

Four-Axis Laser Welding System Instruction Manual_v1.0

Website: <http://www.01mark.com/>

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1 Summary

1.1 Software Introduction

1.2 Software Function

1.3 Interface Description

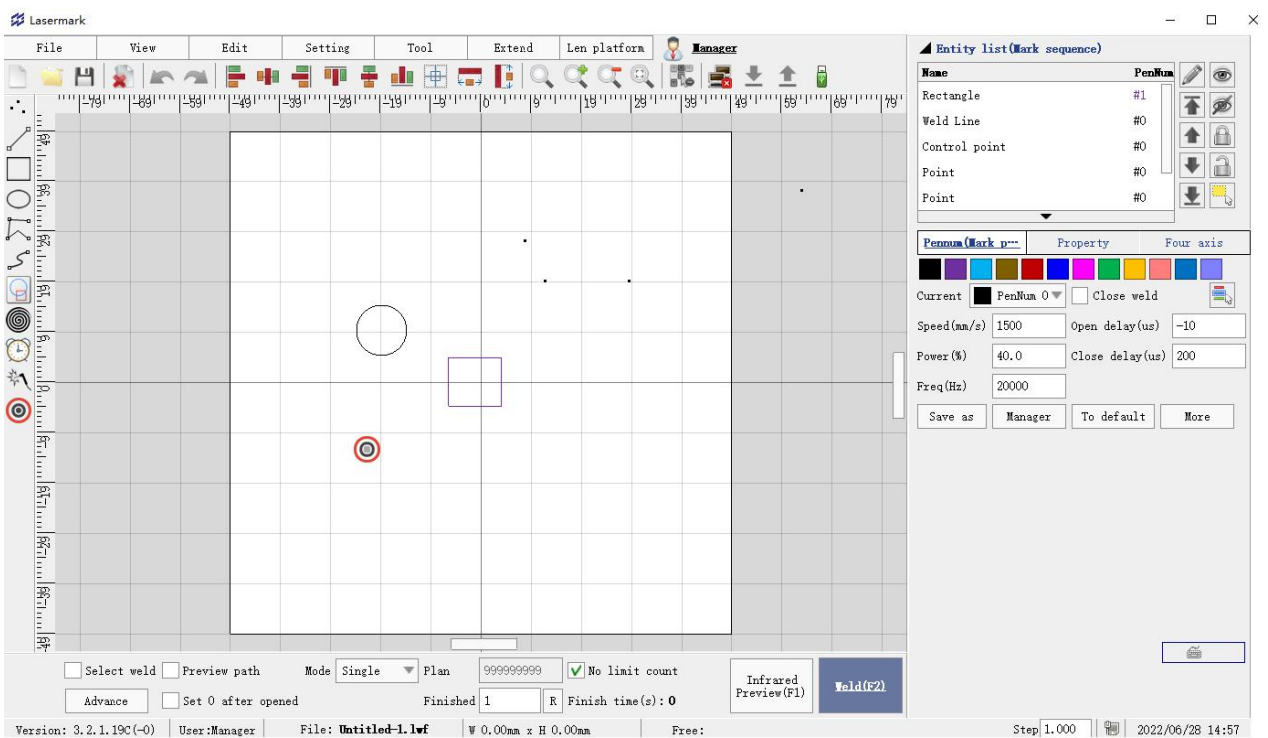


Figure 1-1

2 File Menu

The File menu implements general document operations, including New, Open, Save As, Save, and resource import and export. Figure 2-1.

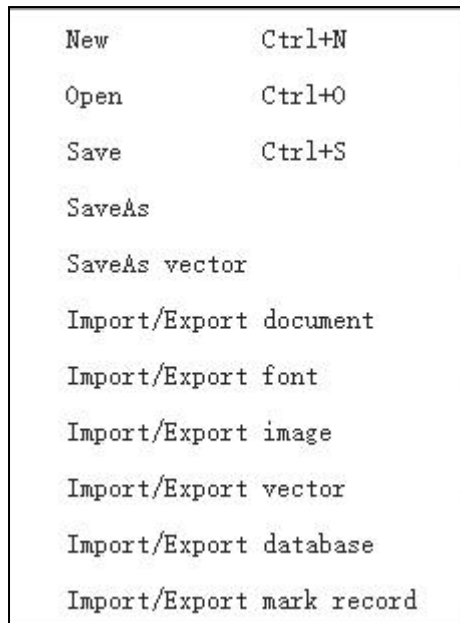


Figure 2-1 File menu


2.1 New

The New menu is used to create a new document with a blank editing area, and the shortcut key is CTRL+N.

When clicking the New menu or pressing the shortcut key, if there is currently a document being edited, the user will be prompted to save, and then the Input File Name dialog box will pop up and create a new blank document, as shown in Figure 2-2.



Figure 2-2 The new file name is entered

The corresponding button for the new menu in the shortcut toolbar is , Click this button to achieve the same function.

2.2 Open

Open the menu to open a saved document in the laser welding machine, with the suffix name of lmf3, and the shortcut key is that of CTRL + O.

When clicking to open the menu or press the shortcut key, the selection file dialog box will pop up, as shown in Figure 2-3.

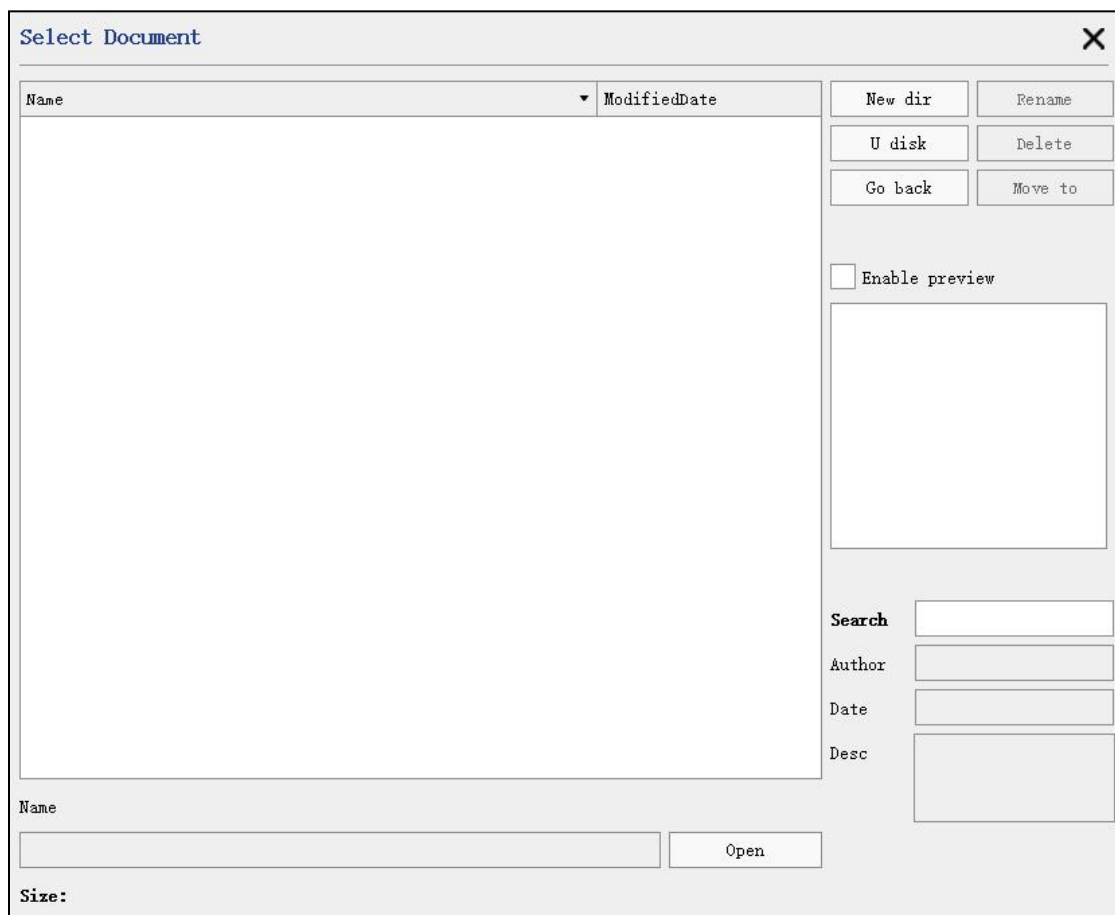


Figure 2-3 Select the File dialog box

In the Select File dialog box, you can click the file name in the file list area as required, and then click the Select button to open the document. If the document is saved in a subdirectory, it can be browsed and selected by double-clicking the subdirectory item to open the subdirectory. At the same time, when a file is selected, it can be renamed or deleted. Support keyboard up, down, left and right to select


documents. After selecting a document, you can view the author, date and description of the document creation on the right.

Click [Modified Date] in the title bar to display the latest modification time of the file from top to bottom.

Enter a keyword to quickly find files.

If the current U disk (note: only FAT32 format U disk is supported) has been inserted into the control panel, you can open the files in the U disk.

Check [Enable Preview] to preview the currently selected document (Note: If the document contains a lot of content, there may be a freeze when switching the selected document. If the freeze is serious, it is recommended to uncheck the preview function).

Open menu The corresponding button in the shortcut toolbar is , Click this button to achieve the same function.

2.3 Save As

Save As menu for saving documents currently editing into different file names, as shown in Figure 2-4.

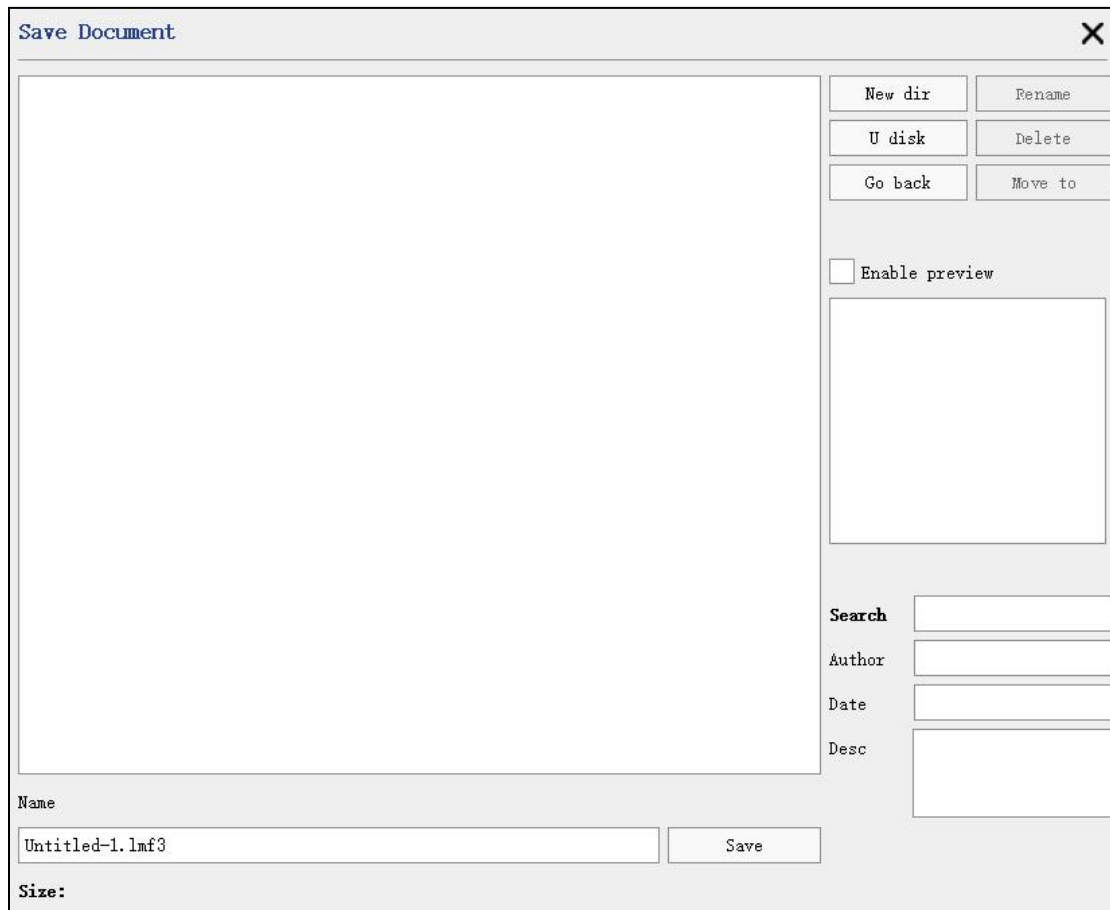


Figure 2-4 The Save the File dialog box



In the Save File dialog box, you can save the current document to any named file, or select an existing file to overwrite.

In the right column, you can enter the author of the document and create the date and description.

2.4 Save

The Save menu saves currently edited documents with the shortcut key of CTRL + S.

If the currently edited document is a new document, perform Save as feature in section 2.3, which will not be described here.

The corresponding button for the save menu in the shortcut toolbar is  , click this button to achieve the same function. If the current document cannot be saved (if no editing, etc), shown as  , unable to click at this time.

2.5 Save as Vector

Save the current content as a vector graph.

2.6 Import / Export documents

Shortcut operation menu, see [Upgrade Management].

2.7 Import / Export Vector

Shortcut operation menu, see [Upgrade Management].

3 View

View menu implements zoom display of workspace as shown in Figure 3-1:

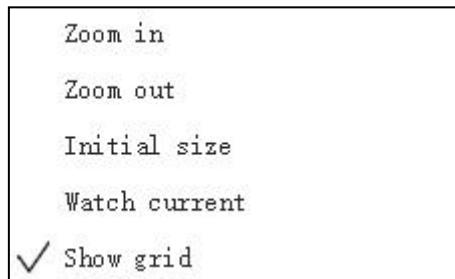




Figure 3-1

Click to enlarge or click on the toolbar  The button enlarges the workspace display;

Click to put a small bar or a toolbar  The button shrinks the workspace display;

Click on the original size or the toolbar of the  The button can restore the workspace original display size;

Click on the current or toolbar  The knob can zoom in to display the currently selected mark;

Click the Display Grid to switch the grid display / no display in the workspace;

4 Edit

The editing menu implements the editing operation of the tags, as shown in Figure 4-1.

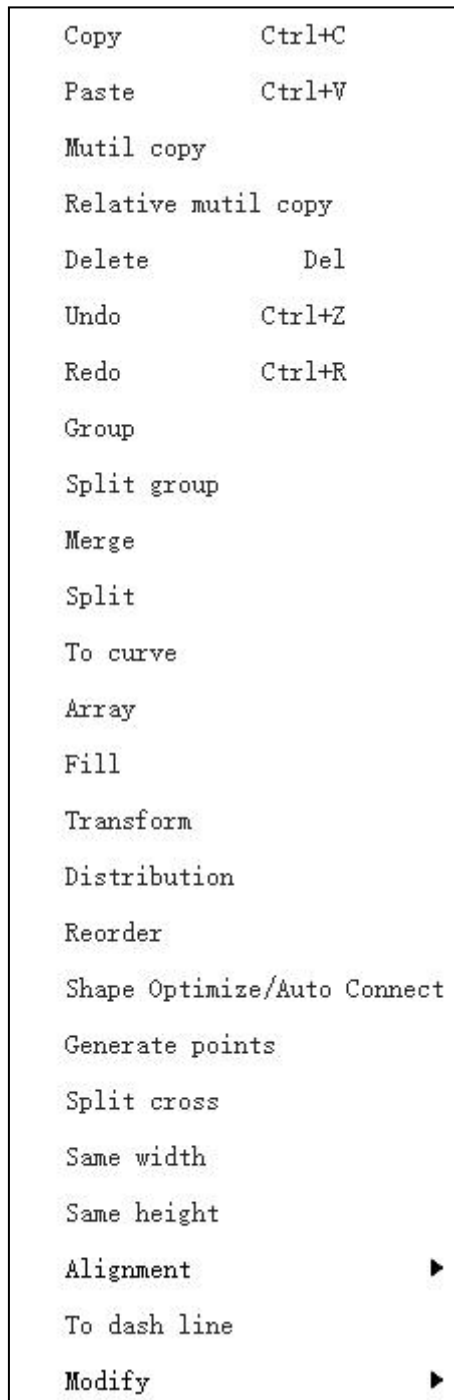


Figure 4-1 edit menu

4.1 Copy

The Copy menu replicates the currently selected tags that supports copying multiple tags, and the shortcut key is CTRL + C.

4.2 Mutil copy

The Multiple Copy menu is used to copy the currently selected markers following the selected parameters, as shown in Figure 4-2.

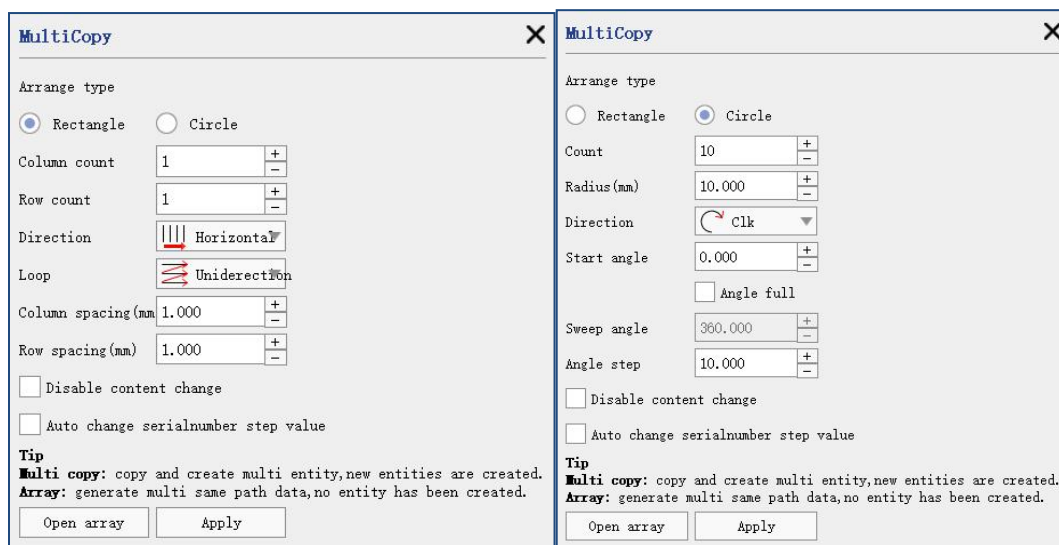


Figure 4-2 Mutil copy

Mutil copy is similar to replication, in that Mutil copy is replicated multiple times according to the set parameters. The parameters are described as follows:

4.2.1 Rectangular arrangement

Column count: Indicates the number of selected markers displayed in the horizontal direction of the edit area.

Row count: Indicates the number of selected markers displayed in the vertical direction of the edit area.

Direction: Indicates the direction in which the selected tag is copied when the number of rows and columns are increased simultaneously, which affects the order in which the tags are engraved. There are two common horizontal and vertical directions.

Horizontal direction represents markers generated in left to right and top to bottom. The number of rows and columns is both 3, duplicate serial number "01" is illustrated in Figure 4-3.

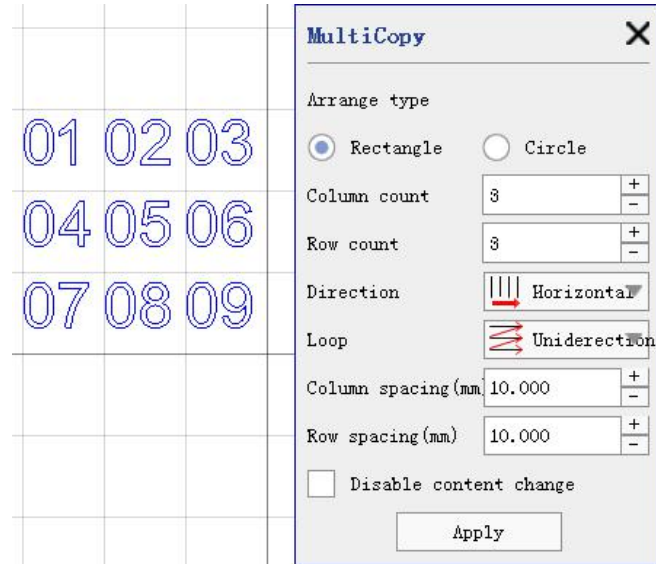


Figure 4-3 Marking effect generated by the horizontal direction

Vertical directions indicate sequential generation markers from top to bottom and left to right, as shown in Figure 4-6.

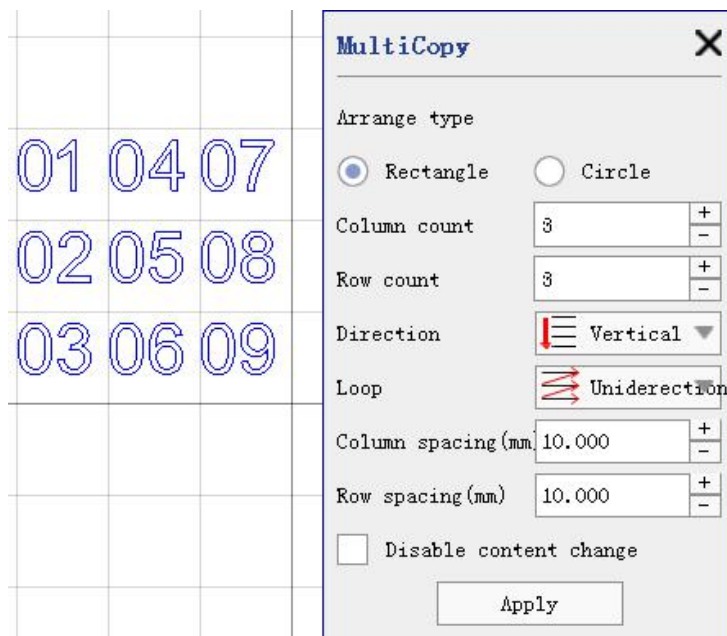


Figure 4-4 Marking effect generated by the vertical direction

Cycle: A rule indicating the direction of the replication when the selected marker increases the number of rows and columns, divided into unidirectional and bidirectional types. One-way direction has been illustrated in Figure 4-3,4-4 for

replication (e. g., from left to right, then from right to left, or from top to bottom, and then from bottom to top).

Row: By setting the column distance, you can change the horizontal distance of the newly generated marker from the original mark, based on the far left side of the mark.

Radius: By setting the row spacing, you can change the distance between the newly generated mark and the original mark at the top of the mark.

4.2.2 Circle

Count: Indicates the total number after copying.

Radius: The radius of the circle.

Direction: minutes clockwise and counterclockwise.

Start Angle: The start angle of the circle where the current marker is located.

Angle full: According to the distribution angle and number, the angle spacing is automatically calculated and distributed evenly (for example, if the number is 8, the distribution angle is 360, and the angle spacing is 45 degrees).

Sweep angle: The total angle range from the first to the last.

Angle step: The angle between adjacent marks, after the angle is full, this value cannot be set.

Take copying the serial number "01" as an example, the effect is shown in Figure 4-5.

