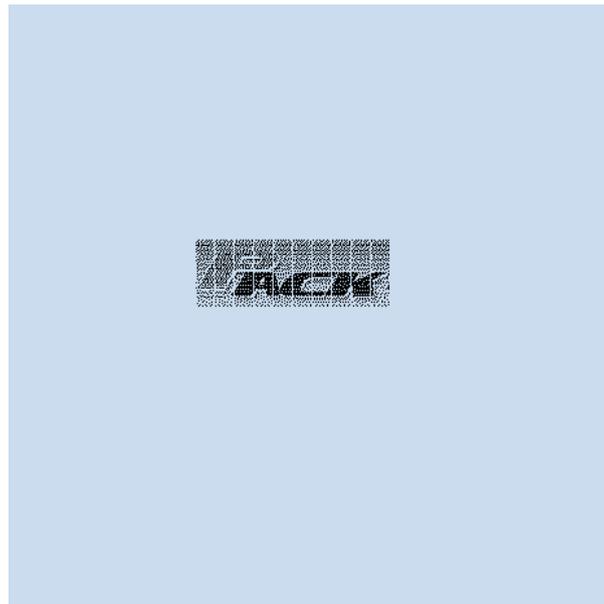


Figure4- 37

The graphic property can be changed:

Resolution: The larger the value , the more the number of points of the image is filled

Brightness: Set this value range (-255~255)

Contrast: Comparison of the different elements of the same drawing, the range of values (-100~100)

Dithering mode: Select a different mode, the image display the different

If users want to upload their own graphics, click on the upload file in Figure 6-35, the current system supports a graphical upload "jpg, bmp, png, dxf" and other standard formats, plug in a USB device, and then select the user to create their own graphics, click Select --- can be

uploaded.

4.4.2.3.10. Dealy time

Delay laser system exit light time, added to the beginning of the file needs marking

4.4.2.3.11. Tools

Interface as shown in picture 4-38, it is including Scale, Lattice and dotted line

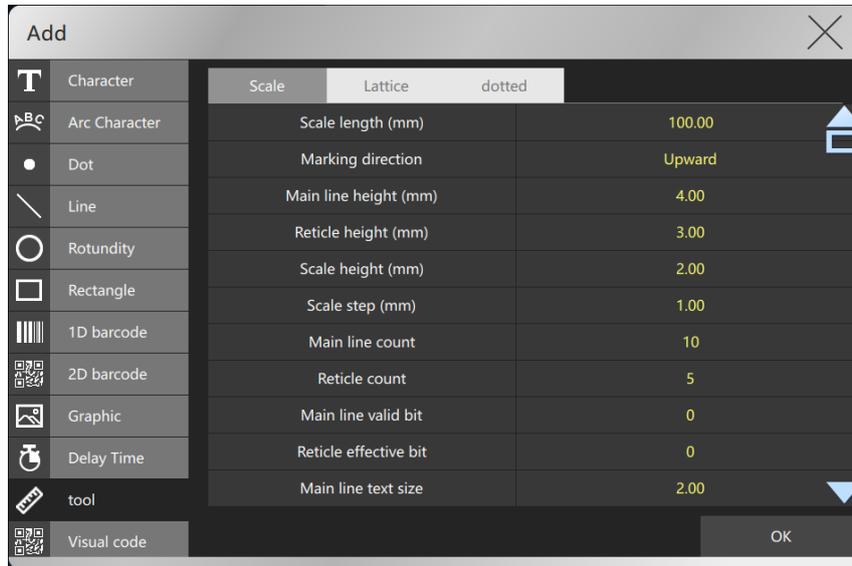


Figure4- 38

Scale

Scale length	set the length of the scale
Marking direction	direction of the scale marking
Main line height	as shown in Figure 4-39
Sub-line scale	as shown in Figure 4-39
Scale height	the height of each scale, in mm
Scale step	the distance between the scale and the scale, in mm
Main line count	the number of scales between main lines
Sub-line count	the number of scales between sub-line lines
Main line valid bit	reserved
Sub-line valid bit	reserved
Main line text size	main line corresponding text size
Sub-line text size	sub-line corresponding text size
Text offset X	the offset between the text and corresponding line on the X axis
Text offset Y	the offset between the text and corresponding line on the Y axis
Starting scale	Define the starting scale value

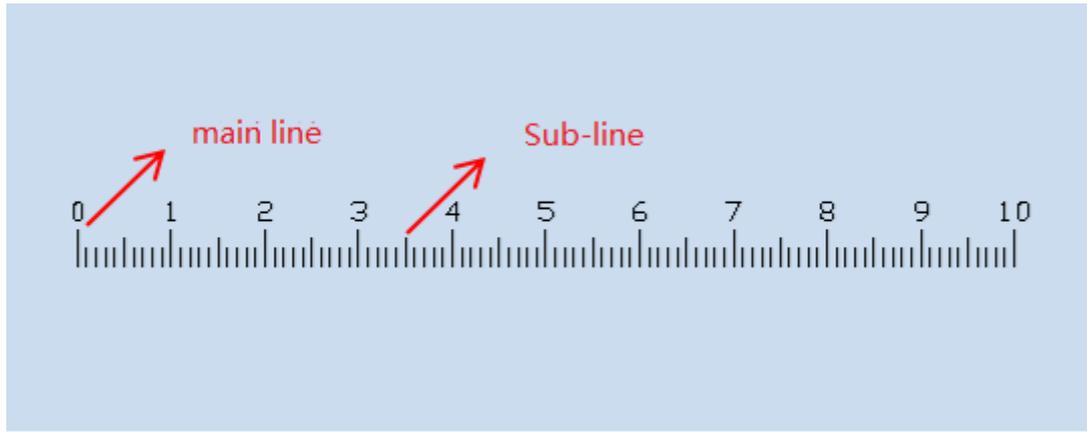


Figure4- 39

Lattice (Dot matrix)

This function is mainly used for easy tearing line, as shown in Figure 4-40.

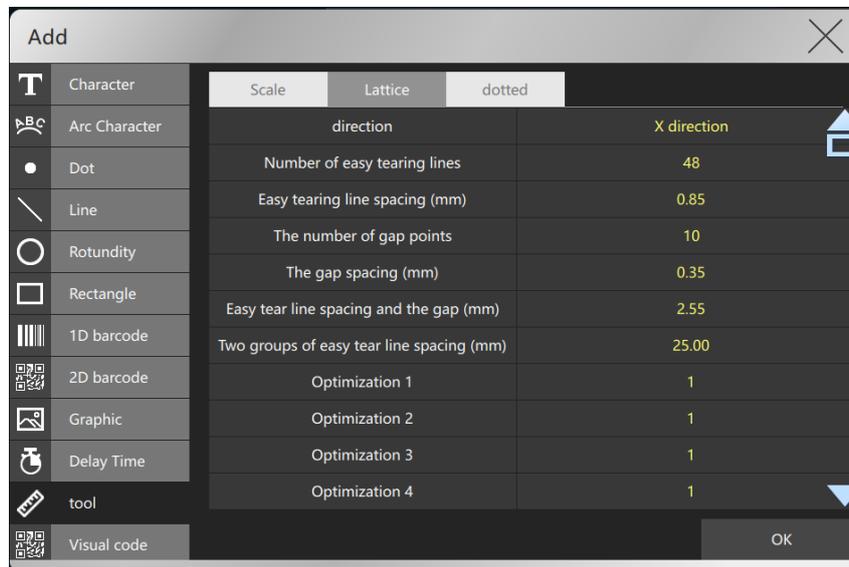


Figure4- 40

Direction	The direction of the lattice
The number of easy to tear lines	The number of easy tearing points per row
Easy tearing line spacing	The spacing between each easy tear points of each rows
The number of gap points	To make the easy tearing line easy to tear, the gap function is specially set (Fig. 4-41)
Gap point spacing	The spacing between each gap point in each row
Easy tearing line spacing and gap	The space between easy tearing lines and gaps in each row
Two groups of easy tearing line spacing	The space between two group easy tearing lines in each row
Optimization of 1, 2, 3, 4, 5, 6	The optimization of power for the first and last points of each row of easy tearing lines
Connection line	Whether to connect two sets of easy tearing lines, select

Yes, and set the number of extension points at both ends of the connection line

Whether to mark the gap

Select Yes, mark the gap line, and set the gap line consists of points or consists of lines and the power of the gap line. Select No, do not mark the gap line.

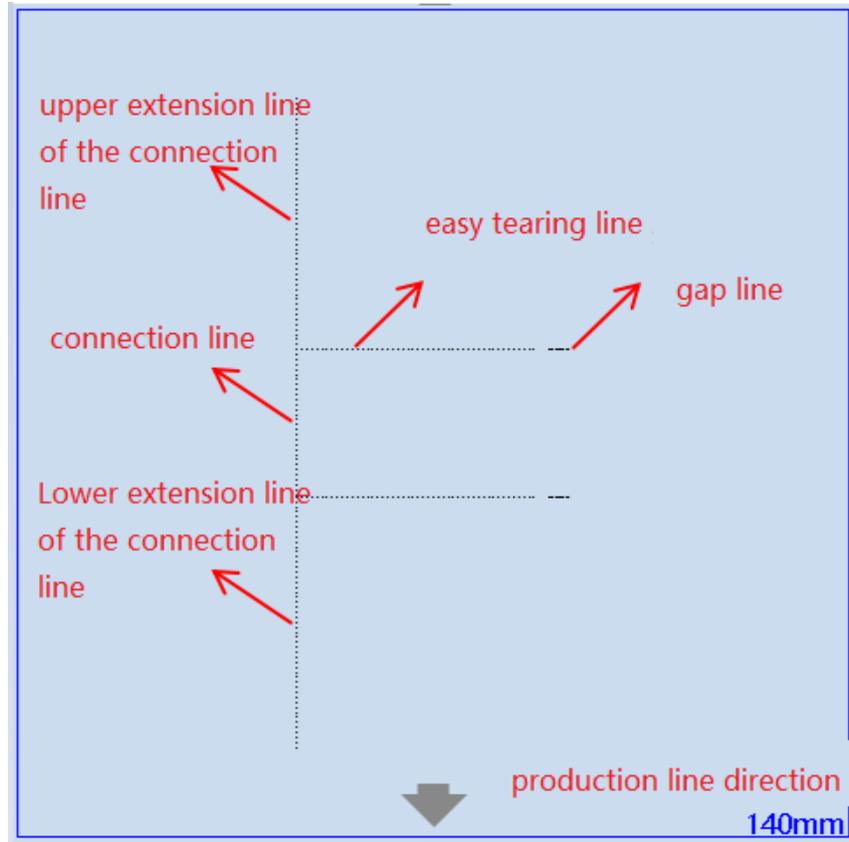


Figure4- 41

Dotted line

This function is mainly used for easy tearing, as shown in Figure 4-42.

