

# **GRENTSUN Fly Laser Printing Machine**

## **Operation Manual**

(V5.16.22)

**WUHAN GRENTSUN INDUSTRIAL SYSTEM CO., LTD**

---

# **Part I**

## **User's Guide for the Machinery**

---

Please take time to read and understand this User's Guide and familiarize yourself with the information that we have compiled for you before you use the product. This User's Guide should stay with the product to provide you and all future users and owners of the product with important operating, safety and other information



**Pic1. External View**

## **Notices**

The information contained in this document is subject to change without notice. GRENTSUN Laser believes that the information provided is accurate and reliable, however GRENTSUN makes no warranty of any kind as to the information contained in this document, including without

limitation the implied warranties of merchantability or fitness for a particular purpose. Further, GRENTSUN does not assume responsibility for use of the information contained in this document or for any infringement of patents or other rights of third parties that may result from its use. GRENTSUN shall not be liable for errors contained in this documents or for incidental or consequential damages in connection with the furnishing, performance or use of this material.

GRENTSUN grants no license, directly or indirectly under any patent or other intellectual property rights from use of the information provided herein.

Copyright 2018 GRENTSUN Laser. All rights reserved. You may not reproduce, transmit, store in a retrieval system or adapt this publication, in any form or by any means, without the prior written permission of GRENTSUN, except as allowed under applicable copyright laws.

We have identified words that we consider as trademarks. Neither the presence nor absence of trademark identifications affects the legal status of any trademarks.

---

## **I. Installation & Commissioning:**

### **1. Machine Setup Warning:**

- a. Printer's power supply or electricity socket must be independent & Electricity must be have earth wire.
- b. Printer must be connect earth wire before working.

### **2. Guidelines of Daily Maintenance:**

Prohibit touching or knocking against the workbench when the machine is working.

The laser and the Optical Lenses are fragile, and need to be very careful and escape shocking when moving.

You must stop the machine when anything wrong with it, and ask the professionals to deal with.

Please notice the way of turning on and off the machine.

Keep the workshop and machine surface clean.

### **3. Working Environment:**

Temperature: 5-40°C; Relative Humidity: 30 ~ 80% (non-condensing)

Ventilation device is required, no strong shocking and hot body around. And workshop needs to be clean.

### **4. Details of Maintenance The Whole Printer:**

Keep the workbench clean. and regular remove dust on machine body, fans & electronic part

Wipe the transmitting mirror with carton fabric and alcohol regularly.

Lock the machine cabinet well, in case some metal drop into it to damage the circuit.

The scanning workbench is precise instrument, and the working environment must be clean.

Don't be close to the laser when it working. If anything wrong, please ask the professionals to deal with.

If the laser decay and weaken, please turn off the machine first, then re-plugged the USB line between the PC and control card testing.

### **5. Normal Fault Checking:**

**a. If the workbench doesn't move, please check the following in sequence:**

If the power supply is in good connection; If the power line is in good connection

**b. If there is no laser output from the laser, please check the following in sequence:**

If the power supply is in good connection; If the power of the software is too low (the best in 50%---90%)

If the optical system was broken; Re-plugged the USB line between the PC and control card

**c. There is laser outputting, but shallowly carving even the power is normal, please check:**

Check the focal length

If the optical system skewing

If any dirt on the transmitting mirror surface

Re-plugged the USB line between the PC and control card

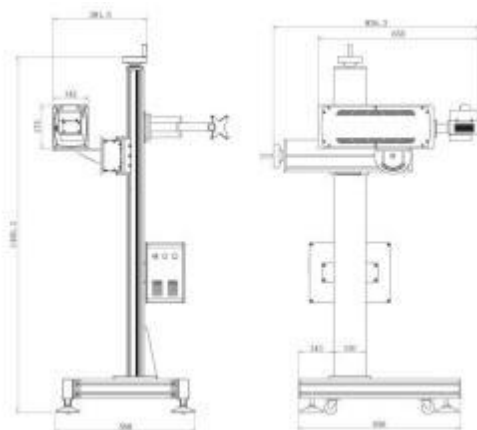
**d. If the carving lines are out-off-straight, please check:**

If the marking head loosening

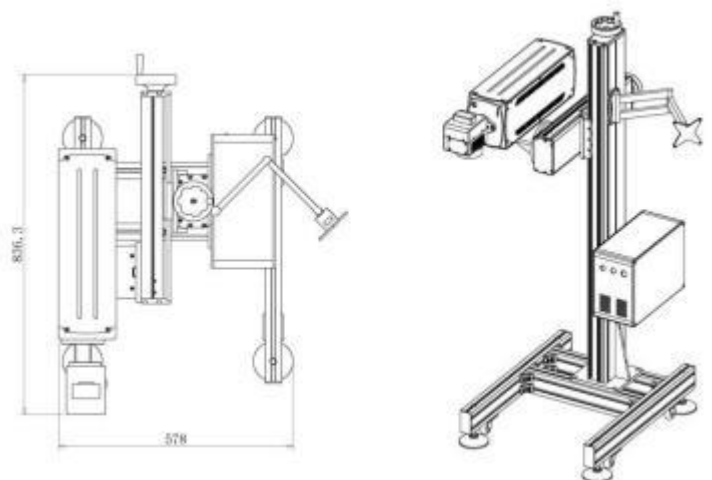
If the machine doesn't connect the earth wire

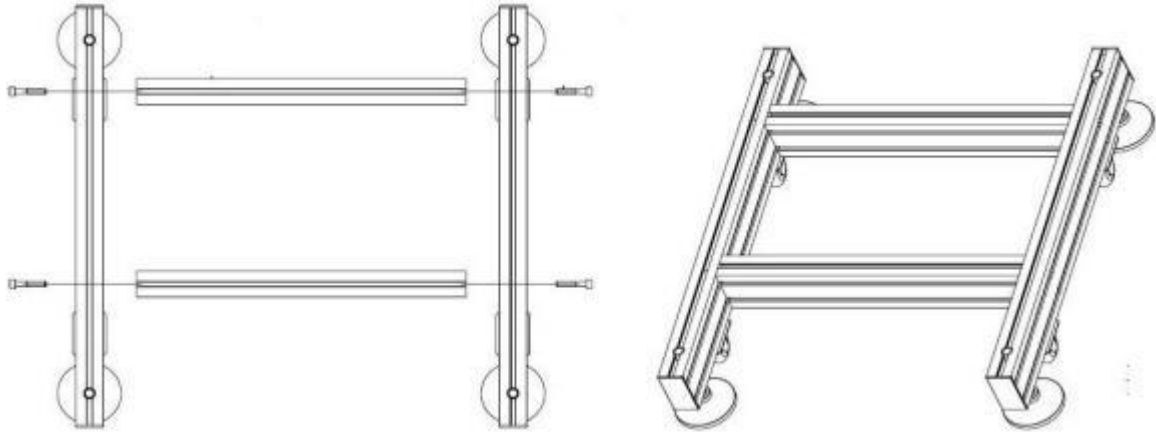
If there is any external electromagnetic interference

**Pic2. Internal installation**



**Pic3. External installation**





**Pic4. Base Installation**

1.Laser Device. 2.Laser Power Station 3. Air Fans. 4. Galvanometer Power Station. 5. Mother Board. 6.Color Touch Screen

## **II. Safety Instruction:**



The GRENTSUN Laser Model G S L Series is a Class IV laser product.

This laser emits about 20/30 Watts of invisible laser radiation in the optical band near 1064 um.

Avoid eye or skin exposure to direct or scattered radiation emitted from the optical output.

Do not open the device. There are no user serviceable parts, equipment or assemblies associated with this product. All service and maintenance will be performed only at the factory.



## **Safety Conventions**

We use various words and symbols that are designed to call your attention to hazards or important information. These include:

### **WARNING**

Refers to a potential personal hazard. It requires a procedure that, if not correctly followed, may result in bodily harm to you and/or others. Do not proceed beyond the WARNING sign until you completely understand and meet the required conditions.

---

## CAUTION

Refers to a potential product hazard. It requires a procedure that, if not correctly followed, may result in damage or destruction to the product or components. Do not proceed beyond the CAUTION sign until you completely understand and meet the required conditions.

## IMPORTANT

Refers to any information regarding the operation of the product. Please do not overlook this information.



This symbol indicates laser radiation. We place this symbol on products which have a laser output.

## General Safety Instructions

In order to ensure the safe operation and optimal performance of the product, please follow these warnings and cautions in addition to the other information contained elsewhere in this document.

**WARNING:** Always use your laser device in conjunction with a properly grounded power source.

**CAUTION:** Before supplying the power to the instrument, make sure that the correct voltage of the DC power source is used (24 VDC). Failure to use the correct voltage could cause damage to the instrument.

**WARNING:** No operator serviceable parts inside. Refer all servicing to qualified GRENTSUN personnel. To prevent electrical shock, do not remove covers. Any tampering with the product will void the warranty.

**WARNING:** This device has an output optical head connected to the laser by a fiber cable. Please, be careful dealing with the output head.

**WARNING:** If this instrument is used in a manner not specified in this document, the protection provided by the instrument may be impaired. This product must be used only in normal conditions.

## Laser Classification

This device is classified as a high power Class IV laser instrument under IEC 60825 [and under 21 CFR 1040. 10]. This product emits light at or around 1060 um wavelength at total power of light

---

radiated out of the optical output up to nearly 20 W. This level of light may cause damage to the eye and skin. Despite the radiation being invisible, the beam may cause irreversible damage to the cornea. Laser safety eyewear is not provided with this instrument, but must be worn at all times while the laser is operational.

**WARNING:** Do not install the collimator when the laser is active.

**WARNING:** NEVER look directly into the output head and make sure that you wear appropriate laser safety glasses at all times while operating the product.

**CAUTION:** Use of controls or adjustments or performance of procedures other than those set forth in this Guide may result in hazardous radiation exposure.



---

# **Part II**

## **User's Guide for Control System**

---

---

# 1. Overview

## 1.1. Software Overview

This version is still in the process of revision and improvement. As a temporary version, this software provides the following functions:

- The software supports user authentication to prevent illegal operations .
- Design the graphics and patterns for marking freely.
- Support all the fiber laser devices, CO<sub>2</sub> and end pumping lasers in the market .  
Adjust the parameters such as current, impulse frequency and duty ratio by software setting according to different types of laser devices .

- 
- Support independent red light indication .
  - The software provides the authorization management to prevent parameters from being modified randomly.
  - Support high-speed fly mark : Applicable to assembly line .
  - Support filling operation: Provide straight and annular filling, allow arbitrary angle filling and cross filing, adjust edge distance, edge frame and space .
  - Provide variable text function: Fixed text, serial number, date, time, network communication, serial communication, etc .
  - Support 16-layer marking parameters: Customize parameters of each layer optionally to realize multi-parameter mark easily.
  - Text input function: Support single line, double lines, dot matrix, True Type font, and different settings of Chinese and English fonts .
  - Marking of dynamic file: During text and picture processing, file name is unchanged, but file content changes .
  
  - Powerful editing functions: Array, mirror, copy, alignment, cancel/redo, etc .
  
  - Simulation function: Preview mark track of graphs before marking .
  
  - Secondary development : SDK library supports user for custom-made development, expands the functions of the existing mark system and meets special application need, etc .

## **1 . 2 . Description of the Manual**

- When actual operation mode and function setting are inconsistent with this User' s Manual because of software upgrading, the software shall prevail .
  
- Other products and company name in this User 's Manual may be the trademark of relevant owners respectively.

---

### **1 . 3 . Software Installation and Use Instructions**

- The software is green software, so it can run after decompression .
- It is required to install the board driver.

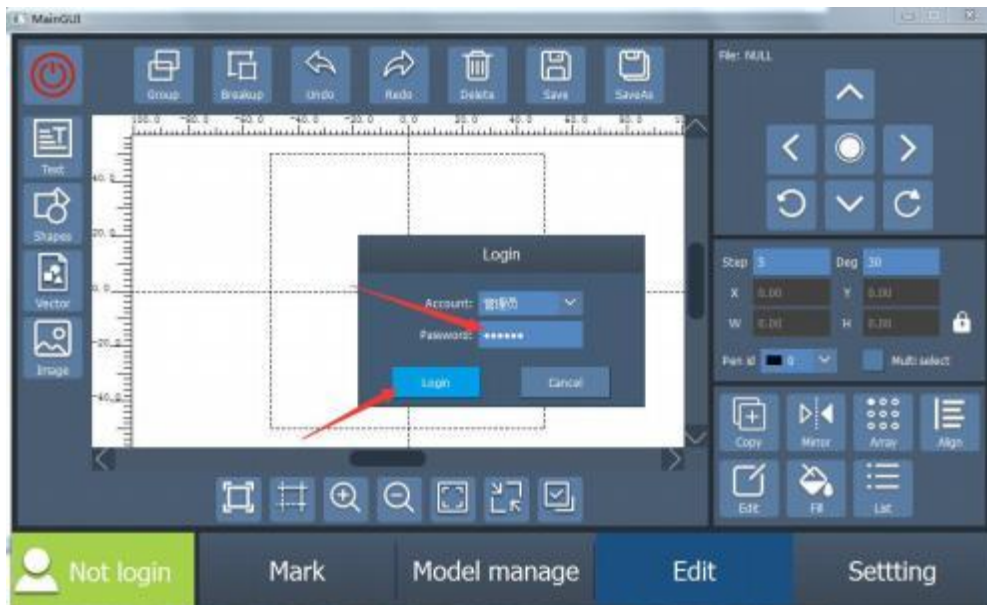
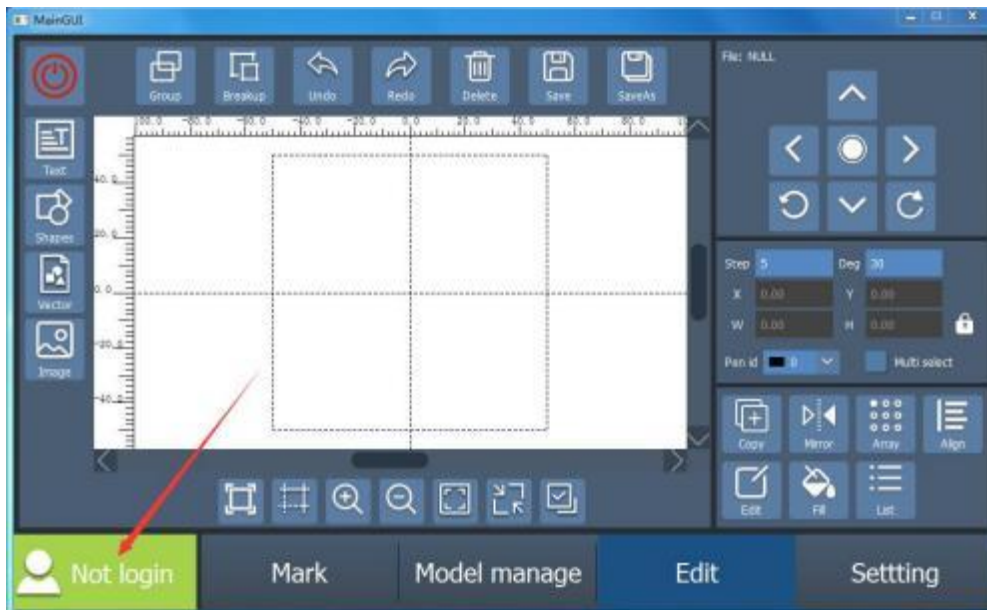


## 2. Quick Start

Here is an example about generating a fixed text template file with the production date and the batch number.

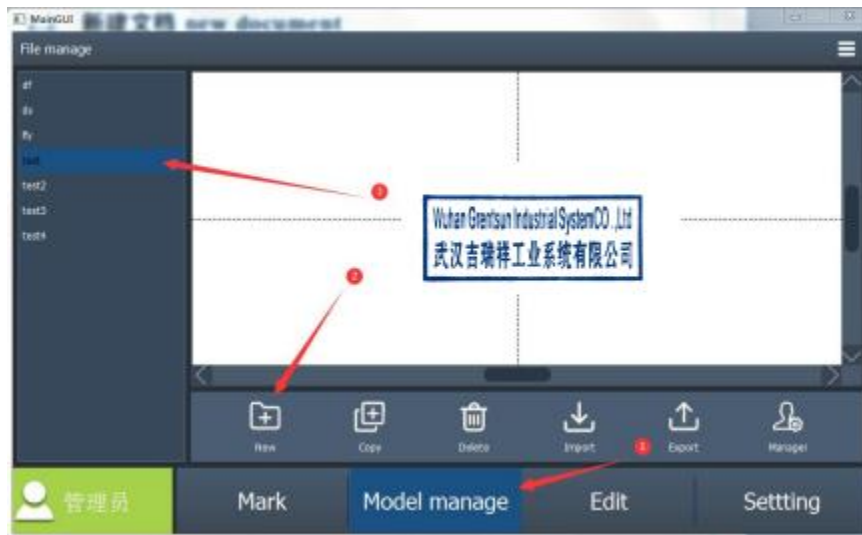
### 2.1 login

After opening the software, firstly confirm whether the connection icon in the upper right corner is green . If it is red, please check whether the board is connected . Then log in (the default password of the administrator is 111111) .  
Note: You cannot perform any operations if you log out .



## 2.2 new document

Click to switch to the file interface and create a new file . ( After the template file is created, it will be automatically saved in the template file, as long as you switch to the file interface . )

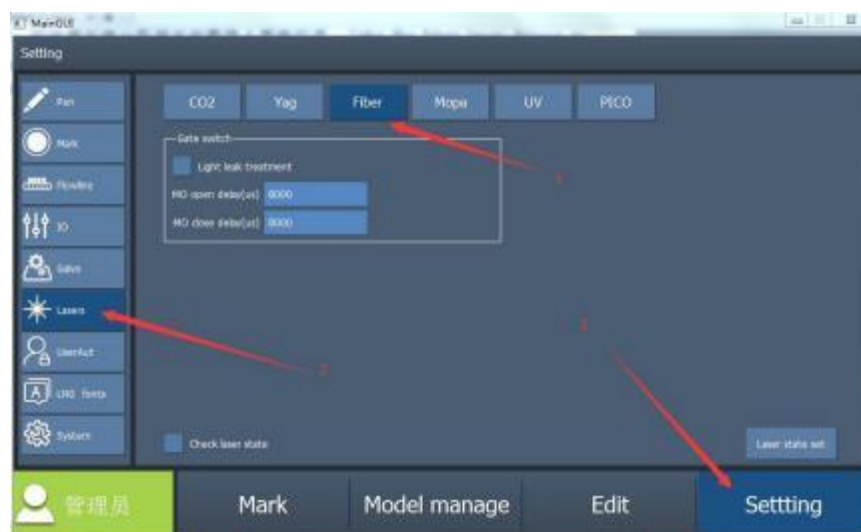


## 2 . 3 Set parameters

Switch to parameters, set laser parameters, regional parameters, pen list, marking parameters and assembly line, respectively

### 2.3 . 1 Set l aser paramet ers

Take the fiber laser device as an example, after selecting the optical fiber, test to check whether the laser device emits light normally with the laser. If the light does not leak, there is no need to tick the box of light leakage .

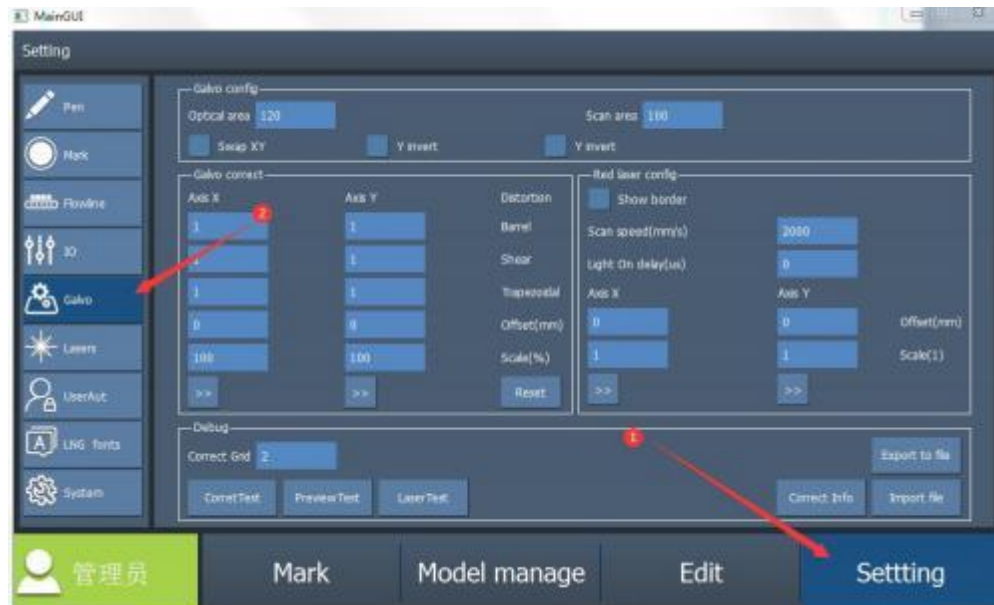


### 2.3 .2 Set regi onal paramet ers

Set the format and work area according to the actual situation of the field lens (the work area should be smaller than the format) . Adjust the XY exchange, X

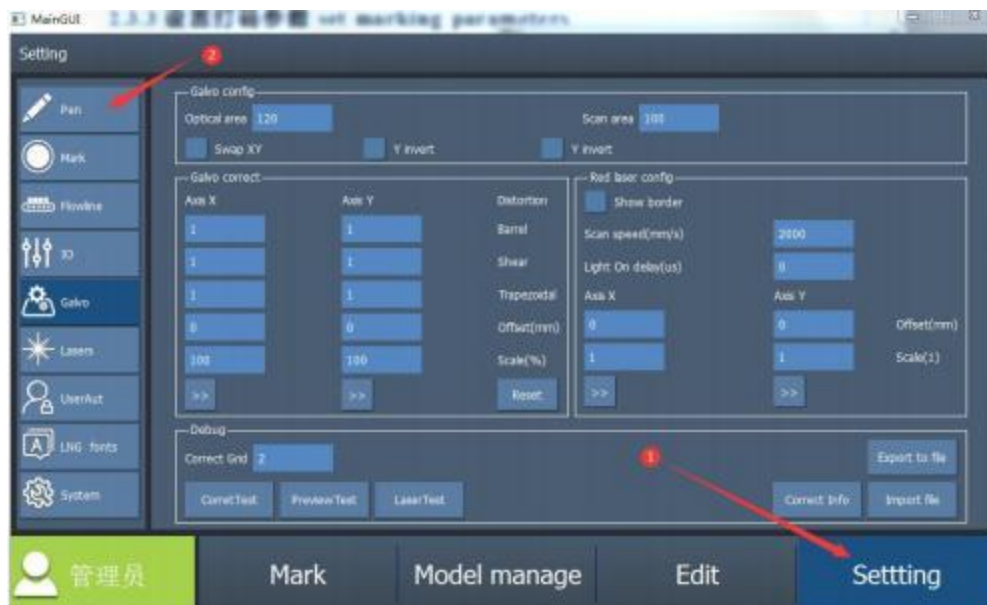


reverse and Y reverse according to the actual marking effect . Adjust the parameters of the galvanometer calibration according to the calibration marking effect . Adjust the parameters of red light calibration according to the effect of the red light indication .