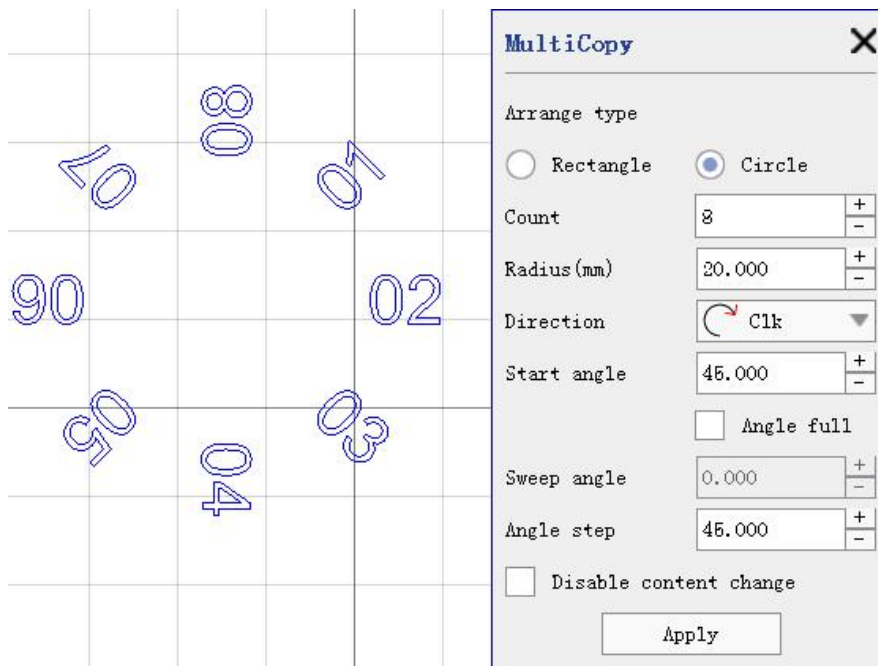


Figure 4-5 Round arrangement copy

Disable content change: Does the copied tag update the content. If checked, the copied tag content will remain unchanged, and the copied tag content will be automatically updated (e. g., serial number, database, etc., is updated to the next data).

Auto change serialnumber step value: If the copied tag contains a serial number, the step value of the serial number is changed to the current total number of the replicates. If four copies are copied, the step value of the serial number is changed to 4.

4.3 Delete



The Delete menu lets you remove the selected tag from the current edit area. The shortcut key is Del (Delete). The delete operation can be recovered by unthe menu.

Delete menu in the shortcut bar of the corresponding button is, click this button to achieve the same function. Delete menus are also available in the floating menu bar.

4.4 Undo

The undo menu cancels the last operation, and the shortcut key is CTRL + Z.



Undo the editing operations that mainly act on tags, including but not limited to the tag location movement, content modification, parameter modification, etc., and also include the addition and deletion of tags. The unoperation can be performed multiple times until the initial editing state. After saving the current document, Cancel cannot click until after the next edit operation.

The corresponding button for the Cancel menu in the shortcut toolbar is , click this button to achieve the same function. If there is no current undo operation, it appears as , unable to click at this time.

4.5 Redo

The redo menu cancels the last unoperation with the shortcut CTRL + R.

The redo mainly works on the undo operation, if the last operation of the current user is to undo, the redo function will work, otherwise the redo menu cannot be used. Redo operations can be performed multiple times until all undo operations are canceled. After saving the current document, the redo cannot click until after the next undo operation.

The corresponding button in the shortcut toolbar is , click this button to achieve the same function. If there is no current redo action, it is displayed as , unable to click at this time.

4.6 Group

Group operations retain the selected tags, and combine them into a group tag, facilitating movement, zoom, selection, replication, and other operations.

Separation group operation separates the group tag from multiple markers

before merging, and the tag type remains unchanged, such as grouping rectangles and circles into groups, and after separating the group, it returns to rectangles and circular markers.

4.7 Split Group

The Group menu is used to merge the current selection tag into a new tag, and to remove unique attributes to the individual tag itself. This post-Group tag can perform attribute modifications such as location shift and size modification like other tags, as well as replication, multiple replication, deletion, etc. Markers after Group can be G r o u p again with other markers.

The Split Group operation separates tags from multiple polygons, each independent of a new tag.

If the markers to be separated contain more than 100 polygons, then in 100 polygons, such as the markers to be separated contain 320 polygons, four Group markers (corresponding to 100,100,100,20 polygons), and then the markers to be modified.

If the tag to be separated contains less than 100 polygons, then the polygons in the tag are completely separated.

4.8 To curve

Turn other objects to curve objects, edit operations in [8.5 Curve].

4.9 Array

The array menu is used to generate multiple content of the currently selected tags following the selected parameters. As shown in Figure 4-6.

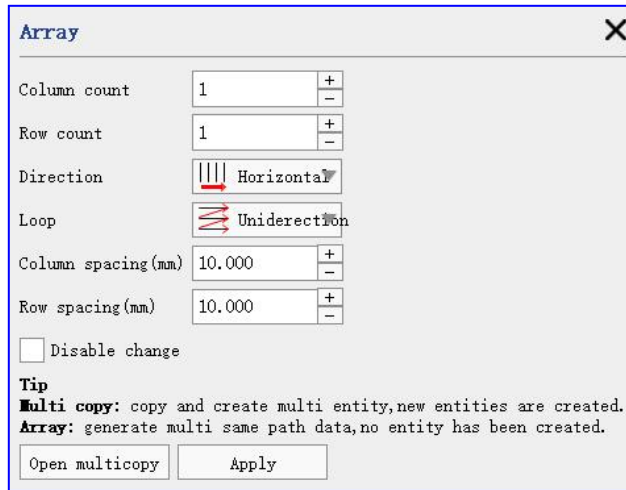



Figure 4-6 array

The new marker formed by the array is similar to the effect after [4.2.1 rectangular arrangement], in that the mark after the array is still a single marker, while the mark after multiple replication is multiple markers.

4.10 Transform

The transform menu contains move, zoom, rotate, flip, and tilt, with the shortcut buttons of , Figure 4-7.

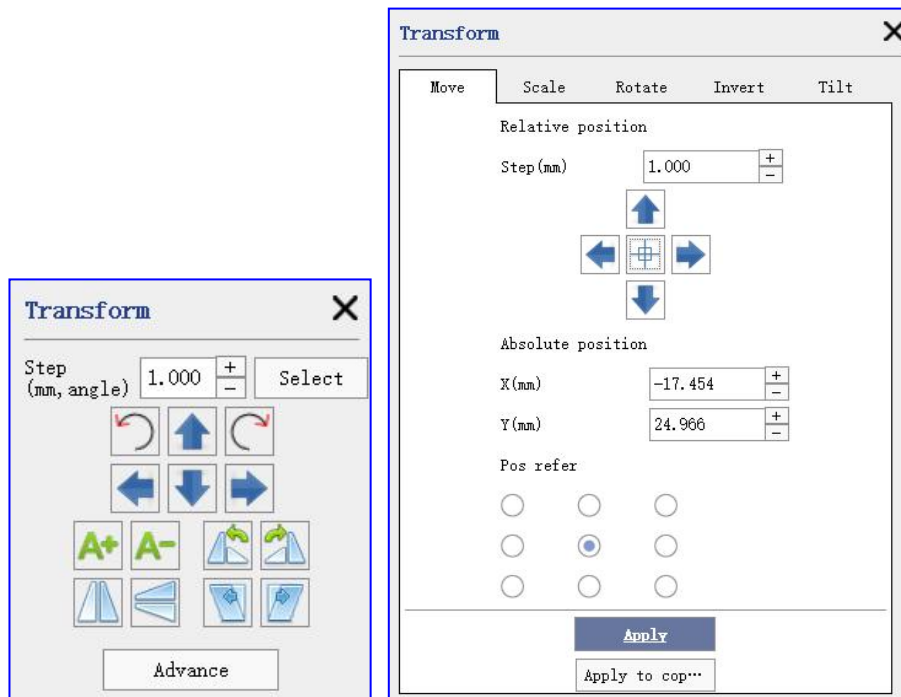






Figure 4-7 The the left is the simple transformation, and the right is the advanced transformation

Move: Divided into two parts: relative position and absolute position, relative position can modify the step size of each move and then selected  The four directional buttons are moved, and the absolute position is the corresponding coordinate reference according to the X and Y coordinate values input by the user, and moved to the coordinate value position. The absolute position setting needs to click the application effect.

Scale: It is to directly modify the width and height attributes of the mark. If you check Keep aspect ratio, when you modify one of the width or height, the other will also be modified proportionally; otherwise, it will not.  proportionally bigger and smaller.

Rotate: The user can choose to rotate counterclockwise or clockwise, and the angle according to their needs. Note that the angle here is a relative angle instead of an absolute angle..  to rotate 90 degrees left and right.

Invert: There are two modes, namely horizontal line flip and vertical line flip. The horizontal line base and vertical line base of flip are selected by the coordinate base below.  flip for horizontal and vertical lines.

Tilt: The interface is similar to the rotation interface, in that the rotation is the overall angular change of the marker according to the coordinate reference, while the tilt is the inclination inside the marker. The Angle here is still the relative one.

4.11 Distribution

The role of the distribution is to retype the selected multiple markers in the edit area in the specified distribution manner, making them distributed in the edit area with regular and equal spacing. The interface is shown in Figure 4-8.

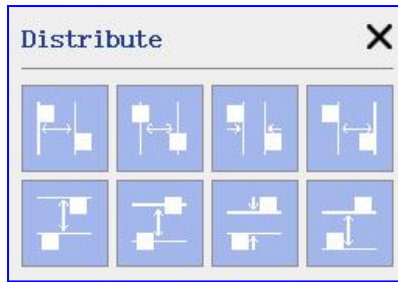
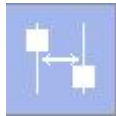


Figure 4-8

There are 8 distribution rules, namely, the left end, horizontal center, horizontal spacing, right end, top, vertical center, vertical spacing, and bottom end.



: Left end, with equal left margin based on the marked left line.



: Horizontal center, with equal center spacing based on the marked vertical bisector.



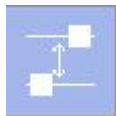
: Horizontal spacing, based on the marked spacing for left and right equally spaced typesetting.



: Right end, with equal right margin typesetting based on the right line of the mark.



: Top, with equal top margins based on the top edge of the mark.



: Vertical center, with equal center spacing based on the marked horizontal bisector.



: Vertical spacing, using the marked spacing as the basis for equal-space typesetting.



: Vertical spacing, using the marked spacing as the basis for equal-space typesetting.

4.12 Reorder

The selected markers are sorted horizontally / vertically. As shown in Figure 4-9.

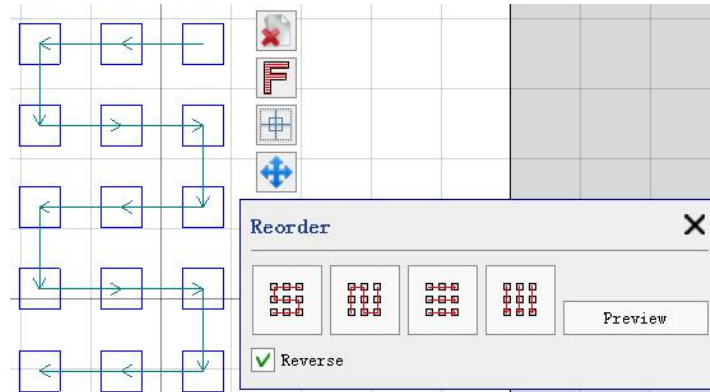
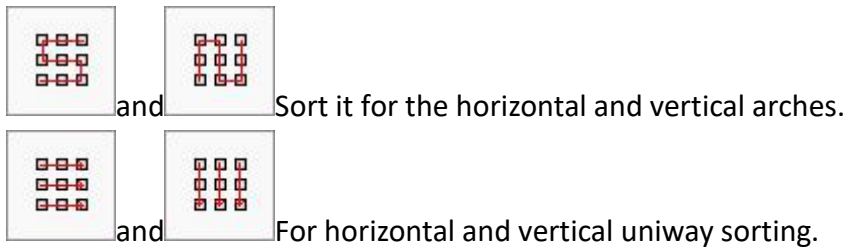


Figure 4-9



4.13 Shape optimize/Auto connect

The paths are specially optimized to facilitate the filling. See Figure 4-10.

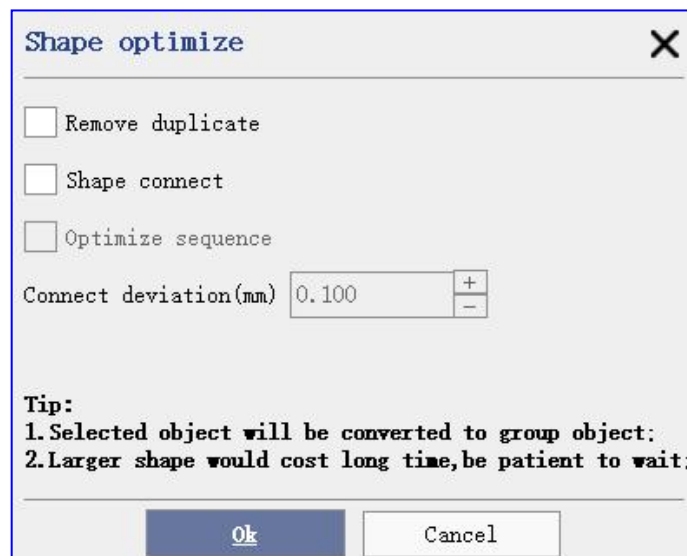


Figure 4-10

Remove duplicate: Remove the overlapping line paths.

Shape connect: Adjacent lines with connection error within the range of connection error values are full paths.

Optimize sequence: Some lines that seem to be connected together may be in random order in line direction, as shown in the left figure of Figure 4-11, even if the tick line connection does not work. At this time, check the optimized line order, and it can be converted into the path shown in the right figure of Figure 4-11, and the line is successfully connected.

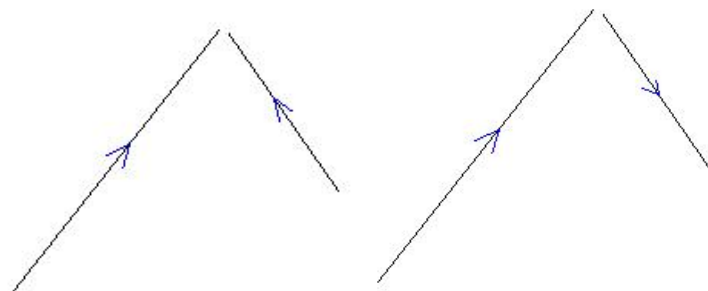


Figure 4-11

4.14 Generate points

Create a set of points from the selected tag profile. See Figure 4-12.

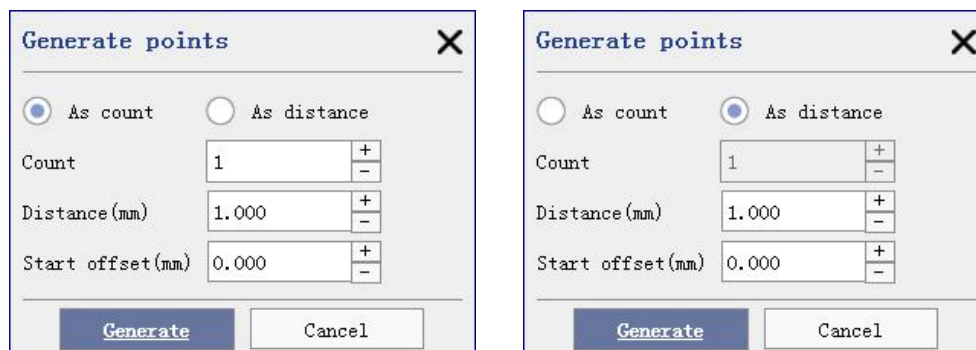


Figure 4-12

As count: Create multipoints by number and spacing.

As distance: Created from the first to the last point of the pitch profile.


Start offset: Refers to how far to start before calculating and generating point operations.

4.15 Split Cross

Used to remove intersections within markers or between different marker lines.


4.16 Same width

Set the width of the selected object to the uniform width.

The Same width has set the button in the menu bar to .

4.17 Same height

Set the height of the selected object to the uniform height.

The Same height has set the button in the menu bar to .

4.18 Alignment

Left alignment, horizontal center alignment, right alignment and apical alignment, vertical center, bottom end alignment were supported.

5 Toolbar

5.1 Move to the center



, Move the selected tag to the center of the view.

5.2 View



, Restore View original size.



, Amplification view area.



, Minimize view area.



, Observe only the currently selected markers.

5.3 Login



, The engineer default password is 000000. The administrator default password is 111111.

Login(CTRL+L): When logged login, the user does not have edit permission and can only open edited documents for welding.

Login can select the engineer or administrator, the engineer can modify the document, and the administrator changes the hardware parameters (such as laser calibration, etc.) to the authority of the engineer. Engineer permission can login automatically (if checked).

5.4 Hide quick tool bar



, hide/show quick tool bar.

5.5 Help



, ZeroOneLaser system help button.

6 Setting

The settings menu is shown in Figure 6-1.

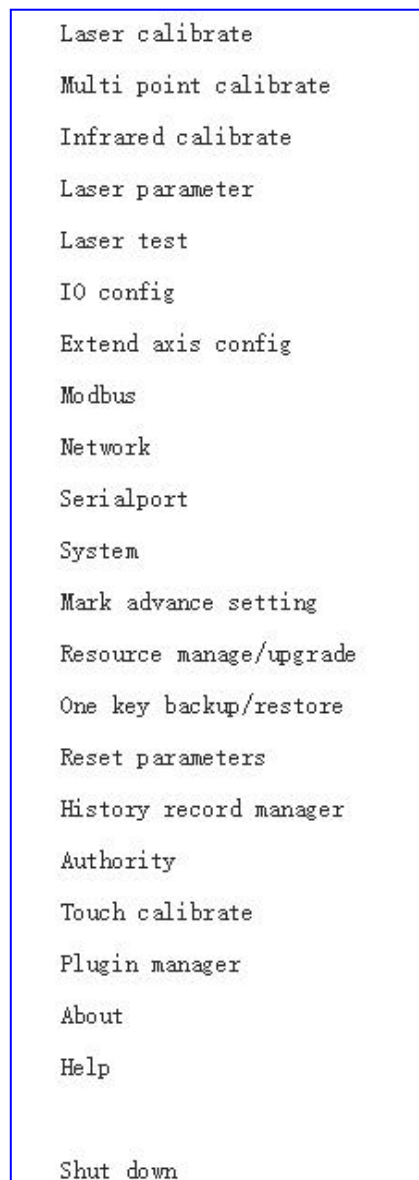


Figure 6-1 Setting

6.1 Laser calibrate

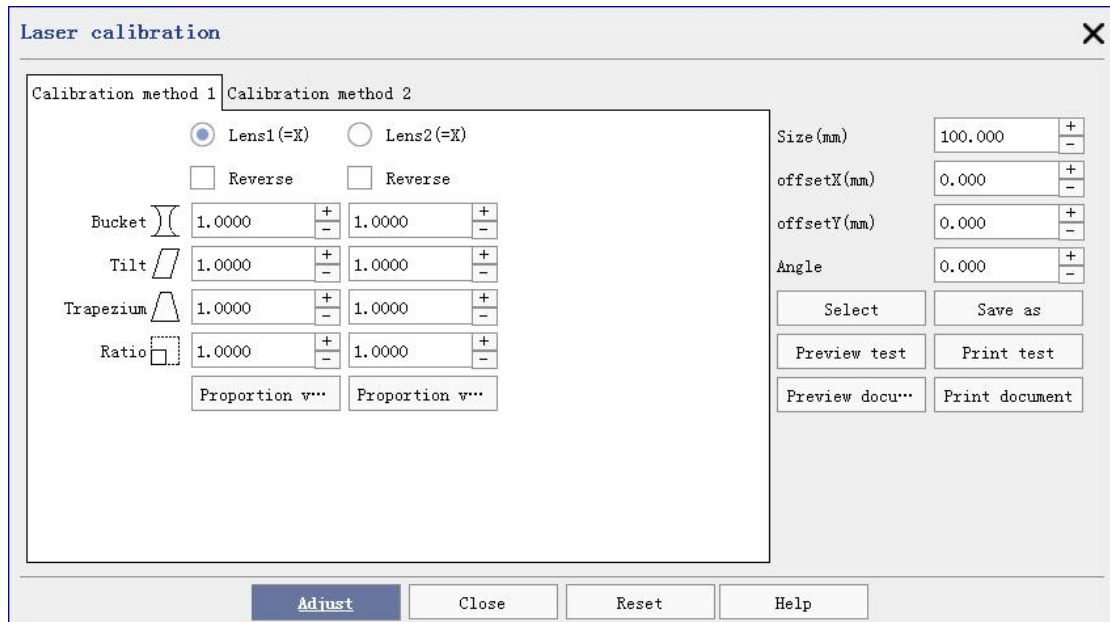


Figure 6-2-1 Laser Correction Method 1 Interface

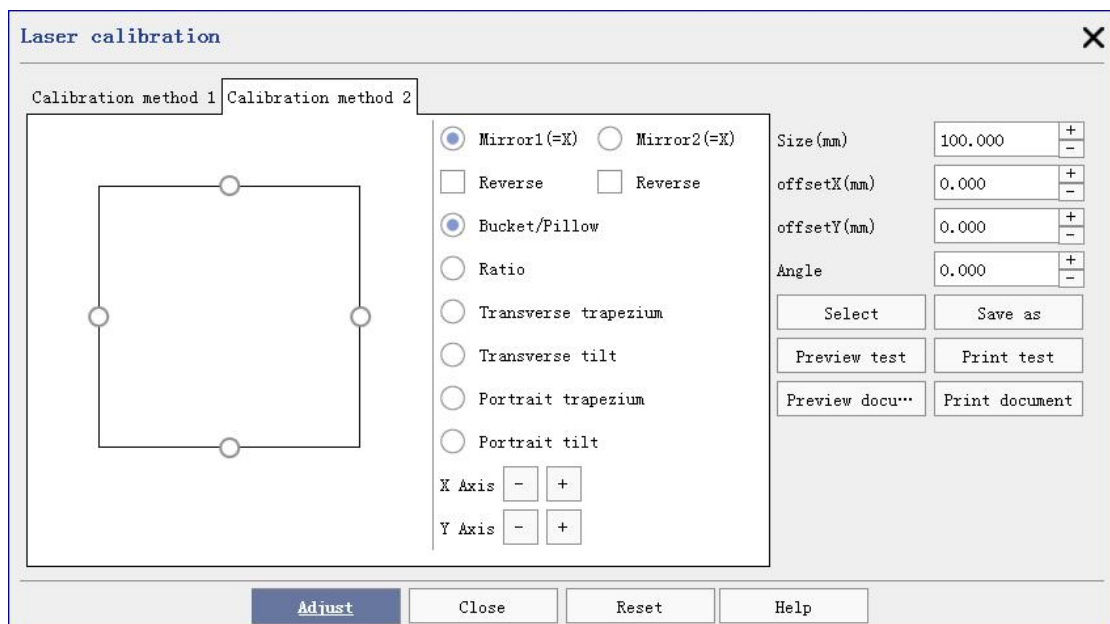


Figure 6-2-2 Laser Correction Method 2 interface

laser marking machine consists two lens. some physical properties of the lens and the light path causes morphing of the actual marked graphs. Some parameters are adjusted appropriately to make the actual marked graphs close to the designed graphs in software.