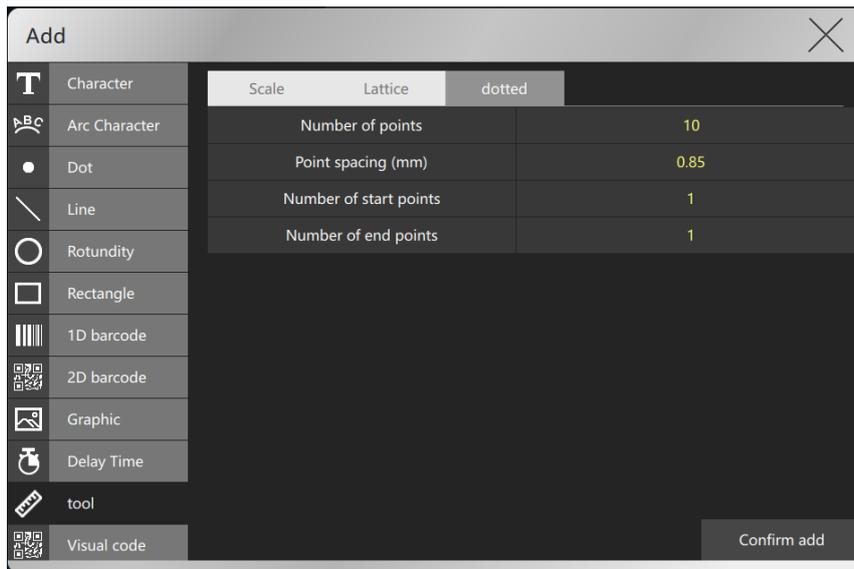


Figure4- 42

- Number of dots The number of dots forming a dotted line
- Dot spacing dot to dot spacing
- Number of starting dots Adjust the starting dots power. The larger the value, the greater the power.
- Number of end dots Adjust the end point power. The larger the value, the greater the power.

Visual code

The reserved function,as shown in Figure 4-43.



Figure4- 43

4.4.2.4. New



create a new blank file

4.4.2.5. Save



Save the document to the file

4.4.2.6. Group



The combination of multiple objects together, let it have the overall regulatory Function

4.4.2.7. Copy/Stick



Copy and stick the selected file

4.4.2.8. Delete



Cancel the selected file

4.4.2.9. Align



Contains left-aligned, horizontally aligned, right-aligned, vertically evenly distributed, centered ,upper alignment, vertical alignment, alignment, horizontal evenly distributed, aside aligned



left align



horizontal align



right align



vertically evenly distribution



center



upper align



vertical align



below align



horizontal evenly distributed



aside align

4.4.2.10. Rotation



Related operations on selected objects clockwise, counterclockwise rotation, vertical mirror, horizontal mirror



Clockwise



Counterclockwise



Horizontal mirror



Vertical mirror

4.5. Log

Divided into System log and Operation log

System log Display some relevant information system appears, such as: Production line overspeed, as shown in Figure4- 44:

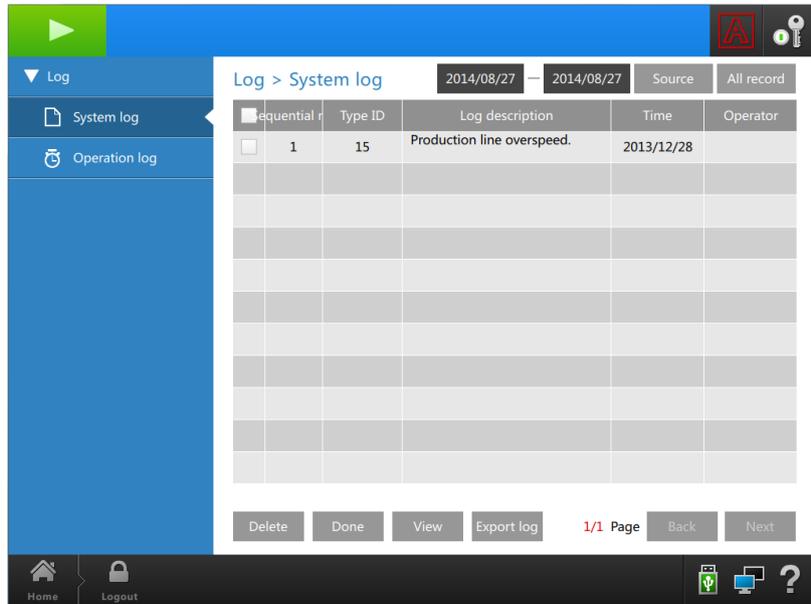


Figure4- 44

Operation log Display the operation information operator made,such as: Login, as shown in Figure4- 45:

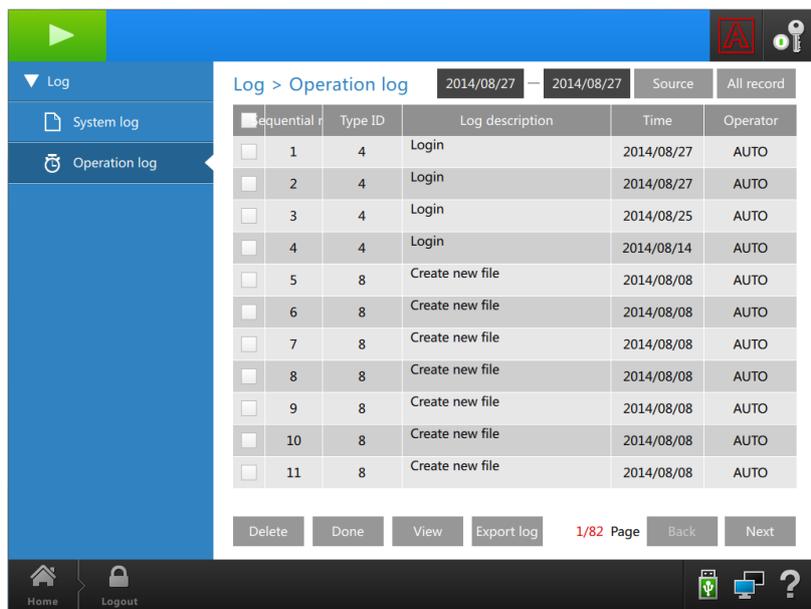


Figure4- 45

- Source** source the log information for specified date
- All record** all log information in the laser system
- Num** log serial number, as time queue
- Log description** log detail information
- Time** log create time
- Operator** display the operator for each log.
- Delete** delete selected log
- Done** the treated logs

- View** view log detail information
- Export log** export the selected log or source result

4.6. Setting

Setting interface as shown Figure4- 46:

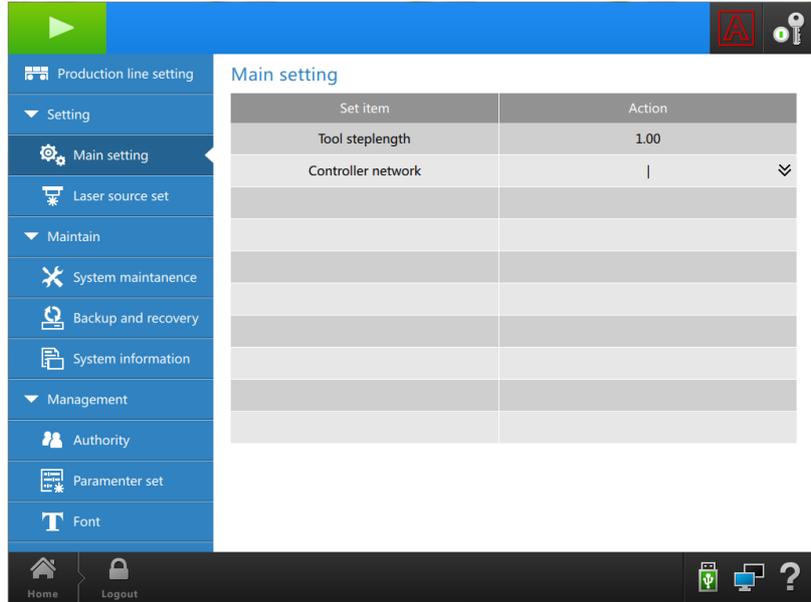


Figure4- 46

4.6.1. Production line setting

Setting of the Production line relevant property and marking property

4.6.1.1. Production line

Select the product movement as YES, that is, fly marking, as shown in Figure 4-47.

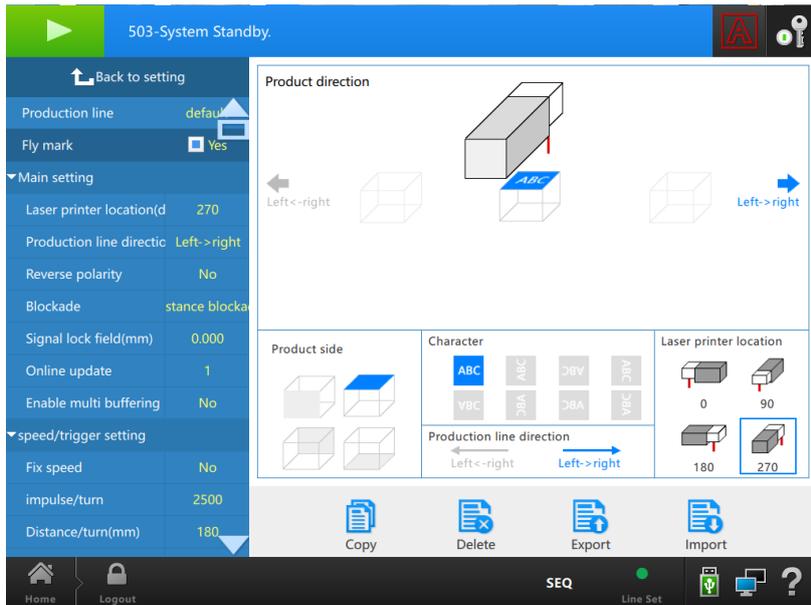


Figure4- 47

When setting the relevant attributes of the production line, the direction of the laser machine, the direction of the production line, the direction of the text, and the surface of the marking should be consistent with the scene.

4.6.1.1.1. Main settings

Laser machine position	Set the position of the laser machine. Four angles: 0 degrees, 90 degrees, 180 degrees, 270 degrees
Production line direction	Set the direction of the production line, from left to right or right to left
Reverse Polarity	The polarity of the product detector. Low level trigger or high level trigger
Blocking mode	Time blocking or distance blocking, shielding the external control trigger signal generated during the marking process. That is, the product will not be marked multiple times even if there is an external control signal during the marking process.
Online update	Real-time update data
Enable multi-buffering	Cache data, avoiding excessive transmission speed and cause overspeed

The selection of the sensor polarity(reverse polarity) is as follows:

When select “off”, the reversed polarity is disabled, high level trigger, as shown in figure 4-48.

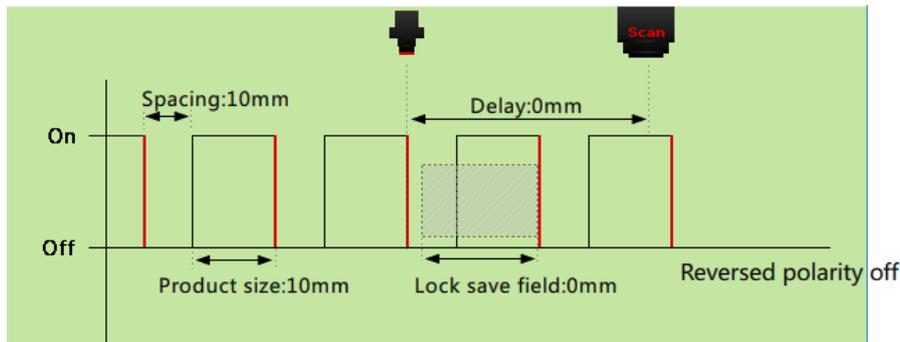


Figure4- 48

When select “on”, the reversed polarity is enabled, low level trigger, as shown in figure 4-49.