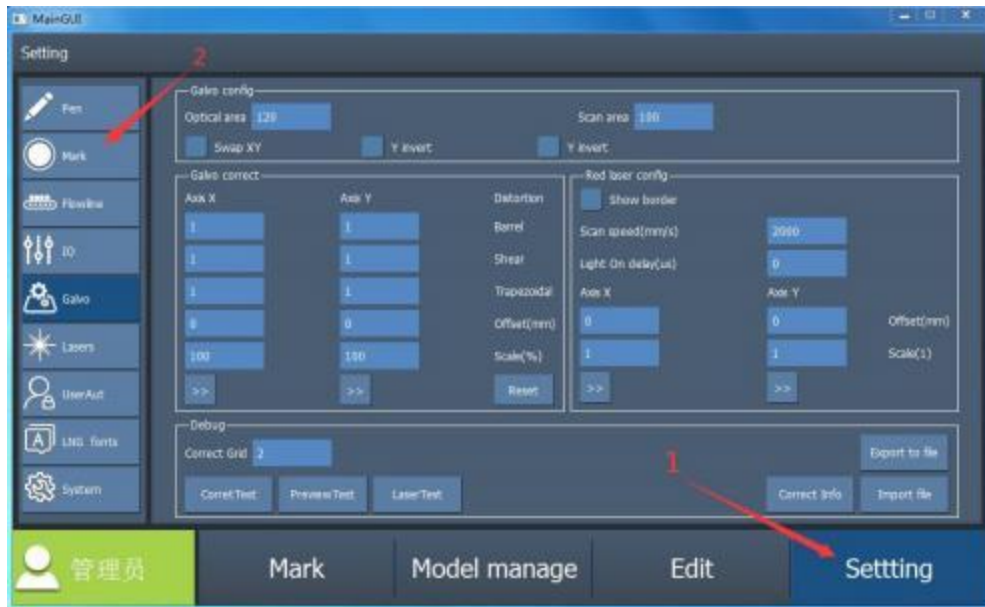
### 2.3 .3 Set marking paramet ers

Adjust marking parameters appropriately according to the marking content .



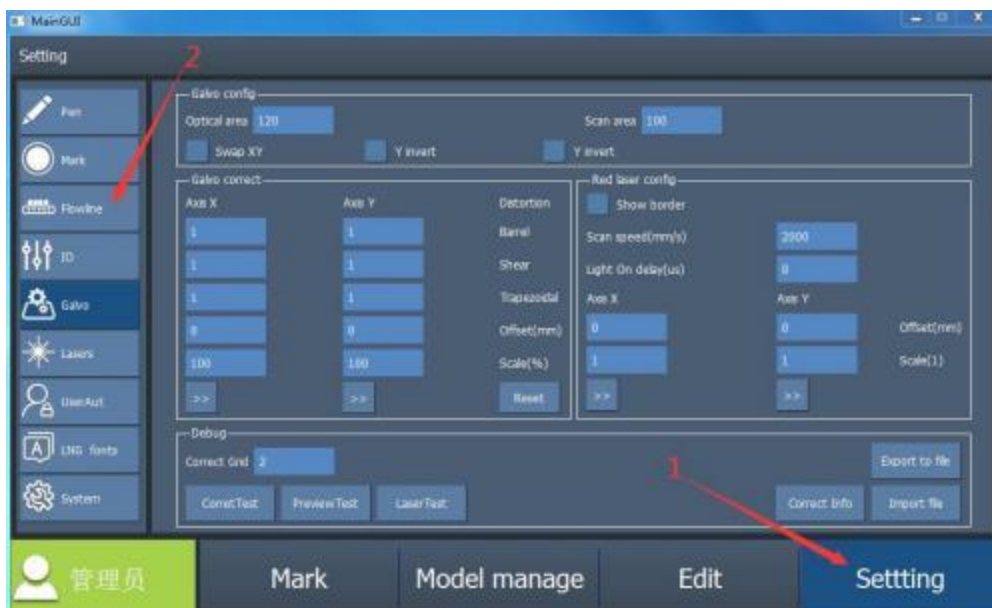
### 2.3 .4 Set marking parameters

When adjusting the effect, set the parameters as shown below. After the effect is adjusted, adjust the trigger mode, trigger delay, minimum interval and starting point according to actual fly marking .



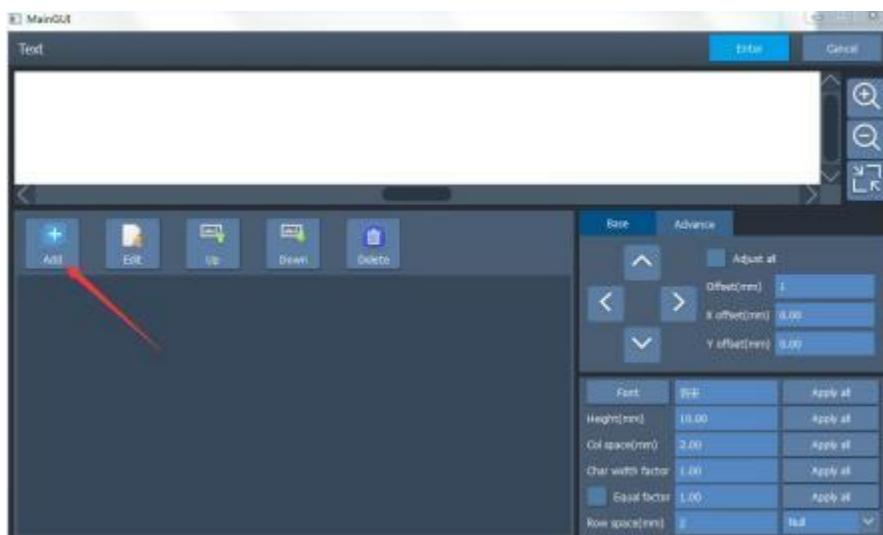
### 2.3 .5 Set the assembly line

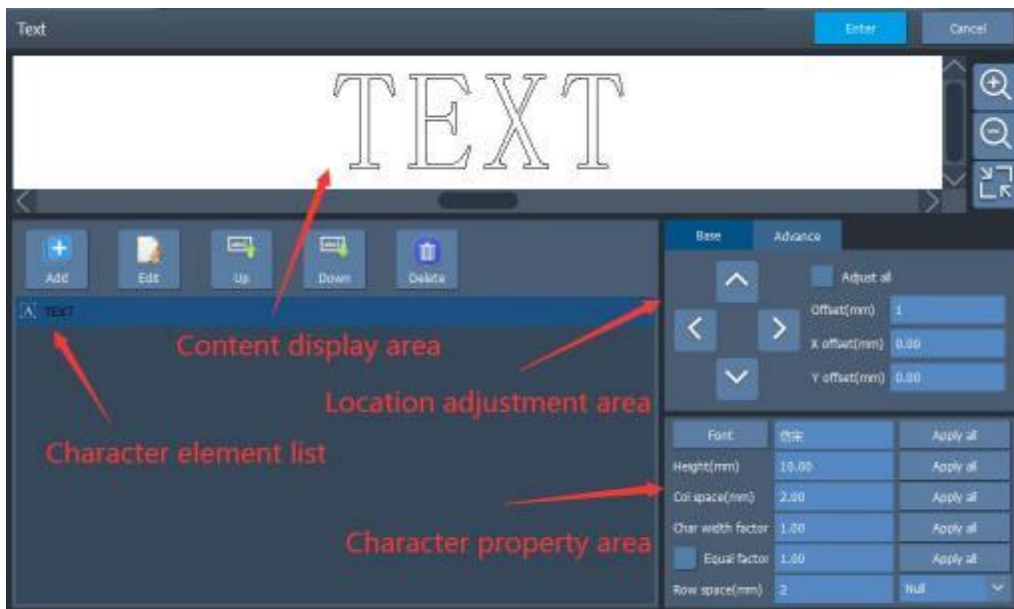
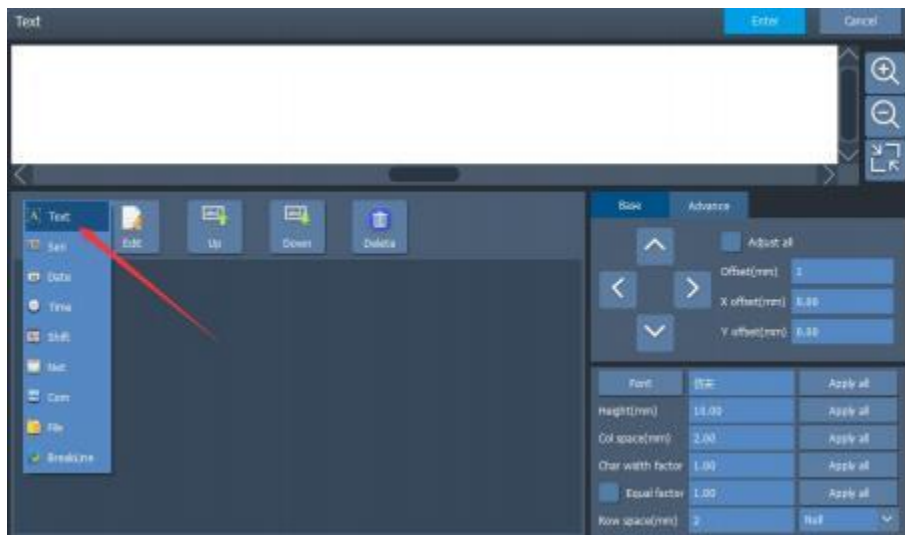
When adjusting the effect, set the parameters as shown below. After the effect is adjusted, adjust the direction of the assembly line according to the actual situation of the assembly line, and decide whether to use an encoder or a fixed assembly line .

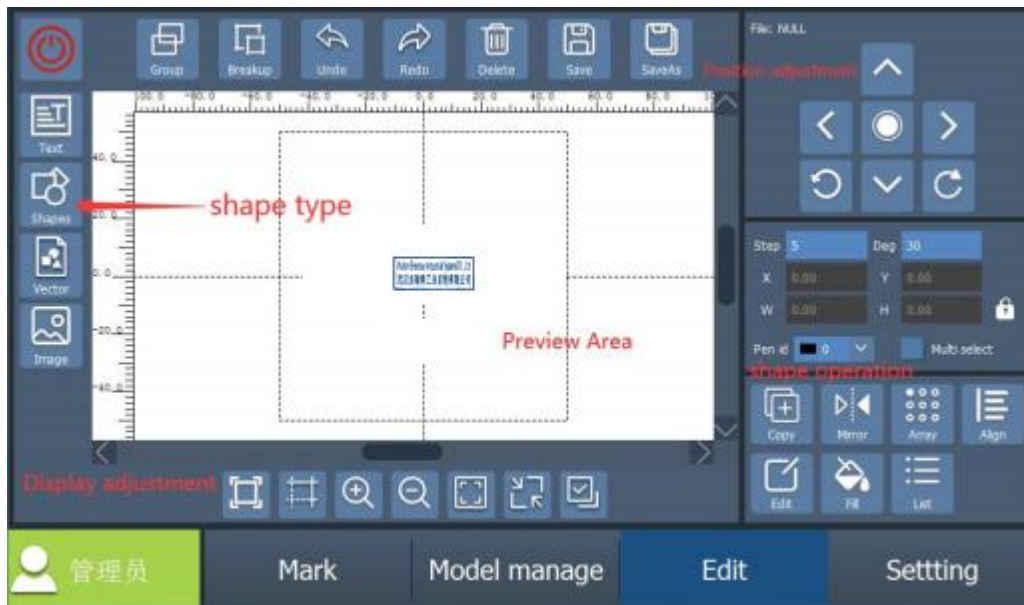


## 2.4 Edit content

Switch to the editing interface to draw the fixed text(Note: If you want to make a mark on dark materials, you need to tick the box of“reverse” in the fixed text features) . After the QR code is drawn, switch to the template interface to save the current content all at once .

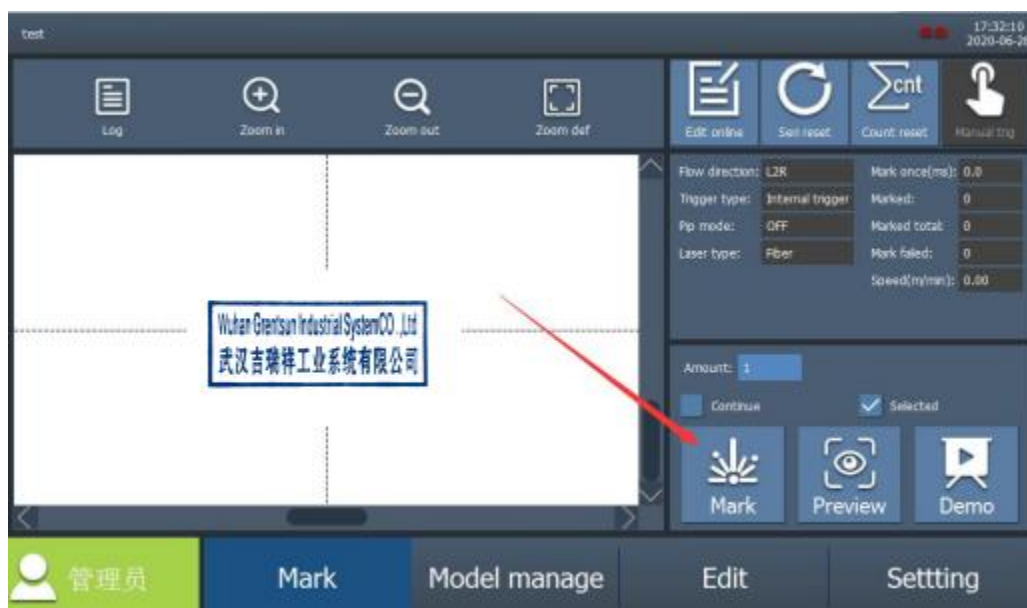






## 2 . 5 Marking authentication

Switch to the marking interface to observe the marking effect .



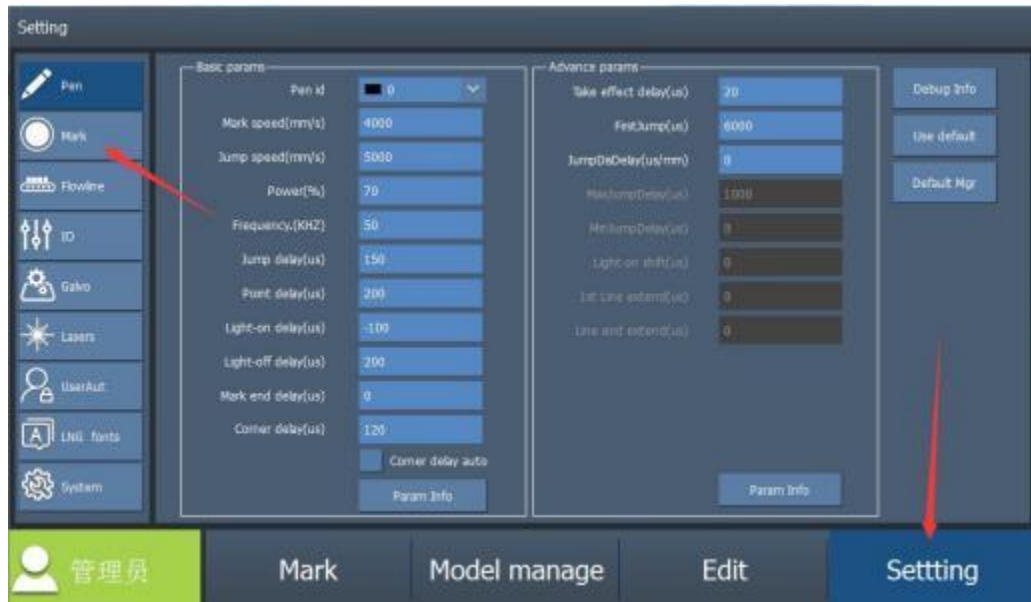
## 2.6 Marking parameters and assembly line .

If the static marking effect is good, switch to the settings interface to set the marking parameters and assembly line .

### 2.5 . 1 Set marking parameters

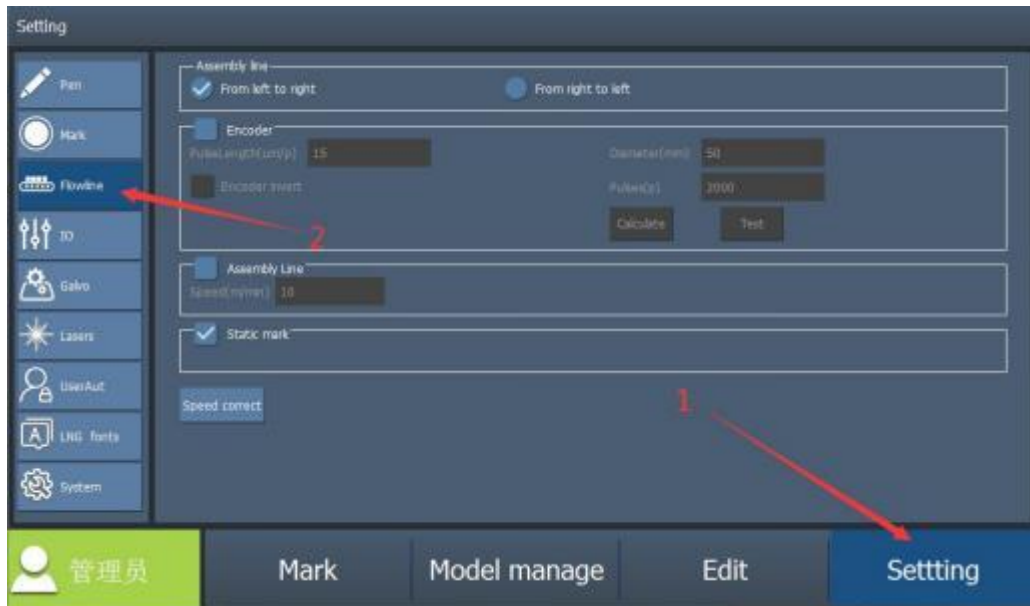
Select the trigger mode, trigger delay, and minimum trigger interval according to

the actual situation . It is OK to use a designated point or automatically-selected point as the starting point . For a designated point, generally set the X Coordinate, and the specific value is half of the work area minus the size of the first marking content, and then decide the positive and negative values according to the direction of the assembly line .



## 2.5.2 Set the assembly line

Under the condition that the marking speed and the delay are matched, the neatness of the shapes during fly marking can be adjusted by adjusting the impulse distance. This parameter is calculated by filling in the diameter of the encoder and cycle impulse.

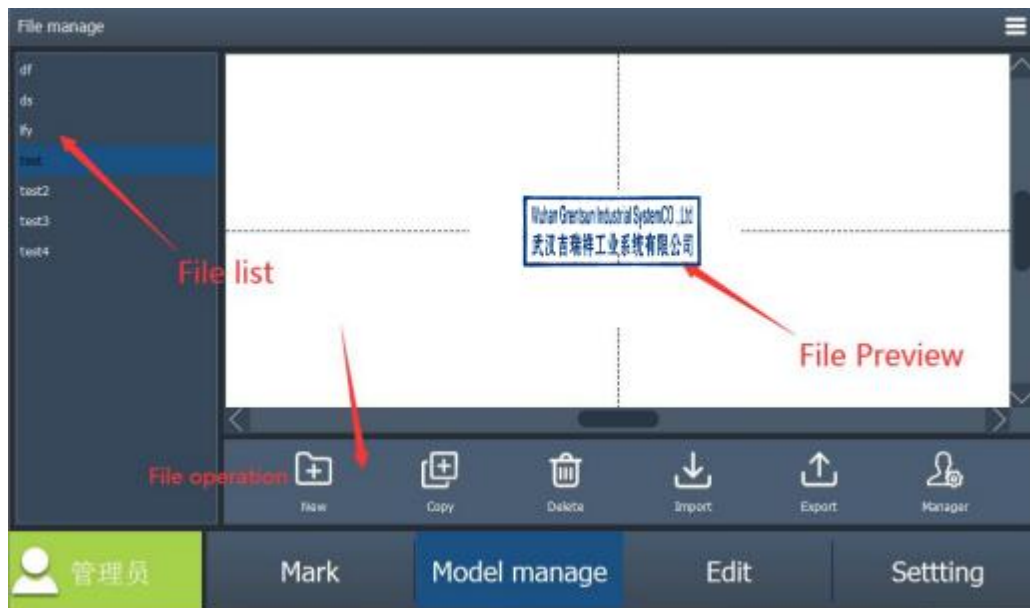


After all the parameters are adjusted to perform normal fly marking, switch to the file interface to save the content. Each time when you open the software, you can start working by just loading the file template.