Lens1(=X):the output signal 1 from control card is as x-axis of user's coordinate system.

Lens2(=X):the output signal 2 from control card is as x-axis of user's coordinate system.

Reverse: reverse to the output of lens.



Bucket: When barrel deformation occurs, this parameter needs to be accurately corrected.



Tilt: When parallelogram deformation occurs, this parameter needs to be accurately corrected.



Trapezium: When trapezoidal deformation occurs, precise correction of this parameter is required.



Ratio: If the expected size of the graphic (the drawing size set in the software) does not match the actual size (the size of the actual engraved graphic sample), you can adjust the zoom ratio to correct it.

Size:the size of working area.It is normally set as the actual maximum marking range of lens..

Offset X、 Y: In all normal cases, the value of this field is only set to be X=0 and Y=0. If the carved position is found to be 5m to the right, enter-5m for the X item in this field; the rest, and so on.

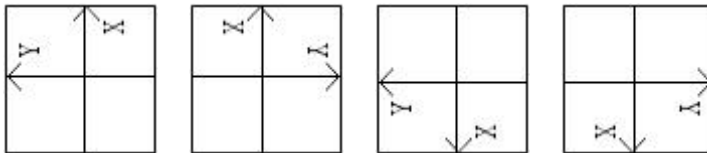
Angle: The whole welding whole counterclockwise at a certain Angle, unit degree. Note It must be corrected before this parameter can be set.

The sequence of lens parameter correction steps is generally as follows:

1. Correction of the galvanometer coordinate system;
2. Galvanometer reverse correction;
3. Barrel correction;
4. Tilt (parallelogram) correction;
5. Keystone correction;
6. Proportional correction;
7. Offset correction;

Step 1、 Galvo coordinate system correction

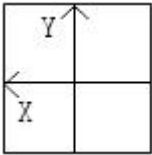
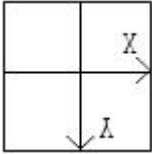
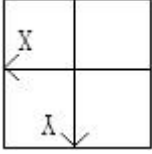
- ① Please All current parameters;
- ② Adjust the focal length of the vibrator;
- ③ Set the size of the galvanometer area, the default is 100mm;
- ④ Click button;
- ⑤ Check the welded X-axis, Y-axis and arrow position. If one of the following four renderings appears, select [galvanometer 2 (=X)];

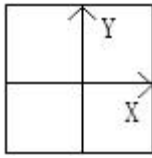


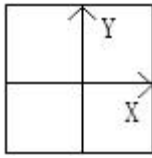
- ⑥ The calibration of the XY axis coordinate system of the galvanometer is completed, please continue with the following operations;

Step 2. Galvanometer reverse correction

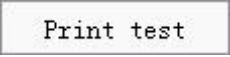
- ① The default X-axis and Y-axis [Reverse] are not checked;
- ② Click button;
- ③ View the welding effect

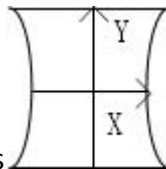
- If the effect is , Please check the [reverse] of the X-axis;
- If the effect is , Please check the [reverse] of the Y-axis;
- If the effect is , Please check [reverse] for the X and Y axes;



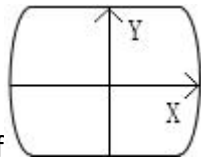
- If the effect is , It means that the reverse correction of the galvanometer has been completed, please continue with the following operations;

Step3. Bucket calibrate

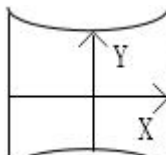
- ①The default X-axis and Y-axis [Barrel] parameters are both 1.0;
- ②Click  button;
- ③View the welding effect



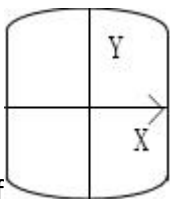
- If the X-axis effect is  please reduce the X Bucket parameter;

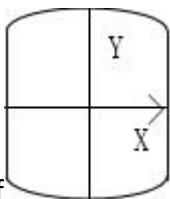


if  Please increase the X Bucket parameter;

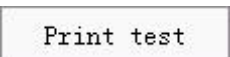


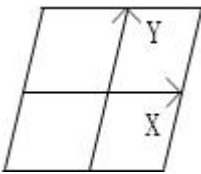
- If the Y-axis effect is  Please reduce the Y Bucket parameter;

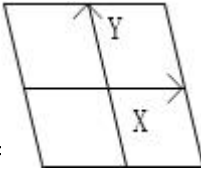


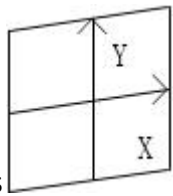
if  Please increase the Y Bucket parameter;

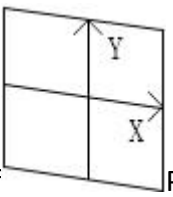
Step 4. Tilt calibrate

- ①The default tilt (parallelogram) parameter for the X and Y axes is 1.0;
- ②Click  button;
- ③View the welding effect


- If the X-axis effect is  Please reduce the X Tilt parameter;

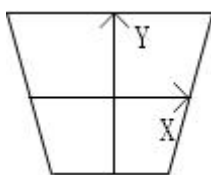
If  Please increase the X tilt parameter;

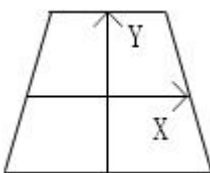
- If the Y-axis effect is  Please decrease the Y tilt parameter;

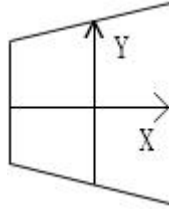
If  Please increase the Y tilt parameter;

Step5. Trapezium calibrate

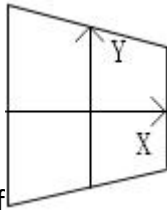
- ①The default trapezoidal parameter for the X and Y axes is 1.0;
- ②Click  button;
- ③View the welding effect

- If the X-axis effect is  Please reduce the X trapezoid

parameter; If  Please increase the X trapezoid parameter;



■ If the Y-axis effect is  Please reduce the Y trapezoidal



parameter; If  Please increase the Y trapezoidal parameter;

Step6.Ratio calibrate

①The default X-axis and Y-axis scale parameters are 1.0;

②Click button;

③Measure the width of the welded rectangle, if it is not equal to the expected width, click on the corresponding X axis , Enter the expected width into [Target Size], enter the measured width into [Actual Size], click OK, and go back to step ② to test the operation;

④Measure the height of the welded rectangle, if it is not equal to the expected height, click on the corresponding Y axis , Enter the expected height into [Target Size], enter the measured height into [Actual Size], click OK, and go back to step ② to test the operation;

Step7.Offset calibrate

①The default X-axis and Y-axis offset parameters are 0.0;

②Click button;

③If the welded position is more inclined to the right than expected, reduce the X offset parameter; otherwise, increase the X offset parameter;

④If the welded position is higher than expected, reduce the Y offset parameter; otherwise, increase the Y offset parameter;

DB15 galvanometer interface description

The control signal of the galvanometer is a digital signal, which can be directly connected to the digital galvanometer. Since the digital signal transmission protocol used by the digital galvanometer is not exactly the same, it is necessary to confirm which transmission protocol the digital galvanometer uses. This product only supports XY2- 100 protocol. Note: It is recommended to use a shielded twisted pair connection for digital signals.

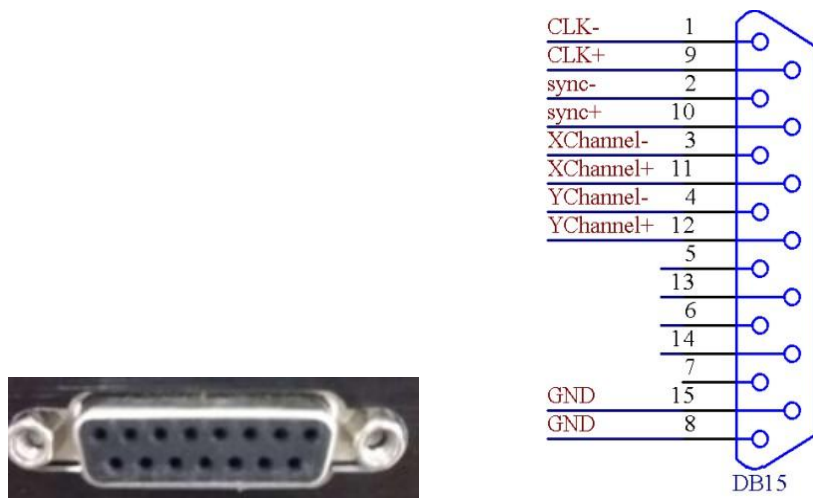


Figure 6-3 DB15Galvanometer interface

Pin number	Signal name	Specific instructions
1, 9	CLK-/CLK+	Clock signal-/Clock signal+
2,10	SYNC-/SYNC+	Sync signal-/Sync signal+
3,11	XChannel-/ XChannel+	Lens X signal-/Lens X signal+
4,12	YChannel-/ YChannel+	Lens Y signal-/Lens Y signal+
5,13	NULL	Reserved
6,14	NULL	Reserved
7	NULL	Reserved
8,15	GND	Ground

6.2 Multi point calibrate

Include 9 point correction, 25 point correction and Excel correction, and refer to multipoint correction use help.

6.3 Infrared calibrate

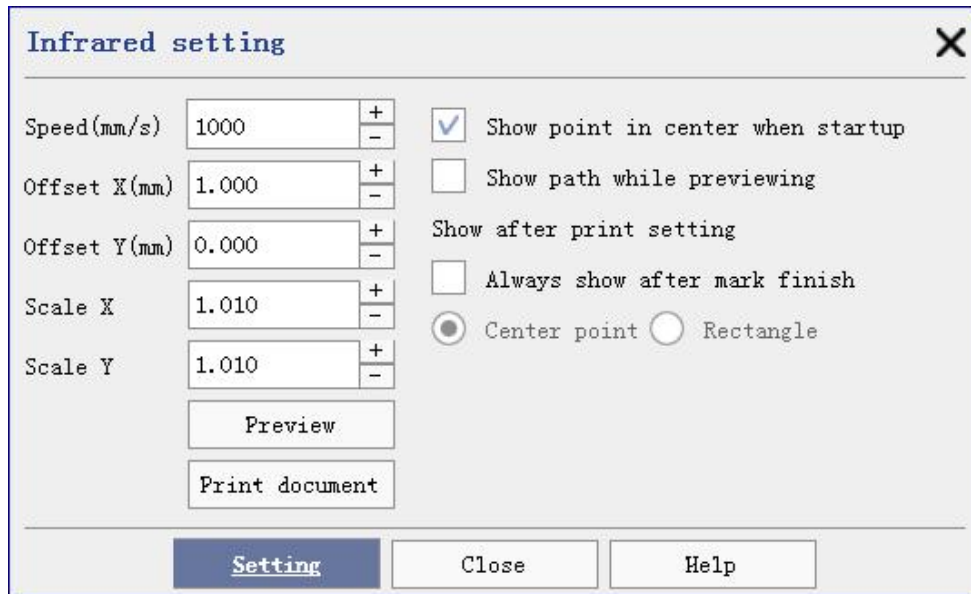


Figure 6-4 Red light correction interface

Generally, the laser welding machine is equipped with red light to realize functions such as preview and positioning. Since the position of the red light is generally not coincident with the position of the laser light, it is necessary to correct the red light.

Before calibrating the red light, the laser must have been calibrated.

Speed: The swing speed of the X and Y galvanometers during the red light preview.

Offset X: The red light preview is compared with the actual welding, the offset value on the X axis.

Offset Y: The red light preview is compared with the actual welding, the offset value on the Y axis.

Scale X: The red light preview is compared with the actual welding size, and the zoom in and out on the X axis.

Scale Y: The red light preview is compared with the actual welding size, and the zoom in and out on the Y axis.

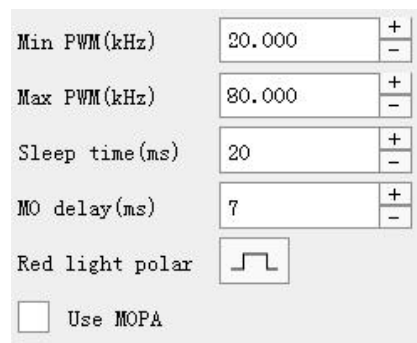
Show point in center when startup: Display a red light point in the center of the galvanometer after startup.

Show path while previewing: When unchecked, after previewing with red light, a rectangle of processing area will be indicated with red light. When checked, after previewing with red light, the specific welding path will be displayed. Note that when the welding file is too large (As picture), using red light to preview the outline is not good, only shows a rectangle of the processing area.

Preview: Preview the current document after modifying the parameters, support the keyboard to move up, down, left and right to modify the parameters, and automatically update the calibration parameters after stopping the preview.

6.4 Laser parameter

6.4.1 Fibre laser




Min PWM(kHz)	20.000	+ -
Max PWM(kHz)	80.000	+ -
Sleep time(ms)	20	+ -
MO delay(ms)	7	+ -
Red light polar		
<input type="checkbox"/> Use MOPA		

Figure 6-5 Fiber-optic laser parameter interface

Minimum PWM signal: Minimum allowable frequency of the pwm signal of the laser.

Maximum PWM signal: Maximum allowable frequency of the pwm signal of the laser.

Laser MO time delay: Before the fiber laser emits light, the main oscillator needs to be turned on in advance. After the main oscillator is turned on for 7ms by default, light can be emitted. For the specific delay, please check the laser instruction manual of the specific model.

Sleep time: After the fiber laser is welded, the main oscillator needs to be switched off to save energy. After the default laser welding, close the main oscillator

after 20ms. When frequent and fast welding is required, the interval between the two welds can be reduced by increasing the dormancy delay, so that the interval is less than the dormancy delay.

Use MOPA: Check this item when the laser is a MOPA.

Power mapping: Set the ratio of the user-defined power to the actual power corresponding to realize the printing effect corresponding to the actual power.

Vender: Select the laser manufacturer and model / sequence to automatically update the above parameters.

Fiber Laser DB25 pin description

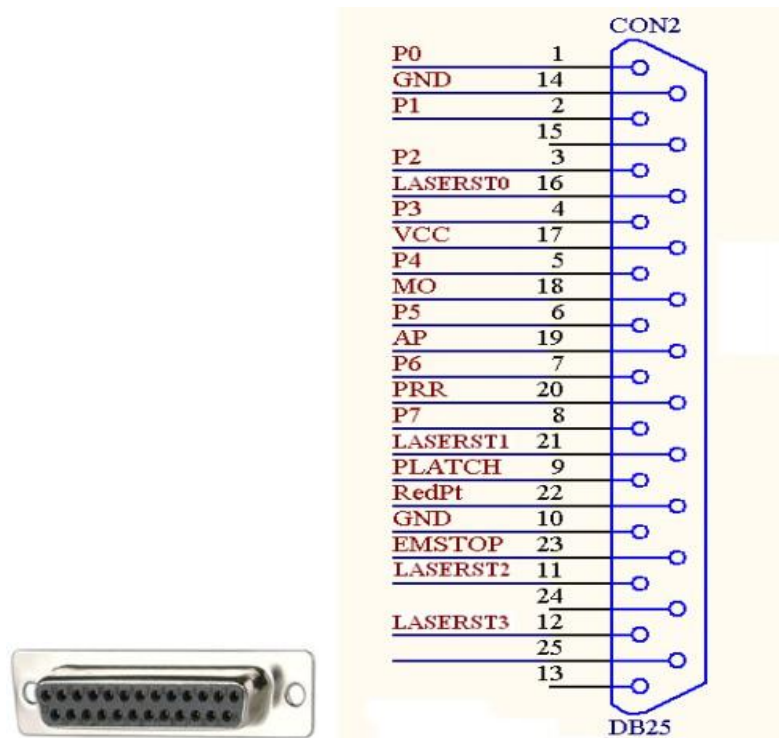


Figure 6-6 Optical Fiber Laser DB25 Tube Foot

Pin number	Signal name	Specification
1-8	P0-P7	Laser-based power. TTL output
9	PLATCH	Power-latch signal. TTL output
10,14	GND	Reference place of the control card
11,12,16,21	LASERST0-3	Laser state input
17	VCC	The 5V power supply output of the control card

18	MO	Main oscillator switch signal. TTL output
19	AP	Power amplifier switch signal. TTL output
20	PRR	Repeat the pulse frequency signal. TTL output
22	RedPt	Red light indicates that the light. TTL output
23	EMSTOP	Emergency stop switch signal. TTL output
13,15,24,25		This foot is suspended and is not connected

6.4.2 CO2 Laser source

The image shows a software interface for configuring a CO2 laser. It contains several sections, each with a checked checkbox and associated numerical input fields with up/down arrows:

- Use PWM output
 - Minimum PWM(Hz): 1
 - Maximum PWM(Hz): 25000
- Use pre-ionization
 - Pulse freq(Hz): 5000
 - Pulse width(us): 1
- Use CO2 first pulse control
 - Start power(%): 10
 - Power increment: 10

Figure 6-7 CO2Laser parameter interface

Use PWM output: The co2 laser enables the pwm to control the power. After disabled this, the co2 laser power cannot be adjusted, is always the maximum power welding, other parameters do not work.

Minimum PWM: Minimum allowable frequency of the pwm signal of the laser.

Maximum PWM : Maximum allowable frequency of the pwm signal of the laser.

Enable pre-ionization: Enables the preionization signal. The laser of the partial co2 requires this signal to work properly.

Pulse freq: Pulse frequency of the preionizing signal.

Pulse width: Pulse width of the preionization signal.

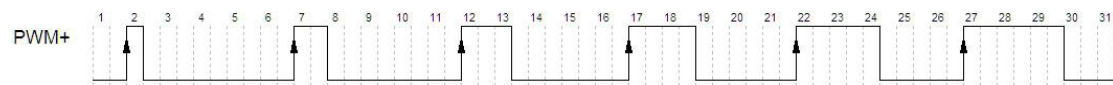
Use CO2 first pulse control: This function is designed to solve the welding on the CO2 machine, the laser power

Too strong or a long interval time, laser energy savings are more, at the beginning of the mark caused by the "first point of heavy" phenomenon.

Start power: After light out, the power of the first pulse is the percentage of the set welding power.

Power increment: From the first pulse, the next pulse increases the percentage, increasing to the set welding power.

Example: Suppose you need to type a text of "TEXT", the welding power is set to 80%, the initial power is 10%, and the power increment is 20%. After switching on, the first pulse power is 8%, the second pulse power is 24%, and the The power of the 3rd pulse is 40%, the fourth pulse is 56%, the fifth pulse is 72%, the sixth pulse is 80%, and then it is 80% until the light is turned off. As can be seen from the figure below, from the start of the light, the pulse width continues increase to the specified power.



Power mapping: Set the ratio of the user-defined power to the actual power corresponding to realize the printing effect corresponding to the actual power. Most co2 lasers can use the default power mapping, and the coherent co2 laser power map table needs to be modified, and its maximum power only corresponds to 60%.

CO2 laser DB25 pin description

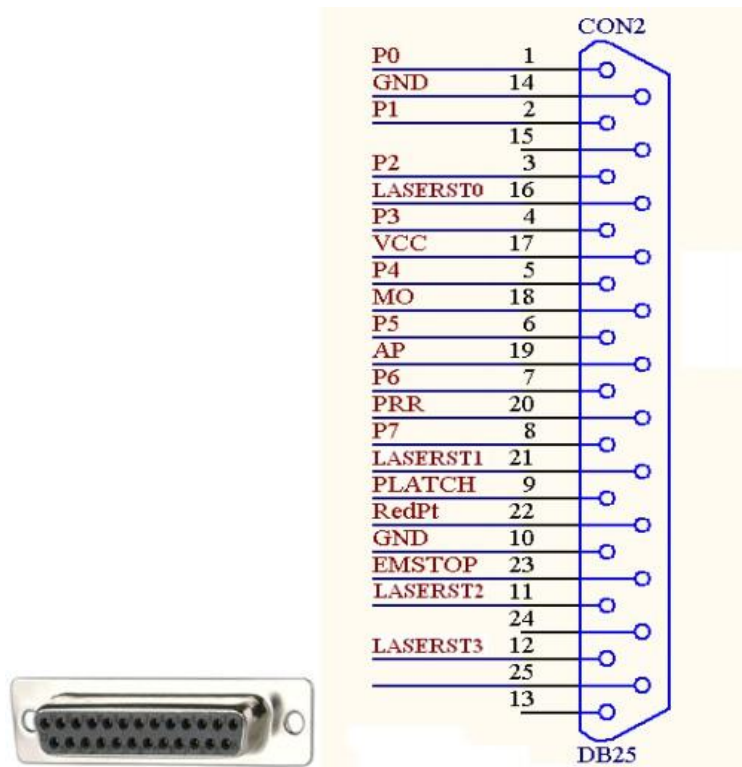
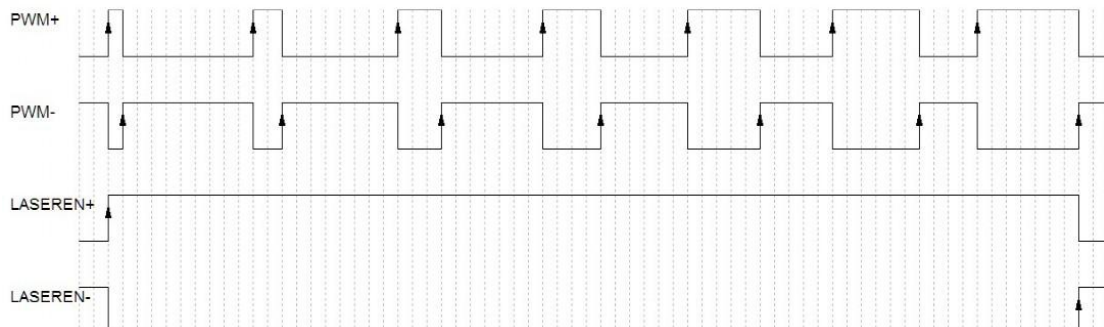


Figure 6-8 CO2Laser DB25 pins

Pin number	Signal name	Specification
4	P3 (CO2_LASER_EN+)	co2 enable signal+.TTL output.
5	P4(CO2_LASER_EN-)	co2 enable signal-.TTL output.
19	AP(CO2_PWM+)	co2 pwm+.TTL output.
20	PRR(CO2_PWM-)	co2 pwm-.TTL output.
10,14	GND	Ground
17	VCC	5V power output

co2 oscillogram



Description:

- 1.Pin 19 is PWM+ signal of CO2,refer to PWM+ in oscillogram;
- 2.Pin 20 is PWM- signal of CO2,refer to PWM- in oscillogram;
- 3.Pin 4 is enable signal + of CO2,refer to LASEREN+ in oscillogram;
- 4.Pin 5 is enable signal - of CO2,refer to LASEREN- in oscillogram;

Generally, the co2 laser only needs to be connected to pin 19 for normal welding. When some laser welding requires PWM differential signal, it needs to connect pin 19 and pin 20 at the same time. When the power signal is differential, you need to connect pin 4 and pin 5 at the same time.