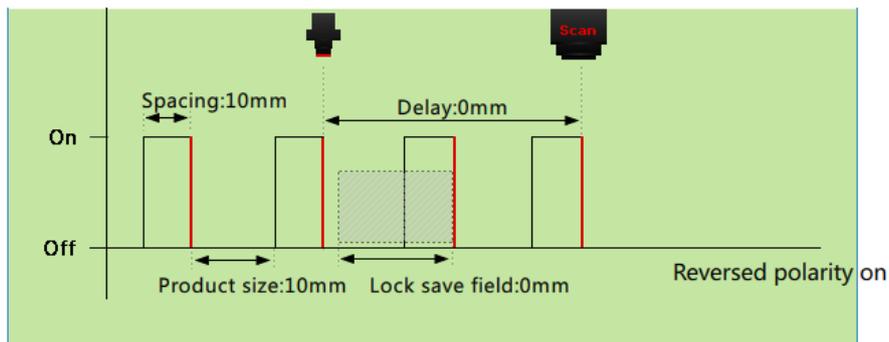
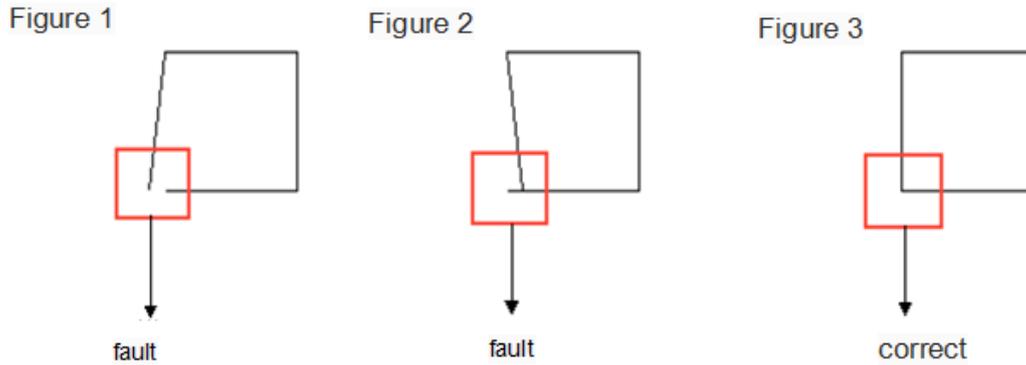


Figure4- 49

4.6.1.1.1. Speed/trigger setting

If install the encoder and set the marking speed synchronized with encoder, the setting is as follows:

Fixed speed	NO
Product size	The length of the products need to be marked(internal trigger effects)
Product spacing	The distance between the products (internal trigger effects)
Pulse/rotation	The pulse produced by the encoder in one rotation
Distance/rotation	Circumference of wheel installed on encoder (3.14x wheel diameter)
Ratio	Encoder ratio, calculation method is shown in figure 4-50
Trigger	External trigger or internal trigger
Marking times	The number of marking times when triggered once
Space	Space between each marking
Delay distance	When sensor is triggered, if the marking cannot be done on the specified position of the object, the value should be adjusted.
Optimize marking	To improve productivity, objects can be marked either from left to right or from right to left.
Field mode	Reserved
2D one-way	Reserved
Range extension	The default setting is Yes.
Angle of assembly line	Angle between laser machine and the assembly line, when the angle between the laser machine and assembly line is small, and the physical adjustment is not accurate enough, then the angle can be corrected by software modification



adjust method:

Figure 1: Reducing the proportion value of the encoder [mm / pulse] until normal marking

Figure 2: Increasing the proportion value of the encoder [mm / pulse] until normal marking

Enable fie speed

Fix speed Yes

Speed (m/min) Set the value of the fixed rate, the value corresponding to the current line Speed

Product size (mm) Setting of product size value

Product spacing (mm) Setting distance between products

Trigger External trigger or Internal trigger.

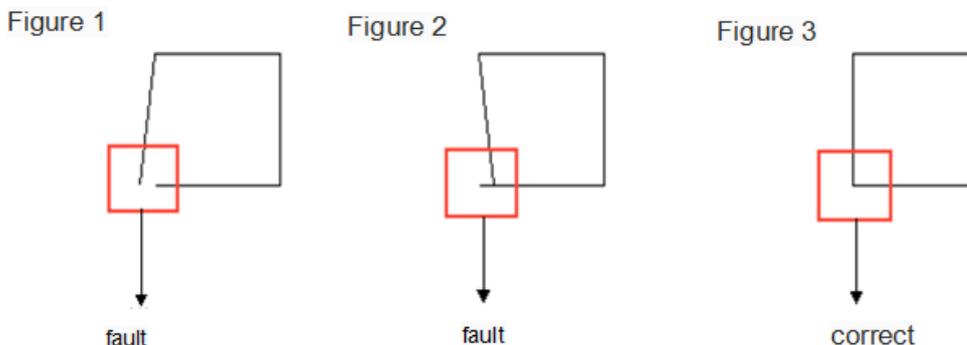
Spacing delay The distance between the laser head and the electric eye. When the photocell triggered, if not correctly marking the items specified location, you need to adjust the value to the marking specified location in objects.

Optimize marking Only useful when marking lines

Line angle Set the angle between the laser and the pipeline

Add a square, select Fixed speed, hen the following occurs,

adjust the method :



adjust method:

Figure1: Increasing the speed value[mm/sec]until normal marking

Figure2: Reducing the speed value[mm/sec]until normal marking

4.6.1.1.2. Marking area

- Max.marking area** The maximum range of the pendulum galvanometer
- Left border (%)** Galvanometer placed in the maximum position of the left border
- Right border (%)** Galvanometer placed in the maximum position of the right border
- Top border (%)** Galvanometer placed in the maximum position of the top border
- Bottom border (%)** Galvanometer placed in the maximum position of the bottom border

Example: Set the left, right, top and bottom border are 80%, indicating left, right, top, bottom the scope of marking can only reach 80% of the maximum marking range, dashed boxes marking the restricted range.

When the production line direction is from left to right, the left border marking unlimited , the other three sides restricted items ,will be prompted to go beyond the scope of marking, in order to make the marking faster, you can move the object beyond the scope of the left border.As shown in Figure4- 51:

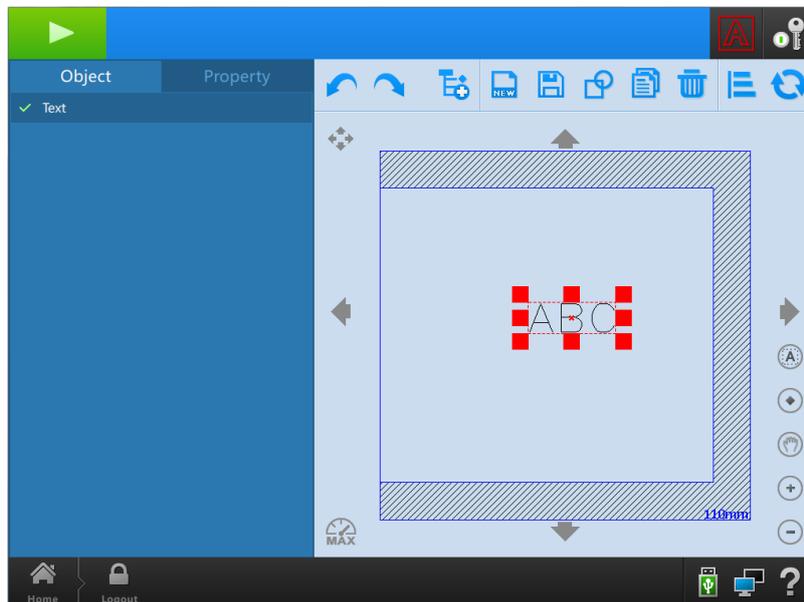


Figure4- 51

When set the line direction from right to left, the border right side is not restricted, the other three sides restricted items ,will be prompted to go beyond the scope of marking,in order to make the marking faster, you can move the object beyond the scope of the right border. As shown in Figure4- 52:

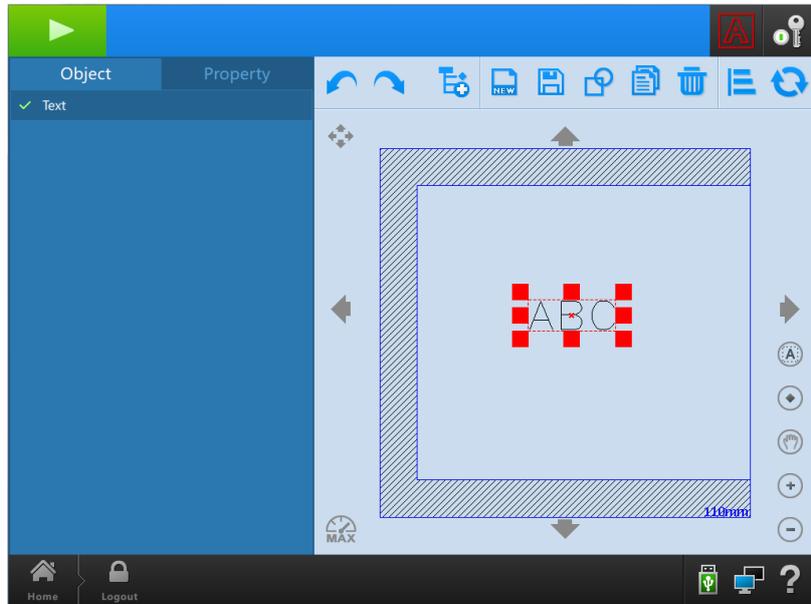


Figure4- 52

4.6.1.2. Static state marking set

Fly mark select “NO”, as shown in Figure4- 53:

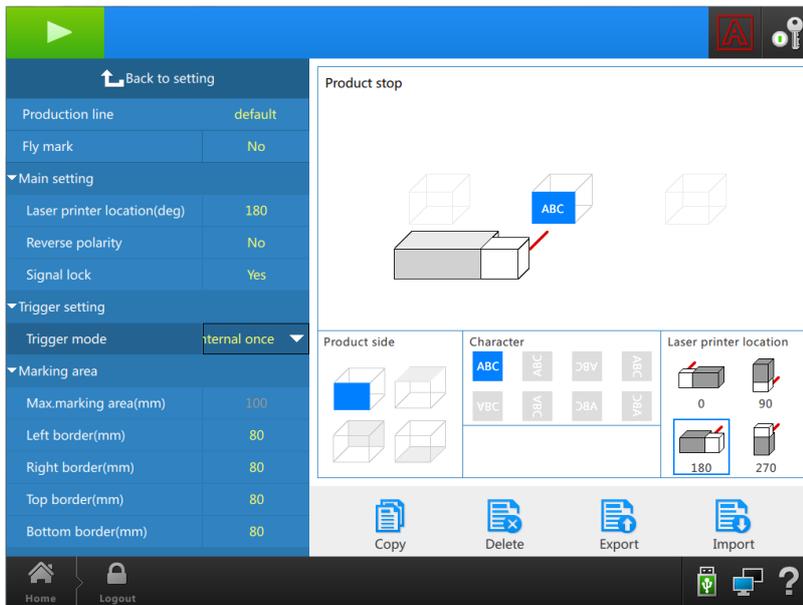


Figure4- 53

4.6.1.2.1. Main setting

- Laser printer location** there are four degree: 0、90、180、270.
- Reverse polarity** photocell polarity, same setting as production line