### 3. Description of the Software

#### 3.1. File management

File management is a functional group that manages the user's template files, including six sub-functions: new folder, copy, delete, import, export, and manage .

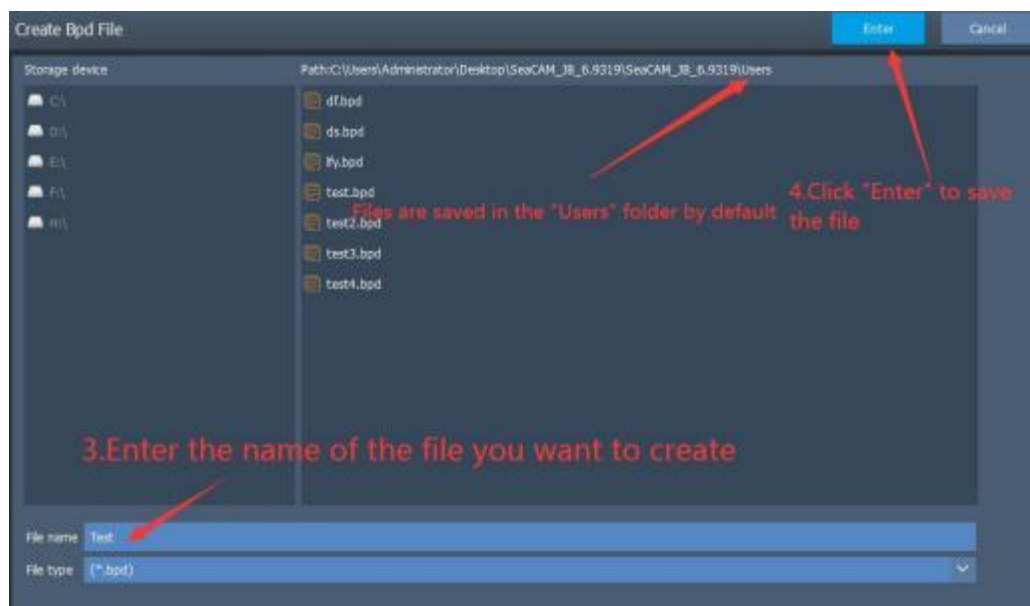
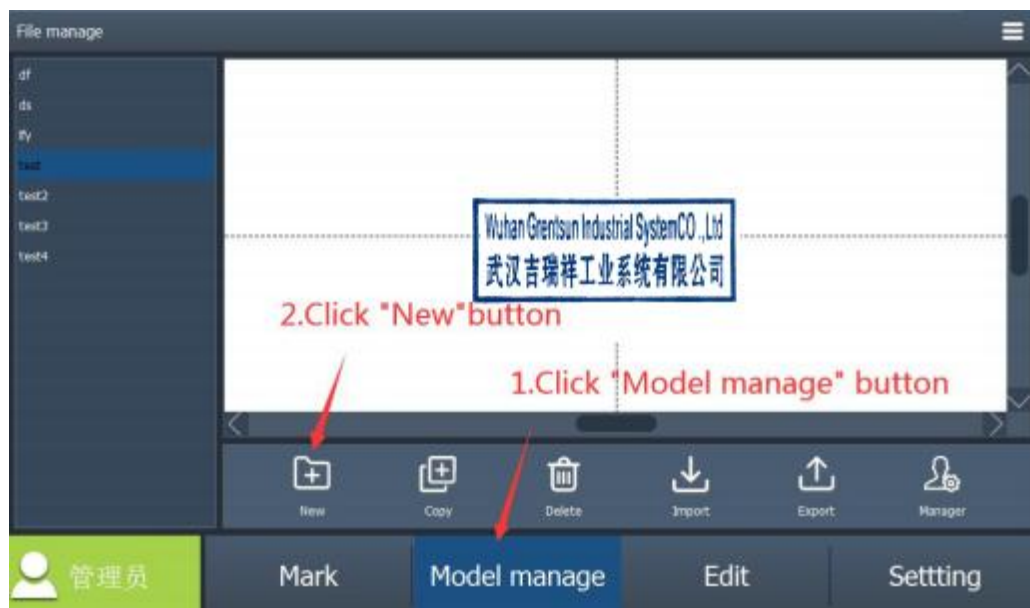


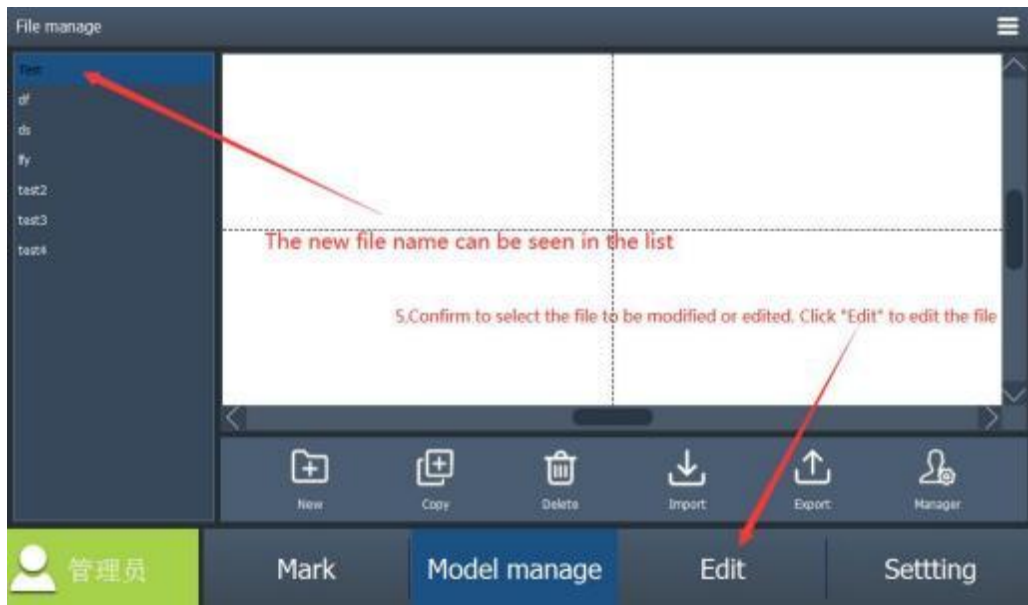
- New folder: Create a new blank template file .if there is no template file,click save directly in the editing interface, which has the same effect
- Copy: Copy the selected template file .
- Delete: Delete the selected template file .
- Import : Import a template file from a designated location .
- Export : Export a template file to a designated location .
- Manage: Namely the file manager, which can add, delete and change all files .



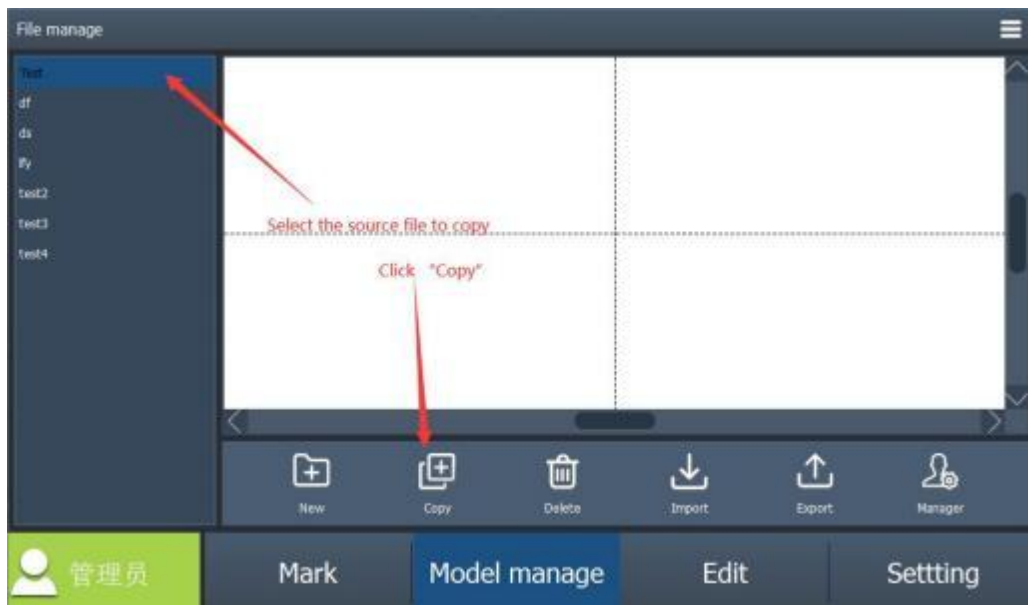
### 3.1.1. Function description

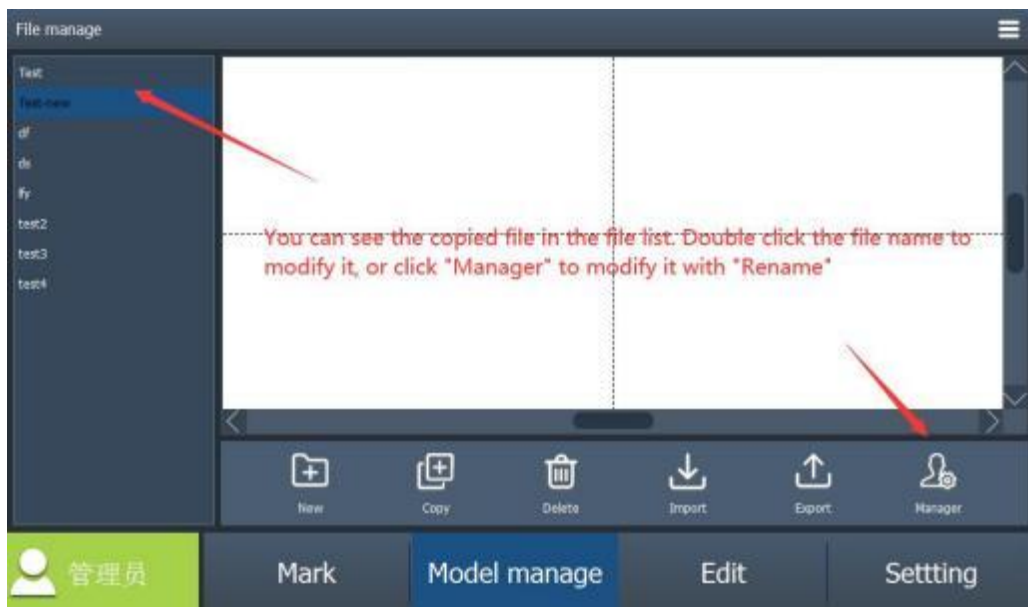
#### 3.1.1.1. new folder



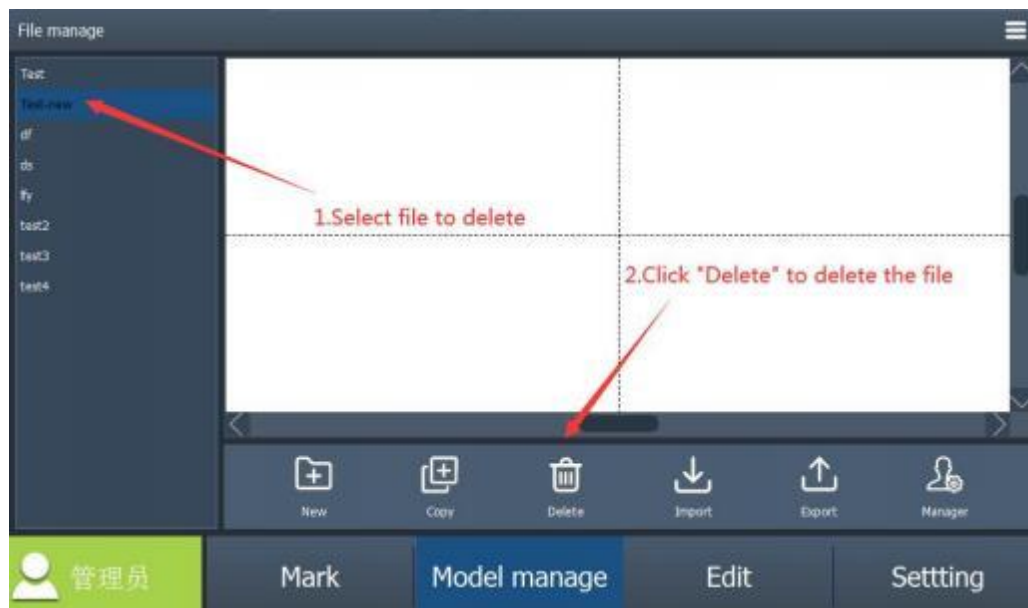


### 3.1.1.2. copy

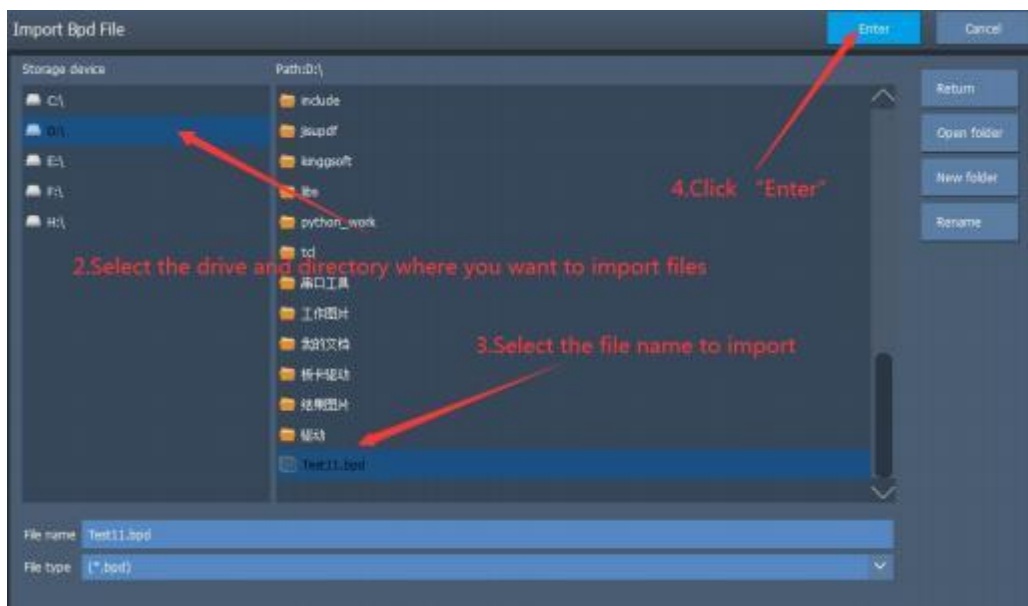
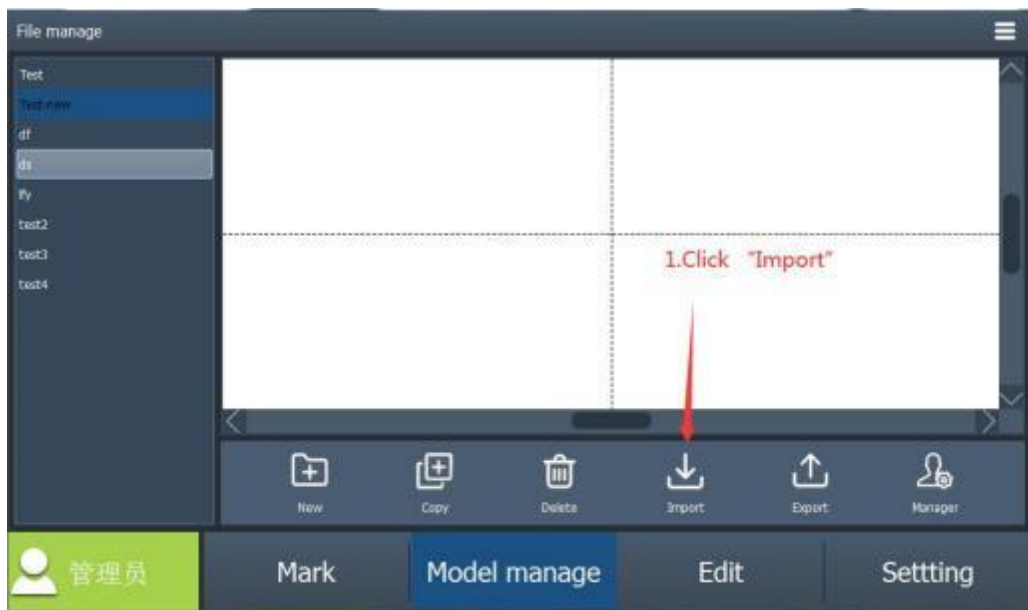