Example 1: The M series CO2 laser of Wuhan Crystal Photoelectric Technology Co., LTD., which only the PWM pin 19 and reference ground pin 10.

Example 2: The Diamond G100 / G150 / E150 laser requires an enabling signal pin 4, a pair of differential signal pin 19 and pin 20, and a reference terminal ground pin 10.

6.4.3 YAG(UV)

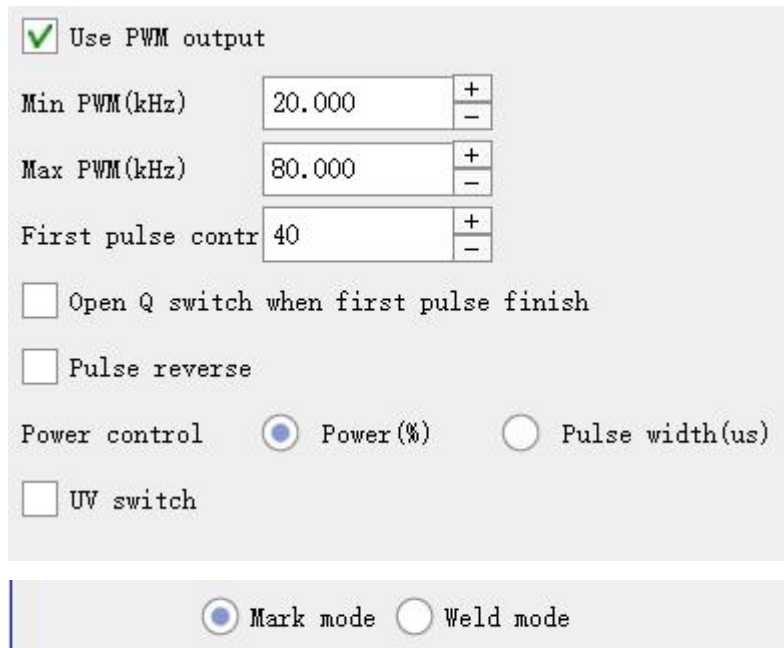


Figure 6-9 YAG(UV) Laser parameter interface

It is divided into marking mode and welding mode. In different modes, the

interface of the pen number (welding parameter) is different. If the laser is used for marking and connecting, please select the marking mode; if it is used for welding, please select the welding mode.

Use PWM output: The YAG (UV) laser enables pwm power control. When this is disabled, the YAG (UV) laser power cannot be adjusted.

Min PWM: Minimum allowable frequency of the pwm signal of the laser.

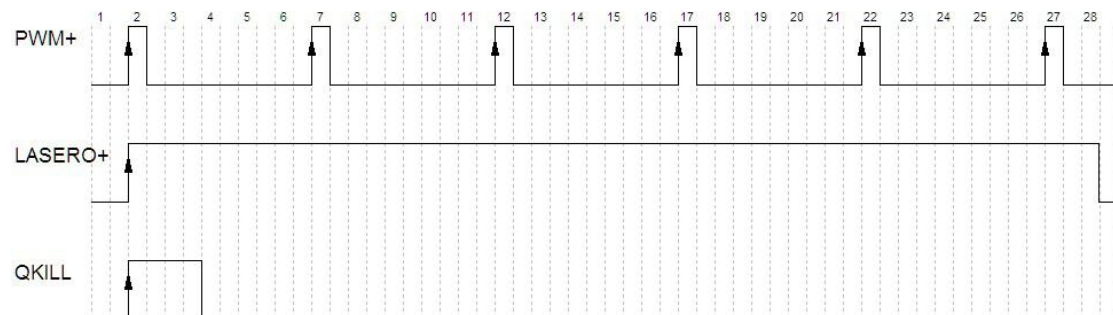
Max PWM: Maximum allowable frequency of the pwm signal of the laser.

First pulse contr: Duration of the first-pulse suppression signal when the laser is turned on. Used to avoid a match head or focus in the switch position.

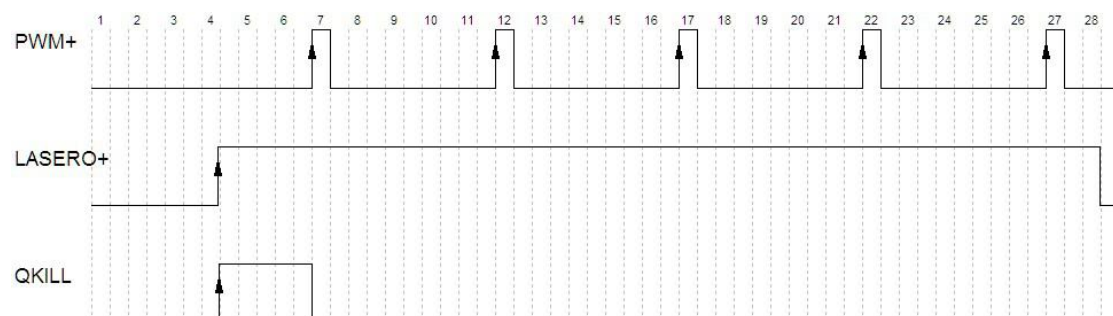
Open Q switch when first pulse finish: When the laser is turned on, the Q switch is turned on only after the first pulse suppression signal is over, otherwise, the Q switch is turned on only when the first pulse suppression signal is turned on.

Pulse reverse: The PWM pulse high level is changed to low level, the corresponding low level to high level and offset from the corresponding phase angle to meet the PWM low level effective Q drive requirements.

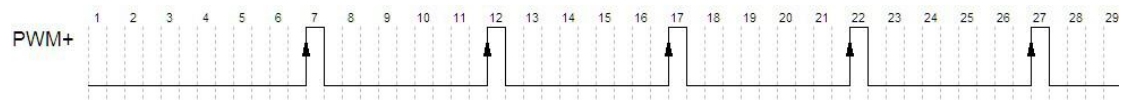
The following figure produces the first-pulse suppression signal simultaneously with the PWM signal.



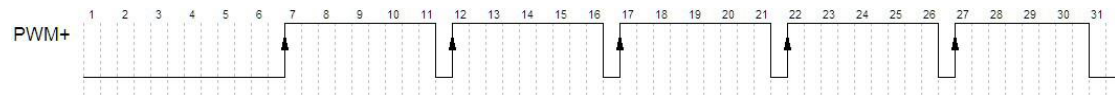
The following figure outputs the PWM signal after the primary pulse suppression signal ends.



The following figure shows the PWM signal before the pulse width inversion.



The following figure shows the PWM signal after the pulse width inversion.



YAG laser DB25 tube foot description

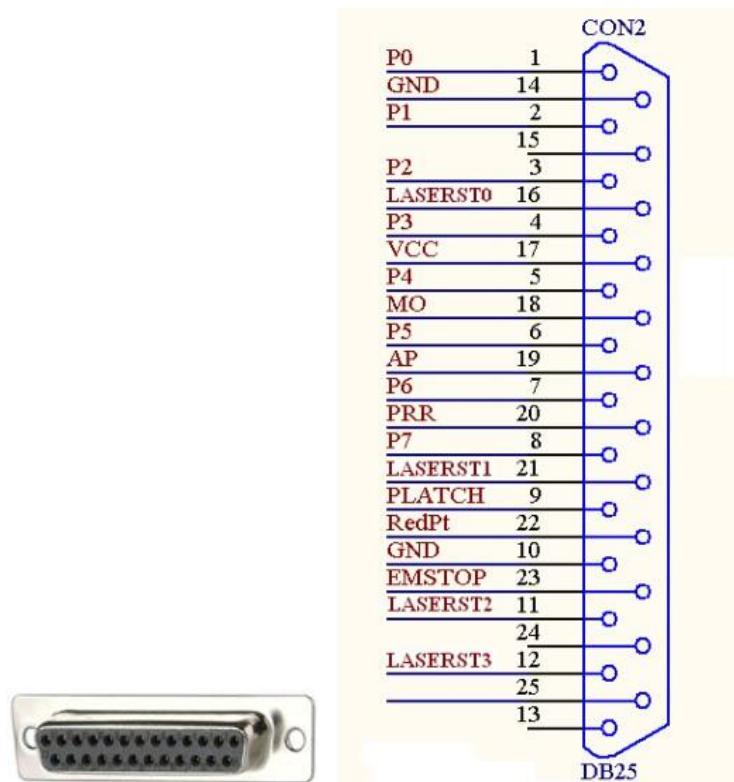
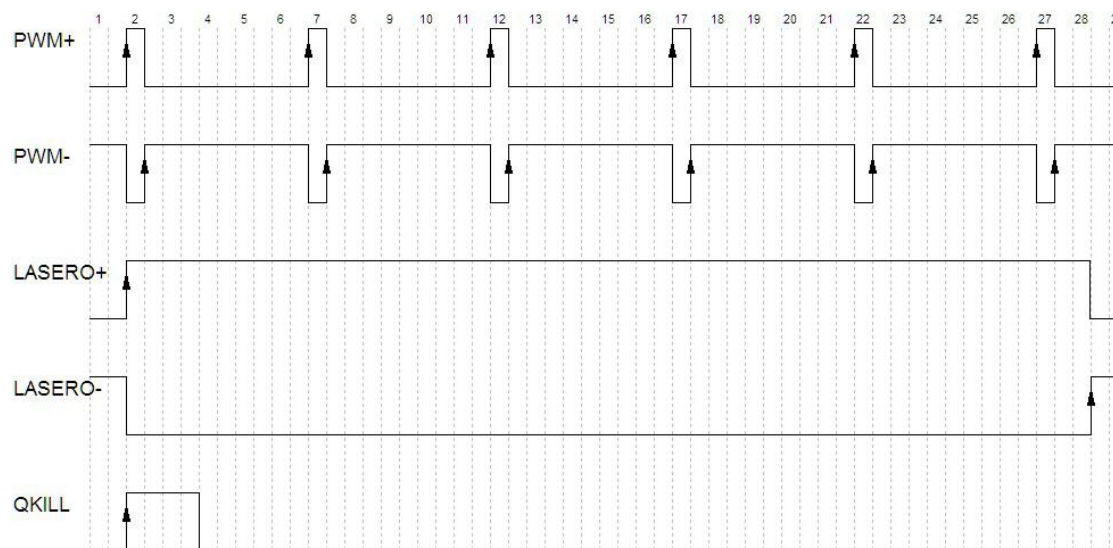


Figure 6-10 YAG Laser DB25 pins

Pin Number	Signal name	YAG laser switch signal+(optocoupler). TTL output
9	PLATCH (YAG_LASERO+)	YAG laser switch signal-(optocoupler). TTL output
7	P6(YAG_LASERO-)	YAG laser first pulse signal constrain. TTL output

8	P7(YAG_QKILL)	YAG laser pwm+ output.TTL output
19	AP(YAG_PWM+)	YAG laser pwm- output.TTL output
20	PRR(YAG_PWM-)	Ground
10,14	GND	5V power output
17	VCC	YAG laser switch signal+(optocoupler). TTL output

YAG oscillogram



Description

- 1.Pin 19 is PWM+ signal in YAG,refer to PWM+ in oscillogram;
- 2.Pin 20 is PWM- signal in YAG,refer to PWM- in oscillogram;
- 3.Pin 9 is optocoupler signal + in YAG,refer to LASERO+ in oscillogram;
- 4.Pin 7 is optocoupler signal - in YAG,refer to LASERO- in oscillogram;
- 5.Pin 8 is first pulse control signal in YAG,refer to QKILL in oscillogram;

The YAG solid-state laser has no typical connection method and should be wired according to the characteristics of the laser. Here are two typical examples:

(1) PULSE foot 19 of pin control board, foot 9 of GATE pin control board, foot 8 of FPS pin control board, and set Gate Input as ext, Trig mode as ext and FPS Input as

ext.

(2) LASER + pin control board pin 7 and PWM pins for DPSSLP-UV-3 / 5-AIO.

UV switch: For turn-on automatic switch laser (such as Inno and ari UV laser).

6.4.4 Analog

Use PWM output

Min PWM (kHz) 20.000 Max PWM (kHz) 80.000

Use Power output (DA1)

Min power volt (mV) 0

Max power volt (mV) 10000 Analog Laser...

DA test

Figure 6-11 Analog laser parameter interface

Use PWM output: The analog laser enables output PWM. The corresponding frequency is set by the frequency corresponding to the pen number parameter, and is limited by the minimum PWM signal and the maximum PWM signal. The pulse width (high level) of the PMW is set by the pulse width of the pen number parameter, and if it exceeds 100%, the Duty cycle, automatically set to 99% duty cycle.

Min PWM: Minimum allowable frequency of the PWM signal of the laser.

Max PWM: Maximum allowable frequency of the PWM signal of the laser.

Use power volt: Enable analog power output. The laser power is set by the analog voltage, and is limited by the minimum power delay, maximum power delay, minimum power voltage, and maximum power voltage.

Min power volt: The analog output voltage corresponding to the hourly power rate is generally 0mV.

Max power volt: The analog output voltage corresponding to the maximum power is generally 5000mV or 10000mV.

When the enable analog first pulse suppression option is not opened, as shown in the figure below:

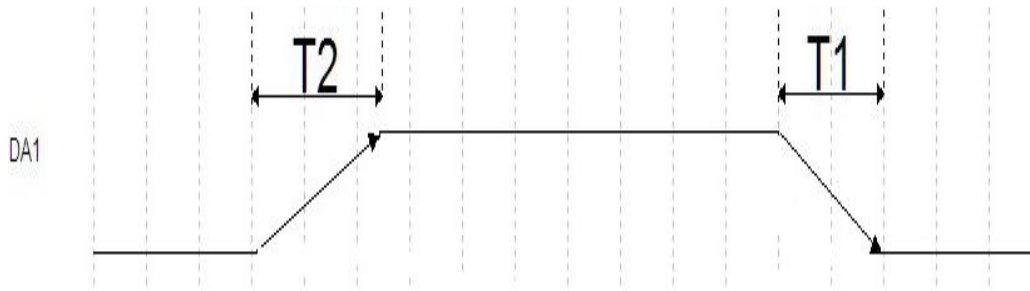


Figure 6-12

T2 Maximum power delay: The time required to rise from the minimum power voltage to the maximum power voltage. If the minimum voltage is 0V and the maximum voltage is 10000mV, the time for rising from 0V to 10000mV is 20000us.

T1 Minimum power delay: Time required to drop from maximum power 1 voltage to minimum power voltage.

The power change process occurs when the laser is not turned on.

When the enabled analog first pulse suppression option is opened, as shown below:

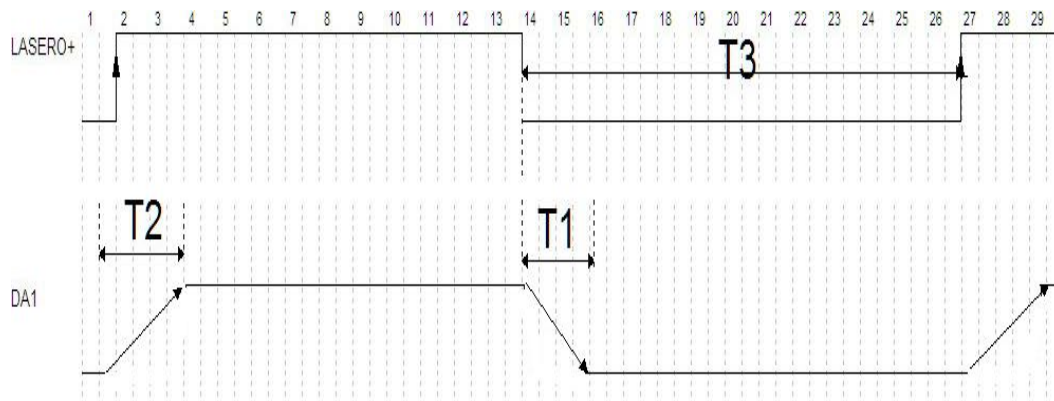


Figure 6-13

T3 first-pulse inhibition time interval: If the light turn-off time is greater than T3, the first pulse is inhibited, and the first pulse is not suppressed.

T2 Maximum power delay: The time required to rise from the minimum power voltage to the maximum power voltage. The power change process occurs during the light-on process.

T1 Minimum power delay: Time required to drop from maximum power 1 voltage to minimum power voltage. The power change process occurs during the light-off process.

Enable the analog frequency output: Enabling the analog voltage corresponds to the actual output frequency.

Minimum frequency voltage: The simulated voltage, corresponding to the minimum PWM frequency, is generally 0V.

Maximum frequency voltage: The analog voltage corresponding to the maximum PWM frequency is generally 5,000 m V or 10,000 m V.

Maximum frequency delay: Up or down time from the minimum analog voltage to the maximum analog voltage.

Power mapping: The power of the pin number parameter corresponds to the percentage of the actual simulated voltage. (Maximum power voltage-minimum power voltage) * x% + minimum power voltage.

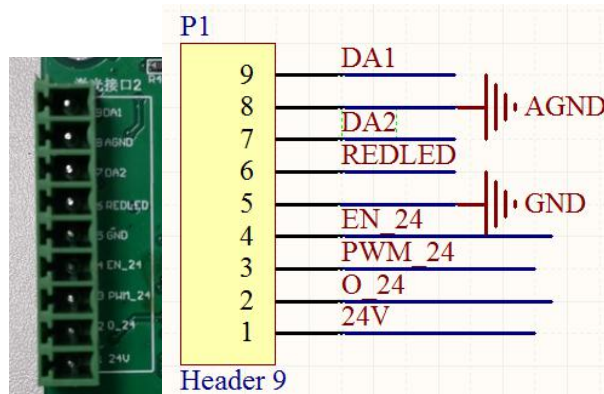


Figure 6-14

PIN Number	Signal name	Instruction
1、	DA1	Analog signal 1 output, generally used as power output
2	AGND	analog ground, return ground for analog output
3	DA2	Analog signal 2 output
4	RUNLED	Red light output, TTL output
5	GND	land
6	EN_24	temporarily unused, reserved
7	PWM_24	24V level, used as 24V modulation

		signal
8	O_24	24V level, used as 24V shutter signal
9	24V	The 24V power supply is in the output

Waveform diagram of the modulation signal and the light switch signal

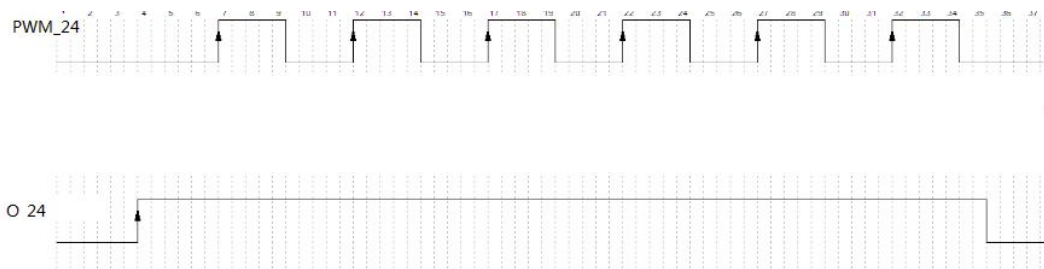


Figure 6-15

High level is 24V in output and 0 V in output at low level.

6.4.5 SPI

Min PWM(kHz)	20.000	+ -
Max PWM(kHz)	500.000	+ -
Standby power (%)	80	+ -

6-16 SPI Laser parameter interface

Min PWM: Minimum allowable frequency of the PWM signal of the laser.

Max PWM: Maximum allowable frequency of the PWM signal of the laser.

Standby power: Standby power of the laser device.

6.4.6 Laser status prompt

When enabled, set the corresponding error message according to the state of the laser interface pin. When the pin is abnormal, the laser preparation signal is low

(not ready). Referto [Powermark Laser Preparation Output Description (Static)].

6.5 Laser test

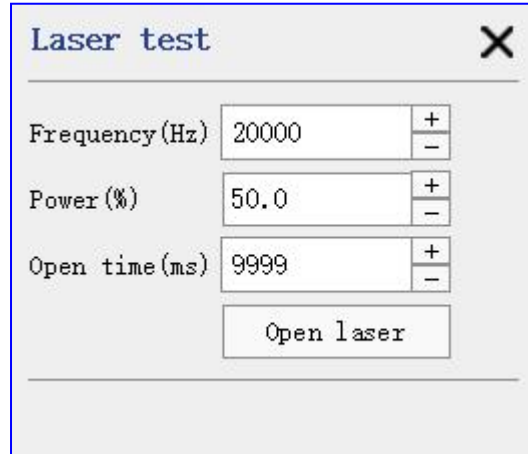


Figure 6-17 Laser test interface

After opening the laser, it will always be in the light state, which is generally used to verify whether the power is normal.