4.6.1.2.2. Trigger mode setting

- Trigger mode** **Internal once:** internal trigger once, marking once
- Internal continue:** Internal continuous trigger, the trigger time interval, such as the time interval is set to 1000ms, that is

triggered once every 1000ms, the corresponding execution marking time

External trigger: external control signal trigger, such as photocell trigger

4.6.1.2.3. Marking area

- Max.marking area** The maximum range of the pendulum galvanometer
- Left border (%)** Galvanometer placed in the maximum position of the left border
- Right border (%)** Galvanometer placed in the maximum position of the right border
- Top border (%)** Galvanometer placed in the maximum position of the top border
- Bottom border (%)** Galvanometer placed in the maximum position of the bottom border

Example: Set the left, right, top and bottom border are 80%, indicating left, right, top, bottom the scope of marking can only reach 80% of the maximum marking range, dashed boxes marking the restricted range, as shown in Figure4- 54:

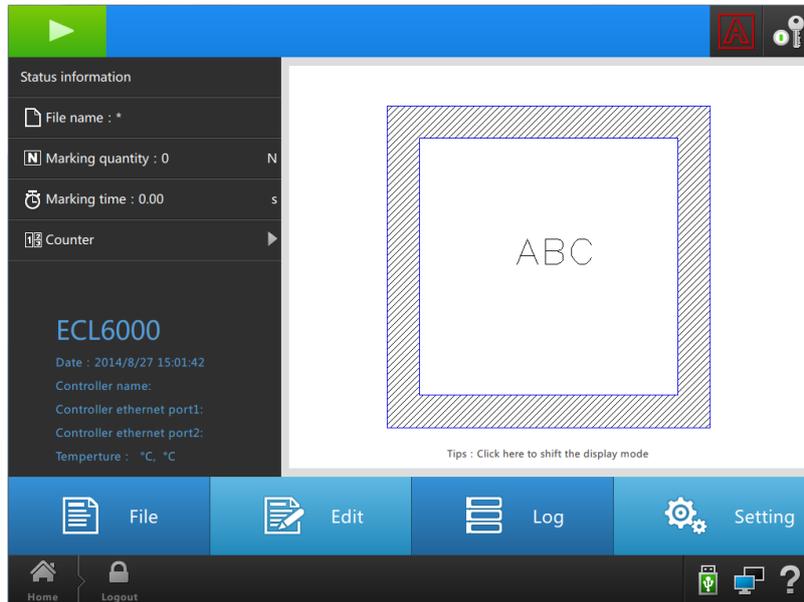


Figure4- 54

4.6.2. Setting

4.6.2.1. Main setting

As shown in Figure4- 55:

Main setting

Set item	Action
Tool steplength	1.00
Controller network	⤴
Network No.	Network 1
Controller name	
DHCP addressing	No
IP address	
Subnet mask	
Default gateway	
DNS address	
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	

Figure4- 55

Tool steplength Four directions for setting the offset value of the object up and down movement and stretching. Define how many units, then move move around and stretch how many units

Controller network Displays the current network and PC terminal-related matching laser system information

Network No: Network1, To connect to the network card via the touch screen, the corresponding control box X9 interface (remote panel interface)

Network 2, To connect to the network via ethernet.

Controller name the current laser system controller name

DHCP addressing

IP address IP address of the current laser system

Subnet mask subnet of the current laser system

Default gateway default gateway of the current laser system

DNS address DNS address of the current laser system

4.6.2.2. Laser source setting

As shown in Figure4- 56:

Laser source setting

Item	Value
Machine model	ECL1000
Lens	C150
Date	2014-08-27
Time	15:04:17
Coefficient of heat transfer	0.5
Controller low temperature limit	0
Controller high temperature limit	60
Laser source low temperature limit	5
Laser source high temperature limit	40
Smoke extractor ON detection	No
External cooling ON detection	No

Figure4- 56

Machine model	select the current laser source model
Lens	select the current lens model
Date	Modify the laser system date
Time	Modify the laser system time
Coefficient of heat transfer	Number of revolutions of the fan
Controller low temperature limit	When the controller temperature falls below this value (minimum temperature 2 degrees), the system will automatically alarm
Controller high temperature limit	When the controller temperature up above this value (minimum temperature of 58degrees), the system will automatically alarm
Laser source low temperature limit	When the laser source temperature falls below this value (minimum temperature of 5 degrees), the system will automatically alarm
Laser source high temperature limit	When the laser source temperature up above this value (minimum temperature of 60 degrees), the system will automatically alarm
Smoke extractor ON detection	if open the smoke detection device or not
External cooling ON detection	if open the external cooling or not

4.6.3. Maintain

4.6.3.1. System maintenance

4.6.3.1.1. General Maintenance

System Update

There are two update ways:

- 1.File update: update the file from USB device

2.Website update: update the file from the specified website position
Interface as shown in Figure4- 57:

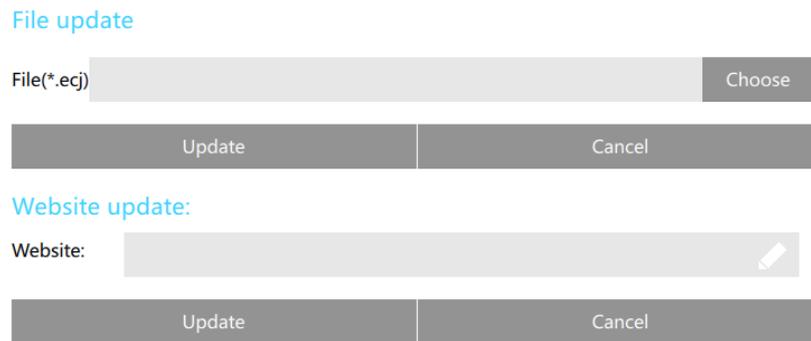


Figure4- 57

File update

Updated as follows:

1. Update files stored in the USB device
2. Click Select, eject the USB device
3. Select the updated file

1、 Click update

Website update

1. Enter the specified network address (update files stored network address)
2. Click Update, enter the specified URL automatically download the update file

Action script reserved

Electronic compass reserved

Communication setting reserved

M3 update reserved

4.6.3.1.2. Debounce setting

Detection of the project value set here. For the detection of laser temperature, check CheckTempwarn, the value is set to 3, which detects the project three times, if the temperature has been in the high or low state laser system will prompt laser temperature exceptions, any items need to detect , operating values must be greater than or equal to 3, it will not detect less than 3, as shown in Figure4- 58:

Maintain		General	Debounce Set	Diagnosis	EC maintain>>
Items	Value				
CheckLaserInterlock(N)	3				
CheckLaserDCOk(N)	0				
CheckVoltageOk(N)	3				
CheckTempwarn(N)	3				
CheckLaserReady(N)	3				
CheckPwrFpln(N)	3				
CheckStartKey(N)	3				
DelayDCTime(ms)	1000				
CheckIOTime(ms)	0				
FilterTime(ms)	20				
FiberStatus1(N)	0				
FiberStatus2(N)	0				

Figure4- 58

4.6.3.1.3. diagnostic message

Diagnose if all functions are working well, as shown in figure 4-59.

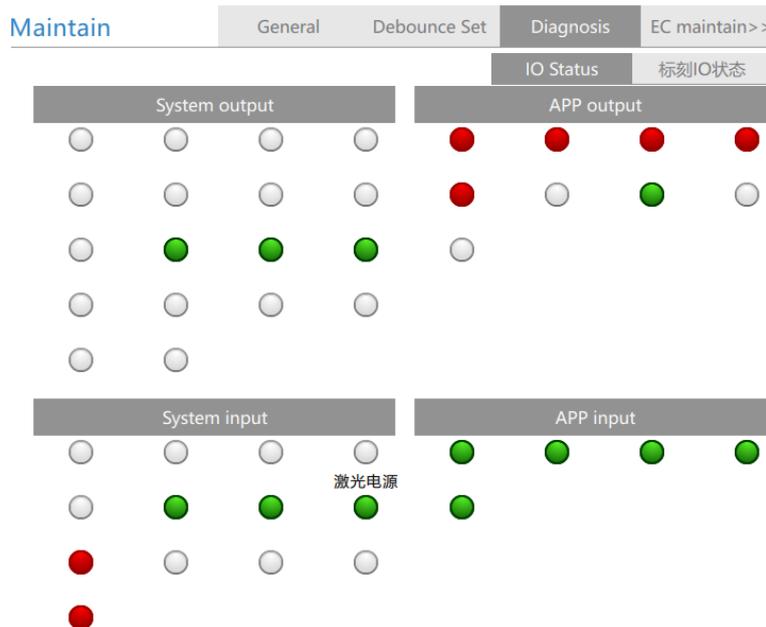


Figure4- 59

4.6.3.1.4. EC maintenance

EC maintenance includes laser testing, lens correction, red light correction.

This function requires the second level password provided by the manufacturer. If necessary, please contact us.

1. Laser testing

Test if the laser is beaming, test if the beaming power is correct.

Set the laser power, frequency and time; and use the laser power testing instrument to test if the power is declined.

2. Lens correction

The interface as shown in Figure4- 60:

Parameter	Value
Working range(mm)	110
X magnification	1.0000
Y magnification	1.0000
Rotation degree(deg)	180.00
X mirror image	No
Y mirror image	Yes
X offset(mm)	0.00
Y offset(mm)	0.00

Correction

Figure4- 60

Because some of the physical characteristics of the lens itself and the optical path problem, will cause the graphics actually carved out of the deformation, appropriate adjustments lens parameters, will actually carved out of graphics and graphic design software converge.

① Lens parameter setting

Working range (mm) : the lens working range

X/Y magnification: If the graph theory size (software set), and the actual size (actual carved out of the graphic sample size) do not match, adjust the X / Y magnification values to correct. Calculating the ratio value is: theoretical size / actual size.