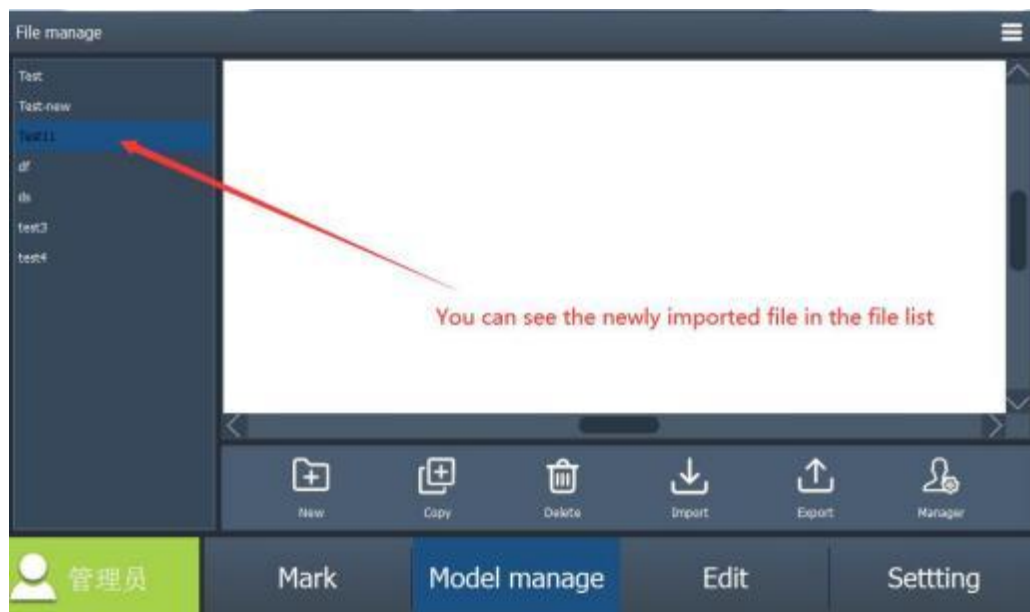


### 3.1.1.3 . delete

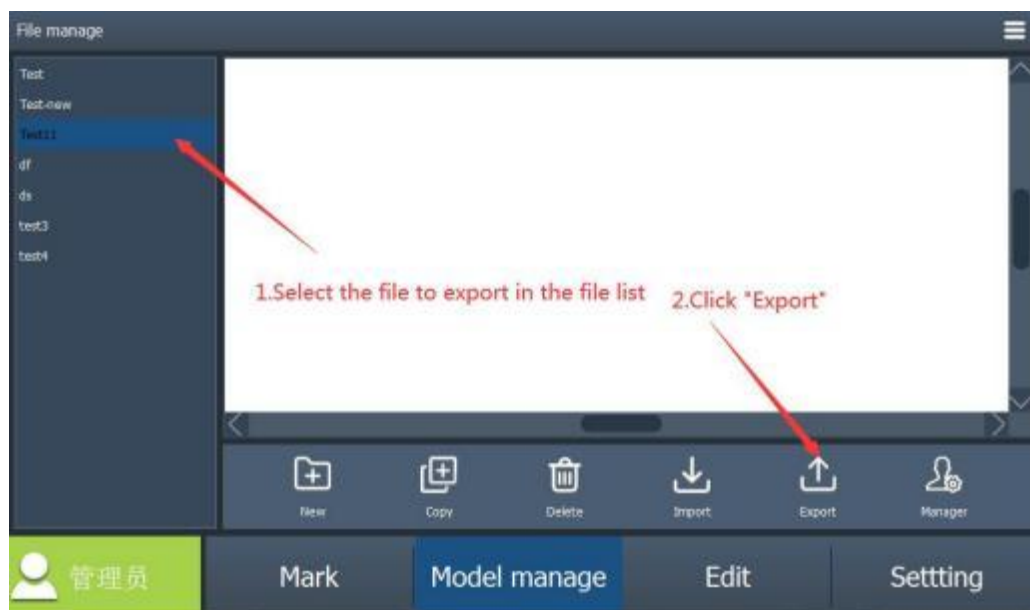


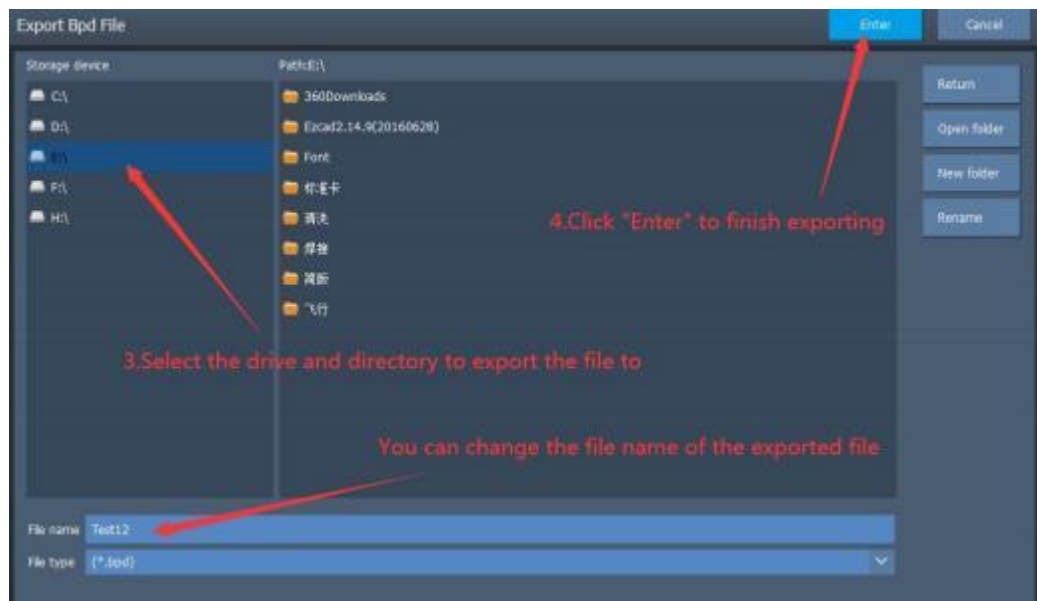
### 3.1.1.4 . Import Files



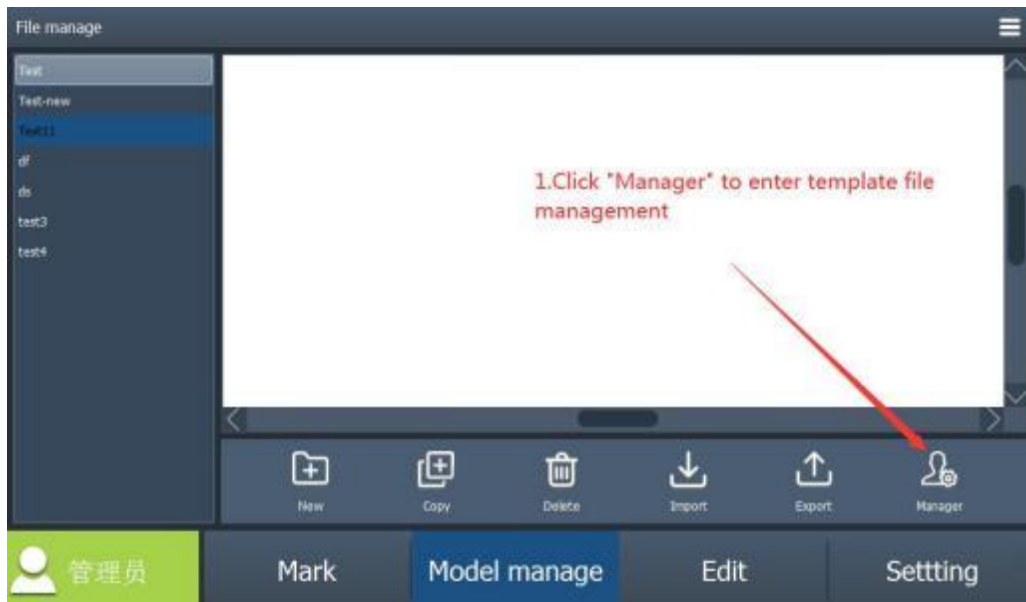


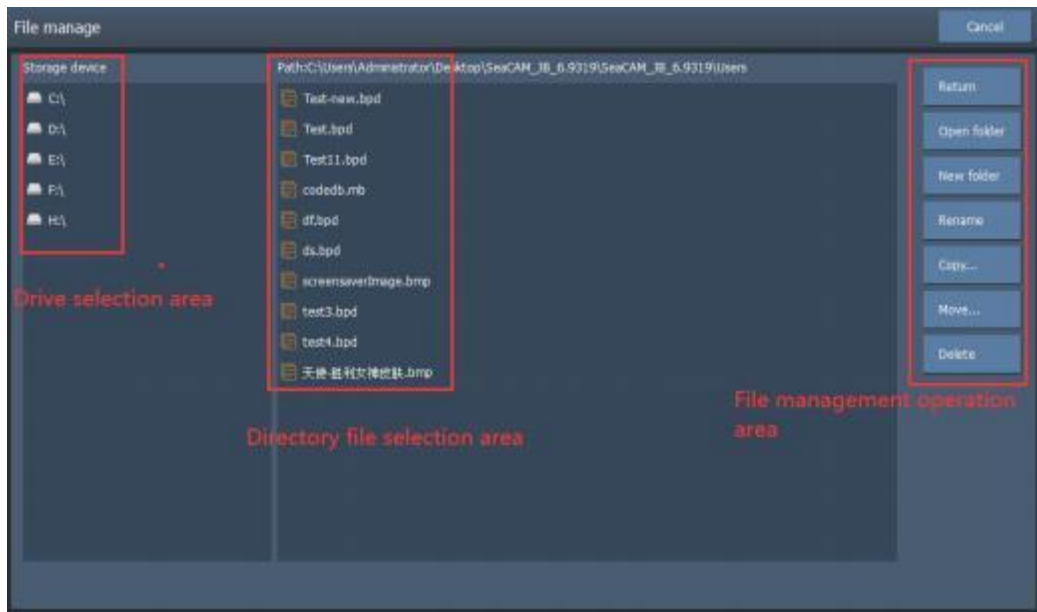
### 3.1.1.5 . Export Files





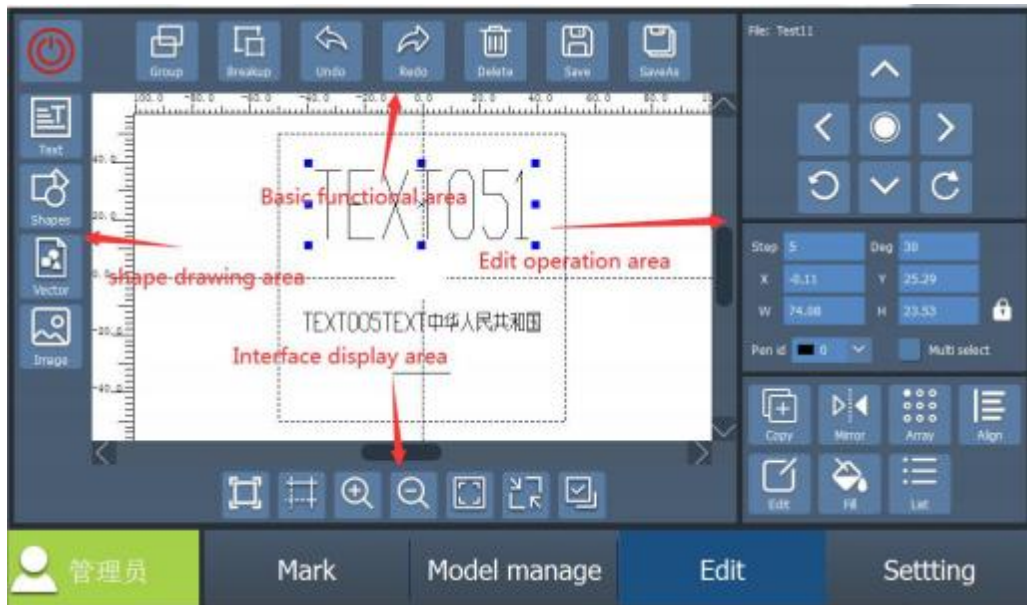
### 3.1.1.6 . manage





## 3.2. Editing

Editing is a functional group for drawing and editing various shapes, including drawing (text, QR code, bar code, shapes, vector graphics and pictures), editing, filling, mirroring, arraying, moving, rotating, etc .



### 3.2.1. Basic Functions



: Group the selected plural shapes & ungroup the selected group .



: If you are not satisfied with current operation during graphic editing, you can use “Undo” to cancel current operation and return to the previous status . After undoing the current operation, you can use “Redo” to restore the operation which has been canceled . It is one of the most commonly used function for editing .



: Delete the shape you do not need .



: This function can create a template file and save the current content when no template file is created . It can save the current content when there is a template file .

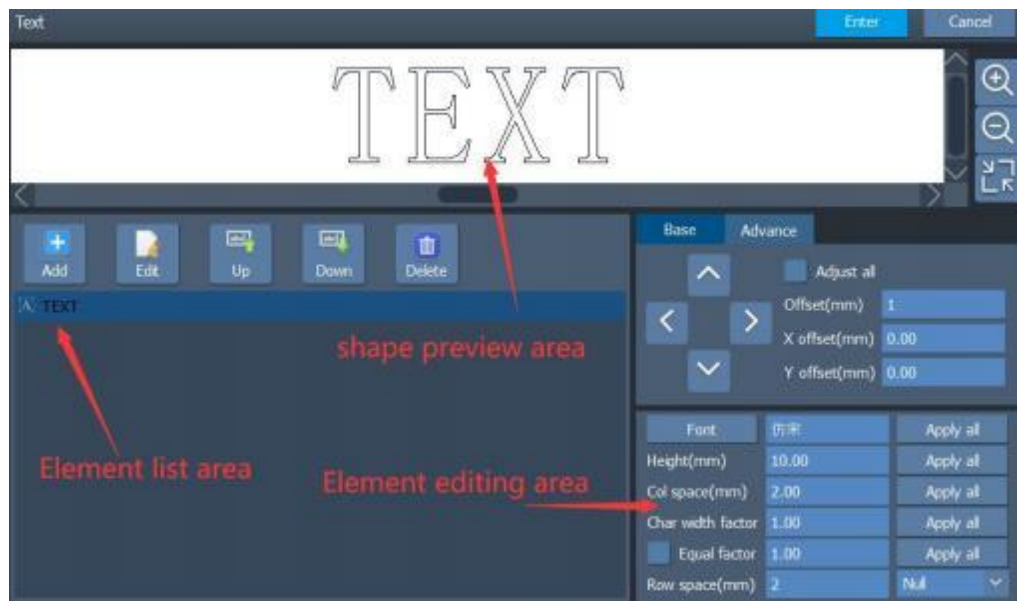
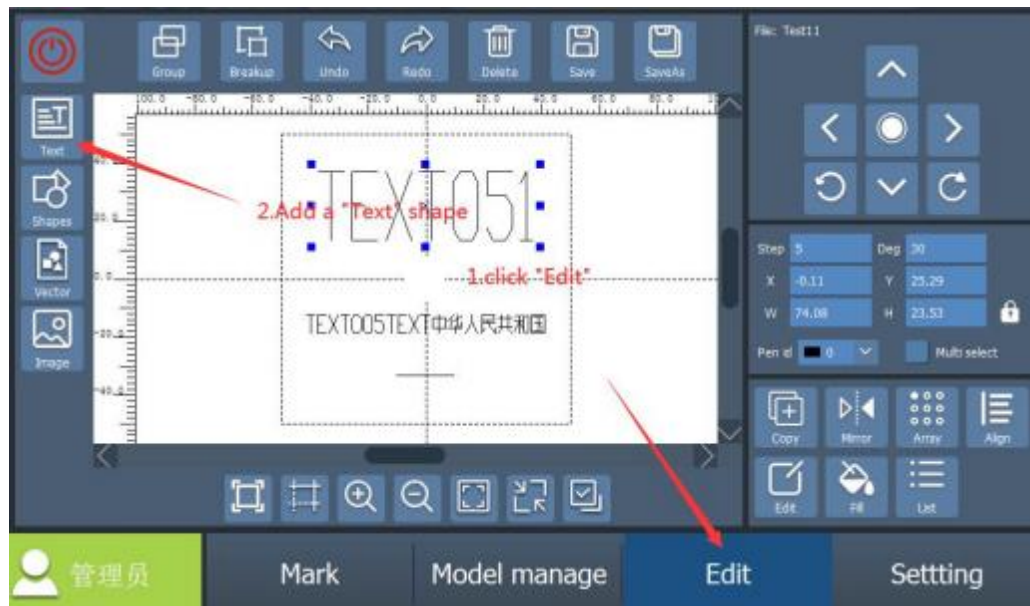


: save the current file with a different file name , generally used to save the backup file



## 3.2 .2 . Drawi ng area of sh ape

### 3.2.2.1 . Text shape



#### 3.2.2. 1. 1. The Preview Window

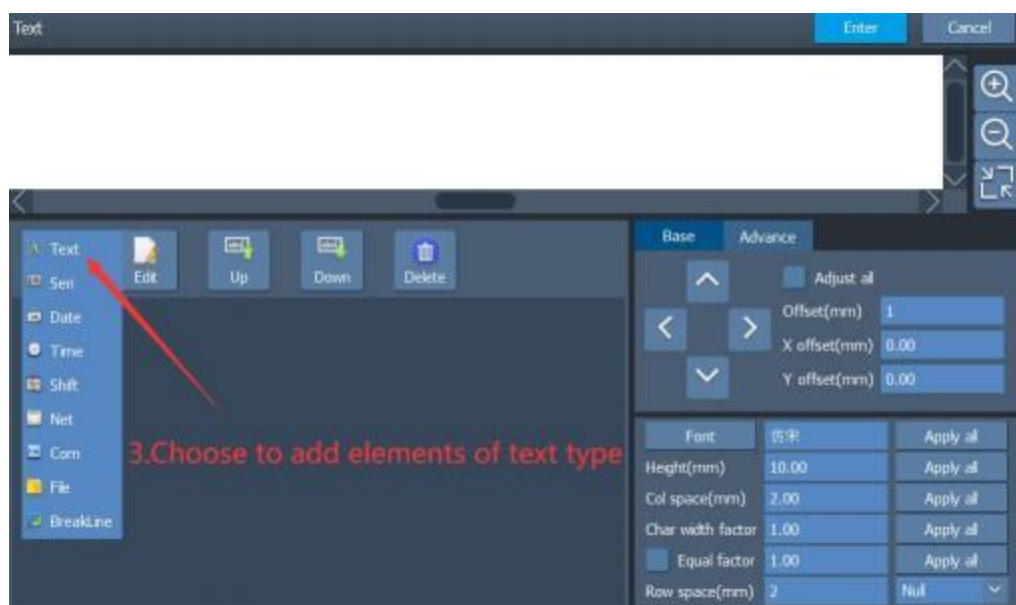
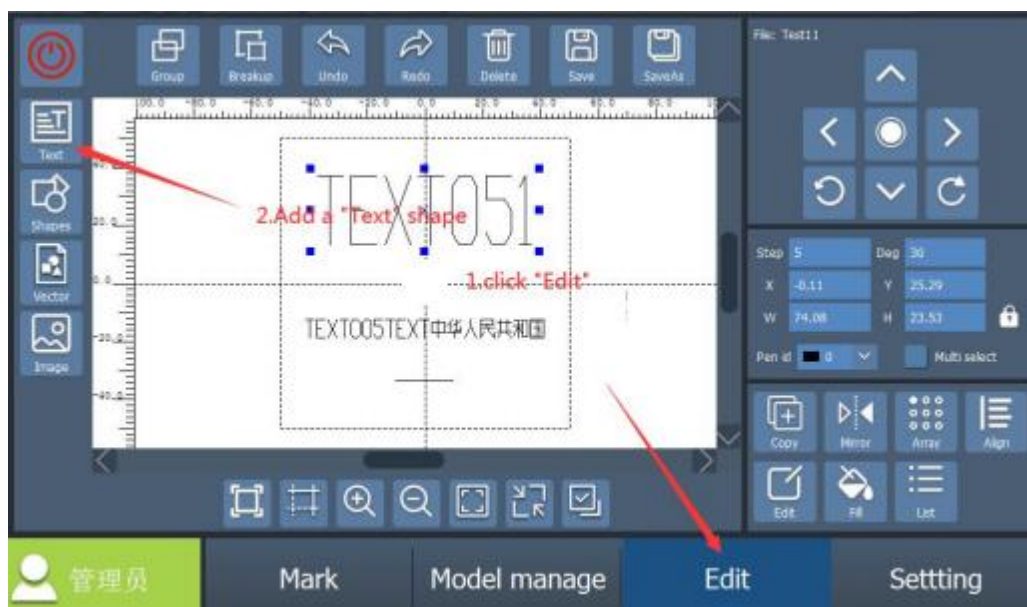
All contents of the current text will be displayed here .

#### 3.2.2.1.2.

Each element in the text is displayed here . After selecting, use the edit button below to perform the corresponding operations .

- Add: add a new element and press this button to edit it
- **Editing:** Select the existing element, and press the editing button to edit .
- 
- **Move Up/Move Down:** Modify the location of the selected elements .
- 
- **Delete:** Delete the selected elements .
- 

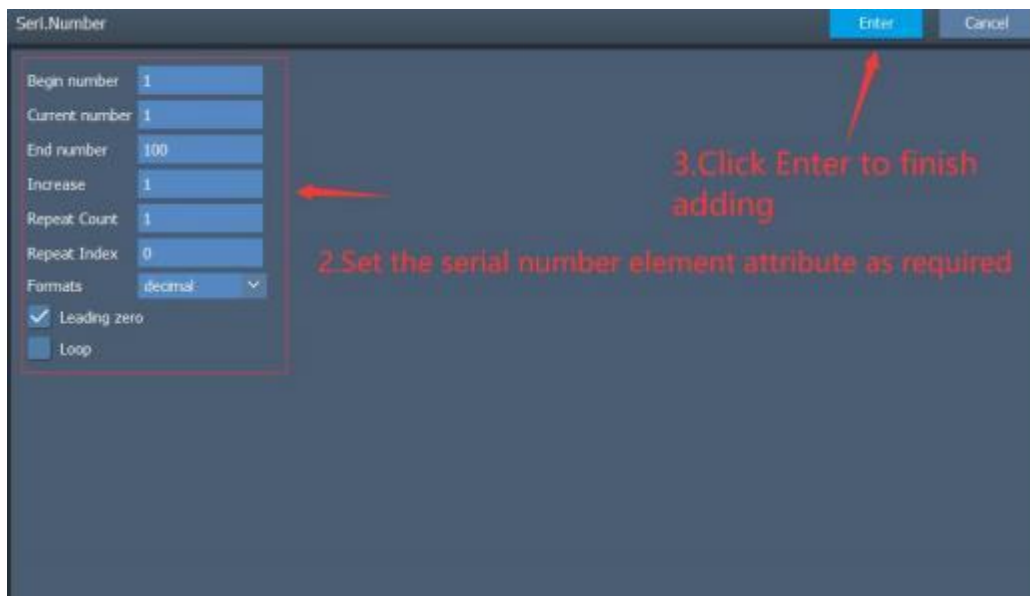
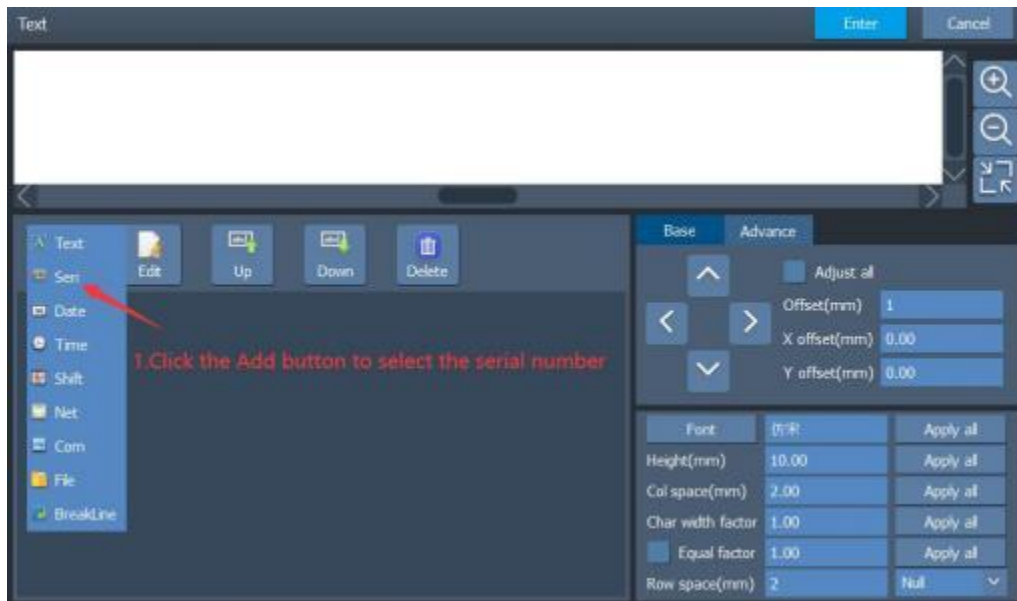
### 3.2.2. 1.3. Fixed Text





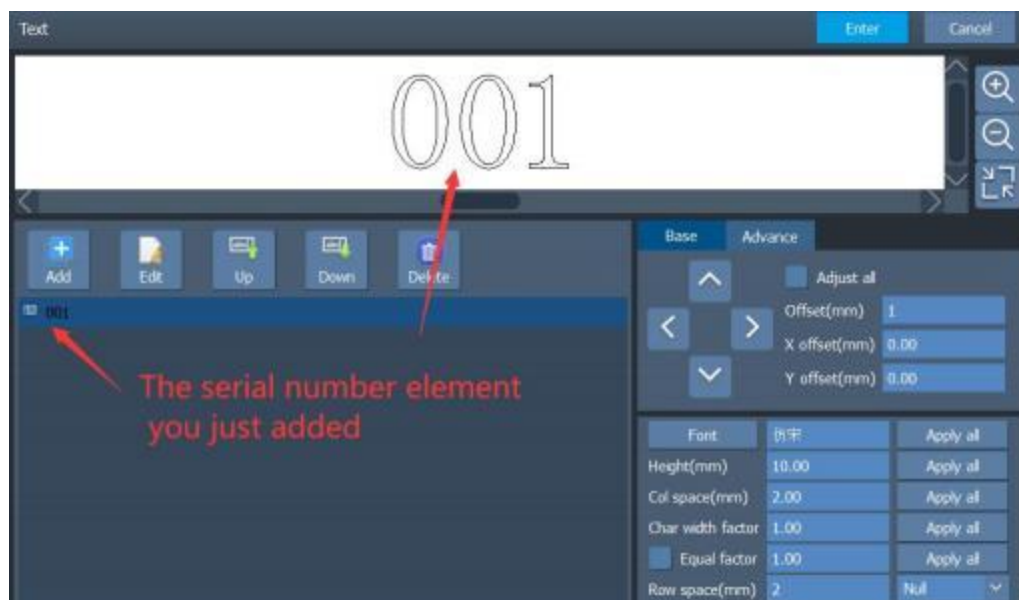
### 3.2.2. 1.4. Serial Number

Text elements that change in fixed increments during processing, as shown below: (For the previous steps, please refer to the fixed text adding step)



- ◆ **Starting serial number:** The digit when the serial number begins
- ◆ **Current serial number:** The digit of the current serial number.
- ◆ **Ending serial number:** The digit of the serial number in the group .  
When the processed serial number is equal to the ending serial number, the serial number in the group ends the processing .