6.6 IO Configure

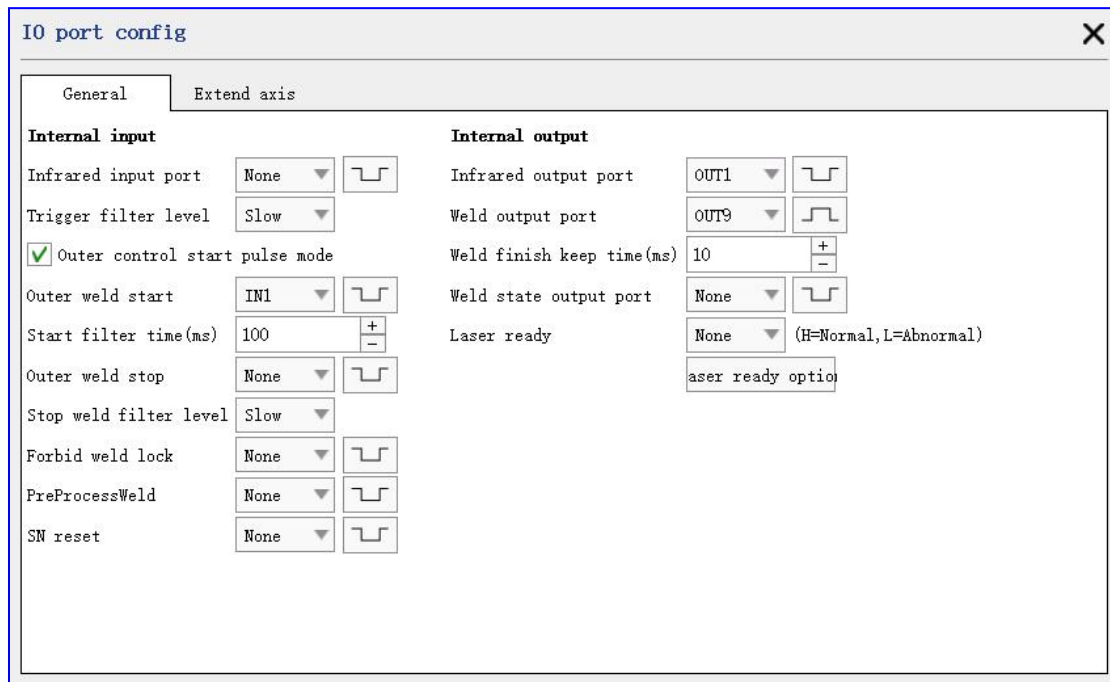


Figure 6-18-1 IO Configuration interface (conventional) welding

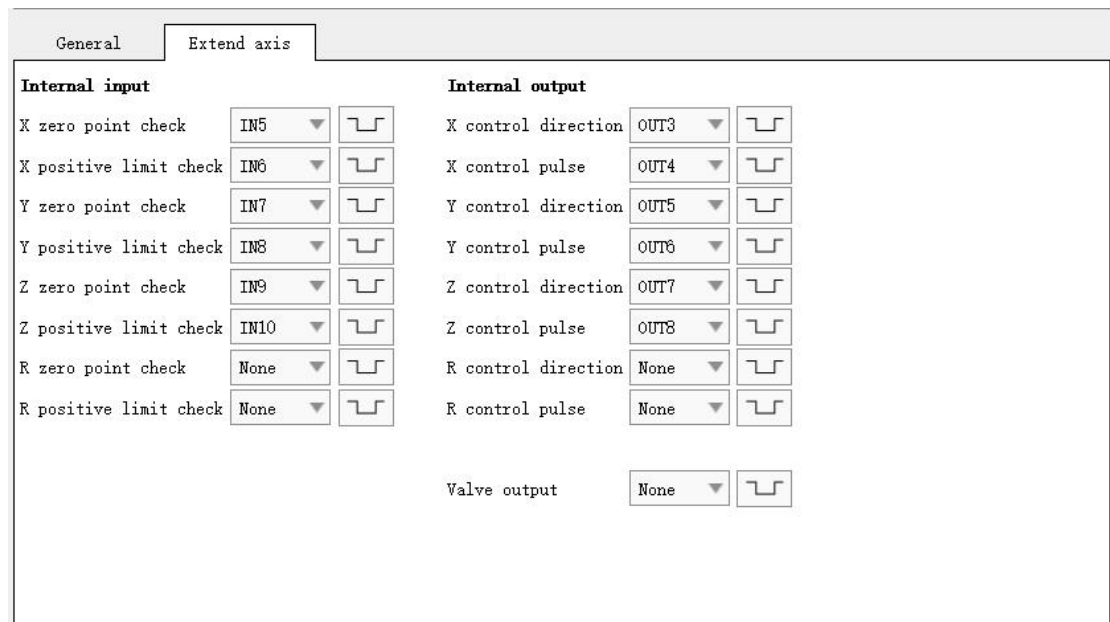


Figure 6-18-2 IO Configuration interface (expansion port)

6.6.1 Port interpretation




Select the button for the polarity, and indicate that the low level is valid.




Select the button for the polarity, and indicate that the high level is valid.

Both the input ports and the output ports can be configured manually. According to the screen printing mark written on the control board, the input port is generally IN1, IN2, and the output port is generally OUT1, OUT2, etc.

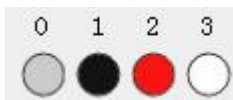
Example:

If the trigger input port is selected as 1, the polarity is , It means that the trigger signal is sent to the program when the control board port IN1 shifts from high to low level.

If red light indicates the output port is 1 and polarity is , It means that the control board port OUT1 shifts from low level on the click or IO trigger to high level.

IO port status

example:



Port 0 (gray) is not supported, port 1 (black) is used, port 2 (red) indicates a conflict (if multiple ports and port 2 is selected, the port number is checked and modified before setting successfully), and port 3 (white) is not used.

6.6.2 Input port

Infrared input port: Control start red light input port.

Trigger filter level: If the filter level is fast, it means that the trigger signal needs to last for more than 20us to be able to trigger successfully; if the filter level is slow, it means that the trigger signal lasts for more than 20ms to be able to trigger successfully.

Outer control start pulse mode: If checked, it means that the external input

control port is pulse-triggered (such as high level→low level or low level→high level); if not checked, it means that the external input control port is level-triggered (such as input If the port is always in the set level state, it will always trigger to start marking).

Outer weld start: It is equivalent to manually clicking the "marking" button on the screen (usually pedal, relay switch, button, etc.).

Start filter time: During this time after the external mark start is triggered, the external mark start signal is ignored, which is used to filter multiple start marks caused by false triggers or interference.

Outer weld stop: Equivalent to manually clicking the "Stop" button on the screen.




Stop weld filter level: If the filter level is fast, it means that the signal needs to last for more than 20us to stop marking; if the filter level is slow, it means that the signal lasts for more than 20ms before it can stop marking.

Forbid weld lock: Forbid all start marking operations, enable the protection function.

PreProcessWeld: Equivalent to clicking the [Welding Preprocessing (F8)] button in the Welding column;

SN reset: trigger reset serial number

Example:

Outer weld start	IN1	
Start filter time(ms)	100	
Outer weld stop	None	

When the input port IN2 (pin 8) is turned on to the ground, a marking start signal will be generated;

When the input port IN3 (pin 7) is turned on to the ground, a stop marking signal will be generated;

6.6.3 Internal output

Infrared output: The signal that controls the red preview.

Weld output port: Each time a welding is completed, this port will output a valid pulse, and the duration of the pulse is set by the parameter "Weld finish keep time". When the duration is valid, a new round of welding will start at this time, and a new welding completion signal will be sent. Automatically ignored.

Weld state output port: Indicates the status of welding in progress.

Laser ready: Only the fiber laser is valid, outputting this signal means the laser is running normally, please refer to "Powermark Laser Preparation Output Port Instructions" for details.

6.6.4 Extend axis-Internal input

X zero point check: Extended axis X detection zero point switch signal.

X positive limit check: Extended axis X detection positive limit switch signal.

Y positive limit check: The extended axis Y detects the zero switch signal.

Y positive limit check: The extended axis Y detects the positive limit switch signal.

Z zero point check: Extended axis Z detection zero point switch signal.

Z positive limit check: The extended axis Z detects the positive limit switch signal.

R zero point check: Extended axis R detection zero point switch signal.

R positive limit check: Extended axis R detection positive limit switch signal.

6.6.5 Extend axis-Internal output

X control direction: The signal of the extension axis X to control the rotation direction of the stepper motor.

X control pulse: The pulse signal of the extended axis X to control the rotation of the stepper motor.

Y control direction: The signal of the extension axis Y to control the rotation direction of the stepper motor.

Y control pulse: The pulse signal of the extended axis Y to control the rotation of the

stepper motor.

Z control direction: The signal of the extension axis Z to control the rotation direction of the stepper motor.

Z control pulse: The pulse signal of the extended axis Z to control the rotation of the stepper motor.

R control direction: The signal of the extension axis R to control the rotation direction of the stepper motor.

R control pulse: The pulse signal of the extended axis R to control the rotation of the stepper motor.

Valve output: It is used to control the valve output/close.

6.6.6 Debug IO port

Used to test whether the IO port is normal.

When the control panel has input status, the input port interface button lights up.

When pressing the interface button of the output port, the system changes the state of the output port of the corresponding control board, and the external device can detect whether there is output

6.6.7 DB15 extended IO port description

This interface can be used for the input and output of the IO port to control the welding of the system, as shown in the figure below:

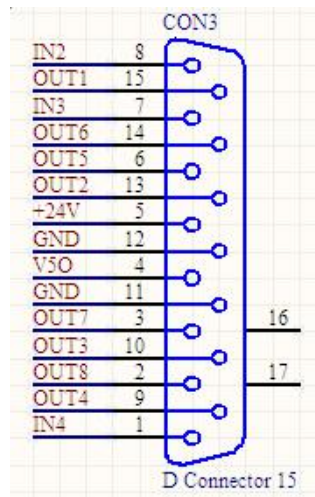


Figure 6-19-1 DB15 Extended IO port

PIN Number	Signal Name	Instruction
1	IN4	12V Optocoupler input 4, forming Loop with GND
2	OUT8	Configable output 8,OC gate
3	OUT7	Configable output 7,OC gate
4	5V	5V output, forming Loop with GND
5	24V	12V output, forming Loop with GND
6	OUT5	Configable TTL output 5
7	IN3	12V Optocoupler input 3, forming Loop with GND
8	IN2	12V Optocoupler input 2, forming Loop with GND
9	OUT4	Configable TTL output 4
10	OUT3	Configable TTL output 3
11, 12	GND	Ground
13	OUT2	Configable TTL output 2
14	OUT6	Configable output 6,OC gate
15	OUT1	Configable TTL output 1

6.6.8 DB25 Expansion IO port description

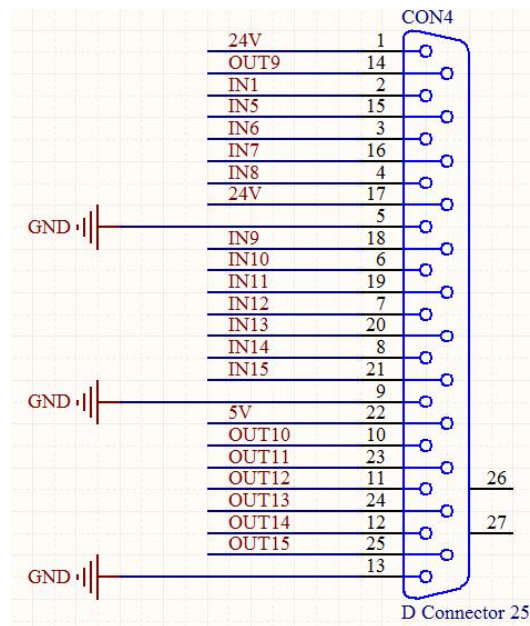


Figure 6-19-2 DB25 Connection port

PIN Number	Signal Name	Instruction
1, 17	24V	24V output
2	IN1	24V optocoupler input 1, form a loop with GND
3	IN6	24V optocoupler input 6, form a loop with GND
4	IN8	24V optocoupler input 8, form a loop with GND
5, 9, 13	GND	GND ground
6	IN10	24V optocoupler input 10, form a loop with GND
7	IN12	24V optocoupler input 12, form a loop with GND
8	IN14	24V optocoupler input 14, form a loop with GND
10	OUT10	Configurable TTL output port 10
11	OUT12	Configurable TTL output port 12
12	OUT14	Configurable TTL output port 14
14	OUT9	OC output port 9 can be configured to form a loop with 24V, and external relays can be connected

15	IN5	24V optocoupler input 5, form a loop with GND
16	IN7	24V optocoupler input 7, form a loop with GND
18	IN9	24V optocoupler input 9, form a loop with GND
19	IN11	24V optocoupler input 11, form a loop with GND
20	IN13	24V optocoupler input 13, form a loop with GND
21	IN15	24V optocoupler input 15, form a loop with GND
22	5V	5V output
23	OUT11	Configurable TTL output port 11
24	OUT13	Configurable TTL output port 13
25	OUT15	Configurable TTL output port 15

6.7 Extend axis configuration

Configure the extended axis parameters, as shown below.

The screenshot shows the 'Extend axis setting' dialog box with the following configuration:

Axis driver	Axis	Unit	Pulse per unit	Min speed (pulse/second)	Max speed (pulse/second)	Accelerate (pulse/ms)	Accelerate step per ms	Direction output port	Pulse output port
Limits	X	MM	1000.000	1000	5000	100	10	OUT3	OUT4
Reset	Y	MM	1000.000	1000	5000	100	10	OUT5	OUT6
Quick stop	Z	MM	1000.000	1000	5000	100	10	OUT7	OUT8
Valve	R	MM	1000.000	1000	5000	100	10	None	None
Other									
Axis linkage									

Buttons at the bottom: Setting (highlighted), IO Config, Reset, Close.

Figure 6-20 Extended axis parameters

6.7.1 Axis driver

Unit: Optional millimeter, angle, or pulse.

Unit Pulse: Number of pulses per millimeter or angle output.

Min speed: The minimum speed at which the extension axis can move.

Max speed: The maximum speed at which the extension axis can move.

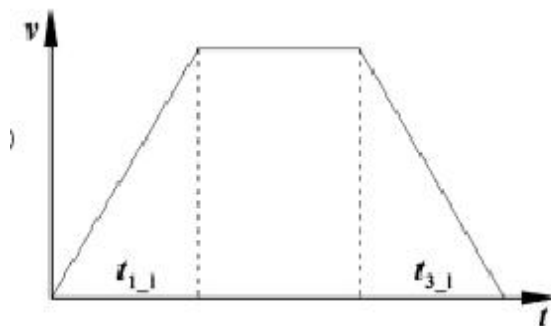
Direction output port: same [6.6.5].

Pulse output port: same 【6.6.5】 .

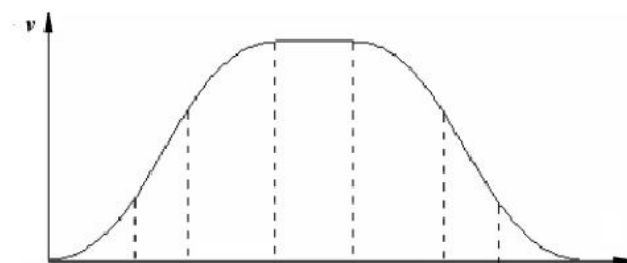
Accelerate: Increased pulse speed per ms, per unit of Hz / ms

Accelerate step: Rate of change per ms of acceleration. The default is 1, and the modification is not recommended.

When the acceleration is 0, the electric opportunity runs at the speed shown in the figure below



When the acceleration is not 0, the click runs at the speed shown in the figure below



6.7.2 Limits

Axis driver	Axis	Limit	Zero point check	Positive limit check
Limits	X	<input checked="" type="checkbox"/> Enable	IN5	IN6
Reset	Y	<input checked="" type="checkbox"/> Enable	IN7	IN8
Quick stop	Z	<input checked="" type="checkbox"/> Enable	IN9	IN10
Valve	R	<input checked="" type="checkbox"/> Enable	None	None
Other				
Axis linkage				

Limit switch : Whether to use the limit signal to control the motion axis to stop. When the motor is moving forward, it encounters the positive limit switch, resulting in an out-of-bounds; when the motor moves in a negative direction, it encounters the zero limit switch, resulting in an out-of-bounds. enable this option

Zero point check: 【6.6.4】 .

Positive limit check: 【6.6.4】 .

6.7.3 Reset

Axis driver	Axis	Decelerate after reset	Decelerate pulse after reset	Accelerate on reset decelerate (pulse/m)	Reset speed (pulse/second)	Zero point offset
Limits	X	<input type="checkbox"/> Enable	1000	100	1000	0.000 MM
Reset	Y	<input type="checkbox"/> Enable	1000	100	1000	0.000 MM
Quick stop	Z	<input type="checkbox"/> Enable	1000	100	1000	0.000 MM
Valve	R	<input type="checkbox"/> Enable	1000	100	1000	0.000 MM
Other		<input type="checkbox"/> Startup reset				
Axis linkage		Reset sequence	XY	Help		
		Over time(s)	100			

Decelerate after reset: After enabling, when resetting, check the proximity switch, do not stop immediately, decelerate at the reset deceleration, and run the number of deceleration pulses; disable, stop immediately after resetting the switch is checked. This setting will conflict with the limit switch , When the limit switch is set, the reset deceleration cannot be used. It is only recommended for rotating shafts.

Decelerate pulse after reset: Number of running pulses for reset deceleration

Acceleration on reset decelerate: When resetting deceleration, decelerate at this acceleration

Reset speed: Movement speed of extended axis reset.

Startup reset: After the start is completed, according to **Reset sequence** The reset action until the reset detection signal is triggered or exceeded **Return Zero reset timeout time** Just stop.

Reset sequence: Use the English comma (,) to separate the reset sequence. for instance:

X,Y,Z,R = X-axis-> Y-> Z-> R axis reset


XY,Z = XY axis reset-> Z axis reset

6.7.4 Quick stop

Axis driver	Axis	Quick stop decelerate (pulse/second)	
Limits	X	5000	+ -
Reset	Y	5000	+ -
Quick stop	Z	5000	+ -
Valve	R	5000	+ -
Other			
Axis linkage	<input checked="" type="checkbox"/>	Enable decelerate on stop	

Quick stop decelerate: When the motor is running, there is a sudden emergency stop, the motor decelerates from the current speed at an emergency stop, decelerates to the minimum speed, and then stops. This option can prevent the motor from suddenly stopping at a very high speed.

6.7.5 Valve

Axis driver	<input type="checkbox"/> Enable valve	Always output ▾
Limits	Valve output	None ▾ 
Reset	Open early(ms)	0 <input type="button" value="+"/> <input type="button" value="-"/>
Quick stop	Close delay(ms)	0 <input type="button" value="+"/> <input type="button" value="-"/>
Valve		
Other		
Axis linkage		

Enable:

① **Always output:** Keep the air valve output from pressing F2 or clicking the welding button until the welding is stopped;

② **Sync with laser:** Keep the valve output from the laser light out until the laser light is turned off.

Valve output: same 【6.6.5】 .

Open early: The time when the air valve opens on the output early.

Close delay: The when the valve delays closing the output.

6.7.6 Axis linkage

There are three movement modes available: **XY**, **XYZ**, **XYZR**.

Coordinate range: To determine the range of mechanical shaft motion.

Length: X Movement length, if X positive and negative limit signal is installed, click [Move and calculate length] button to perform automatic calculation.

Width: Y Motion width, if Y positive and negative limit signal is installed, click [Move and calculate width] button to perform automatic calculation.

Height: Z Movement height, if the Z positive and negative limit signal is installed, click the [move and calculate height] button to perform automatic calculation.

Zero pos type: Red triangles indicate the negative limit signal position.

Finish return to: ① **Zero pos**, That is, the zero-point coordinate position of the axis of motion; ② **Specific pos**; ③ **Stay pos**; ④ **Zero signal pos**, That is, after the welding, the negative limit direction until the induction negative (zero) limit signal;

Axis linkage parameter, need to enable four axis case effective, reference **【9 Four axis parameters】** .

6.8 System

Click on the system menu to pop up the system Settings dialog box, as shown in the figure below.

General		Date & Time	
Device name	Powermark	Year (2001-2050)	2022
Language	English	Month(1-12)	6
<input type="checkbox"/> Clean chinese		Day(1-31)	28
Screen resolution	1366x768	Hour (0-23)	9
Line density	Default	Minute(0-59)	34
<input checked="" type="checkbox"/> Open document startup		Second(0-59)	16
<input type="checkbox"/> Enable touchscreen		Copy offset	
<input type="checkbox"/> Use numeric pad		H copy x(mm)	2.000
<input checked="" type="checkbox"/> System backup&maintain tip		V copy Y(mm)	2.000
<input checked="" type="checkbox"/> Show backup action	edit close password	Keyboard	
<input checked="" type="checkbox"/> Tip stay(s)	15	Keyboard step(mm)	1.000
Reset counter	Edit tip	Rotate angle(°)	15.000
<input checked="" type="checkbox"/> Enable auto save doc			
Auto save interval (m)	5		

Figure 6-21 System Settings

Language: The language of the Laser Welding Machine System, which currently supports Arabic, Simplified Chinese, Traditional Chinese and English, French, German, Italian, Japanese, Korean, Russian, Spanish, Turkish, Vietnamese.

Screen resolution: When the connected display resolution varies, modifying this parameter can achieve a better display effect.

Keyboard step: The unit is millimeter (mm), indicating the step length when the tag is controlled using the direction key of the external keyboard.

Rotate angle: Unit (°), indicating the angle of marker rotation using the Ctrl + direction key of the external keyboard.

Line density: There are three options: Default, High, and Low. Modifying this option will change how finely the laser welding machine system draws marks that include arcs. In the case of low line density, arcs will appear as fewer polyline segments, i.e. smoother. On the contrary, when the line density is high, the arc will be smoother, and the display speed will be reduced. When using the array function, if there are a large number of arcs, the running speed may be reduced. It is recommended that the user reduce the line density to improve the running speed. In general, the default can be used. As shown in the figure below, it corresponds to the display effect of the circle (size of 1mm) under different line densities.:

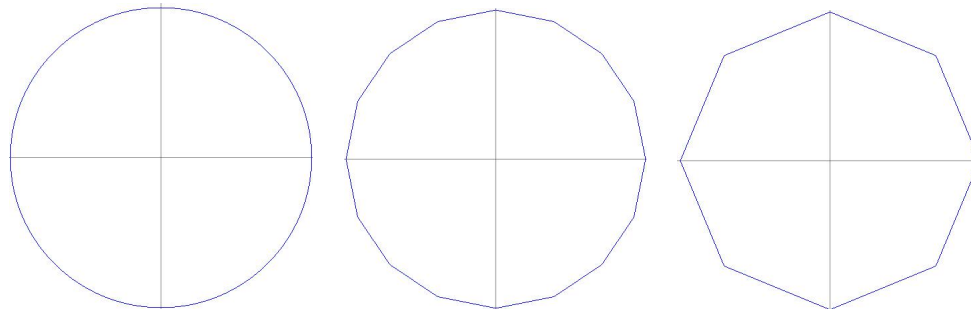


Figure 6-22 Line density from left to right is high, by default, and low

Open document startup: Open the last welded document or the edited document after the system starts.

Enable touchscreen: Check this item when using an external touch screen.

Use numeric pad: When the system is enabled and restarted, the digital input box will popup. As shown in the figure below:



Figure 6-23 numeric keypad

System backup&maintain tip: The system regularly pop up the backup and maintenance prompt every month, you can click [Edit prompt] to modify the prompt content.

Date&Time: It includes year, month, day, time, minutes and seconds. When the system time is different from the actual time, the system time can be modified here.

Copy offset: Sets the offset distance between the new object and the copied object after the copy tag object.

6.9 Weld advance setting

The interface is shown in the figure below.

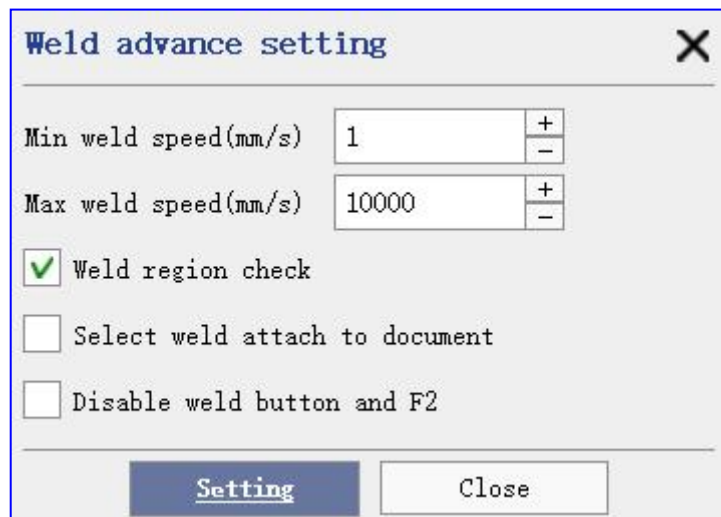


Figure 6-24 Advanced Setup Interface

Min weld speed/Max weld speed: Limit the laser welding speed, detect before welding, and automatically prompt if less than / exceed this limit.