Rotation degree: If the optical path is completely normal, but because of the restrictions countertops, work material can not be properly placed, you need to change this to do the appropriate angle of rotation in order to achieve the effect of relative levels

X/Y mirror imag: Respectively to X / Y axis as the reference line for the reverse treatment

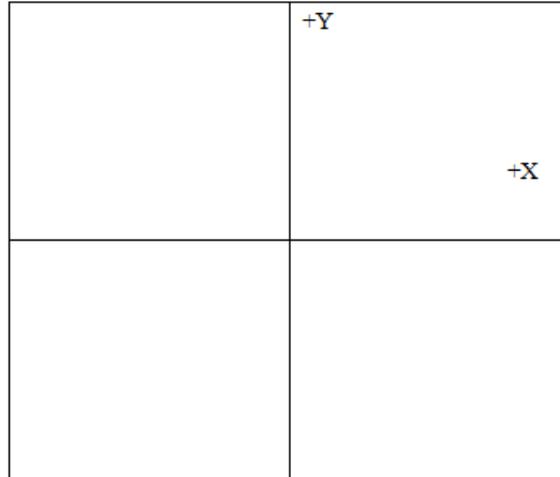
X/Y offset: Under all normal circumstances, the value of this field as long as the set X = 0, Y = 0 can be. If it is found to discover the location carved out a position to the left than expected 5mm, you should modify the X Offset, enter 5mm; the rest so

Lens correction

Operation as below:

1. Attach the lens and adjust to the appropriate focal length

2. Enter the lens working area depending on the scope galvanometer
 3. Click the Test button, view the graphic styles carved out
- Graphic style played under normal circumstances as follows:



3. Graphics have carved out such deformation can be corrected in accordance with the following aspects:

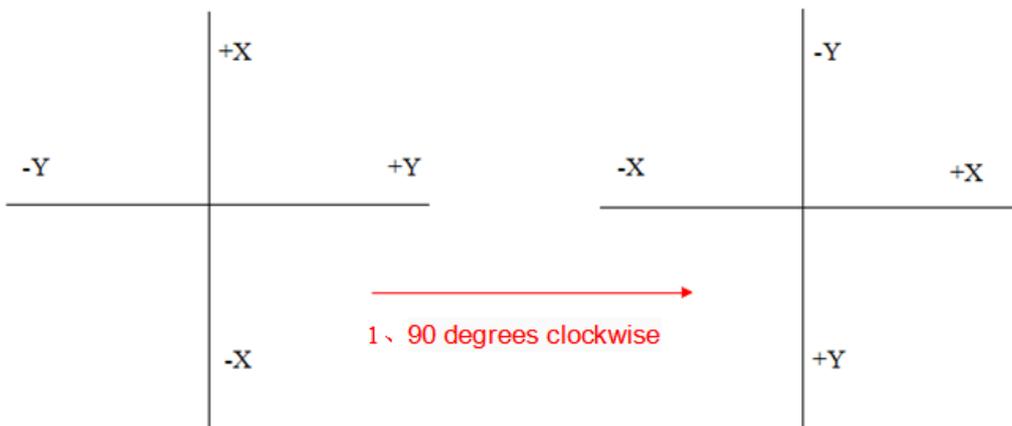
① Graphic size adjustment

1. Played with a ruler to measure the actual length of the axis;
2. When the played graphic size is inconsistent with the setting lens working area, according to "graphic size deformation parameters = lens working area value of lens parameter setting page / actual value side played" algorithm derived scale values were filled X, Y-axis to adjust the size of the deformation parameters.

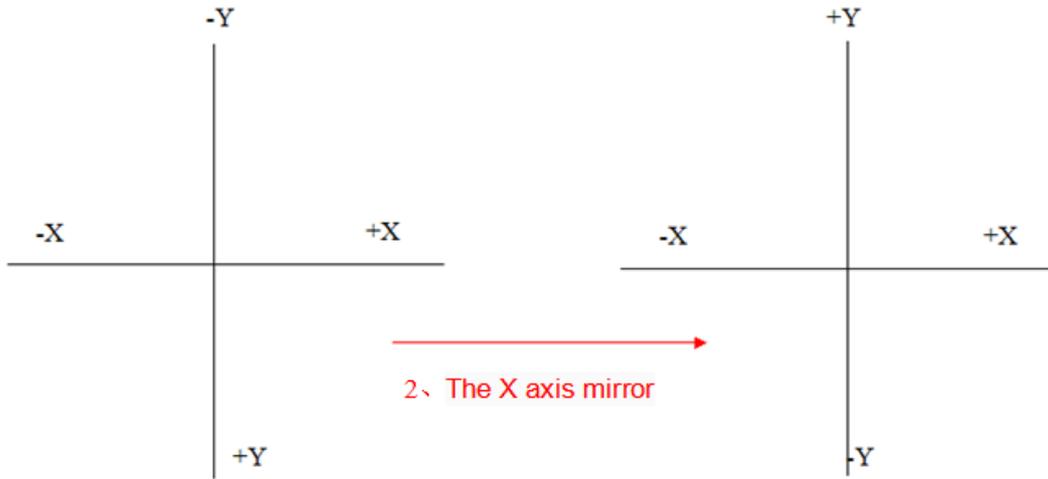
② adjust the X, Y axes of the current state of the lens to a standard

Since the lens are randomly assembled inside the X, Y axis when export from the factory, not according to the standard axes to assemble, it may cause vibration of the lens in the current X, Y coordinates and field of X, Y axis is not synchronous, According to the following method may be adjusted to X, Y standard axis.

1. Adjustment when the played axis direction is different with the standard axis direction:



Click Test to marking, and play the wrong coordinate.



After the above two steps to adjust to the standard axes

2. Referring to the above adjustment method revisionist "lens parameters" in the rotation angle and the X / Y mirror image until it hit the standard axes.

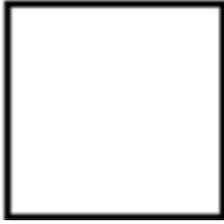
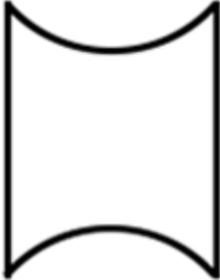
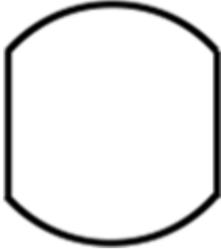
② Correction

The craved graphics are not standard, using the correction file to correct parameters, the interface as shown in Figure4- 61:

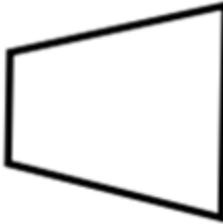
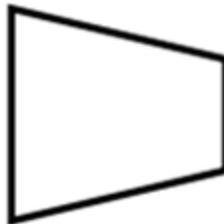
Correct Parameter	
Parameter	Value
▼Curvature distortion	
X axis parameter	-0.2000
Y axis parameter	0.2000
▼Trapezoid distortion	
X axis parameter	0.0000
Y axis parameter	0.0000
▼Right angle distortion	
X axis parameter	0.0000
Y axis parameter	0.0000
▼Dimension distortion	
X axis parameter	1.0000
Y axis parameter	1.0000

Figure4- 61

Curvature distortion

artwork	
	
Marking graphic	
	
correction method	
Reduce the Y axis value	Increase the Y axis value
artwork	
	
Marking graphic	
	
Correction method	
Reduce the X axis value	Increase the X axis value

Trapezoid distortion

artwork	
	
Marking graphic	
	
Correction method	
Increase the Y axis value	Reduce the Y axis value
artwork	
	
Marking graphic	
	
Correction method	
Increase the X axis value	Reduce the X axis value

Right angle distortion

artwork	
	
Marking graphic	
	
Correction method	
Reduce the Y axis value	Increase the Y axis value
artwork	
	
Marking graphic	
	
Correction method	
Reduce the X axis value	Increase the X axis value

Dimension distortion

artwork	
	
Marking graphic	
	
Correction method	
Reduce the Y axis value	Increase the Y axis value
artwork	
	
Marking graphic	
	
Correction method	
Reduce the X axis value	Increase the X axis value

3. Red light correction

As shown in Figure4- 62:

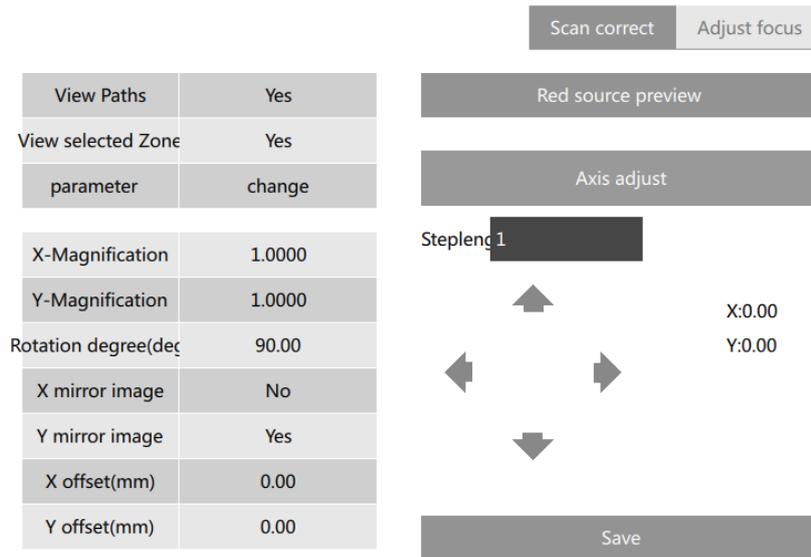
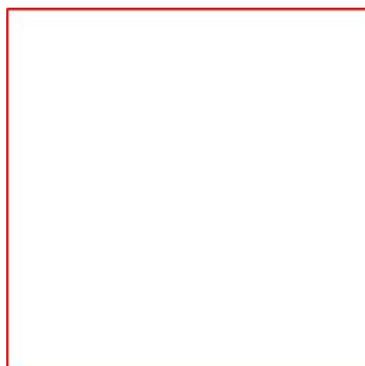


Figure4- 62

- View Paths: Preview the full marking paths.
 - View selected zone: Preview the selected object.
 - Parameter change: Change parameter set -Red source preview.
 - X Magnification : X-axis magnification
 - Y Magnification: Y-axis magnification
 - Rotation degree: The whole red light rotate degree
 - X mirror image: Choose X axis mirror image or not
 - Y mirror image: Choose Y axis mirror image or not
 - X offset (mm) : The red light offset value in X axis
 - Y offset (mm) : The red light offset value in Y axis
 - Steplength: The red light each travelled distance in X-axis or Y-axis, Unit mm
- After each set value, you must click Save, and then click Red source preview to take effect the change value.
- When the red and marking fully coincide , then the red source preview value set correctly, as shown below:

Note: black is the graphic marking by the laser, red is preview graphic by the red light.



For the following situations, the individual adjustment method also corresponds to the following

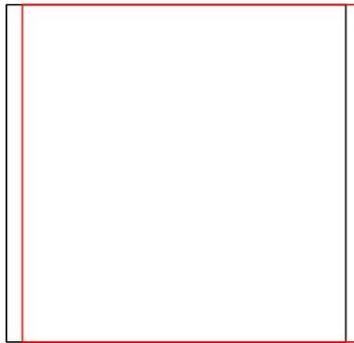


Figure 1

If there is a case of photo 1., The offset value described in the X-axis red is too large
adjusting method : Reducing the X-axis offset value until completely overlap red graphics and marking graphics .

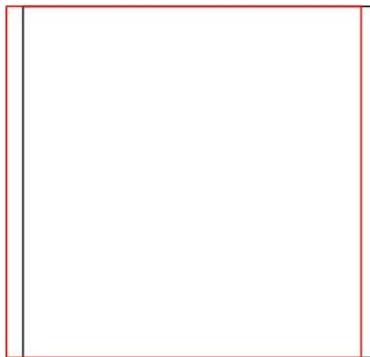


Figure 2

If there is a case of photo 2., The offset value described in the X-axis red is too small
adjusting method: Increasing the X-axis offset value until completely overlap red and marking graphics



Figure 3

If there is a case of photo 3., The offset value described in the Y-axis red is too large
adjusting method : Reducing the Y-axis offset value until completely overlap red graphics and marking graphics .