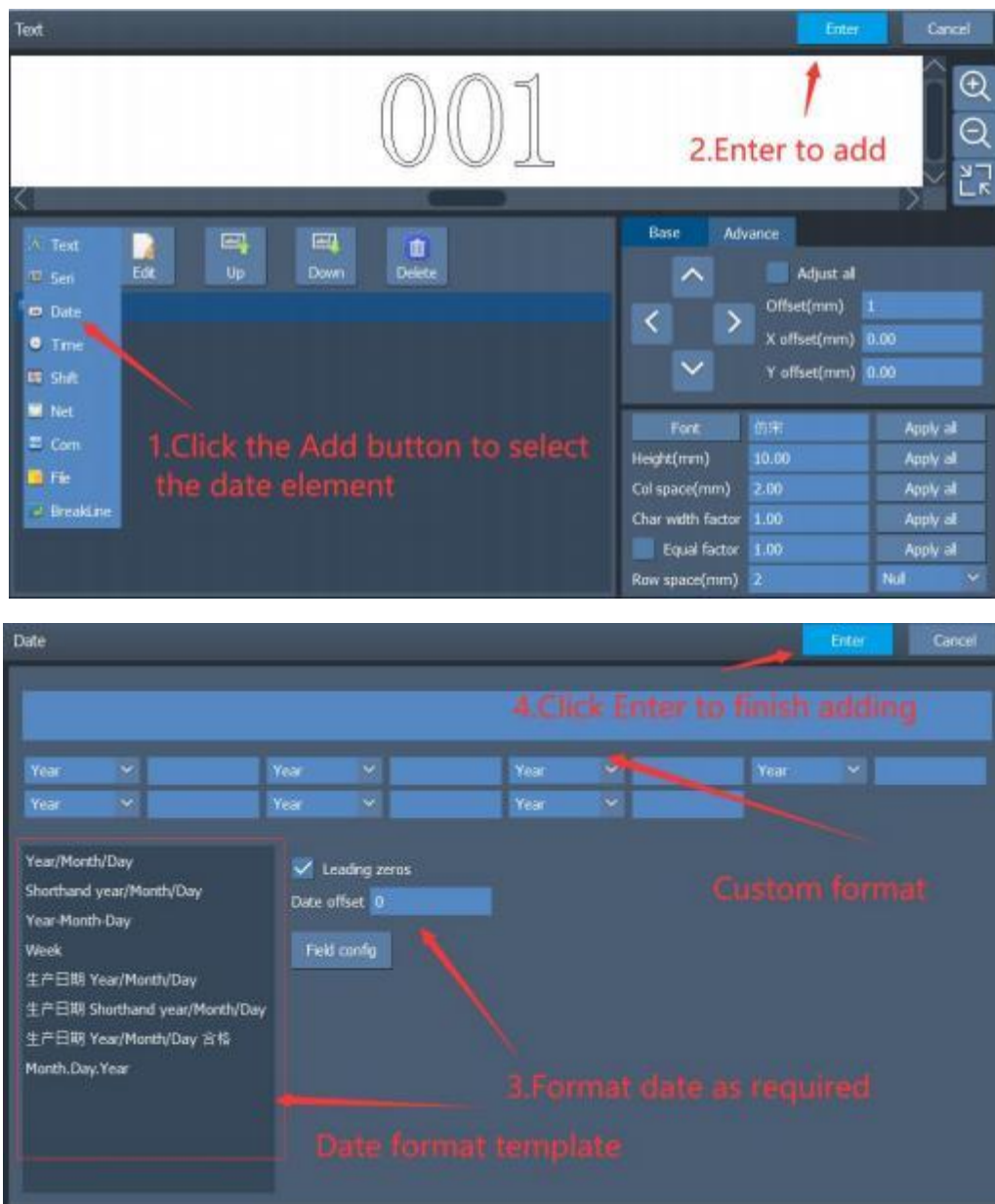
- ◆ **Increment** : The increment of the serial number of the group .
- ◆ **Number of repetitions**: Each value of the serial number of the group will become the next serial number after processed to the designated number.
- ◆ **Positional notation**: The positional notation of the serial number of the group . The default selections are decimal system, hexadecimal uppercase, and hexadecimal lowercase .
- ◆ **Leading zero**: Whether to display the complement digit 0 in front of the serial number.
- ◆
- ◆ **Data cycle**: After marking the ending serial number, whether to automatically mark from the starting serial number.
- ◆



### 3.2.2. 1.5. Date

During processing, the system automatically selects the text element of date from the computer. A variety of date formats are provided by default for selection, and the

default format can be modified as shown below:



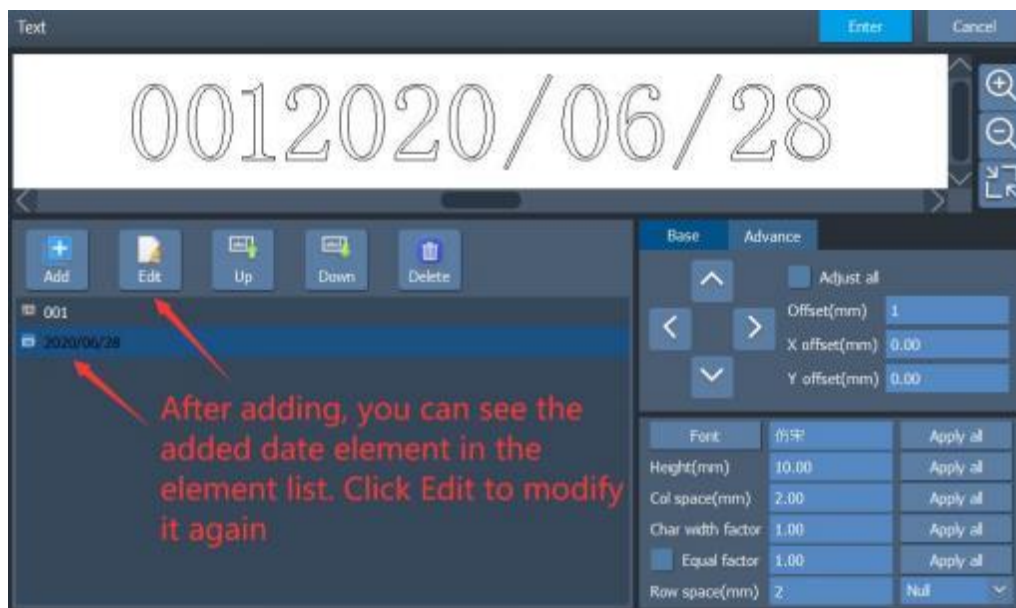
**Preview window:** Preview the current date .

**Default format selection:** There are multiple built-in date formats . After selection, make personalized modifications in the custom format window.

**Numeric field setting:** Select the element to be defined in the drop-down list, and enter the content of the element in the input box .

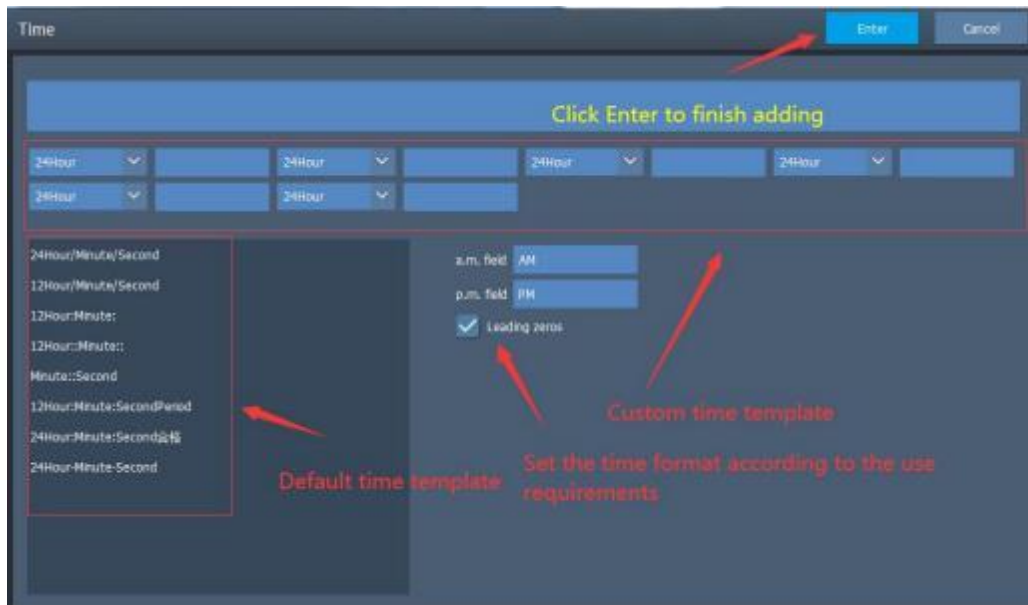
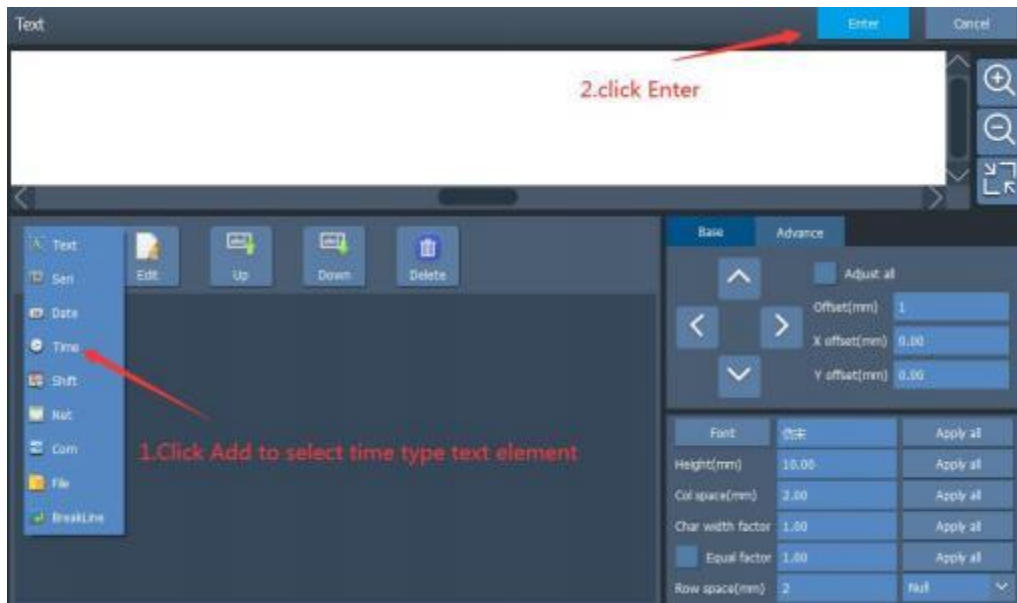
**Numeric field customization:** Customize the display of week and English month . For example, English week and English abbreviations of months .

**Date offsets:** Add or subtract the value from the date to display and mark it .



### 3.2.2. 1.6. Time

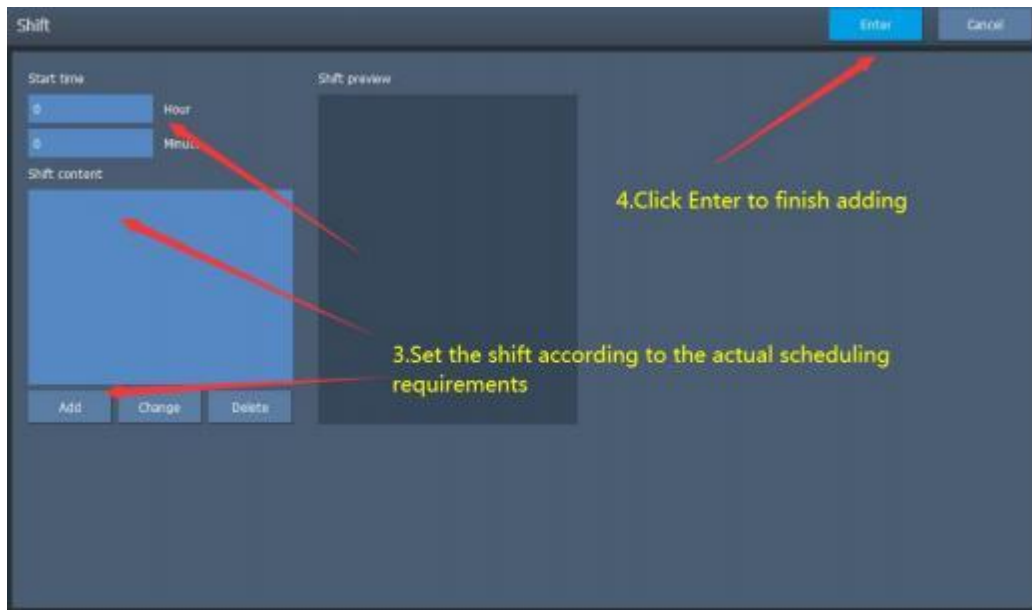
During processing, the system automatically selects text elements of time from the computer. A variety of time formats are provided by default for selection, and the default format can be modified as shown below: ( For the previous steps, please refer to the fixed text adding step)



- **Leading zero:** whether to display the complement digit 0 of time .
  - Default format selection: a variety of time formats are built-in .After selection, you can customize them in the custom format window
  - Field Customization: drop down box select the element to be defined input box input element content
- **AM/ PM numeric field:** Customize the character content displayed by time period



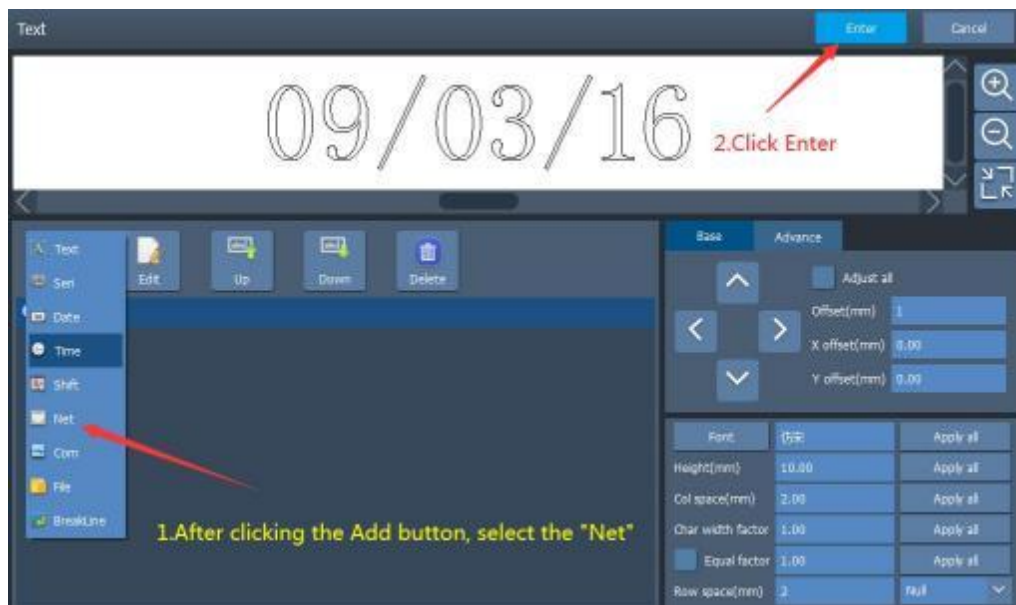




- **Starting time:** The starting time for each shift can be set to minute . When it is the set time, it will display the shift corresponding to the time .
- **Shift content :** The name and code of each shift .

### 3.2.2. 1.8. Internet Access

The network communication element is an element that the system automatically reads text from the network through the computer internet access during processing as shown below( For the previous steps, please refer to the fixed text adding step)



- ◆ **Server:** The IP address of the server.
- ◆ **Interface number:** Select the interface number used for network communication .



**This function is exemplified as follows:**

Suppose there is a customer who needs to process 10,000 workpieces . The marking content on the workpiece is a serial number, He and another The serial number of the workpiece is one-to-one correspondence(the opposite serial number is random) . so every time before processing, the customer must read real-time the content to be processed on a server (IP: 192 . 168 . 0 . 1, Interface number: 1000) from the local area network .such Processing together at the same time,there will be no mistakes .

1. Open the software, choose to draw the QR code, and then select the internet access . The system will pop up the dialog box as shown above . Fill the server's IP in the IP address parameter box, which is 192 . 168 . 0 . 1 . The interface parameter is set to the interface number used for communication, which is 1000 . Note: the internet access parameter must be the same as the interface parameter set on the server, otherwise it will be unable to communicate .
2. Press the “Marking” button to start processing, the high-speed fly mark system will immediately send “CMD” to the server through the internet access, and wait for the server to reply.
3. When the server finds that the internet access receives the order of “CMD” , it

will immediately read the database to obtain the text to be processed, and then answers the high-speed fly mark system through the internet access .

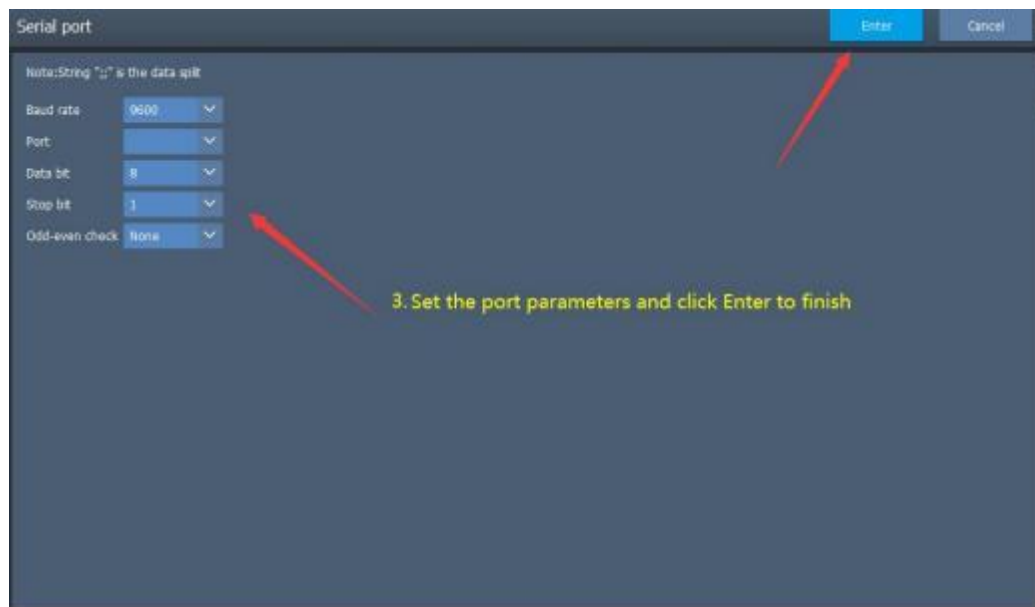
4 . After the high-speed fly mark system obtains the text to be processed, it will immediately update the processed data to the work area and board .

5 . After the board receives the processed data, it will immediately control the mark device to process the workpiece .