Weld region check: Used to limit the range of welding content and prevent damage to the hardware.

Select weld attach to document: Indicates whether the selected weld parameters are saved with the document.

Disable weld button and F2: Used to turn off the start welding control.

6.10 Resource manage/Upgrade

When you click the Upgrade Management menu or insert the U disk, the Upgrade Management dialog box will pop up, as shown in the figure below.

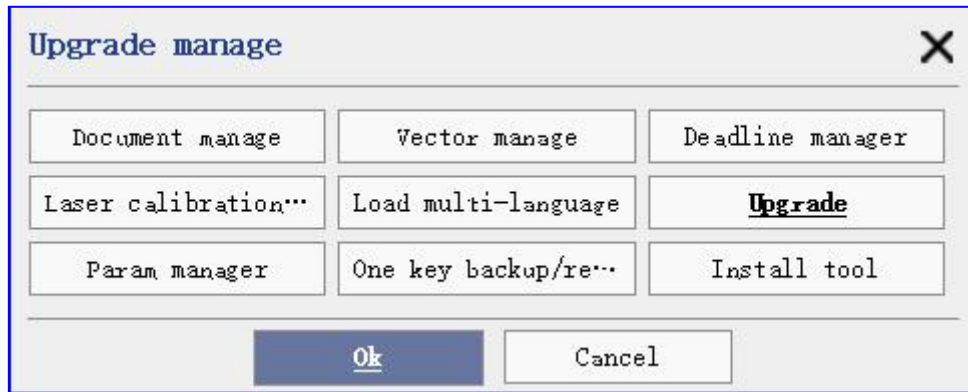


Figure 6-25 Upgrade management

In the upgrade management, the documents or other resource files used in the laser welding machine can be managed, including documents, databases, vector graphics, laser calibration and system parameters. The management interfaces of these types of files are similar, and the following is the document management interface to illustrate, as shown in the figure below.

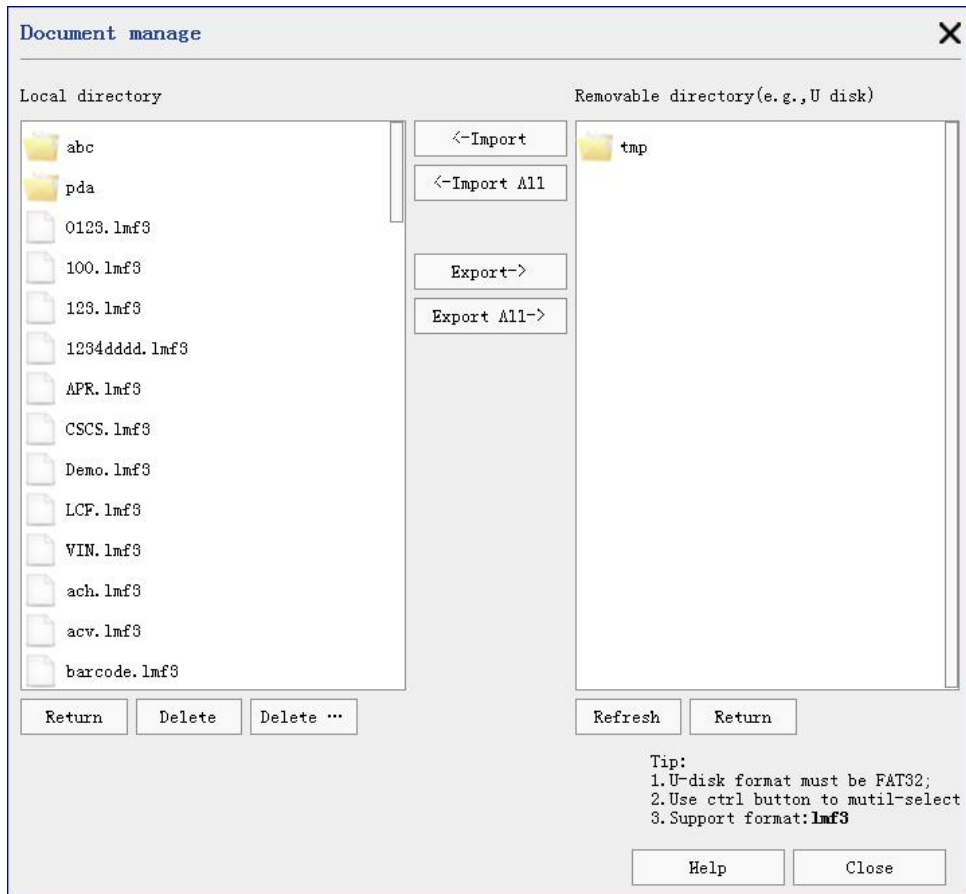


Figure 6-26 Document Management Interface

In the document management interface, the list on the left is the file list on the computer, and the list on the right is the corresponding file list on the U disk. Since the document supports folder import and export, the folder will be displayed, while other resource files only support Import and export from the root directory of the U disk.

Import/export supports selecting file operation or all file operations. When selecting files, hold down the CTRL key and click the file list to perform multiple selection operations.

The delete operation can only operate on the resource files of the local machine, and some resources such as fonts can only delete the files imported by the user but cannot delete the internal resources of the system.

Document: Supported in the format of. The lmf3 format is not available here.

Vector: The supported vector graphs are available for the. plt,. The following data will include: dxf and. ai form.

Laser calibration: Saved laser correction file.

Parameter: Including laser calibration, red light calibration, laser parameters, IO configuration, serial port parameters, etc..

Upgrade: For the system software version updates.

Deadline: Import the key to unlock the advanced function module (such as IC chip welding, etc.).

One key backup: Refer to **【6.11】** .

6.11 One key backup/restore

6.11.1 Backup and Restore

Laser calibration, red light calibration, laser parameters, IO configuration, serial port parameters, etc. are backed up to U disk/local or imported from U disk/local for laser system recovery.

6.11.2 One key backup/restore

System configuration parameters, calibration files (laser/red light), documents, pictures, vector graphics, fonts, databases, special character tables, welding records, plug-in data, etc. are backed up to U disk or imported from U disk for laser system recovery.

6.12 Authority

Click the permission menu under the administrator permission, and the permission setting dialog box can pop up, as shown in the figure below.



Figure 6-27 Authority setting

The password of the engineer or administrator can be modified in the permission setting.

6.13 Touch calibrate

Support for correcting the resistance touch screen of the USB interface.

6.14 Plugin manager

Set up the boot-up module. Existing support for welding systems and cleaning systems. As shown in the figure below:

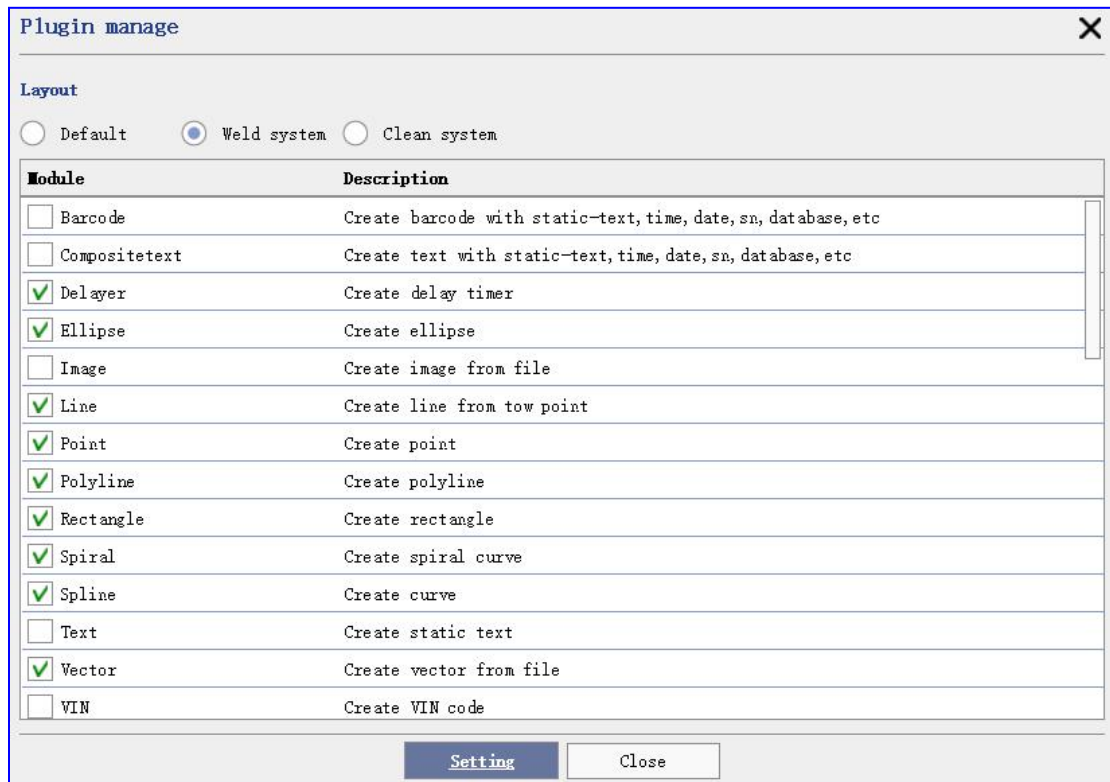


Figure 6-28 Plugin manager

6.15 About

Version number, product unique ID, product model, and authorized module are available.

7 Extend

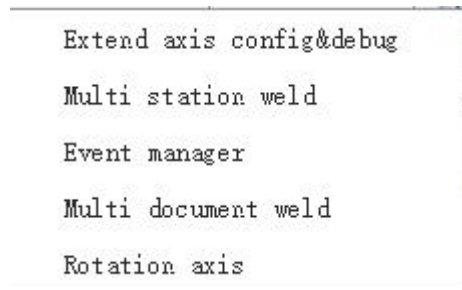


Figure 7-1 Extended menu

7.1 Extend axis config&debug

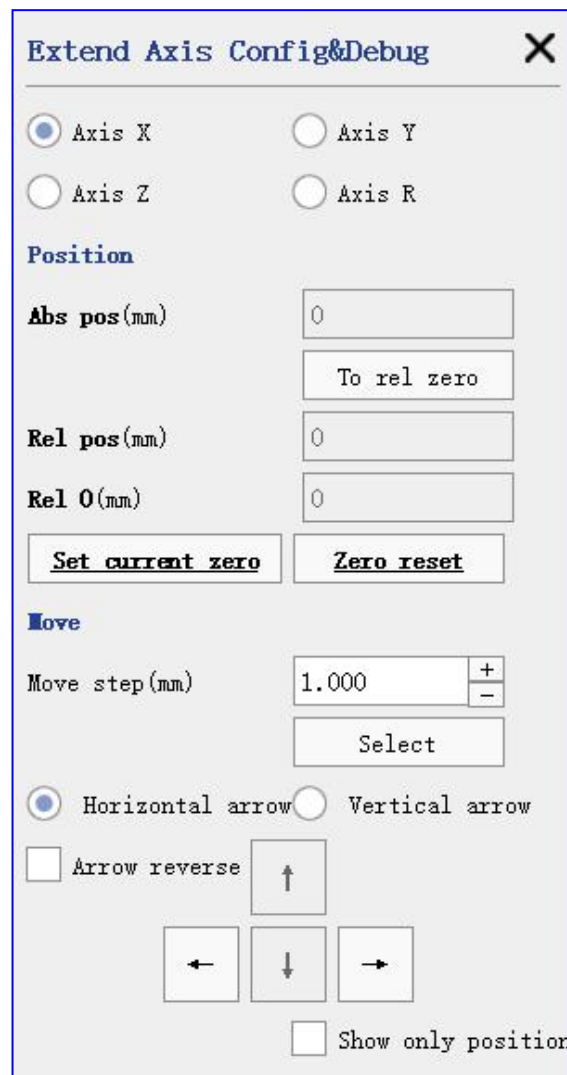


Figure 7-2 Extension axis debugging

Expansion ft 1 & 2: Used to select the required debug extension axis.

Abs pos: Distance from the current position to the zero point of the axis.

Rel pos: Current position versus the distance from the relative zero point.

Rel 0: Displays the relative zero-point position, which is calculated by the distance relative to the absolute zero-point.

Set current zero: Set the current position to the relative zero point. When this button is pressed, the absolute position is the value of **Rel 0**

Move step: Each each of the arrow button.

Select: Sets up the movement step size.

Horizontal arrow: When this is checked, the arrow reverses.

7.2 Event Manager

Take some actions based on the events emitted by the welding system. As shown in the figure below:

Event manager

Enable Engineer editable

Event

App start finished

Action

Up
Down
Edit
Delete

Add output port Add webserver Add delayer
Add preprocess Add comm Add extend axis

Description

App start finished: triggered after application has startup and initial finished.

Apply Reset Close

Figure 7-3 Event Manager

There are categories of events:

App start finished: This event is issued after the program is started is complete and initialized.

Print start: This event is issued after pressing either the weld button or the F2 button.

Print finished: After welding the current content and preparing to update the next welding content (such as serial number or database, etc.) event.

Prepare print next: After updating the welding content (such as serial number or database, etc.) and preparing the next prior trigger.

Print stopped: This event occurs after the system stops welding. If it is a single welding, it is equivalent to the welding completion time. If it is a continuous backtrigger weld, issue this event after pressing the ESC key or clicking the [Stop] button.

Print preprocess: This event is issued after pressing the [weld preprocessing button].

After the event triggers, you can choose to perform the action has:

Add output port: Specify the high / low level signal for output at the set output port;

Add webservice webservice: Pull / push data from a remote server;

Add delay: Time-lapse fixed time;

Add preprocess: Perform preprocessing work such as scanning gun or serial read service;

Add com: Perform serial / net port read / send data.

Add extend axis: Execform extended axis movement.

7.3 Rotation axis

The screenshot shows a dialog box titled "Rotate axis" with a close button (X) in the top right corner. The dialog is divided into several sections:

- Enable rotating mark:** A checked checkbox followed by the text "(Default extend axis" and an unchecked checkbox, and then "Direction reverse".
- Params:** A section containing five numerical input fields with increment (+) and decrement (-) buttons:
 - Pulse per round: 2000
 - Min speed(pulse/s): 1000
 - Max speed(pulse/s): 5000
 - Speed up time(ms): 100
 - Rotation delay(ms): 5
- Mark type:** A dropdown menu currently set to "General".
- Zero point:** A section containing:
 - A checked checkbox for "Reset zero when finish".
 - A dropdown menu for "Zero position" set to "Current po...".
 - Three numerical input fields with increment (+) and decrement (-) buttons:
 - Zero speed(pulse/s): 1000
 - Zero overtime(s): 10
 - Zero correct angle: 0.000
 - A "Correct" button below the angle field.

At the bottom of the dialog, there are five buttons: "Ok", "Close", "Reset", "Open IO", and "Help".

Figure 7-4 Spin axis setting

Pulse per round: The number of pulses required for one rotation of the extended shaft motor. Through the following formula, we can calculate the number of pulses per revolution X required by the software: $X=(360/N)* n$, where X represents the number of pulses per revolution, and N represents our Step angle of the motor used, n represents the number of subdivisions set by the driver;

Min speed: The minimum speed at which the extension axis can move.

Max speed: The maximum speed at which the extension axis can move.

Speed up time: The time required for the extension axis to accelerate the motion from the minimum speed to the maximum speed.

Rotation delay: After the rotation, delay the next operation.

Zero point: If it is not checked, the expansion axis cannot establish an absolute coordinate system. When processing a batch of workpieces, it is necessary to manually adjust the position so that each processing is at the same position; if it is checked, then according to **【 Zero position 】** to establish an absolute coordinate system.


Zero position:

- **Current position,** The system takes the current expansion axis location as the default origin location before each processing;
- **Before mark,** After processing a workpiece, the system automatically moves the extension axis back to the position before starting the processing, so that each workpiece will be in the same position;
- **Zero signal,** It means that after machining a workpiece, the expansion axis moves in the opposite direction until the system receives the zero point signal. After finding the zero point, the expansion axis establishes an absolute coordinate system. If the system does not receive the zero point signal, it will be set in "zero point timeout" The extended axis function will be started normally only after the time has elapsed.;

Zero speed: The speed of movement when the extension axis returns to zero.

Zero overtime: Set the time it takes for the extension axis to find zero, beyond which the extension axis will return to normal.

Mark type:

- **General,** Refers to the rotation mark according to the Z angle value of the label, and the Z angle value is in the coordinate setting interface of the label, as shown in the figure below , Indicates the label 90 degrees from zero (Z angle value is absolute angle);
- **Multi mark,** Refers to the rotation **【 Step angle 】** Mark the current document once, According to the set **【 Number 】** The value is rotated for multiple times;
- **Rotation text,** Split the marked text characters according to **【 Distance per round 】** D and **【 Pulse per round 】** P calculate the number of pulses

corresponding to the unit physical distance $N=P/D$, if 【Split direction】 The direction is the Y-axis direction, then the Y value of the center point coordinate of the character corresponds to the rotation angle $R=N*Y$; If 【Split direction】 The direction is the X-axis direction, then the X value of the center point coordinate of the character corresponds to the rotation angle $R=N*X$;

- **Rotation split**, Divide graphics (such as vector graphics dxf, plt or text) that exceed [Split size]. If the splicing direction is the X axis, graphics whose length is less than [Split size] will not be split, and graphics whose length is greater than [Split size] will be divided according to [Split size]. Split size] to split, when welding, split welding around the axis to the X direction. For example, if the length of the graphic is 40mm, and the [Split size] is 7mm, then the graphic is divided into 6 segments, and the lengths of each segment are 7 and 7 respectively. , 7, 7, 7, 5(7mm*5+5mm=40mm), the height remains the same, as shown in Figure 6-3, first weld the first section, then rotate, the second section, rotate, until the sixth section After welding. In the same way, the splicing direction is the Y axis, then the height is divided according to [Split size], and the length of the graphics remains unchanged after division..

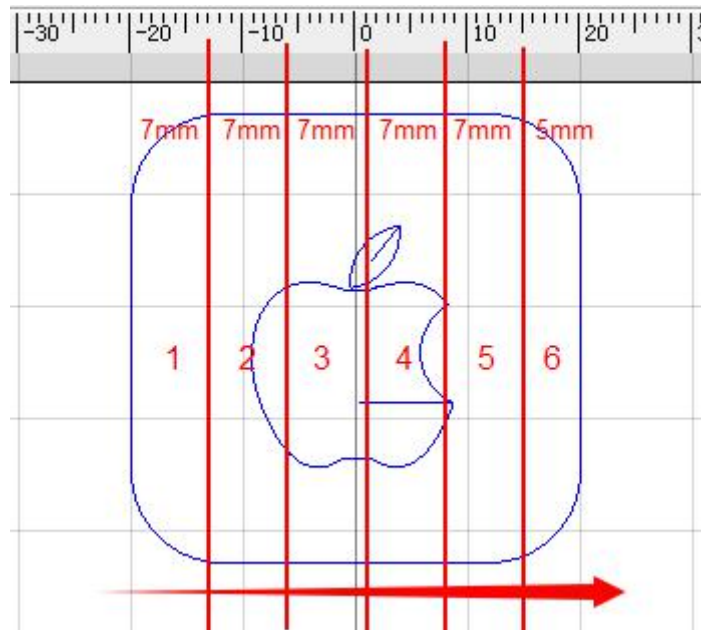


Figure 7-5 X direction splicing, welding direction from left to right, red vertical line for the split line

7.4 Simple home page

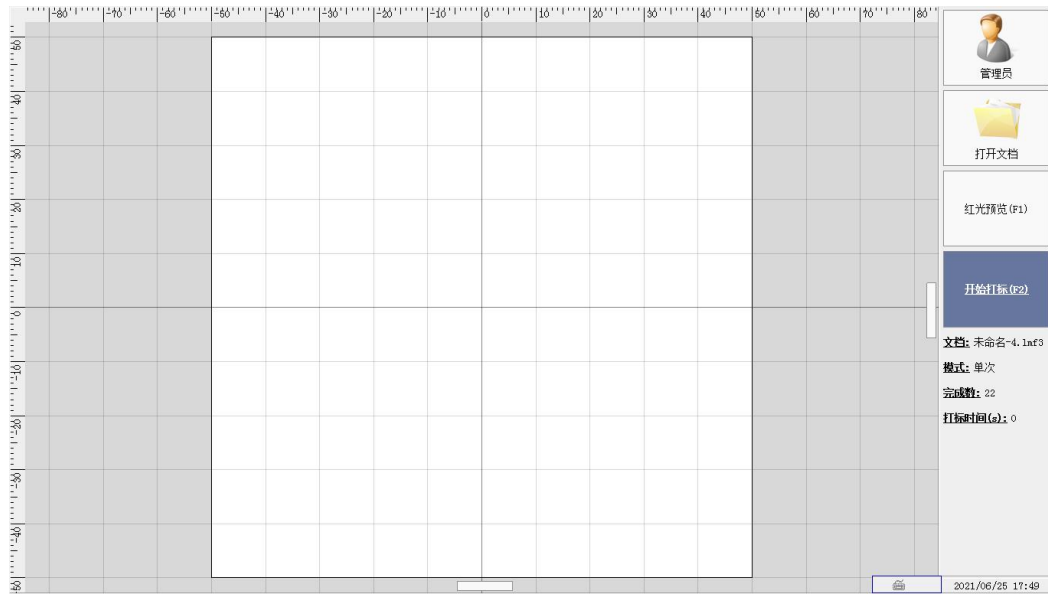


Figure 7-6 Simple home page


Simple and pure welding interface.

8 Drawing and object property bar

The drawing toolbar is located on the far left of the main interface.

The drawing toolbar is used to draw marks in the editing area, including lines, rectangles, vector graphics, text, pictures, etc..

8.1 Point

Click  icon, Point marks are added in the center of the view by default. Figure 8-1 shows the attribute-setting interface.

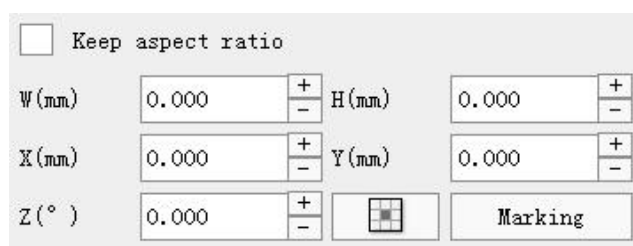


Figure 8-1

Attributes are divided into general attributes and point attributes.

The current point attribute is None.


Common properties include width, height, X, Y, Z, datum and welding controls.

Width: The actual width of the current tag.

Height: The actual height of the current tag.

X and Y: Represents the position of the coordinate reference.