Figure 4

If there is a case of photo 2., The offset value described in the Y-axis red is too small
 adjusting method: Increasing the Y-axis offset value until completely overlap red graphics marking graphics

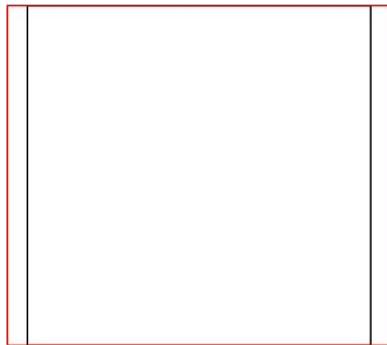


Figure 5

If there is a case of photo 5., The magnification described in the X-axis red is too large
 adjusting method : Reducing the X-axis magnification until completely overlap red graphics and marking graphics

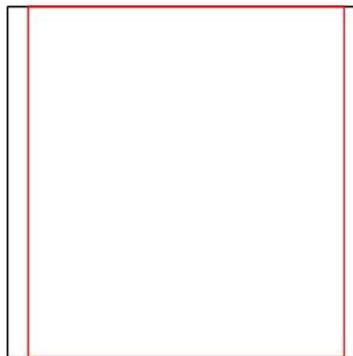


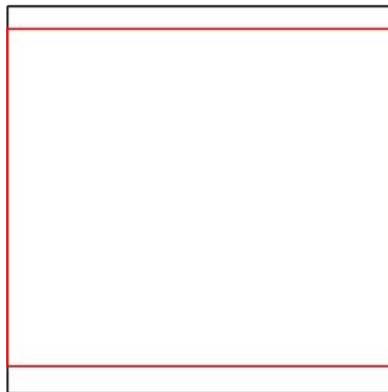
Figure 6

If there is a case of photo 6., The magnification described in the X-axis red is too small
 adjusting method : Increasing the X-axis magnification until completely overlap red graphics and marking graphics.



Figure 7

If there is a case of photo 7., The magnification described in the Y-axis red is too large
adjusting method : Reducing the Y-axis magnification until completely overlap red graphics
and marking graphics.



If there is a case of photo 8., The magnification described in the Y-axis red is too small
adjusting method : Increasing the Y-axis magnification until completely overlap red graphics
and marking graphics .

4.6.3.2. Backup and Recovery

4.6.3.2.1. Recovery Backup

Restore previously saved backup file

4.6.3.2.2. Create Backup

4.6.3.3. System information

Display the relevant information of SmartPAD and controller
SmartPAD information as shown in Figure4- 63:

System information

SmartPAD	Controller
Name	Parameter
Software version	V2.0
CPU use ratio	%
RAM use ratio	%
ROM use ratio	%
Hardware version	V2.0

Figure4- 63

Controller information as shown in Figure4- 64:

System information

SmartPAD	Controller
Name	Parameter
Software version	2.3.5.1708134 
CPU use ratio	1%
RAM use ratio	24%
ROM use ratio	80%
System on duration	0 days 0:12:7
Software on duration	0 days 0:11:53
Marking time	0 days 0:0:0
Hardware version	0.0
Machine model	ECL1030R15
Machine serial number	A0000
Machine running duration	0
Laser source running duration	0 

Figure4- 64

4.6.4. Management

It contains Authority, Parameter set and Font.

4.6.4.1. Authority

It is mainly each user's authority set and reset password, as shown in Figure4- 65:

Set item	Authority set				Reset password
	<input type="checkbox"/> User1	<input type="checkbox"/> User2	<input type="checkbox"/> User3	<input type="checkbox"/> User4	<input type="checkbox"/>
Marking execute	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Character operation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Edit	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Log review	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
System setting	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Red light review	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Key unlock	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Open	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rename	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Copy	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Delete	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Export	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Save file	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Figure4- 65

4.6.4.1.1. Permission setting

Set the user privileges of User1, User2, User3 and User4. If the user wants to have certain privileges, select the function. The blue box indicates that the function has been selected, and the user with the highest authority can set other user's permission.

4.6.4.1.2. Change password

Change the passwords of all users, the password off the highest authority is admin. The original password of other users are user1,user2,user3 and user4.

4.6.4.2. Parameter set

Parameter set management interface displays the current laser systems that already exist in the set of parameters, parameter sets can copy, delete, change, import, export. As shown in Figure4- 66:

5. QUICK REPAIR

5.1. LED lights Description

5.1.1. LED instructions on the control panel

In the laser panel, there are 4 indicating lights, the detail functions as Figure4- 72:

LED	Comment
<p>NetLink</p> 	<p>No bright: server software does not start; Flashes : server software loaded but no client connection; Illuminated continuously: server software has been loaded and a client is connected.</p>
<p>MarkReady</p> 	<p>No bright: Laser machine is not ready; Flashes: Laser machine is ready, can start the marking; Illuminated continuously: Laser machine is marking;</p>
<p>Fail</p> 	<p>No bright: Laser machine normal operation; Flashes: Machine need to be maintained but still marking; Illuminated continuously: Machine fail to work, marking stop;</p>

Figure4- 72

5.1.2. board LEDs instructions

Name	Pin	Status	Instructions
LED1	DSP_STATUS1	Long bright	X
		Flashing	Boot Loader state
		Slake	DSP Program state
LED2	DSP_STATUS2	Long bright	Boot Loader state
		Flashing	DSP Program Busy state (the busier ,the faster flashing frequency)
		Slake	X
LED3	List_STATUS	Long bright	List Buffer execution (Boot Loader)
		Flashing	X
		Slake	Wait to start List
LED4	Laser_Command	Long bright	Laser On Command
		Flashing	X
		Slake	Laser Off Command
LED5	PGM_RDY	Long bright	Marking the end
		Flashing	X
		Slake	Marking

LED6	MARK_RDY	Long bright	Marking
		Flashing	X
		Slake	Marking the end
LED7	nSTOP	Long bright	nSTOP is low, the controller is in the emergency stop state
		Flashing	X
		Slake	nSTOP is high, the controller is in a normal operating state
LED8	PRINT_GO_A	Long bright	PRINT_GO_A is low level, the corresponding input optocoupler Close
		Flashing	X
		Slake	PRINT_GO_A is high, the corresponding input optocoupler open
LED9	PRINT_GO_B	Long bright	PRINT_GO_B is low level, the corresponding input optocoupler Close
		Flashing	X
		Slake	PRINT_GO_B is high, the corresponding input optocoupler open
LED10	Laser_ON	Long bright	Controller instructs the laser is turned on
		Flashing	X
		Slake	Controller instructs the laser is off
D5	DSP_INT	Long bright	DSP interrupt
		Flashing	X
		Slake	DSP interrupt stop
LINK	NET1_LINK	Long bright	NET1 link connection has been established
		Flashing	NET1 link connection has been established and there is network activity on the port
		Slake	NET1 link connection is no established
SPEED	NET1_SPEED	Long bright	Indicates that the port is operating at 100Mb / S speed.
		Flashing	X
		Slake	Indicates that the port is operating at 100Mb / S speed.
ED2	NET2_FDX	Long bright	Show NET2 links are running in full-duplex mode
		Flashing	X
		Slake	Show NET2 link is running in half-duplex mode
USB1	USB_LED1	Long bright	USB1 port is not properly enabled

		Flashing	X
		Slake	USB1 Port normally enabled
USB2	USB_LED2	Long bright	USB2 port is not properly enabled
		Flashing	X
		Slake	USB2 Port normally enabled

5.2. Software Repair

In order to give a quick response for wrong questions caused by some reason, the system provides a rapid repair method. There is a dial switch in the control board and Smartpad board , as Figure4- 73, When the system software, some fault occurs when maintenance is required, insert the SD card to the corresponding control board and Smartpad board, through the following set of dial switch, and re electric to start the system, can quickly restore system software.

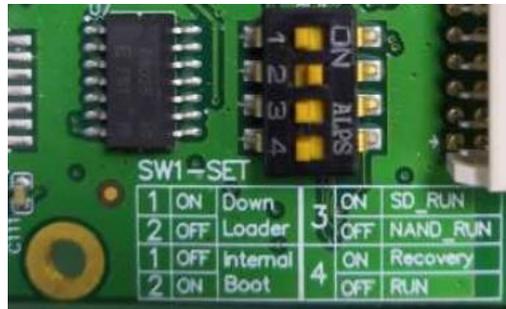


Figure4- 73

1	2	Photo	Function	Comment
ON	ON/ OFF		Start system through NAND	This mode should be used under the normal work condition.
OFF	ON		Forced forma NAND Recovery system from SD card	When the NAND system can not be normal used, recovery system using this model, In the case of power failure, set to this model and check whether the SD card inserted, and then give the macine electricity. Since then, the honeybee has reverberated two times. After a period of time, the honeybee will ring three times, indicating that the system has recovered successfully.

OFF	OFF		Start system through SD card	When the system can't be started from NAND, and can't be restored from SD card , then can use this mode into the system temporarily.
-----	-----	---	------------------------------	--



NOTICE: The system provides a power down data protection, every time after power failure, the re-electrify is not allowed until all of the LED light put out, then one complete operation finished.

6. Common Faults & alarms and solutions

TIPS:

Mentioned failure may occur in the instruction manual of this section, their causes and troubleshooting measures. It also describes the measures all signals and warnings and to avoid failures laser system. Measures mentioned here can be implemented by technical guidance received operating and maintenance personnel.

CAUTION: Where the fault mentioned herein may only be excluded from full-time staff specially trained to implement! Be sure to pay attention to observe the safety tips!

6.1. Common Faults

NO.	Faults	Possible Causes	Measures
1	Laser work interruption. Steady red status lights	There is a failure	Please SmartPad or PC connected to the system and access to a fault signal, then please follow the instructions for troubleshooting.
2	START- Key has been pressed, but no obvious marking action	The selected parameter set does not apply this material	Please select another parameter set
		Laser control section has been damaged	Please contact your dealer
		Lens is contaminated	Clean the lens
		The spacing between the product and the print head is not accurate	Check the working distance, ensure correct spacing
3	Carved line width has been changed (too thick / coarse enough).	F-Theta The working distance between the lens and the products have changed	Please adjust the spacing requirements of work, ensure correct spacing
		Parameter set wrong or incorrect parameter group settings	Open accurate parameter set file or amend the parameters

		Products or product surface material has been changed	Please send parameters and adapted products. If you have questions, please contact your dealer
4	Software operating normally, but can not output laser	Device model setting error	Modify the laser setup interface device model for the current model of the device, the power to restart the device.
		File Error	Create a new file for testing.
		Laser power failure	Laser power supply needs to be replaced, please contact your dealer.
		Laser damage	Laser power supply needs to be replaced, please contact your dealer.
5	After opening the laser power, the status bar displays the laser power is still not open	Laser power cable fault	Check the laser power cable for any obvious faults, please contact your dealer.
		Laser power failure	Laser power supply needs to be replaced, please contact your dealer.
		The control section has been damaged	The controller needs to be replaced, please contact your dealer.
6	Lasers can not always ready	Continuous on / off laser power off fast	Observation of laser power light is flashing back, if flashing, it may be operational problems, when you turn off the laser power, and immediately open it, there will be a certain probability lead to abnormal lasers, lasers can not be enabled at this time ready at this time to turn off the laser power, wait a few seconds, you can normally open again.
		Laser power anomalies	Output voltage detection laser power is normal, please contact your dealer.
		Laser failure	Need to replace the laser, please contact your dealer.
		Debounce settings CheckLaserReady value is too small	Observation of laser lights is lit RDY back, if lit, then the laser is ready, but the software ready signal is not detected, first to check whether the value of CheckLaserReady software debounce setting is 3 or more, if it is not, then set it to 3 or more.
		Loose cable connections	please contact your dealer.
		Control board is damaged	The controller needs to be replaced, please contact your dealer.
6	SmartPad boot progress bar can not start after 2%	System software corruption	Using an SD card reprogram SmartPad software system, if it can not resolve the problem, contact your dealer.