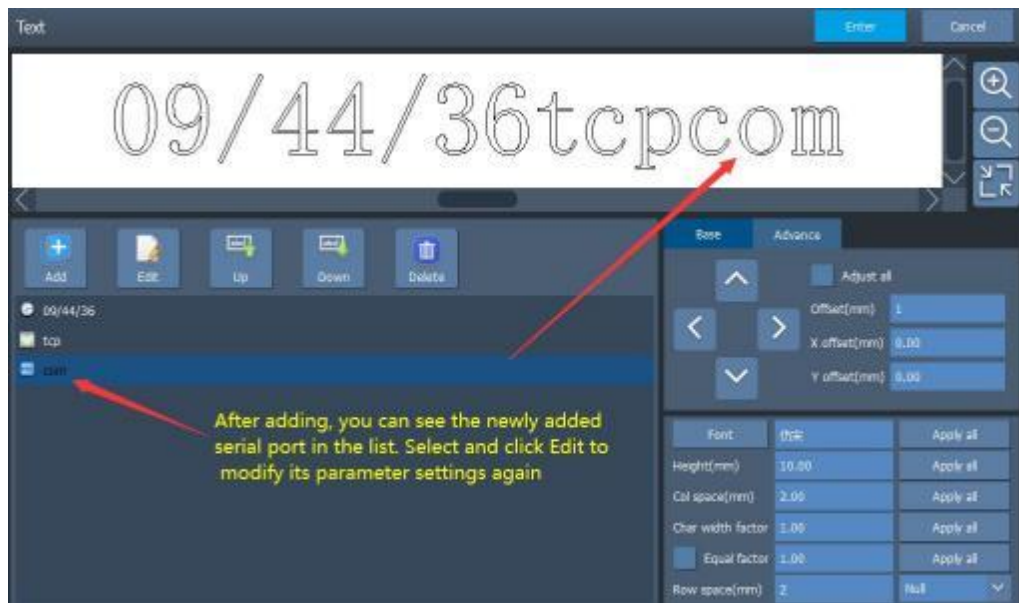
### 3.2.2. 1.9. Serial Ports

The communication element of a serial port is an element that the system automatically reads text from the peripheral through the serial port of the computer during processing as shown below:





- ◆ **Baud :** Select the baud used for serial communication
  - ◆
- ◆ **Interface:** Select the serial port number used by the computer to connect with external devices
  - ◆
- ◆ **Data bit:** Select the data bit used for serial communication
  - ◆
- ◆ **Stop bit:** Select the stop bit used for serial communication
  - ◆
- ◆ **Parity:** Select the parity bit used for serial communication
  - ◆

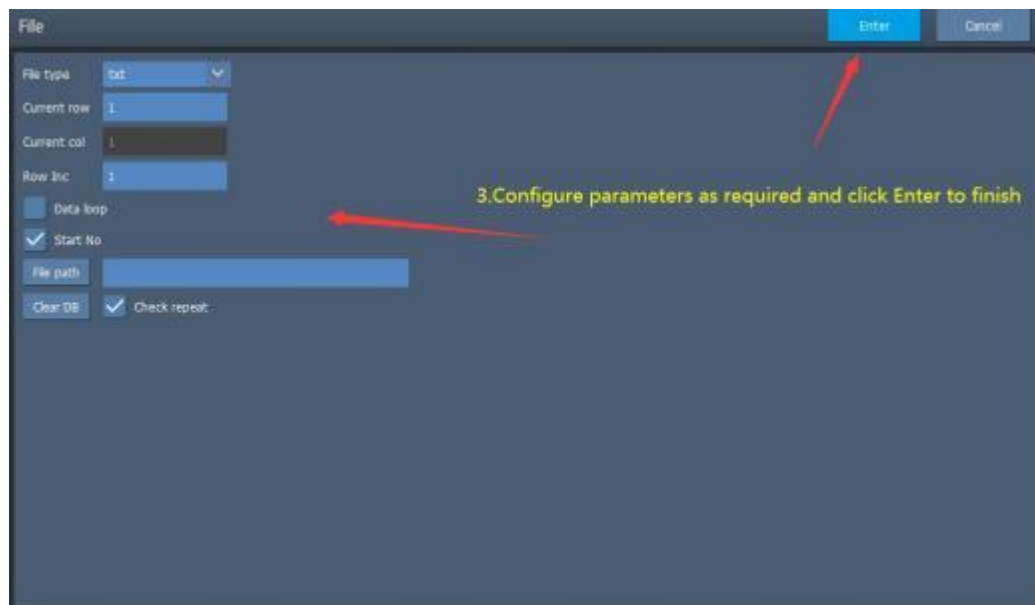


### 3.2.2. 1. 10. Files

The file element is a text element to be processed line by line from a txt or Excel file during processing as shown in Figure:

Note: The content of the file must have the same number of characters in each line, and there must be no blank lines .





**File type:** Select the type of associated file, support TXT and CSV

**Current line number:** The line from which to start reading the processed data .

**Current column number:** The column from which to read the processed data .

**Line increment :** jump a few lines at a time to read the content for marking

**Data cycle:** Whether to read the file again and again when reading the last line of the file .

**Whether to mark the current line:** Whether the content of the current line is marked . If no, mark from the next line of the current line .

**File path:** Specify the path of the associated file .

**Clear cache:** Clear files saved to prevent weight codes .

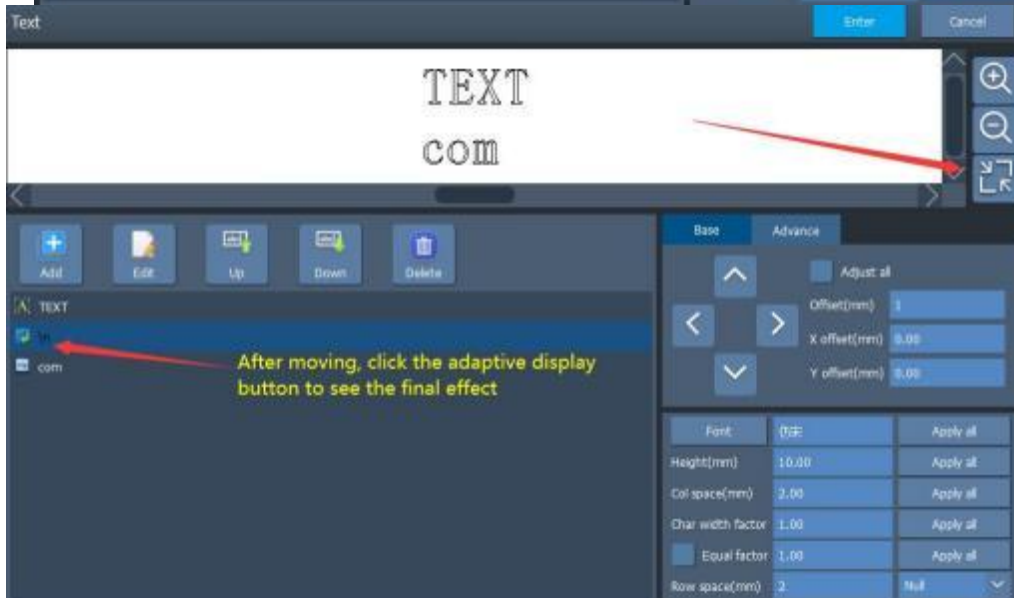
**Check the weight code:** After checking, stop marking if it is found the content is already marked



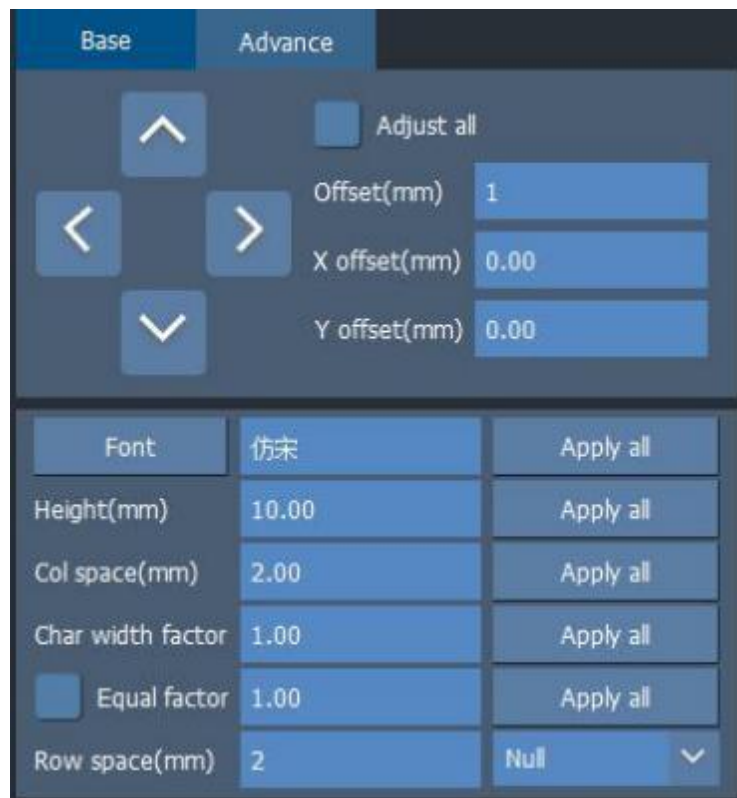
### 3.2.2. 1. 11. Line Break

Insert a line break between two text elements in the text list to allow the two text elements to be displayed on separate lines. In the absence of line breaks, the text elements of the default text list will be all on one line.





### 3.2.2. 1. 12. Basic Parameters



**Font** : Select the font of the text . Support single line, double lines, dot matrix, True Type font .

**Height (mm)** : The height of font sizes.

**Letter-spacing (mm)** : The space between letters .

Word width factor: arranges characters according to the set character width

Equal width factor: arranges characters according to the set occupation width

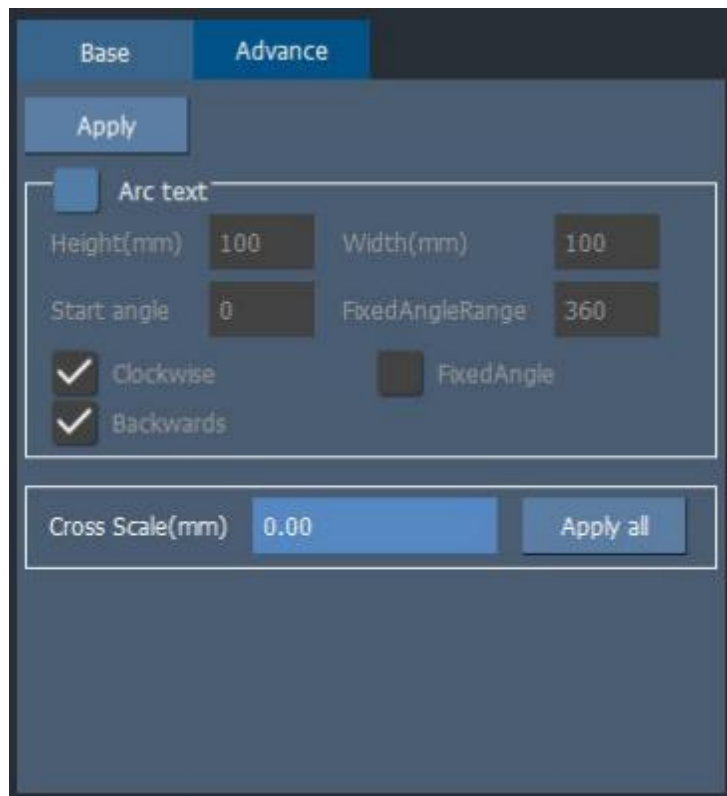
**Leading (mm)** : The space between adjacent lines of type .

Alignment : changing the alignment of text elements

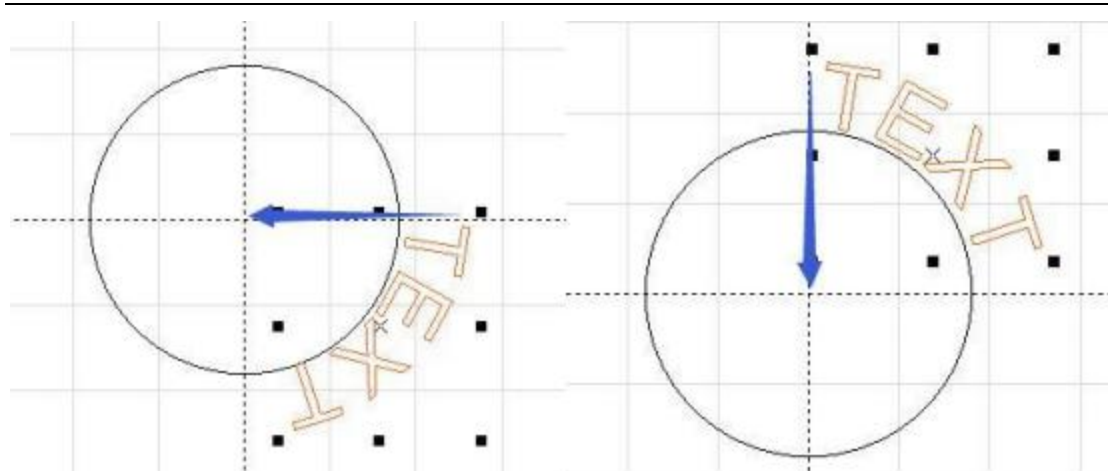
Apply all: after clicking apply all , this parameter will take-effect on the text of all elements in the element

---

### 3.2.2. 1. 13. Advanced Parameters



- Application: let the advanced parameters take effect immediately.
- **Arc fonts:** Whether to allow the current arc function to take effect .
- **Width/ Height:** If the width and height are the same, it is equivalent to the diameter of the arc, and if they are not the same, it will become an elliptical arc .
- **Start angle:** The benchmark of text alignment, with the leftmost side of the text as the start angle as shown below:



On the left the benchmark angle = 0, on the right the benchmark angle = 90 .

- **Fixed angle:** If this parameter is selected, no matter how many characters are entered, the system will limit the text in a certain angle .
- 

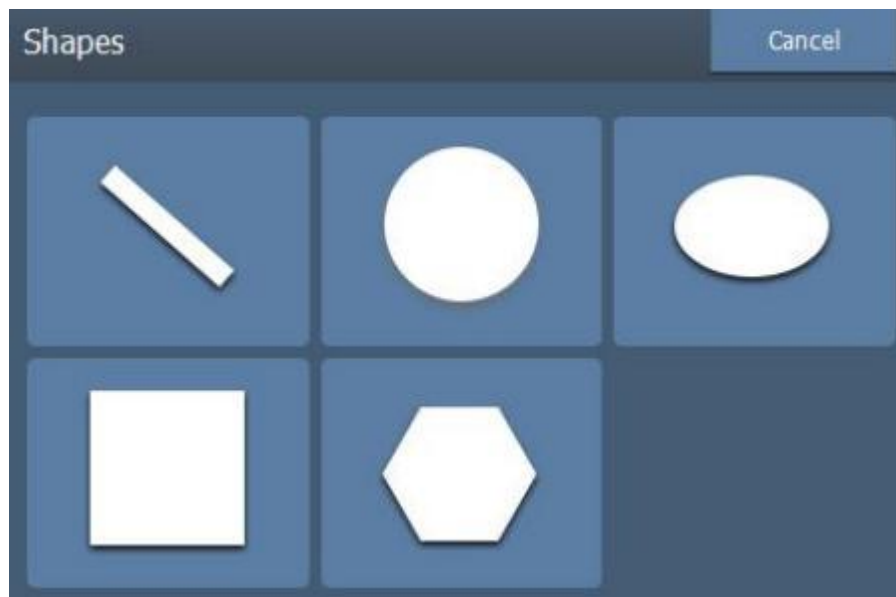
On the left, the angle range is limited,  
and on the right, the angle range is not limit .

**Clockwise:** Arrange the string in a clockwise direction after arcing .

**Text outward :** Mirror the string in the Y direction of the string .

### 3.2.2.2 . Shapes

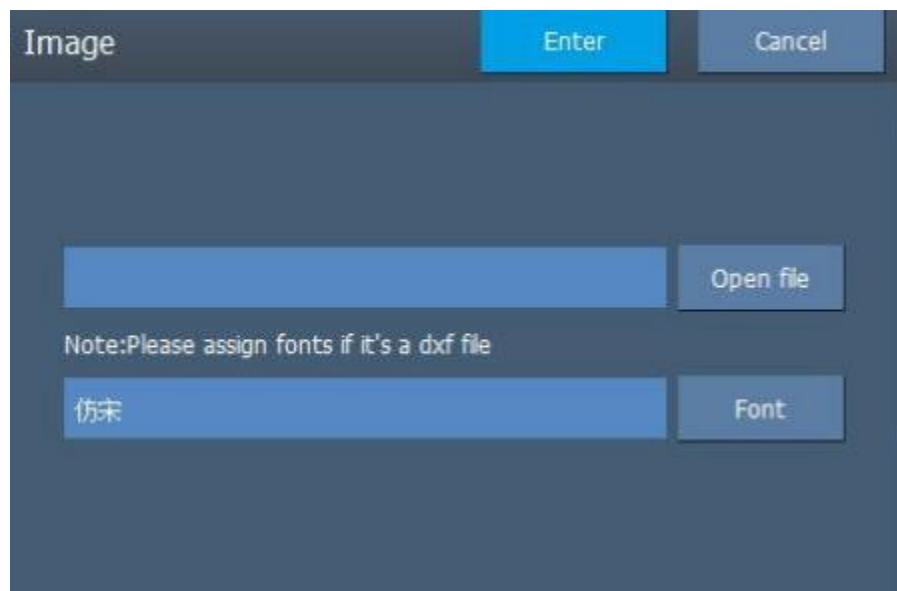
Used to draw straight lines, circles, ellipses, dots, polygons, rectangles and triangles as shown below:



◆ **Polygon:** Draw a polygon with customized edge number.\

### 3.2.2.3 . Vector Graphics

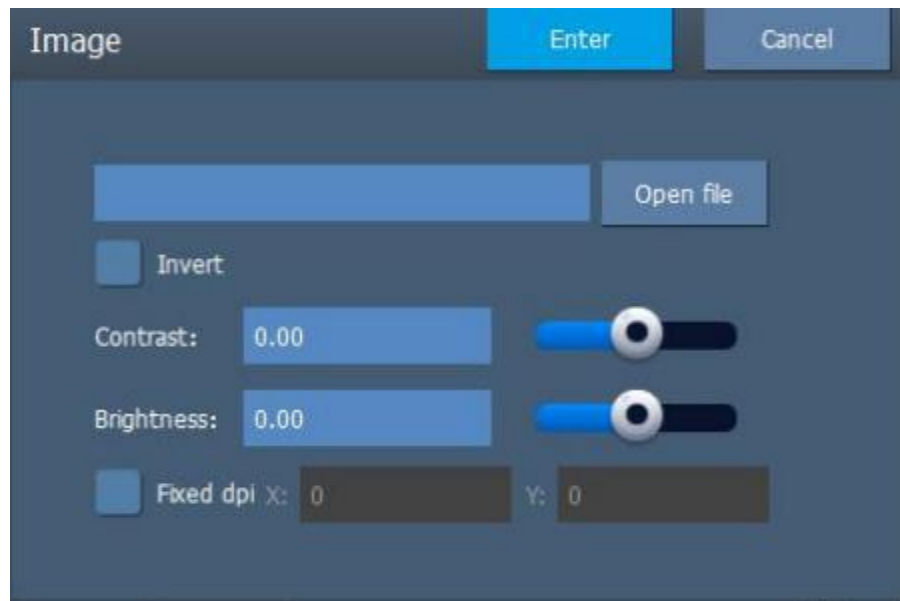
The current software supports vector graphics in DXF, PLT and AI formats .



### 3.2.2.4 . Bitmap

After importing the bitmap, the software will automatically modify it to 256

grayscale bitmap and perform grid processing .



**Reversal** : Marking on dark or light materials can be converted by ticking this option .

### 3.2 .3 . Interface Functions



: Maximize the display of the work area .



: . Hide the range box in the work area, the center cross .



: Zoom in or zoom out the display of the work area .



: Restore the default display size of the work area .









: Maximize the currently selected shape .



: Select all shapes in the work area .

### 3.2 .4 . Editing Functions



-  ,  ,  ,  and **Step (mm)** : Move up, down, left, and right to carry out movement of shape and the movement distance is the step length .
-  : Click Center can directly put shape at any position in the center of work area .
- **Angle, left rotation and right rotation:** Click Left Rotation or Right Rotation to rotate shape . The angle of each rotation is the angle ( ° ) parameter.
- **Pen number:** Each object needs a pen when marking . The first pen is chosen by default . In order to distinguish different pens, we define different colors for different pens . Pen list is edited in the setting of pen list .
- **Copy:** Copy the selected shape ( there will be an icon  in the upper left corner of the work area), click any blank space in the work area to



paste it .

- 
- **Mirror**



- ◆ **Proportion:** Set the percentage of the X- axis and Y- axis of mirroring object and original object .
- ◆ **Mirror mode:** Click it to switch between different mirror modes of horizontal mirror, vertical mirror and diagonal mirror.
- ◆ **Position of datum point :** Set the position of mirroring datum point of mirroring object and original object .

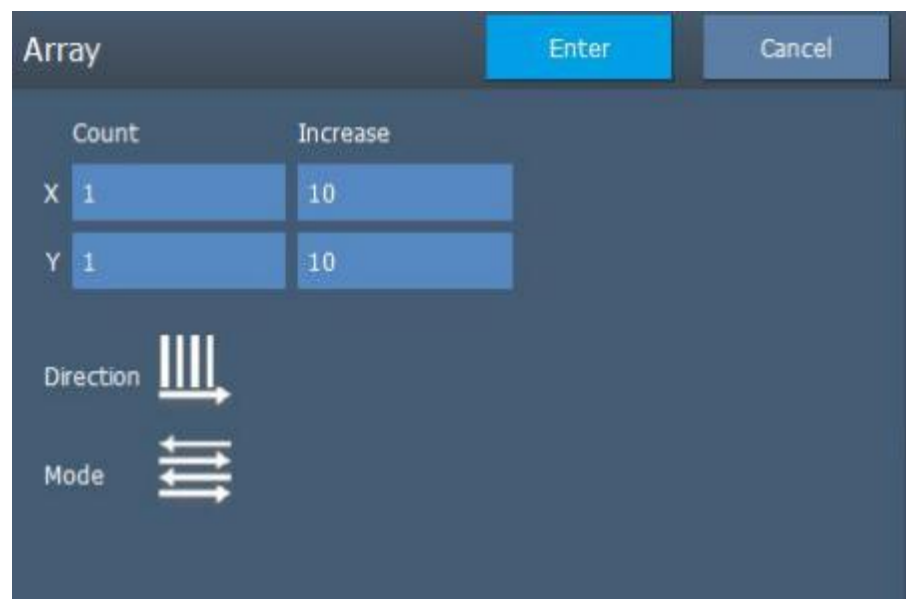
- **Array**

- ◆ **Number of horizontal/vertical arrays:** The number of horizontal or vertical arrays when arraying .
- ◆ **Horizontal/vertical increment :** The space between horizontal or vertical shapes after arraying .
- ◆ **Direction:** Switch the marking order of the array to horizontal or

---

vertical .