Z: Represents the angle of the rotation axis.

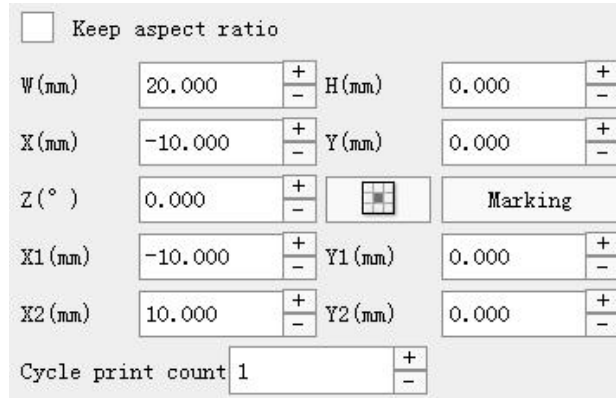
Coordinate benchmark : Reference points representing the X and Y values corresponding to the markers.

Close the welding: Ignore marking the marks that tick this option.

Welding control IO port: Communication control mark engraving, refer to the communication protocol help.

8.2 Line

Click  icon, Mark a straight line to the edit area, as shown in Figure 8-2.



Keep aspect ratio


W (mm)	20.000	+ -	H (mm)	0.000	+ -
X (mm)	-10.000	+ -	Y (mm)	0.000	+ -
Z (°)	0.000	+ -		Marking	
X1 (mm)	-10.000	+ -	Y1 (mm)	0.000	+ -
X2 (mm)	10.000	+ -	Y2 (mm)	0.000	+ -
Cycle print count	1	+ -			

Figure 8-2 Straight line properties


Common properties are the same as **【8.1 Point】** .

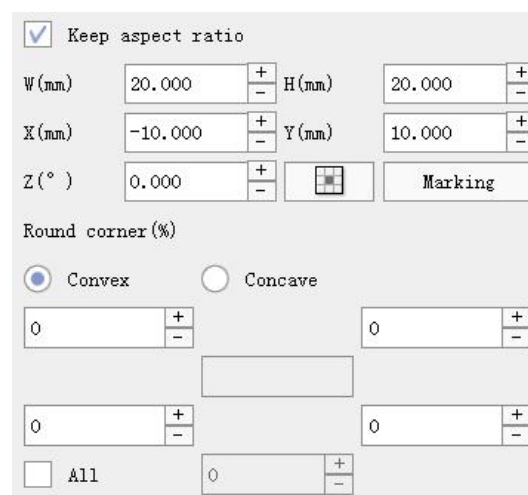
X1 and Y1: represent the left endpoint coordinates of the line.

X2 and Y2: represent the right endpoint coordinates of the line.


Cycle print count: Number of straight line welding (if set to 2, from left to right, then from right to left).

8.3 Rectangle

Click  icon, You can insert a rectangular tag into the edit area. Rectangle properties are shown in Figure 8-3.



Keep aspect ratio

W (mm)	20.000	+ -	H (mm)	20.000	+ -
X (mm)	-10.000	+ -	Y (mm)	10.000	+ -
Z (°)	0.000	+ -		Marking	

Round corner (%)

Convex Concave

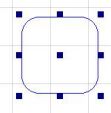
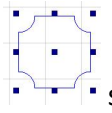
0	+ -	0	+ -
0	+ -	0	+ -

All 0 +
-

Figure 8-3 Rectangular property

Common properties are the same as 【8.1point】 .

The unique attribute of the rectangle is to modify the degree of concave and convex (percentage) of the four top corners, and a rounded rectangle can be drawn. For example, if all rounded corners are set to be convex 45%, it will


appear  style rounded rectangle, while concave will generate  style rectangle.

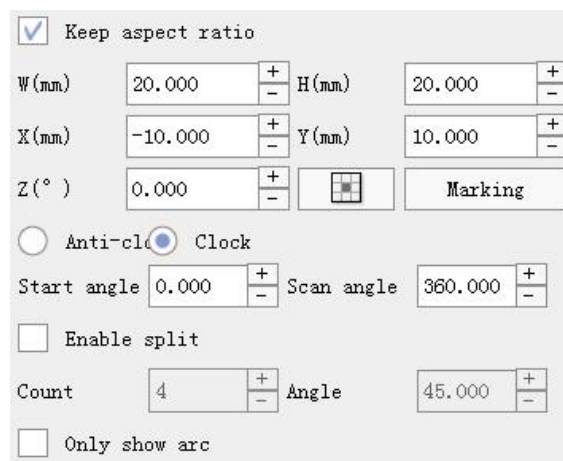
Cycle index : Rectangles are repeatedly welded multiple times.

Start position offset: Offset length of the welding start point.

End-point overlap length: Continue the welding length after welding to the last point.

8.4 Ellipse

Click  icon, You can insert an ellipse mark into the editing area. The properties of the ellipse are shown in Figure 8-4.



The dialog box for the Ellipse property includes the following controls:



- Keep aspect ratio
- W (mm): 20.000 (with +/- buttons)
- H (mm): 20.000 (with +/- buttons)
- X (mm): -10.000 (with +/- buttons)
- Y (mm): 10.000 (with +/- buttons)
- Z (°): 0.000 (with +/- buttons)
- Marking
- Anti-clockwise
- Clock
- Start angle: 0.000 (with +/- buttons)
- Scan angle: 360.000 (with +/- buttons)
- Enable split
- Count: 4 (with +/- buttons)
- Angle: 45.000 (with +/- buttons)
- Only show arc

Figure 8-4 Ellipse property

Common properties are the same as 【8.1 Point】 .

The unique properties of the ellipse are the arc drawing direction, start angle, sweep angle, and whether to display only the arc. The drawing direction indicates

whether the ellipse draws the arc from the start angle counterclockwise or clockwise, and the start angle is the horizontal X-axis positive is 0 degrees, clockwise is positive, and the angle that the arc passes through is the scan angle. The option to show only the arc does not work when the scan angle is 360 degrees, and if it is less than 360 degrees, if this option is not checked, it will be drawn from the center of the circle

out angle guide. , Otherwise, the auxiliary line will not be displayed. .

Number of segments: Divide the arc into several segments.

Sectional Angle: Scanning angle for each segment.

8.5 Curve

Click  icon, Enter the curve editing state, as shown in Figure 8-5.

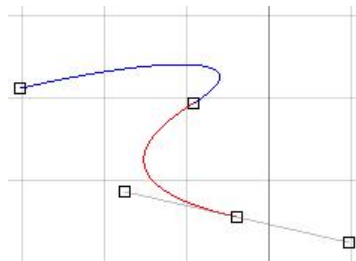











Figure 8-5 Curve editing mode

- **Create a curve**
- New point: click the left mouse button on the blank space. If the mouse is pressed and released immediately, a straight line is created; if the mouse is pressed and moved, a curved line is created, and the gray line is a radian control line;
- Exit Edit Mode: Right-click;


Modify the curve

Double-click the curve marker to be modified to enter the curve editing mode, as shown in Figure 7-5.

Support for new nodes , **Remove the node** , **merge node** ,

Separate nodes  、 Turn into a straight line  、 Turn into a circular arc  、
 Turn to curve  、 Point Angle transition  、 Smooth transition  、 Symmetric transition  、
 Change the direction of the curve  、 Automatic closing curve  .

8.6 Polyline

Click  icon, Enter the polygon editing state.

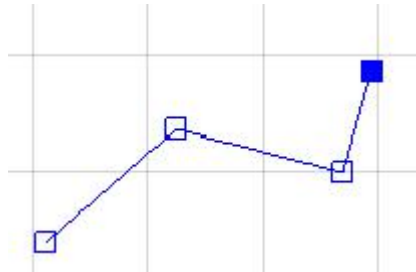



Figure 8-6 Polygon edit status

8.7 Vector

Click  icon, You can insert a blank vector map marker into the editing area.

The vector map properties are shown in Figure 8-7.

<input checked="" type="checkbox"/> Keep aspect ratio	Weld control	
W(mm) 49.539 <input type="button" value="+"/> <input type="button" value="-"/>	H(mm) 100.000 <input type="button" value="+"/> <input type="button" value="-"/>	
X(mm) -24.769 <input type="button" value="+"/> <input type="button" value="-"/>	Y(mm) 50.000 <input type="button" value="+"/> <input type="button" value="-"/>	
Z(°) 0.000 <input type="button" value="+"/> <input type="button" value="-"/>	<input type="checkbox"/> Welding	
<input type="button" value="Select file"/>		<input type="button" value="Optimize cache"/>
<input type="checkbox"/> Remove duplicate		
<input type="checkbox"/> Auto connect neighbouring lines		
Deviation(mm) 0.100 <input type="button" value="+"/> <input type="button" value="-"/>		
<input type="checkbox"/> Optimize lines sequence		
Tip: optimized shape can be export as vector.		

Figure 8-7 Vector graph properties

Common properties are the same as **【7.1 Point】** .


The vector file dialog box will list all the vector files that have been imported into the laser welding machine, including PLT format and DXF format. Double-click the file name or click the file name and then click the select button to display the currently selected vector file to the marked on.

Remove duplicates, automatically connect adjacent line segments, connect errors, optimize line order: refer to [4.15 Line Optimization].

Optimize cache: After the vector image is imported into the system, the system will automatically generate the corresponding cache file. Click this button, the system will remove the old cache file and re-read the vector image file. It is used to solve the problem of re-importing the system after the vector image is changed, but it will be displayed and welded. of still old data issues.


8.8 Delayer



Click  icon, A delay device can be inserted. The delay device has no actual graphics, and when the engraving sequence reaches the delay device, the laser welding machine waits for the timeout time set by the delay device before proceeding to the next step..

8.9 Spiral



Click  icon, Spirical markers are inserted and the properties are shown in Figure 8-23.

Type	Isometry	<input type="checkbox"/> Path reverse
Min radius (mm)	0.100	+ -
Min spiral dist (mm)	0.500	+ -
Max spiral dist (mm)	1.000	+ -
Spiral dist step (mm)	0.010	+ -
Inner rounds	1	+ -
Outer rounds	1	+ -

Figure 8-8 Spiral line

Isometry: The inner and outer spirals are equally spaced apart.

Inner tight: From inside to outside, the spiral line spacing is increasingly larger.

Outer tight: The spacing between the inside and outer spiral lines is getting smaller and smaller.

The effects are shown in Figure 8-24.

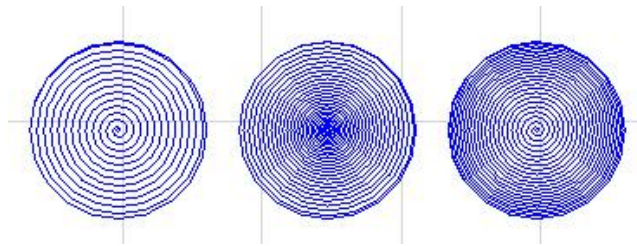



Figure 8-9 From left to right is **Isometry**、**Inner tight** and **Outer tight**

Min radius: Center circle radius minimum value.

Min spiral dist、**Max spiral dist** and **Spiral dist step** Determines the tightness of the spiral line.

Path reverse: The spiral welding sequence can be switched from inside to out or from outside to inside.

8.10 Weld line


Click  icon, Insert the weld line mark with properties shown in Figure 8-25:

Pattern	Circle	<input type="checkbox"/>
Radius (mm)	5.000	+ -

Figure 8-10

The pattern includes: circle, ellipse, straight line, figure 8, square and rectangle.

8.11 Control point

Click  icon, Insert the control point tag.

Input port control: When welding to this mark, the prompt content will pop up and wait until the status of the corresponding input port is successful.

Wait outer start: Wait **【6.6 IO configure】** The external control starts to mark the input port signal.

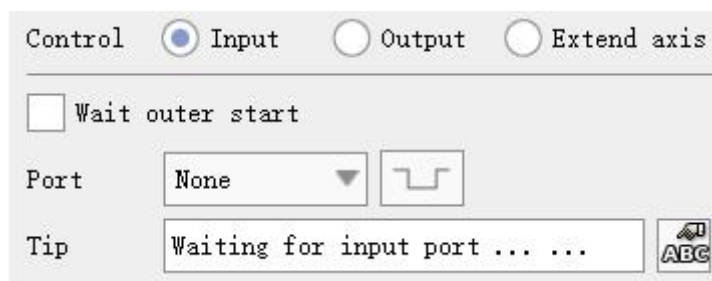


Figure 8-11

Input: When welded to this mark, the corresponding pulse signal is output.

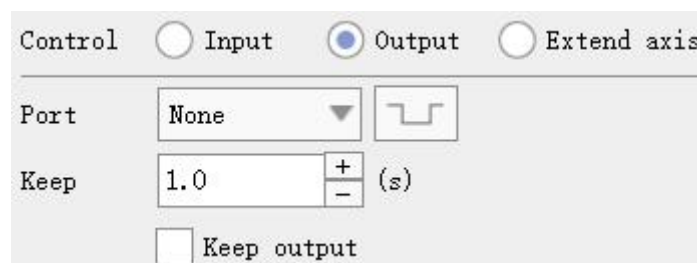


Figure 8-12

Extend axis: Support for X, Y, XY, Z, and R axis control.

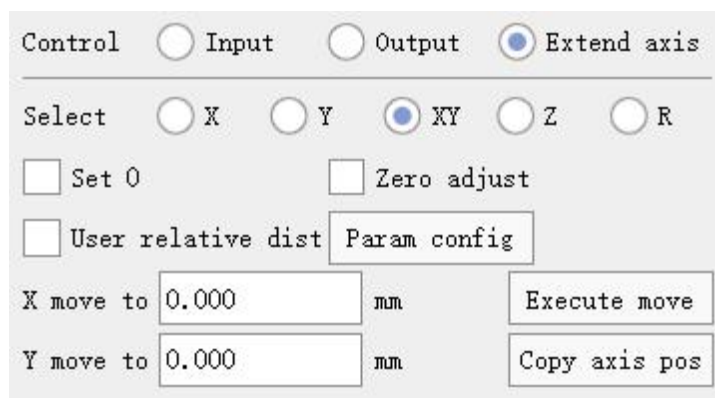


Figure 8-13


Set 0: Indicates that when the welding is executed here, perform zero point reset, zero point detection signal input port is described in [6.6.4 input port (extension shaft)].

Zero adjust: It means that the current mechanical position is the zero position when the welding is executed here.

User relative dist: Check this option to continue moving 50.00 mm from the last position (for example), if not checked, start to move 50.00 mm from the zero position.

Param config: Refer to **【6.7 Extended axis parameter configuration】** .

8.12 Ruler

Click  icon, Insert ruler object.

Type	Straight	Total cell	30
Dist cell (mm)	1.000	Cell num	1.000
Begin num	0.000	<input type="checkbox"/> Revers	Advance

Line wd(mm)	0.000	Decimal	0
Larger cell count	10	Font name	TTF Font
Larger height(mm)	10.000	Ch Width(mm)	2.450
<input checked="" type="checkbox"/> Show smaller text		Ch Height(mm)	3.500
Middle cell count	5	Ch space(mm)	0.350
Middle height(mm)	7.500	Align	Align ce...
<input type="checkbox"/> Show middle text		Angle	0.000
smaller cell count	1	Text offsetX(mm)	0.000
smaller height(mm)	5.000	Text offsetY(mm)	1.000
<input type="checkbox"/> Show smaller text			

Figure 8-14 Ruler

Support for the ruler and round ruler.

If it is a ruler, the total length = the total number of grids * the distance per grid, calculated from the starting value, and accumulated by the value of each grid.

If it is a round ruler, the total radian = the total number of grids * the angle per grid, calculated from the starting value, and accumulated according to the value of each grid.

There are three types of ruler scales: large, medium and small.

Support text and decimal point.

9 Four axis parameter

Click 【Enable the four-axis】 , As shown in Figure 9-1 below:

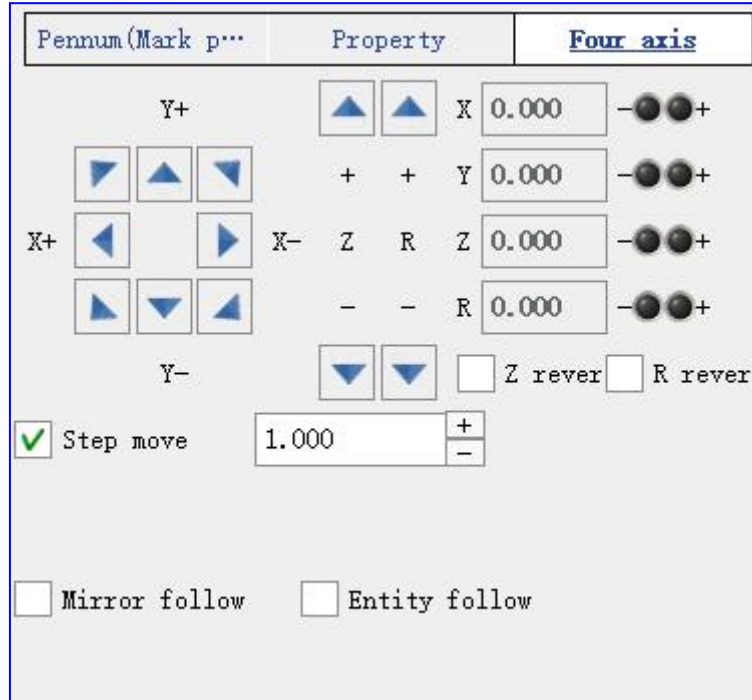


Figure 9-1 Four-axis parameter interface

Displays the processing order: When checked, you can preview the order of processed objects (red dotted arrow).

Extended axis configuration: Refer to [6.7 Extended Axis parameter configuration].

9.1 Debug

As shown in the figure below, the left side is the direction button of the debugging axis, and the right side is the real-time position and positive and negative (zero) limit real-time monitoring lights of the motion axis:

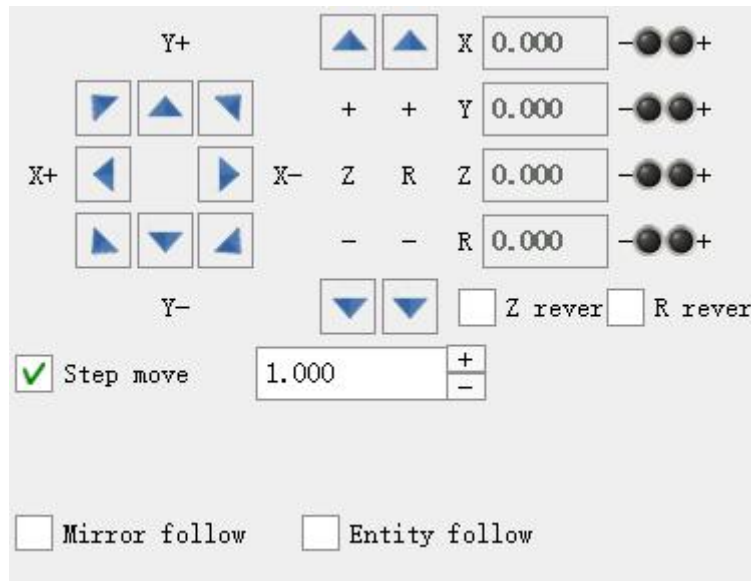


Figure 9-3 Debugging interface

Z/R rever: After checking, the corresponding + -direction switch.

Step move: If checked, click the arrow button to perform step value movement, click once, move once; if not checked, if the button is kept pressed, the motion axis will keep moving at the percentage of the axis driving speed until the button is released.

Mechanical zero reset: Movement shaft return to zero (negative limit) shortcut button.

9.2 Document association parameters

The parameter is saved in the document, and the last parameter is automatically synchronized the next time the document is opened. As shown in the figure below:

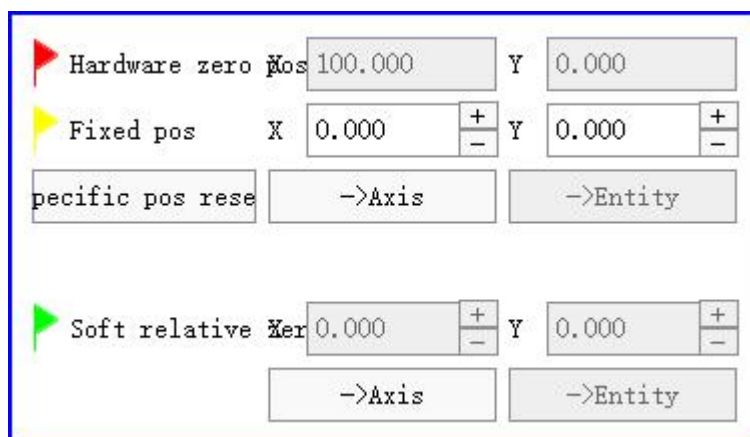


Figure 9-4 Document association parameters

Hardware zero pos: Represented by a red flag, the position in the view will vary according to the coordinate range of [6.7.6 Axis linkage]. The value indicates the distance between Hardware zero pos and Software zero pos.

Fixed pos: It is represented by a yellow flag, and the value represents the distance between the standby coordinate position and the software zero position. The value of the standby coordinate position can be adjusted manually, or click [->Mechanical axis] (move to the current mechanical axis position) and [->Mark center] (Move to the center position of the current check mark) to change the position. Click the [Reset Standby Coordinate] button to move the mechanical axis to the standby coordinate position.

Software zero position: Indicated by a green flag, the position of the standby coordinate or mark center reference can only be changed by [->Mechanical axis] (move to the current mechanical axis position) or [->mark center] (move to the current selected mark center position) (but the value remains at 0).

Mark relative position:Mark the distance between the center position and the zero-point position of the software.



Mark height position: Mark the distance between the center position and the Z-axis zero (negative limit) position.

Mechanical position follow: After checking, the mechanical axis automatically follows it after the central position of the mark object changes.

Mark Center -> Mechanical Axis: When the mark is selected, click this button to move the mark center to the current mechanical axis position (the mark moves, the mechanical axis does not move).

Mechanical axis-> marking the center:When the mark is selected, click this button to move the mechanical shaft position to the selected mark center (the mark remains, the mechanical shaft moves).

9.3 View

Click on the original size of the toolbar  Or observe the current  The button (if unmarked is selected) restores the view to the yellow machining range.

9.4 Infrared Preview and Weld

With quad mode on, red light preview and welding are different from normal mode.

9.4.1 Infrared Preview

Welding positions marked on the workpiece can be marked with the aid of red light debugging:

Method ①: Check [Mechanical Position Follow], check [Select Welding], select the mark object to be previewed, click the red light preview button or press F1, the mechanical axis will automatically move to the selected mark center position and red light Display. Click the up, down, left and right buttons on the keyboard to move the marker position, and the mechanical axis will automatically follow the movement and display in red light.

Method ②: Check [Mechanical Position Follow], check [Welding Completion Enable Always Display] Galvo Position in the red light calibration interface, in the editing state, move the keyboard or mouse to mark the position, the mechanical axis will automatically follow the movement, and The red light display point at the center of the galvanometer can easily arrange and mark the welding position.