7	Control board constantly reboot	Controller PSU power failure	please contact your dealer.
		Encrypted information is lost	please contact your dealer.
8	SmartPad boot progress bar can not start after more than 90%	Software information is lost	Test again after use U disk update software. If you can not resolve the problem, contact your dealer.
9	SmartPad after boot always stay in "Connecting the controller" interface	SmartPad IP address of the controller is set incorrectly	Check the IP address of the controller SmartPad is set correctly, if not properly set the SmartPad the controller's IP address set to the current IP address of the controller, and restart the device.
		SmartPad connection cable fault with the controller	Check the SmartPad controller connection cable is loose or damaged.
		System software failure	Using an SD card repair SmartPad and controller software, please contact your dealer.
10	When turned on, the buzzer always tweet	Start setting error	If the SD card is set to start, but did not insert the SD card, the buzzer will always tweet.
11	Start time is too long and is accompanied by the sound of the buzzer several times	SD card is not compatible	Replace the SD card, please contact your dealer.
12	Marking only stay in that position, you can not marking other content	Device model setting error	Detection software setup device model is the current device models.
		Marking file error	Create a new marking file, using the default parameters for static marking marking, to see if normal.
		Controller power supply failure	please contact your dealer.
		Printhead connection cable fault	Check the printhead connection cable for any obvious loose. If you can not resolve the problem, contact your dealer.

6.2. System status information

Alarm Code	Alarm content	May result	Initiation factor	Solutions
W205	Controller temperature is too low	The system does not work properly and can not be marking	Equipment operating ambient temperature is too low	Ensure that the equipment operating within the specified operating temperature range 5 ~ 40 °C
W206	Controller temperature is too high	The system does not work properly and can not be marking	Controller temperature Overheating	Check the controller fan is working, whether the filter is clogged, replace if necessary controller cooling fans and filters
E311	Laser source temperature abnormal	Laser does not work properly and can not be marking	Ambient temperature is too low or the laser cooling system abnormalities, laser operating temperature range (5-40 °C)	Ensure that the equipment operating within the specified operating temperature range 5 ~ 40 °C. When the temperature is too high, check the laser cooling device, the cooling device when no fault is determined, it can be increased to enhance cooling by increasing the heat transfer coefficient Steps: Setting→ the laser tube →heat transfer coefficient, range: 0.7-1
			Detect anomalies caused by the interference signal	Increases CheckTempwarn (N) values.Steps : Setting→System maintain→Debounce settings→CheckTempwarn (N)
W207	Laser temperature is too low	Laser does not work properly, stop marking	Equipment operating ambient temperature is too low	Ensure that the equipment operating within the specified operating temperature range 5 ~ 40 °C
W208	Laser temperature is too high	Laser does not work properly, stop marking	Equipment operating ambient temperature is too high or cooling not enough	Ensure that the equipment operating within the specified operating temperature range 5 ~ 40 °C, meantime check the cooling device
E304	Laser source voltage abnormal	the laser does not work properly, stop	Laser power supply damaged or voltage is set incorrectly	Check the laser power supply voltage, as the case may be adjusted CO2: 10W(30V)/30W(48V)/60W(48V),

		marking, would have to wait the failure recovery before marking		Fiber: 10W/20W/30W/50W/75W (24V), Or replace the power supply.
			Detect anomalies caused by the interference signal	Increase CheckVoltageOK (N) Value. Steps: Setting→System maintain→Debounce setting →CheckVoltageOK (N)
E312	Laser source reflect alarm	Laser does not work properly, stop marking	Highly reflective laser happen	Check the laser transmission fiber if is excessive bending
E313	Laser source MO abnormal	Laser does not work properly, stop marking	Laser MO failure	Check if the laser is operating properly
E314	Laser TEMP_ERR	Laser does not work properly, stop marking	Laser TEMP failure	fiber machine TEMP abnormal
W201	Air system failure requires maintenance	Airflow insufficient cooling controller and laser	External air cooling system is not used	Cancel detected air cooling system. Steps: Setting→laser→external air cooling system→NO
			Air system failure	Check the air cooling system is properly connected and air system operating conditions
W202	Cooling system error, need maintenance	causes the controller and lasers too high temperature	External cooling system is not used	Cancel detected air cooling system. Steps: Setting→laser→external cooling system→NO
			Cooling system failure	Check the air cooling system is properly connected and cooling machine operating conditions
W203	Smoking system can not function properly	Marking smoke can not be cleaned	Unused smoke smoking system	Cancel smoke detection system. Steps: Setting→Laser→Smoking system→NO
			Smoking system failure	Check the smoking system is properly connected and smoking system operating conditions
W204	Smoking system	Marking smoke can	Smoking system filter is	Replace the smoking system filter

	filter failure requires maintenance	not be cleaned	clogged	
W209	Products moving too fast, marking not completely carried out	Not completely finish marking	Some marking can not be completed, this situation usually occurs when you move too fast but the product marking not fast enough. At this point the control system can not be properly compensated print.	<p>1:Optimization parameters, so that the marking can be implemented faster.</p> <p>2:Narrow marking object, so that it can be implemented faster.</p> <p>3:On the other speed-optimized set of characters.</p> <p>4:If possible, choose a larger lens marking area</p>
W210	Trigger pulse missing, missing product labeling	The product lead to a trigger pulse can not be marked	Burst overflow, then you must cancel a new trigger pulse. This means that to reach the trigger pulse faster than its treatment. There is a trigger pulse phenomenon called buffer that trigger arrangement available, if it has been filled, but there have also been new trigger pulse arrives, it will send an alarm signal.	<p>1:Due to the trigger pulse phenomenon arrive faster than it is processed , so you must shorten marking time.</p> <p>2:If the marking time can not be shortened, it is necessary to reduce traffic.</p> <p>3:If there are usually too many trigger pulse arrives phenomenon excluded, it should be understood as a trigger pulse is wrong. If sustained, such as marking time 50 ms, and determined that only has a new product in every 100 ms, the blockade is usually at least 90% between the two trigger phenomenon of time, in this case is 90 ms.</p>
W212	No files found	Marking file open failed	Marking files may be deleted	Re-create the file
W213	Marking file format error	Marking file open failed	The system does not support the version of the file marking	Re-create the file

W216	Marking file load errors.	Marking file open failed	File is damaged	Re-create the file
W222	Marking file version too high.	Marking file open failed	Marking system version used is too low resulting in marking this file can not be loaded	Re-create the file
E330	Object is incomplete, missing external reference	Object incomplete	Object reference external resources currently unavailable, or some of the resources is missing	If the font of the text object reference is not in the system or the current font library lack of current some fonts usually occurs in this case. Please re-installation information complete font or change the font to use.
E317	The encoder direction wrong		If the information is triggered in the continuous mode to print marking, and the encoder was rotating in the wrong direction, this error occurs	Set encoder direction, you can set the ratio value direction of the encoder through the user interface to correct this error, when criterion encoder direction standard, the main interface line speed is positive.
E327	File path is invalid	Failed to load file	Since the path is invalid, can not find an application or information referenced file	Check the file if is in the correct position
E328	Invalid text format detailed instructions	Object incomplete	Text format text links pointing unrecognized or error	Check that the text link to the text of damaged or malformed
E329	The file is too large to be loaded	Failed to load file	By application or information referenced file is too large to be acceptable	Reduce file size
E331	Unable marking empty information	Unable marking	System configuration information does not accept empty marking, but loaded	Please use the information contains data ,put into objects in the current message.

			with an empty message	
E318	Object beyond Max.marking area	Unable marking	The object located outside of the described marking area of the printhead largest marking range.	1:Narrow marking object 2:Drag the object to the marking the range 2:Select a large focal length (large marking range) of the lens
E319	Preview failed: Empty Information	Unable preview	System configuration does not accept empty message preview, but loaded with a blank message	Please use the information contains data ,put into objects in the current message.
E320	Preview failed:Object beyond Max.marking area	Unable preview	The object located outside of the described marking area, unable to preview	1:Narrow marking object 2:Drag the preview object to the marking the range 3:Select a large focal length (large marking range) of the lens
E321	Marking parameter is invalid	Unable marking	The current project uses the value of the parameter set is invalid	Be sure to select the correct object marking for all parameters
E322	Open the file failed	Unable to open file	File system is damaged or system does not support the file type	Deleted files can not be opened, re-edit a new file after
E323	File storage failed	Files can not be stored	Memory is full	Check the memory capacity, delete expired files and log information to reduce the current store files, such as memory capacity is not full, please contact the EC-JET。
E324	Preview is being executed, the command fails	The current command can not be executed	The current command can not be executed during the execution Preview	First stop the preview, let the system be in standby mode
E325	Testing is being	The current	The current command can not	First stop the testing, let the system be in standby mode

	executed, the command fails	command can not be executed	be executed during the execution testing	
E301	External interlock is open	Lasers can not be opened, not marking	External interlock switch is open	Ensure interlock switch is connected properly and is in a closed state
E305	Laser beam power off	Lasers can not be opened, not marking	Laser power is not turned on	Turn on the laser power through the key switch
E306	Laser source not ready	Laser is not ready, not marking	Laser unopened	Open the laser through the key switch or software interface
E335	Beyond BUFFER capacity, marking fail	Marking failure	Marking too much content	
E336	Software stop marking		Software commands triggered stop marking	
E337	Stop signal to cancel the marking		Stop Signal triggered stop marking	
E338	DSP is busy		DSP is working	
E339	Marking number is limited	Marking failure	the number of marking times over the marking system set maximum number	
E340	Wait suspend action		Pause action has not yet ended	
W211	SmartPad and controller software version does not match.	May cause the software does not work	User interface software version problems	Update the user interface software version
E308	DSP connection		System failure	Please contact the dealer

	errors			
E309	Encrypted information is lost		System failure	Please contact the dealer
E310	System file corruption		System failure	1、 Need the new software 2、 The above operations are still unable to resolve the problem, please call the application service
E315	Turn on the power fails, check the power key is turned on	Laser is not ready	Key switch is not turned on	Turn on the key switch
E302	Power off, please stop marking		Power off	
E303	Power supply voltage is too low			
E316	The batch has been completed	stop marking	Batch size counter has reached the specified value	
E326	Data capture error	stop marking	Variable acquisition failure	
E332	System initialization failed	The system does not work properly	Internal error	
E333	DSP connection initialization failed	The system does not work properly	Internal error	
E334	Open laser system failed	The system does not work properly	Internal error	
501	Enabling laser	System instructions	Laser control is turned on and is waiting for the laser ready	waiting for the laser ready
502	Laser turned out	Laser is not ready,	Laser startup time than	Check that the controller is connected with the laser, the problem can

		not marking	expected	not be resolved, contact your dealer
503	System Standby	The system is in standby mode	Laser is ready, not yet start marking by turning the key switch or remote	Through the key switch or remote start input or "Start" button on the user interface to make the system into the marking state
401	Alarm: Network abnormal, controller disconnect!	System failure	Loose connection interface or software corruption	1.Disconnect the power and restart the device 2.Such as restarting laser machine still can not connect, you need to update your software 3.The above operations are still unable to resolve the problem, please call the application service
E307	Application software and system version does not match		The controller is not compatible with the user interface software version	Update controller or user interface software
101	marking ...		System has entered a marking state	
103	Static repeat marking...			
104	Static marking from external control ...			
105	Waiting for a trigger external control signal...			