- ◆ **Mode:** Switch the shape marking arraying method to unidirectional or bidirectional
- ◆
- **Alignment :** Arrange the selected plural shapes according to the selected alignment mode .
- **Edit:** Modify the content of selected shape (text, QR code, bar code)
- **Fill:** Fill can carry out filling of the designated graph . The graph to be filled must be closed curve, as shown below:



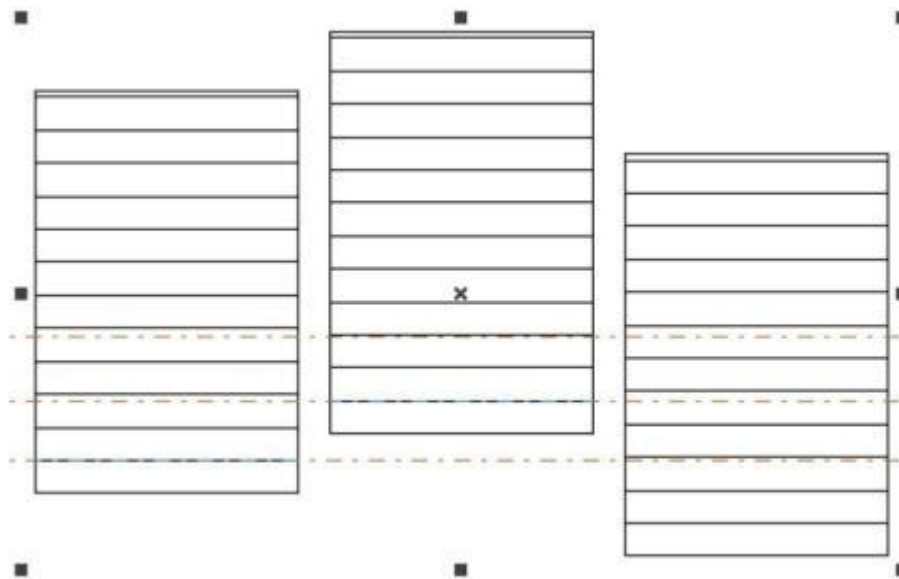
- ◆ **Enable filling:** Allow current filling parameter to be valid or not .
- ◆ **Enable outline:** Whether to display and mark the outline of original graph or not . That is, filling graph maintains original outline or not .
- ◆ **Whole computing:** It is an optimal option . If you select the option,

---

take all the objects which do not contain each other as a whole for calculation during filling calculation . It will increase the marking speed under some circumstances . (If you select the option, the computer computing speed will be reduced), otherwise, calculate each independent area respectively. For the convenience of description, we take a special example to describe the function .

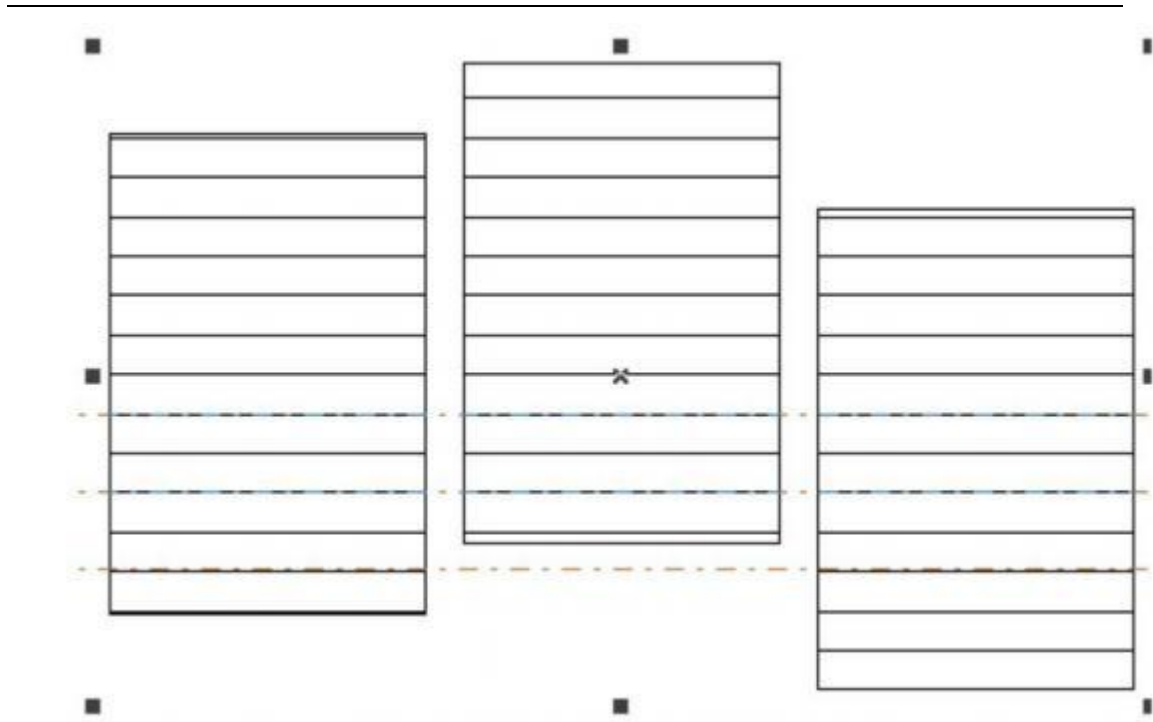


Example: Draw three independent rectangles in work space, with fill line space of **1 mm** and filling degree of  $0^\circ$  . **Do not tick “Whole Computing”**: mark the fill lines according to the marking sequence in the list of objects during processing . That is, mark the filling graph of an object, and then mark the next one, as shown below:



**Do not tick “Whole Computing”**


- ◆ **Tick “Whole Computing”**: Mark all the fill lines during processing . That is, mark the fill lines of several objects at the same line together, as shown below:




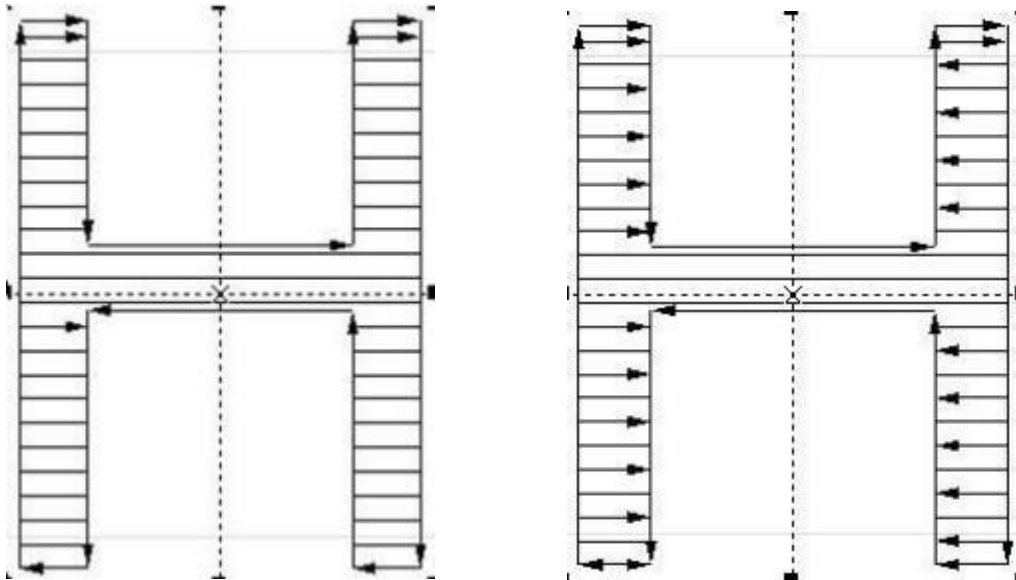
Tick Whole Computing

- ◆ **Average Fill line:** Solve uneven distribution of fill line at the beginning and end of filling object . Due to the settings of size and fill line space of filling object, there may be the phenomenon of uneven distribution of fill line at the beginning and end of filling object after filling . For simplifying operation, and reaching the purpose of even distribution of all the fill lines under the circumstance that the user will not reset line space, add the function . After selecting the option, the software will implement automatic fine adjustment of fill line space on the basis of fill line space set by the user, so that the fill line is distributed evenly.
  
- ◆ Increase an outline graph around fill line after completion of filling calculation .

### Filling Types


- ◆  **Optimizing bi-directional filling:** Similar to bi-directional filling, but there is connecting line between ends of fill line .

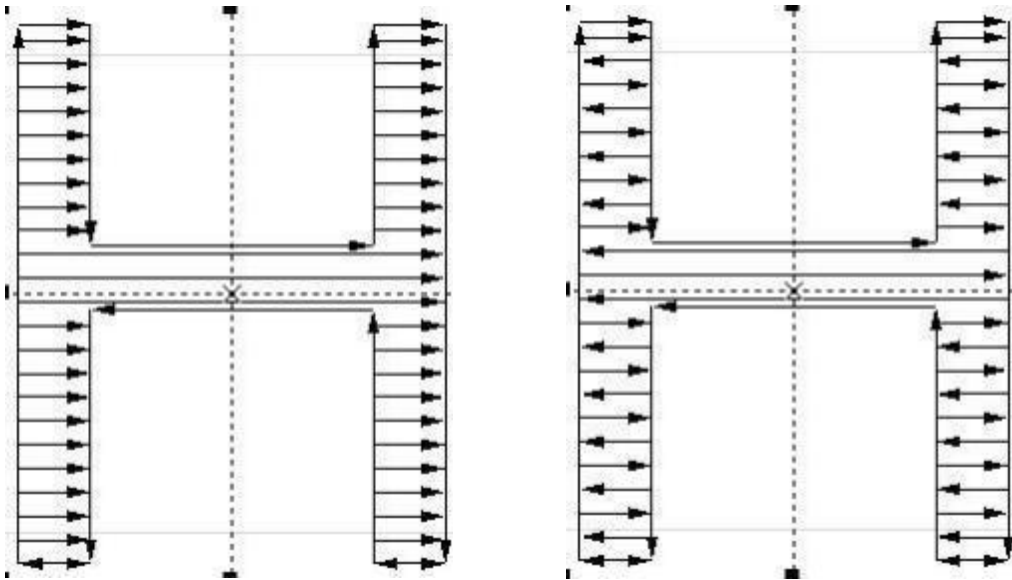
- ◆  **Optimizing arch filling:** Similar to arch filling, jump the area with blank object .



Optimizing Bi-directional Filling on the left, Optimizing Arch Filling on the right

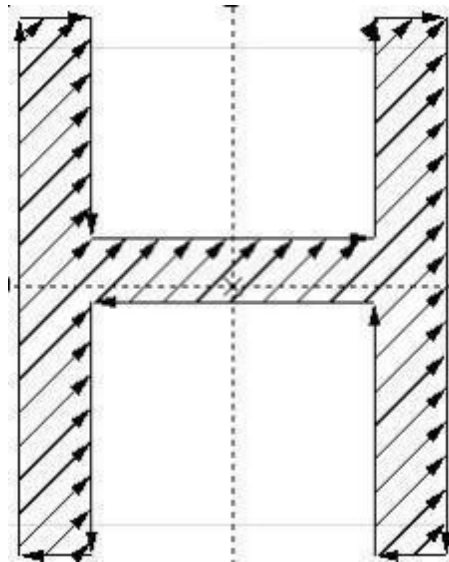
- ◆  **One-way Filling:** Fill line from left to right .

- ◆  **Bi-directional Filling:** Fill line from left to right firstly, and then fill line from right to left . The remaining line implements circular filling .



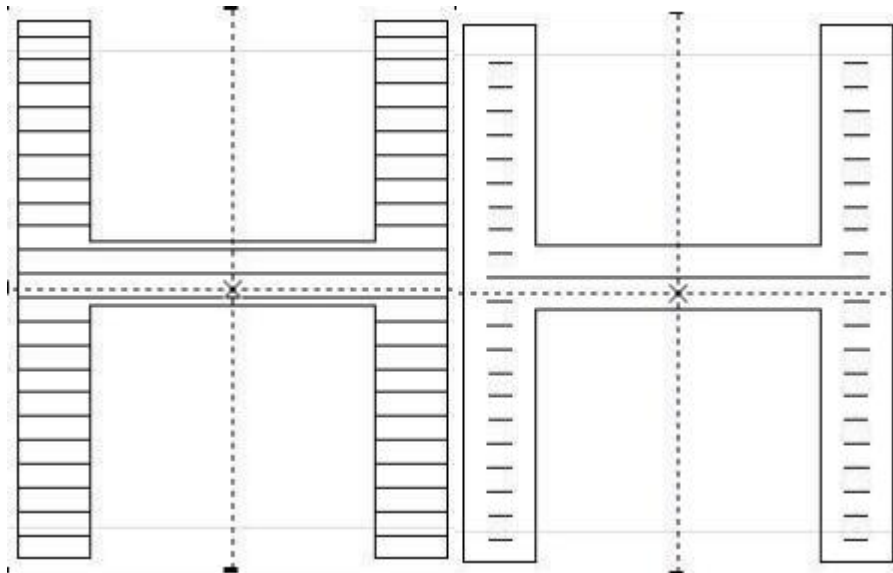
One-way Filling on the left, Bi-directional Filling on the right

- ◆ **Line space (mm)** : refer to the distance between neighboring lines of fill line .
- ◆ **Start offset (mm)** : refer to the distance between the first fill line and boundary.
- ◆ **End offset (mm)** : refer to the distance between the last fill line and boundary.
- ◆ refer to the included angle between fill line and X axis . The filling graph with filling angle of  $45^\circ$  is shown below:
- ◆



filling angle of  $45^\circ$

- ◆ **Edge Distance:** refer to the distance between fill line and outline object during overall filling calculation . As shown below, the distance between fill line and all the edges of object is edge distance .



Edge Distance Example

- **List :** Sort and manage the graphs in the list ( the marking order is from top to bottom in the list) , or delete it .



---

### 3.3. Settings

- **Marking Parameters**
- **Basic Parameters**

The image shows a software interface titled "Basic params" with a dark blue background. It contains several input fields for marking parameters. At the top, "Pen id" is set to "0" with a dropdown arrow. Below it are fields for "Mark speed(mm/s)" (4000), "Jump speed(mm/s)" (5000), "MopaPulseWid.(us)" (20), "Frequency.(KHZ)" (50), "Jump delay(us)" (150), "Point delay(us)" (200), "Light-on delay(us)" (-100), "Light-off delay(us)" (200), "Mark end delay(us)" (0), and "Corner delay(us)" (120). There is a checkbox for "Corner delay auto" which is currently unchecked. At the bottom right, there is a button labeled "Param Info".

Parameter	Value
Pen id	0
Mark speed(mm/s)	4000
Jump speed(mm/s)	5000
MopaPulseWid.(us)	20
Frequency.(KHZ)	50
Jump delay(us)	150
Point delay(us)	200
Light-on delay(us)	-100
Light-off delay(us)	200
Mark end delay(us)	0
Corner delay(us)	120

- **Pen number:** Select the pen with 0 to 15 numbered for configuration . Each pen number corresponds to one color.
- Range value of output power of laser device is 0% ~ 100% .
- **Frequency (kHz) :** It refers to laser's pulse frequency whose adjustment range is based on the type of laser device .



- **Speed (mm/s)** : Running speed of galvanometer when marking .
  - **Jump speed (mm/s)** : Refer to the running speed of galvo during empty jump . Empty jump speed is usually debugged with jump delay. The higher the empty jump speed, the more jump delay time .
  - **Jump position delay (us)** : The delay value of jump position
  -
- Function: Continue to execute the next vector command after galvo jumps to the target point .

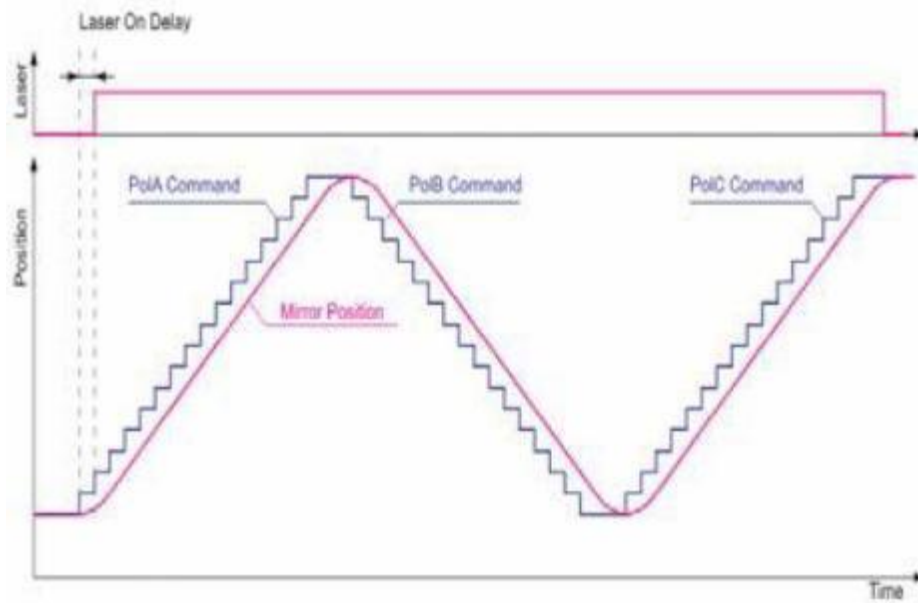


Jump delay example

- **Pulse width (us)** : Ratio of output signal frequency to width
- **Mopa pulse width:** Set the pulse width of Mopa laser device
- **Point time (us)** : This parameter is used to set the marking time if there are dot objects .
-

- LaserOn: The laser starting delay time at the beginning of marking . Appropriate setting of LaserOn delay parameter can eliminate “Burn-in” , but long-term delay will cause blank stroke . Negative value is allowed, and it means advance marking of laser.

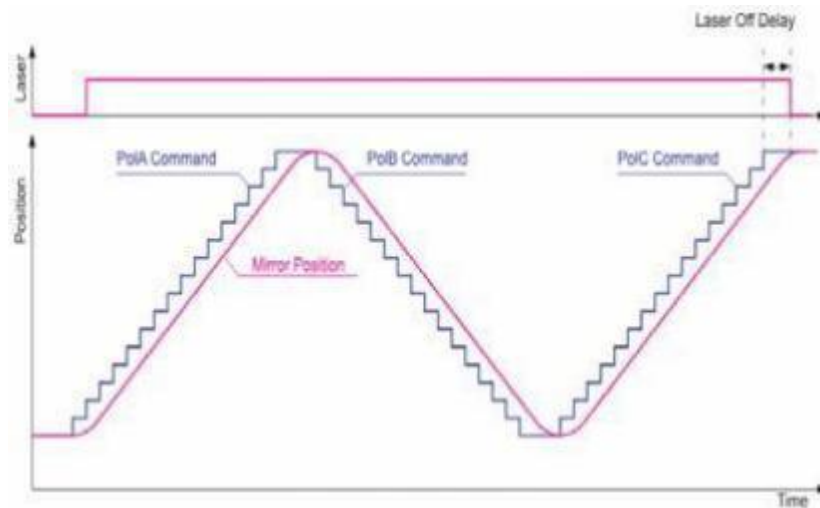
■



Laser starting delay time example

- **LaserOff delay (us)** : The laser closing delay time at the end of marking . Appropriate setting of LaserOff delay parameter will eliminate non- closed phenomenon at end of marking . But too long LaserOff delay will cause “Burn-in” at the end . Negative value is not allowed .

■



Laser closing delay time example

- **Effect delay (us)** : Execute a period for each switching of pen number unconditionally to guarantee effect of the change .
  - **Shape end delay (us)** : Galvanometer delay ( $0, + \infty$ ) after laser off
  -
- Role: Guarantee the accuracy and veracity of galvanometer track at end position . **Alleviate trailing phenomenon of IPG laser device to certain extent.**

---

- **Advanced Parameters**

The screenshot shows a configuration window titled "Advance params" with a list of parameters and their values:

Parameter	Value
Take effect delay(us)	20
FirstJump(us)	6000
JumpDisDelay(us/mm)	0
MaxJumpDelay(us)	1000
MinJumpDelay(us)	0
Light-on shift(us)	0
1st Line extend(us)	0
Line end extend(us)	0

A "Param Info" button is located at the bottom right of the window.

- **LaserOff lag (us)** : There is time difference between execution of command by galvanometer and laser device . Normally, the galvanometer is about 100us slower than laser device . Use the parameter for compensation .
- **First jump delay (us)** : First jump during marking, increase certain delay on the basis of original jump delay.
- **First pen delay (us)** :
- **Extension of the two ends of line (us)** :

- 
- **Corner delay (us)** : Delay time between marking sections

- **Corner delay changeable:** The smaller the corner angle is, the smaller the delay is . After enabling the function, ensure the mark quality of both right angle and arc .

- 

**Save default parameter:** Take each parameter under ordinary parameters as the default parameter, and save it .

**Use default parameter:** Replace current parameter configuration by the default parameter configuration .

	<b>Too Big</b>	<b>Too Small</b>	<b>Negative or Not</b>
<b>Speed</b>	快 Bad stroke, rapid marking speed	Fine stroke, slow marking speed	No
<b>LaserOn delay</b>	Burn-in effects at the start point	“Match end ” focus point in the beginning	Yes ( Negative value refers to advance laserOn)
<b>LaserOff delay</b>	“Match end ” focus point in the end	Non closure at the end	No

<b>Jump speed</b>	Short disposal time of empty stroke, decrease total marking time, but strokes will be connected together, and galvo movement is not stable	Long disposal time of empty stroke, increase the marking time	No
<b>Jump position delay</b>	Dispose next stroke after galvo speeds up and stops for a period, increase the marking time	PC starts to dispose next stroke after galvo slows down . Scattered point occurs at the start of stroke, and oscillations will occur at the start of a vector .	No
<b>Corner delay</b>	Increase the marking time, focus point at corner	Round appears during marking of right angle	No
<b>Shape end delay</b>	Focus point at corner, increase the marking time .	Under high speed, incomplete at the end of valid vector, easy deformation	No

Comparison of Settings of Pen List

### 3.3 . 1 . Marking mod es :

Trigger type

OptoCoupler(us) 40  Rise edge effective

Mechanical switch(us) 10000

Internal

Optimize trigger

Trigger delay  Close Min interval  Close

Distance(mm) 10  Distance(mm) 10

Time(ms) 10  Time(ms) 10

PipeLine Mode

Enable Param Spec

Trig.interval(mm) 100

Mark count 0

Optimize path

Auto sort  Near char first Optimization

Start position  Specified  Auto  Original

Pos.X(mm) 0.00 Pos.Y(mm) 0.00

Note:Optimization 1 is recommended for flight marking.

Others

Number of caches 5

Note:In the fast pipeline mode, if there is a miss, the number of cache can be increased

#### Trigger modes:

- ◆ **Photoelectric trigger/pedal trigger:** Select different trigger modes . The photoelectric trigger corresponds to the GD interface on the board, and the pedal trigger corresponds to the JT interface on the board .
- ◆ **Internal trigger:** Trigger marking automatically in the software
- ◆

#### Trigger optimization:

- **Trigger delay:**
- 
- **Delay distance (mm) :** Execute marking after how far the assembly line moves .

- 
- - **Delay time (ms)** : Execute marking after how long the assembly line moves .
  - 
  - **Minimum distance:** Holes on customer 's product may cause multiple triggers . To avoid this situation, set a minimum trigger interval .
  - 
  - **Distance:** The adjacent trigger must be greater than this distance, otherwise it should be filtered out .
  - 
  - **Time:** The adjacent trigger must be greater than this time, otherwise it should be filtered out .
  - 
  - **Pipeline mode:** Whether to enable pipeline mode
  - 
  - **Trigger distance (mm)** : The distance between marks .
  - **Marking times:** The times before the trigger.
  - 
  - **Path optimization:**
  - 
  - **Starting position:** Set the coordinate position of the shape .
  - 
  - ◆ **Designation:** Designate the starting coordinate of the first



---

marked shape .

- ◆
- ◆ **Automation:** Automatically set the starting coordinates of shapes according to the direction of assembly line .
- ◆
- ◆ **Original :** The coordinates of the shape are not changed . The coordinate should be the same with that of the shape in the work area .
- ◆
- **Others:**
  - 
  - **Number of caches:** Set the number of cache saved, and it cannot be 0.
  -

### 3.3 .2 . Assembly Li ne

Assembly line

From left to right  From right to left

Encoder

PulseLength(um/p) 15 Diameter(mm) 50

Encoder invert Pulses(p) 2000

Calculate Test

Assembly Line

Speed(m/min) 10

Static mark

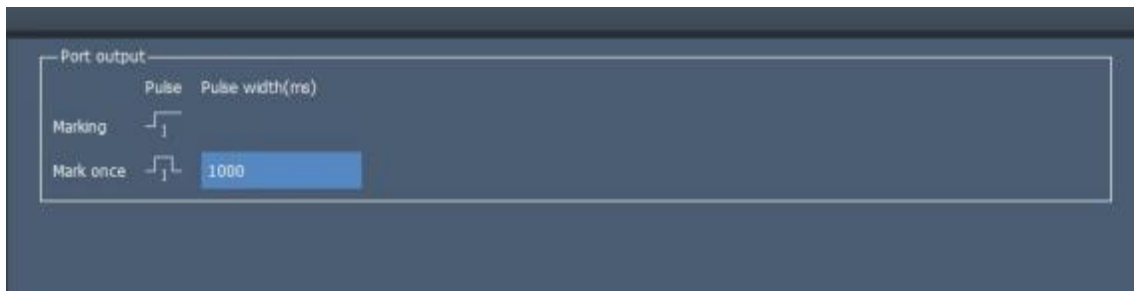
Speed correct

- **Direction of assembly line:**

- 
- From right to left/left to right: Set the running direction of the assembly line .
  
  - **Encoder:**
    - 
    - ◆ **Encoder reverse:** Exchange the input signal of encoder AB phases .
    - ◆ **Diameter (mm) :** The diameter of the encoder.
  
    - ◆ **Pulse per revolution:** Pulse per one full revolution of the encoder.
  
    - ◆ **Pulse distance (um/pulse) :** Movement distance of each pulse of encoder
  
    - ◆ **Calculation:** Calculate the pulse distance of assembly line based on the diameter and the pulse per revolution .
  
    - ◆ **Speed measurement :** Display the current speed of assembly line .
  
  - **Fixed-speed assembly line:** Select the mode of fixed assembly line for fly mark .
    - ◆ **The speed of assembly line (m/min) :** Set a fixed speed, and the value shall conform to current speed of assembly line .

- 
- **Static mark** : Static mark of assembly line
  - **Calibration of the speed of assembly line:** When the assembly line is fixed, use this function to observe whether the speed of the assembly line matches the mark .
  -

### 3.3 .3 . IO Paramet ers



- **Marking:** Set whether the corresponding output interface outputs high or low electrical level when marking .
- **Single marking:** Set the type and time of electrical level output by the corresponding output interface after completing each marking .

### 3.3 .4 . Regional Paramet ers



#### Regional Parameters


**Setting of galvanometer:** Set the datum of X/ Y axis and range of galvanometer.

#### 3.3.4.1.

- **Static area (mm) :** Set the range of galvanometer.
- **Work area (mm) :** Set the size of work area .
- **XY exchange:** Datum of galvo X/Y.
- **X/Y reverse:** Set the output inversion of galvo .

#### 3.3.4.2. Correction of Galvanometer

Correct galvanometer, two vertical corrections are corresponding to galvanometer X and Y respectively.

- 
- **BarrelAdj:** Refer to barrel or pillow-like correction coefficient . Default coefficient is 1.0 (reference range: 0.5- 1 .5) .
  
  - **LeanAdj:** Refer to the correction coefficient of parallelogram, and the default coefficient is 1.0 (reference range: 0.5- 1 .5) .
  
  - **TrapezoidAdj:** refer to the correction coefficient of trapezoid, and the default coefficient is 1.0 (reference range 0.5- 1 .5) .
  
  - **OffsetAdj ( mm) :** Adjust the offset between the actually marked shape and the predicated shape position .
  
  - **ScaleAdj (%) :** It refers to the flex percentage, and the default is 100% . This parameter will be adjusted when the trim size marked is different from the setting size . If the trim size is smaller than the designed one, users can raise this parameter; if the trim size is bigger than the designed one, users can lower this parameter.
  
  - **Scale:** When setting scale, press  directly. At this time, Fig . 2-10 will pop up . We can enter the dimension set in software and the measured actual mark size, and the software will calculate the scale automatically.
  
  -



Setting of Scale

#### 3.3.4.3. Modulation

- ◆ **Laser test** : Check whether the laser emits light normally.
- ◆ **Correction test** : Draw a rectangular box according to the set parameters to check whether the correction meets the requirements .
- ◆ **Red light test** : Test whether the red light changes correctly according to the red light parameters .
- ◆

#### 3.3.4.4. Red Light Correction

- **Enable display outline:** Display the outline of shape .
- **LaserOn delay:** The delay time of laser on .
- **The speed of red light (mm/s)** : Display speed of red light . The slower the speed, the more obvious the red light path . The faster the speed, the clearer the red light outline .

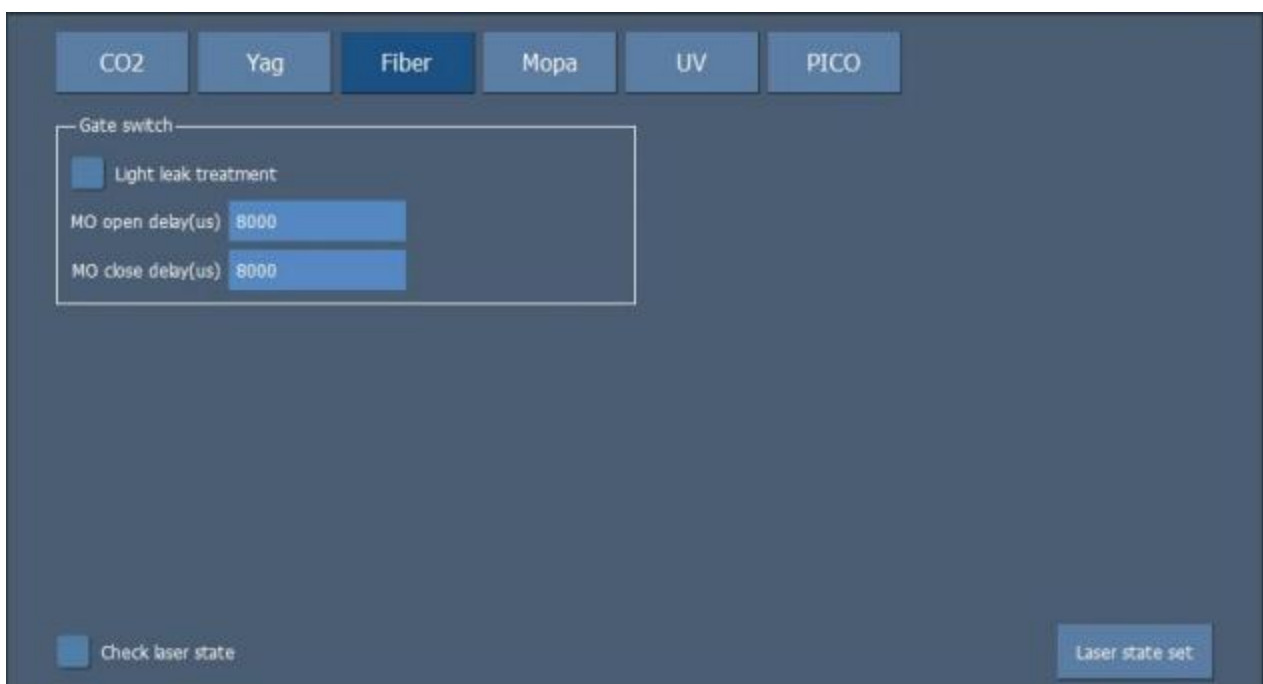
- **Offset position X ( mm) :** Refer to the set distance after deviating the frame or outline of red light to X direction .
- **Offset position Y ( mm) :** Refer to the set distance after deviating the frame or outline of red light to Y direction .
- **Scale X/Y:** Refer to the size deviation of red light and laser . Adjust the parameter to fully coincide laser and red light .
- 

### 3.3.4.5. Export/Import Files

Save the current correction value as a file/read the saved corrected file .

### 3.3.5. Laser Parameters

Set the types of the used laser device, and set relevant basic parameters, as shown below:



Laser Parameters

---

## CO2

- ◆ **Enable preionization:** Enable preionization signal . CO<sub>2</sub> laser devices of some manufacturers require such signal for normal work, such as laser device of SYNRAD .
- ◆
  - **Pulse width:** Pulse width of preionization signal .
  - **Pulse frequency:** Pulse frequency of preionization signal .
- ◆ **First pulse depress:** This function aims to solve mark on CO<sub>2</sub> machine . Too strong laser power, longer interval, or more laser energy saving will cause the phenomenon of “First Point Heavy” at the beginning of mark .
  - **Start power:** Power of first pulse .
  - **Power increment :** Power increment of each pulse, till the set power value .

## CO2/YAG/UV

- 

## CO2 / YAG/ UV

**Leakage:** Treatment of door signal delay time . When laser is unsteady, tick the Leakage . During marking, each LaserOn/ LaserOff will execute related door signal on/off delay time . If you fail to tick the Leakage during marking, execute a door signal on/off delay time only at the start position .

- **Door signal on time (us) :** Door signal on delay time before laserOn .
- **Door signal off time (us) :** Door signal off delay time before laserOff.
-



## YAG

- ◆ **Enable PWM signal** : Produce the modulating signal of certain frequency at PWM pin .

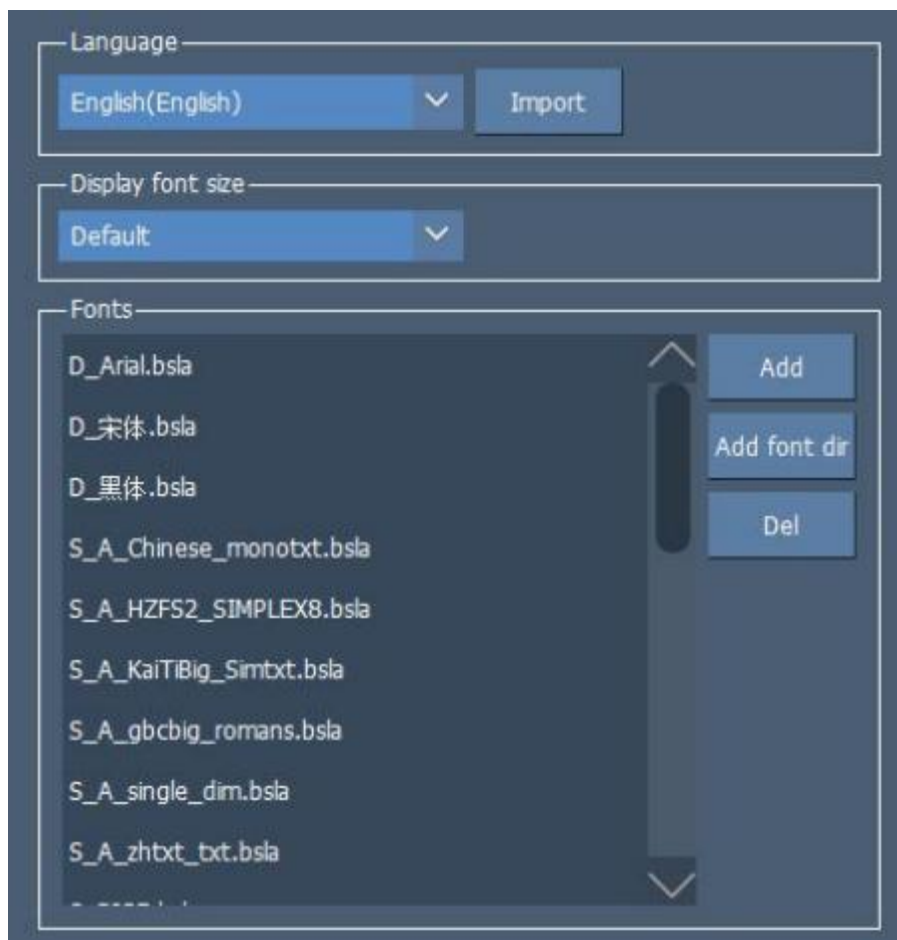
## YAG/ UV ultraviolet

- ◆ **Pulse width reversal** : Change PWM pulse is changed from high level to low level and vice versa . Deviate it to a corresponding phase angle to meet the requirements of PWM low-level and effective Q driver.

## Fiber/ MOPA

- **MO on/off time ( ms )** : Open MO before opening laser device transmission pin, set the MO on/off time .

### 3.3 . 6 . Languages and Font s



**Language:** Choose the language of the software .

**Fonts:** Manage existing fonts in the software . You can import the fonts in the specified location or delete the existing fonts . Currently, only fonts in .bsla format are supported. You need to use a font conversion tool to convert them .

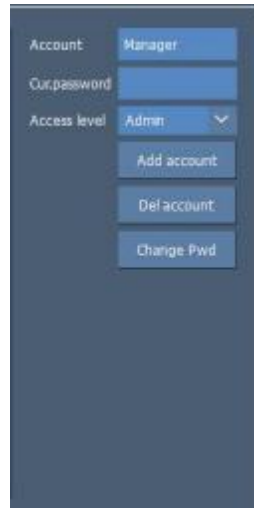
### 3.3 . 7 . Permi ssi on Paramet ers

Different permissions can be set for different users . Three user levels are provided by default .



Permission Parameters

### 3.3 . 8 . User Management



User Management

Users can be managed, such as adding, deleting, changing passwords and permission levels .

### 3.3 . 9 . Syst em

◆ **Company information:** Display information related to the company.

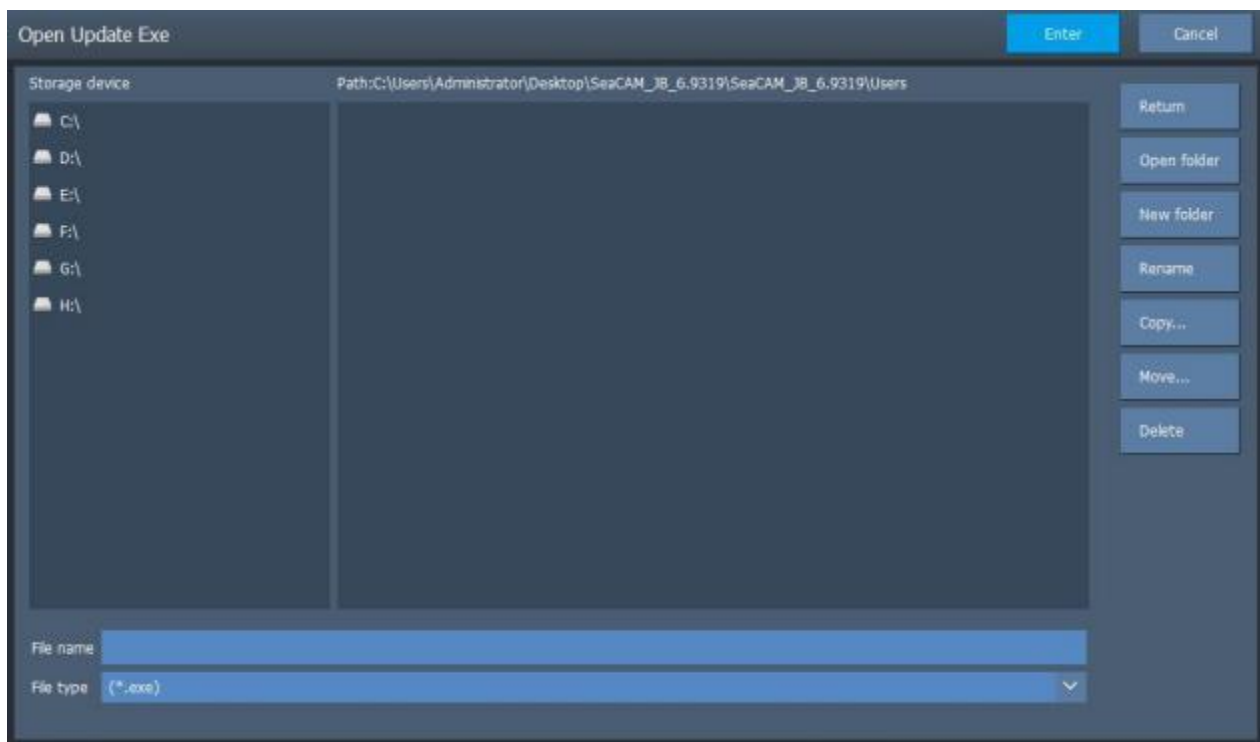
◆ **Update:** The company information can be changed by importing the specified XML file .

◆ **Update the start screen:** Specify the bitmap file that meets the requirements to change the start screen .

◆ Display the version numbers of software and hardware

◆ **Registration and upgrade:** Display the activation status of the current software, and provide functions such as registration and upgrade .

- 
- ◆ **Registration information:** Complete the registration with the registration file generated by the designated manufacturer.
  
  - ◆ **Generate a file:** Generate a file containing the information of this computer for manufacturer to register.
  
  - ◆ **Upgrade FPGA:** Upgrade the hardware version .
  
  - ◆ **Upgrade software:** Upgrade the current software version .



Click the “Upgrade Software” button and select the upgrade tool provided by Basiliang.

Enter the upgrade program, the red box is to select the new installation package to be upgraded, the green box is the files or folders that are not allowed to be modified under the original designated program (generally no need to be processed), click to start the installation, and wait for the installation to complete .

## ◆ Advanced Functions

Function options

Advanced options

Watchdog(ms) 1000

Refresh period(s) 600 Note:Update content if cannot be collecte encoder signal within the time,Use with caution!

Min. mark interval(mm) 100

Probation tip(day) 12

UV laser control Null

Config

Manual trigger Enable  Edit online Enable  Preview Enable

Illegal Trigger Enable  SerialNum reset Enable  Flowline speed Enable

CableMode Enable  GPO Enable  Real Fresh

Pen Enconde Enable  Variable text save in real time  Full screen launch

Debug

Open file with all its params

Log level Debug

Others

Restore Screen Set

### 1. Advanced Functions

◆ **Enable watchdog (ms)** : If there is no signal from the host computer within the set time, it will be reset, and the corresponding output interface will output the signal .

◆ **Timed update (s)** : Even if not triggered, the time element in the marking content will be automatically updated according to the set time .

◆ **Minimum logistics distance (mm)** : This parameter will only affect the calculation of the suitable assembly line speed of the software, and will not affect the actual marking . It is not necessary to set it .

◆ **Trial period reminder**: If it is a trial version, how long will it be before the trial period ends .

---

**2. Function configuration:** Some advanced function switches . Among them, note that the assembly line mode can only be used with the board FPGA12 . 12 .X and above .

**3. Debugging:**

a) **SDK code test log:** Open it to read related logs in

b) **Interface code test log:** Open it to read the related log in

c) **Open all attributes of the template:** Tick it to save all parameters in the template .

**4. Others**

**Factory reset :** All settings can be reset to the factory state .

**3 . 4 . Marking**

The "marking" window is a laser operation interface for the designed files . Before the official marking , please repeatedly debug the marking parameters and carefully check the design documents to avoid unnecessary losses !

NOTE :The marking window is mainly divided into five parts: status bar, preview area , optional function, parameter display and marking operation .

---