Other system information code: such as the following code.Impact machines use.Please contact the company

S214 S215 S217 S218 S219 S220 S221 S223 S224 S225 S226 S231 S232 S233 S235 S236 S237 S238
S341 S342 S343 S344 S345 S346

7. Maintenance and Cleaning

7.1. Maintenance Tips

The laser system maintenance work just takes a short time. Please carry out maintenance work on time in accordance with the provisions of the maintenance cycle.

The design of the laser system makes you can complete all the due maintenance work safely and successfully.

Note that all maintenance work is allowed only guided by the highly technical operation and maintenance personnel!

All maintenance work can only be carried out after pulling out the key switch and a power plug!

Before cleaning the laser system and peripheral equipment, must disconnect the power supply.

Please record your regularly maintenance work in the Maintenance Record in this chapter! If you do not comply with the provisions of the maintenance plan, Guangzhou EC-PACK Packaging Equipment Co., Ltd reserves the right to limit guarantee!

7.2. Maintenance Plan

Maintenance cycle setting is according to the laser system work about 10 hours every day and work environmental moderate pollution.

If you use every day of the time beyond the limit, or work environment of high pollution, then we must shorten the maintenance period. If have questions for these, please contact EC-PACK or its distributor.

In the following sections ,there are detail description for maintenance work

Maintenance Cycle	Measures
Every month	Please check the focus lens in the marking head whether it is polluted, if polluted, please clean the lens.
Every month or the Monitoring light on	If has the exhauster device: please change the filter bag.
Every three months (In the serious pollution should be regularly)	Please perform a visual inspection for the laser system
Every half year	If has the exhauster device: please change the carbon filter

TIPS: We can provide the targeted training for the maintenance and operational staff. If have questions, please contact EC-PCAK or its distributor.

7.3. cleaning focusing mirror

Focusing mirror in the print head, it will because of dust or particulates in the air and contamination, such contamination can damage the focusing mirror, and marking an adverse effect, it must be cleaned periodically focusing mirror.

Under normal circumstances only need to wipe the focusing mirror outward side, please also check the print head toward the side of the focusing mirror is clean, if necessary, cleaned.

Warning

Focusing mirror from zinc selenide coating composition, this material has ingredients harmful to human health.

Please be sure to wear latex gloves to clean the focusing lens! If you touch the focusing mirror too, then you must immediately with sufficient water and soap to wash your hands. Please avoid focusing mirror scratched the surface! Do not breathe dust material! In case of focusing mirror broken, please focusing mirror fragments packed in a sealed plastic bag and send it to us deal with.

Notice

All optical components are high-precision and high demand processed through parts! Minor damage to the lens surface may cause (from a long-term perspective) part destruction, or marking of poor quality, so the surface can stick in the stain removal with optical cleaning paper and acetone. Please be careful not to fall into the printhead dirt!

When focusing lens cleaning needs:

- optical cleaning paper
- Acetone
- Protective gloves

Tips

Carrying out all the work should wear protective gloves!

7.3.1. Removing focusing mirror

Warning

Before you start working laser system must be powered off.

1. Please put the key switch to the "0" position. Remove the key to ensure that the laser system is no longer open.
2. Press the emergency stop button switch.
3. Unplug the power cord.

Focusing mirror in a bayonet holder, you first need to snap connector from the print head spin out. The use of special tools and then snap connectors focusing mirror removed.

7.3.2. Cleaning focusing mirror

For infrared optics installed, if you want to conduct a comprehensive clean its surface, tuft swabs should be used instead of tampons. Be careful not to apply pressure when using a cotton swab. Production methods tuft swab is to put a not used cotton swab placed on the external particles do not contain foam, then longitudinal friction.

When handling infrared optics in extreme caution. Please note the following precautions:



- 1. In dealing with optics, you should always wear powder-free finger cots or rubber / latex gloves. Dirt and traces of oil on the skin will seriously contaminate optical components, making it a significant decline in performance.
- 2. Do not use any tools to manipulate optical components, including tweezers.
- 3. For protection purposes, should always be placed in the swab mirror optics paper provides.
- 4. Do not place the optical element is placed in a hard or rough surfaces. Infrared optics can easily be scratched.
- 5. All materials used for the production of infrared optics are fragile, whether they are monocrystalline or polycrystalline, whether large or small grains. Their strength is inferior to the glass, can not afford those operations often used for the glass optical element.

Because when you will encounter a variety of problems when clean the installed optical element, it is recommended that you only use the cleaning procedures described here on the optical element is not installed.

Step 1: against light pollution (dust, fiber particles) were flexible cleaning

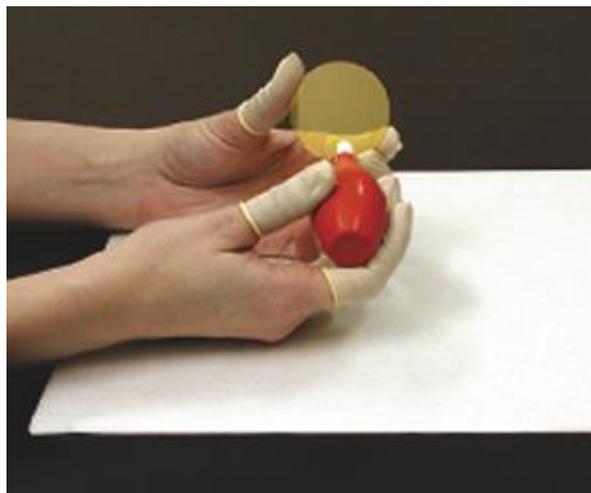


Figure 7-1 focus mirror dust cleaning

Before you continue following the cleaning step, the first blow off the surface pollutants with an inflatable balloon ,as shown in figure 8-1.If this step does not remove the contamination, proceed to Step 2.

Notice:

Avoid the use of air ducts in the workshop, because they typically contain a large amount of oil and water. These contaminants harmful absorption layer is formed on the surface of the optical element.

Step 2: For slight contamination (dirt, fingerprints) of flexible cleaning

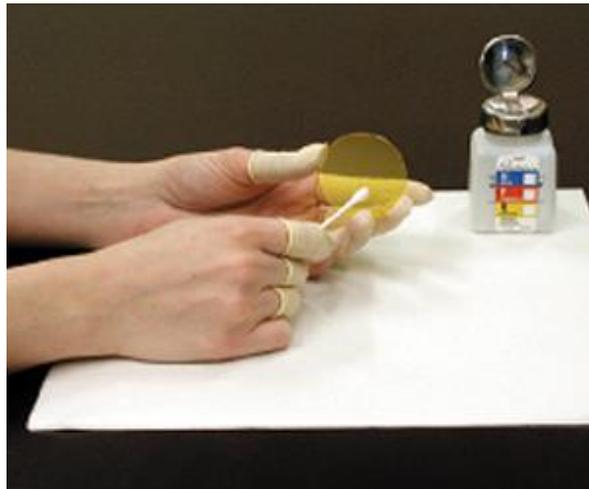


Figure 7-2 focus mirror light pollution cleaning

Infiltration with acetone or isopropyl alcohol a cotton swab or unused. Gently wipe the surface of the optical element with a wet cotton, as shown in 8-2 . Do not rub. Drag on the wet cotton surface drag speed control, so that the liquid leaving behind just the wet cotton evaporate immediately. So will not leave streaks. If this step does not remove the contamination, proceed to Step3.

Notice:

Use only plain paper sign pole body swabs, and high-quality medical cotton. Recommend the use of reagent grade acetone and isopropyl alcohol.

Step 2 (Alternate Method) "drag Law": be flexible cleaning against light pollution

The lens paper on the surface of the optical element. Use a dropper, squeeze a few drops of acetone wipe the mirror drops in the paper, wetting the entire diameter of the optical elements. Do not pick up the lens paper, lens paper should drag on the optical element and control the speed, so that leaves behind a liquid lens paper just to evaporate immediately. So will not leave streaks. If this step does not remove the contamination, proceed to Step 3

Notice:

Use only lens paper optics cleaning tool provided in the kit, or other high-quality lens paper. Recommend the use of reagent grade acetone.

Step 3: for moderate contamination (saliva, oil) clean



Figure 7-3 focus mirror moderate pollution cleaning

Infiltration of distilled white vinegar with an unused swab or cotton ball. Rubbing with light pressure to wipe the surface of the optical element with a wet cotton. Dry with a clean cotton swab to wipe the excess on the optical element distilled vinegar. Then use a cotton swab or cotton ball with acetone infiltration gently wipe the surface of the optical element, remove all the acetic acid. If this step does not remove contaminants, proceed to Step 4.

Notice: Use only plain paper sign pole body swab .. Use only pick up the election, without any grinding of high-quality medical cotton material. You should use distilled white vinegar containing 6% acetic acid ingredient.

Step 4 - A serious contamination (splatter) optical elements strong cleaning

Warning:

Step 4 must not be used for new or unused laser optics.

By using only the optical element is heavily polluted, and in steps 2 or 3 after cleaning effect failed to achieve an acceptable situation to use this procedure. If in addition to film coating, the performance of the optical elements will be completely destroyed. If the color of the optical element change significantly, indicating that the film coating has been removed. Severely polluted and dirty optics, you may need to use an optical polishing compound to remove the contaminated layer has an absorption effect. Before opening the container filled with polishing agent, should be fully shake the container. Four or five drops of pouring a polishing agent, which was dropped on the cotton ball. In the optical element surface needs to be cleaned in order to draw a circle Gently move the cotton ball. Do not press a cotton ball! Cotton should use its own weight and drag on the surface gently. If too much pressure is applied, polishes will soon cause scratches on the surface of the optical element. Please continue rotating optical elements, so as not to be over-polish certain direction. Clean the optical components used in time should not be more than 30 seconds. If this step, you find that the color of the surface of the optical element changes, should immediately stop polishing. Color change, indicating that the outer film coating is corrosion.



Figure 7-4focus mirror serious pollution cleaning

Tips

If by the method described above can not remove the stain or scratch the surface of the focusing mirror too deep: Replace a new focusing mirror.

7.3.3. Installing focusing mirror

1. The focusing lens is mounted is connected through a dedicated tool holder
2. The print head mounted on the focusing mirror

7.4. fans and vents

Warning:

Pre-inspection and cleaning work on laser marking system, unplug the main power connector.

Located on both sides of the fan control unit and laser head, fan failure will immediately generate the risk of overheating, which may cause damage to the control unit and the laser head, the fan must be checked once a month.

1. Check the fan is noisy, if noisy , replace this fan.
2. Check the controller's fan filter (left one and right one) clogging and is clean. Replace them if necessary. Without opening the controller, on the outside you can easily complete this action

Tips:

If not using ECL laser inkjet printer, you must power off, key collection is good, the focusing lens protection cap to protect the lens and prolong life. And machine pushed to open ventilated dry place.