9.4.2 Weld

Click the welding button or press F2, according to the processing sequence, the galvanometer moves to the center of the mark for welding. If the center of the mark is beyond the periphery of the yellow frame, an error will be reported and the

welding will be stopped.

10 Entity list

The list of objects refers to the list of labels in the top rightmost part of the main interface, as shown in Figure 10-1.

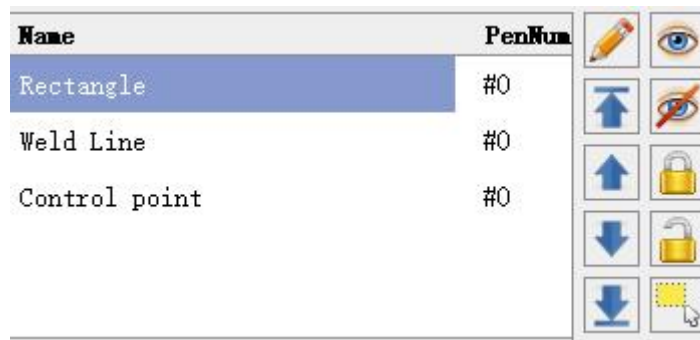








Figure 10-1 Entity list


Click Welding in the object list, all the marks displayed in the editing area will be arranged in the order of marking. The single-selection and multi-selection operations performed in the editing area will also be displayed in the object list at the same time.

In the radio state, the tag can be moved up   Or move down   To change the engraving order.

Click  and  You can hide and display the selected objects.

Click  and  Selected objects can be locked and unlocked.

Hidden or locked objects cannot be selected with the mouse in the view area, you need to click to select in the object list.

Double-click on the label name in the list or click  , The tag name modification box pops up, and you can customize the input tag name.

11 Pen number

The pen number attribute bar is located in the right middle of the main interface, as shown in Figure 11-1 and Figure 11-2.

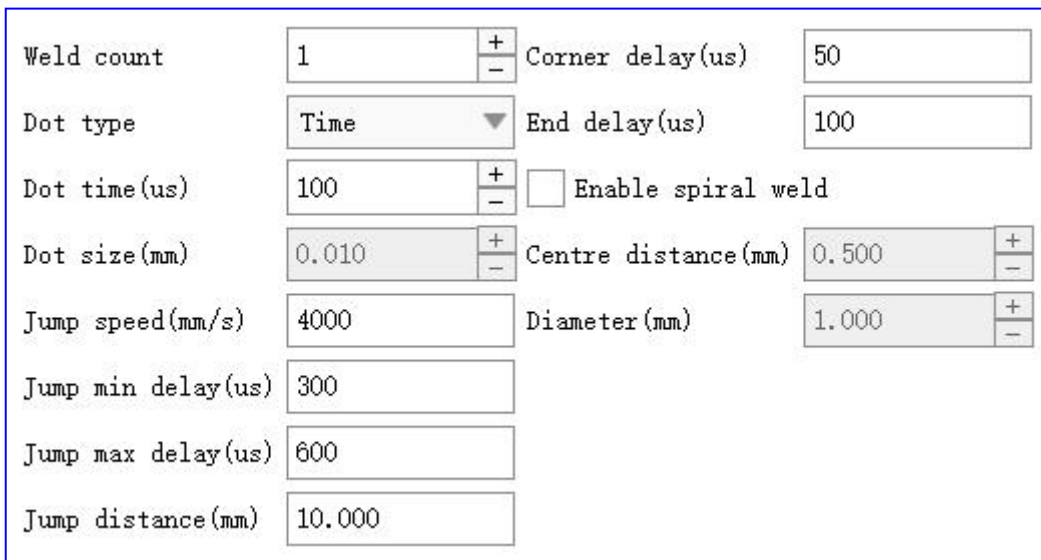
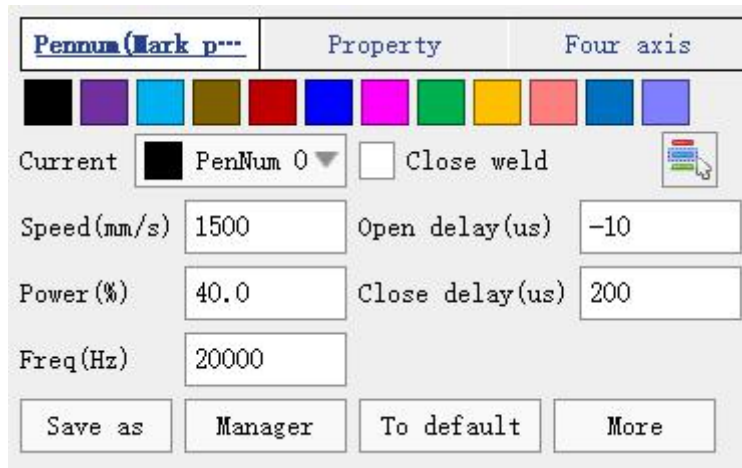


Figure 11-1 Pen number attribute bar



Figure 11-2 Quick number switch bar

Quick number switch bar: Color squares represent the pen number. Select the tag, click on one of the color blocks, and the pen number of the selected mark changes to the color block pen number that you click on.

11.1 Pen number property

When you create a new blank document, the laser welding opportunity automatically creates 21 new pen numbers.

Current: The pen number of the currently selected object.

Speed: The unit is millimeters per second (mm/s), which is the swing speed of the X.Y two-way galvanometers inside the scanning head during light-emitting welding. The range is (1---20000mm/s). When adjusting the speed, pay attention to the size of the power, The frequency has a corresponding relationship. The faster the speed, the higher the frequency. The speed value directly affects the work efficiency. The larger the value, the shorter the welding time; the smaller the value, the longer the welding time..

Power: The unit is percentage (%), the relative power of the laser (the actual power depends on the energy of the laser), the range is (1%-100%). Under the condition that other parameters remain unchanged, the larger the value, the greater the output energy. The effect of welding is heavy in color and deep in traces.

Freq: The unit is kilohertz (kHz), which is the number of pulses per unit time, that is, the number of light spots that emit light per second. The larger the value, the more the number of light spots per unit length, and the tighter the arrangement. Suitable light The point spacing is conducive to the adjustment of the effect. Under the condition that other parameters remain unchanged, the lower the frequency, the higher the peak power, and the better the direct gasification effect on the material; the light energy effect exhibited by high frequency is closer to the average power, i.e. the reaction is more thermal effect.

Open delay: The unit is microseconds (us), for the delay of the laser, the laser delay is turned on to wait for the galvanometer to complete the command, (the range is -2000---2000us). Because the galvanometer jumps from the current stop point to the next character or pattern During the process of starting the position of the pen, the response of the galvanometer to the position signal will lag behind the timing of the signal sent by the system, so the laser must be turned on with a delay

to wait for the galvanometer to jump to the corresponding position and then emit the laser. It is related to the response time of the laser. Usually, this value should be set to a positive value, but when the response time of the laser's light output is greater than the response time of the galvanometer, the value should be set to a negative value. CO2 lasers and fiber lasers should usually be set to negative values value.

Close delay: The unit is microseconds (us), for the delay of the laser, the laser delay is turned off to wait for the galvanometer to respond to the last position command, the range is (-2000 to 2000us). Because the response time of the laser to the "light off" command is much longer than that of the vibration The response time of the mirror to the "end position" command is short, so the laser must be turned off after a delay to wait for the galvanometer to reach the response position. This setting is related to the welding speed and needs to match the welding speed set by the user. The setting is appropriate The light-off delay parameter can remove the non-closing phenomenon at the end of welding, but if the light-off delay is set too large, it will cause the phenomenon of excessive dots in the end section.

Close weld: When checked, all marks under this pen number.

Weld count: Sets the number of times that all marks under this pen number are engraved under one welding operation.

Dot type: Available in time, pulse and diamond modes.

Dot time: The unit is microseconds (us), which means the light-emitting time of the laser. When marking the dot matrix, the welding speed has no effect on the overall welding time. The longer the spotting time, the deeper the trace.

Dot pulses: The dot mode is valid when the pulse is used, and the light time is controlled by the number of pulses.

Dot size: The unit is millimeter (mm), valid when the dot pattern is diamond, the larger the value, the thicker the dot, otherwise the finer.

Pulse width: The unit is nanoseconds (ns), which is the time that the

laser power lasts at a certain value. At the same frequency, the larger the pulse width, the smaller the peak power. This parameter is valid only when MOPA is enabled in the [6.4.1 Fiber Laser] parameter (visible).

End delay: The unit is microseconds (us), the laser machine makes a stroke, and after the stroke is completed, the light needs to be turned off after the light-off delay is completed. Since the laser needs a reaction time to turn off the light, the end delay is this waiting time. After waiting for the end delay, it will be Empty go to the next marking coordinate. If the delay setting is too small, the laser has not been completely turned off, resulting in tailing; if the setting is too large, it will affect the welding time.

Corner delay: The unit is microseconds (us), the delay time of the galvanometer signal at the corner of the character (the range is 30–200ns). The delay time required for the laser welding of the corner of the character or the arc line. If this setting is not set properly, there will be burnt black at the corners or arc lines of the characters, and the required delay time will vary depending on the welding material and welding speed..

Jump speed: The unit is millimeters per second (mm/s), the speed of the X.Y two-way galvanometer in the scanning head swinging when jumping, the range is (1–20000mm/s). This parameter is mainly used to control welding characters or patterns. The speed of jumping between strokes. That is, after welding a character or the last point of the stroke, the galvanometer moves to the starting point of the next character or the starting point of the stroke. There is no laser in the middle..

Jump min delay: In microseconds (us). The minimum delay required for the laser to jump between strokes.

Jump max delay: The units are microseconds(us). The maximum delay required for the laser to jump between strokes.

Jump distance: In millimeters (mm). The maximum distance required for the laser to jump between the strokes.

When the actual jump distance of the < **Jump max distance**, Actual jump delay = Jump min delay + (actual jump distance / Jump max distance)*(Jump max delay - Jump min delay).

When the actual jump distance >= Jump max distanc, the actual jump delay = Jump max delay.

Save as: Save the currently set parameters to the laser welding machine, you need to enter a unique name.

Manger: It is described in the [10.2 Parameter Manager].

The following are examples of the effects of each parameter:

Create a new welding file, add a fixed text, and the text content of the "TEXT" font is set as the GENISO.shx font, and the dimension is set to 31.78X11 mm.

An arrow was used to simulate the direction of the laser welding.

Adjust open delay:

Weld this text, observe the lines at the beginning of each line segment of the welded letter, there may be the following situations:

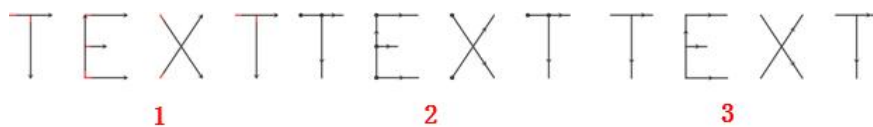


Figure 11-3 Welding effect under three different light opening latencies

The first case: A section of the line at the beginning does not emit light (the red line is the segment that does not emit light). This is caused by the long delay of turning on, and it is necessary to reduce the delay of turning on, or even to a negative value.

The second situation: The "emphasis" phenomenon as shown in the figure appears in a line at the beginning, that is, the laser is heavy at the beginning. This is caused by the delay of turning on the light is too small, and the delay of turning on the light needs to be increased.

The third situation: the length of the line is appropriate, and there is no "key" phenomenon of the second situation, this is what we need, and the delay of opening the light at this time is more appropriate.

Close delay: Weld the text made above, and observe the lines at the end of each line segment of the welded letter. There may be the following three situations, similar to the beginning segment.

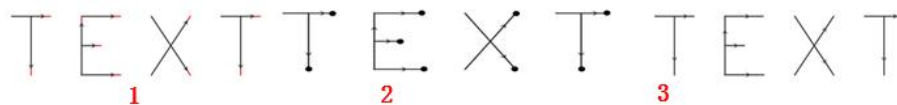


Figure 11-4 The welding effect under three different light-off delay

Case 1: A section of the line at the end does not emit light (the red line is the segment that does not emit light). This is caused by the too small delay of turning off the light, and it is necessary to increase the delay of turning off the light.

The second situation: The "emphasis" phenomenon as shown in the figure appears in a line at the end, that is, the laser at the end is heavier. This is caused by the excessively large light-off delay, and the light-off delay needs to be reduced.

The third situation: the line length is appropriate, , this is what we need, and the light-off delay at this time is more appropriate.

Due to the different lasers and galvanometers used by different manufacturers, the performance is also different, and the welding materials are different. Sometimes, no matter how to modify the light-on delay and light-off delay, the length of the line segment cannot be made appropriate, and the line is not a straight line. There are several other situations:



Figure 11-5 Three possible abnormal images

The first case: the start segment line is deformed, and the jump delay

can be increased at this time.

The second case: the end segment line is deformed, and the end delay can be increased at this time.

The third case: The lines of the start and end segments are not deformed, and the two delay parameters are just right.

As long as it is ensured that the line is not deformed, the smaller the value of the end delay and the jump delay, the better, the two delay parameters are too large, although the line is normal, it will affect the efficiency of welding.

Corner delay:

Create a new welding file, add a fixed text, the text content is "A4" font is GENISO.shx font, and the size is set to 15.89x11mm.

Soldering this text, observing the corners of the font, the following three situations may occur:



Figure 11-6 The three corners are delayed

The first case: The graph that should have been sharp corners has become an arc corner, which is caused by the too small value of the corner delay parameter. In this case, the value of the corner delay parameter should be increased.

The second case: Although the graph that should have sharp corners is sharp, but the vertices of the right angles are heavy by the laser, which is caused by the too large value of the corner delay parameter. At this time, the corner delay value should be reduced.

The third case: The graph that should be sharp corners is sharp corners, and there is no vertex-focused phenomenon, which is the case where the corner delay parameter value is more appropriate.

After the above parameter values are set, you can use this group of parameters for welding work. It is best not to modify the set parameters, because the welding effect may change after modification. Similar methods can be used to create other Welding parameters and save them. In the future, there is no need to modify the parameters every time, just directly select the required welding parameter name, which reduces a lot of repetitive work and improves work efficiency.

Overall calculation of welding times: After checking, the pen number corresponds to all the marks after the whole welding is completed, and then the next mark is welded until all the times of welding are completed.

Enable spiral weld: Weld the welded line segment in the spiral mode, Diameter determines the size of the spiral, and Centre distance determines the tightness of the spiral. The effect of the welded lines will become significantly thicker.

11.2 Parameter Manager

After the welding parameters are modified, they can be saved through the parameter manager. Click the parameter manager button under the more menu to pop up the welding parameter manager interface, as shown in Figure 11-7.

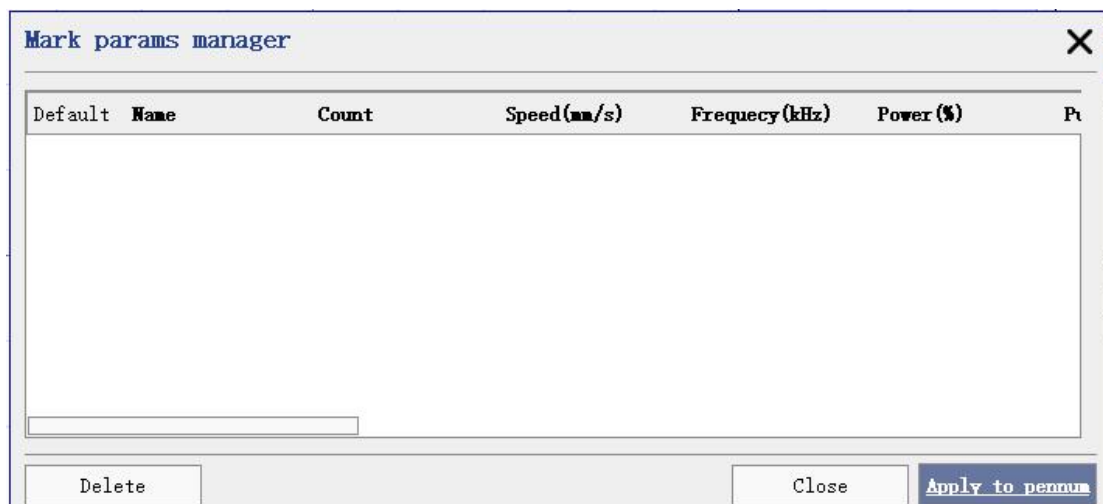


Figure 11-7 Welding parameter manager interface

In this interface, a list of welding parameters saved in the current laser welding machine can be displayed. Click an item in the list to delete it or apply it to the current pen number. If you want to set the selected welding parameter as the default parameter, Then you can click the default box before the welding parameter, so when you create a new document in the future, the default is the selected welding parameter.

The parameter manager also supports quick modification of saved parameters. Double-click the item you want to modify, and the modification interface shown in Figure 11-8 will pop up.

Weld count	1	<input type="button" value="+"/> <input type="button" value="-"/>	Corner delay(us)	50
Dot type	Time	<input type="button" value="v"/>	End delay(us)	100
Dot time(us)	100	<input type="button" value="+"/> <input type="button" value="-"/>	<input type="checkbox"/> Enable spiral weld	
Dot size(mm)	0.010	<input type="button" value="+"/> <input type="button" value="-"/>	Centre distance(mm)	0.500 <input type="button" value="+"/> <input type="button" value="-"/>
Jump speed(mm/s)	4000		Diameter (mm)	1.000 <input type="button" value="+"/> <input type="button" value="-"/>
Jump min delay(us)	300			
Jump max delay(us)	600			
Jump distance (mm)	10.000			

Figure 11-8 Parameter modification interface

Here you can quickly modify the saved parameters, click OK to re-save.

13 Welding control bar

The welding control bar refers to the control area below the editing area of the main interface, as shown in Figure 13-1.

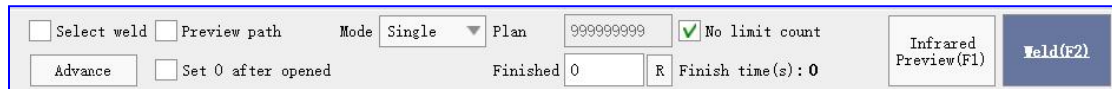


Figure 13-1 Welding control bar

Select weld: After selecting the mark in the editing area, and then checking Select Welding, only the selected marks will be marked during welding, otherwise, all marks that are not closed welding will be marked. has the highest priority.

Preview path: If checked, it means that the red light shows the welding path; if it is not checked, it means that the red light shows the welding frame rectangle.

Set 0 after opened: If checked, the number of welds will be automatically cleared every time the document is opened..

Mode: Have Single、Trigger and continuous three modes. With the advanced setting parameters, as shown in Figure 13-2.

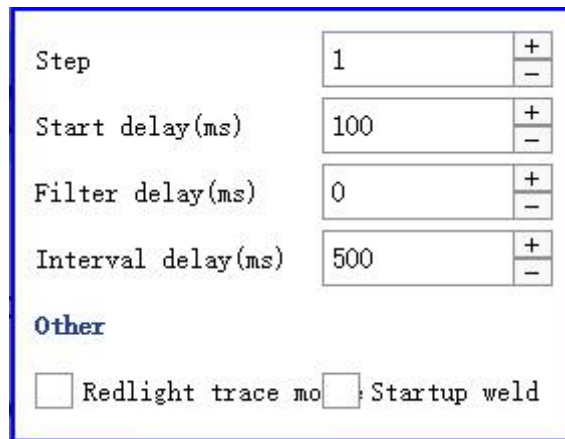


Figure 13-2 Advanced settings parameters

Single mode: Press the marking button or "external control to start marking" to start a welding. Start delay: In this mode, the start delay is not accurate. It consists of start delay plus software delay; filter delay: invalid; Interval delay: invalid.

Trigger mode: Press the marking button or "external control to start marking" to

enter the trigger mode. The IO port of the "start marking input port" is used to trigger welding. Start delay: IO port valid to start printing delay time; filter delay : Only one trigger is processed within the set range, and subsequent triggers within this time interval are ignored; interval delay: invalid.

Continuous mode: Press the marking button or "external control to start marking" to enter continuous mode. Start delay: In this mode, the start delay is not accurate. It consists of start delay plus software delay; filter delay: invalid; Interval delay: the interval time from the completion of one mark to the start of the next mark.

Step: Refers to the number of times of marking in one welding operation. For example, if the number of single steps is set to 2, in single mode, click once welding, and two marks will be marked in the document record.

Plan: Plan the total number of times to be engraved, and automatically stop it after reaching them.

Finished: The number of times they have been completed.

Finish time: The total time to complete the mark that needs to be engraved in the entire document. Unit is seconds (s).

No limit count: Unlimited document welding times.

Infrared Preview: That is, the red light preview. After clicking, the red light will appear to confirm the welding position. The shortcut key is F1. The red light preview box will appear on the interface, as shown in Figure 13-3.

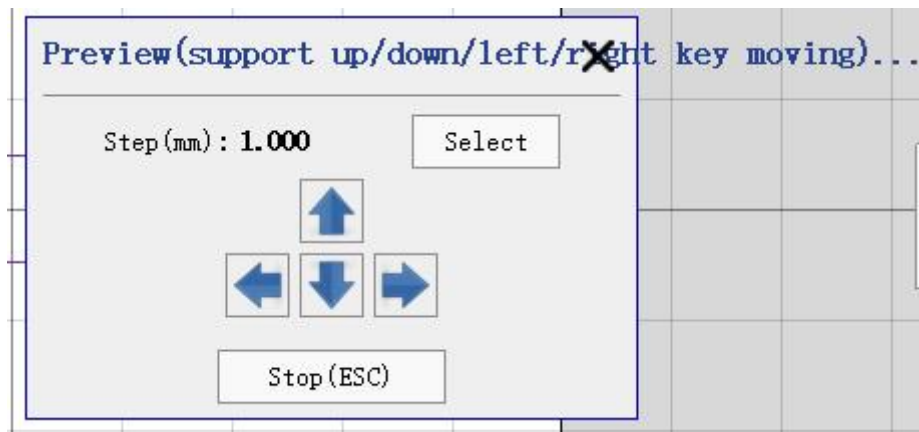


Figure 13-3 Red light preview interface

Support the keyboard to move the document tags up and down, and refresh the red light preview in real time.

Weld(Print): The shortcut key is F2. The welding interface will appear, as shown in Figure 13-4.



Figure 13-4 Weld interface

The red light interface will not be closed automatically, the user needs to click the stop button or press the ESC key on the keyboard to exit the red light preview after the red light preview is over.

The welding interface will automatically close after welding. If you need to stop welding in the middle, click the stop button or press the ESC key..

14 Status bar

The status bar is the long strip area displayed at the bottom of the main interface, as shown in Figure 14-1.



Figure 14-1 Status bar

The status bar is from top to bottom: version number, current user, current edited document, selected tag size, network connection status, and system time.

15 Typewriting



The input method status bar is displayed as a floating frame on the main interface, which supports mouse movement. After the next boot, the floating frame position is the position after the last move. Click the keyboard icon to pop up a menu. As shown in Figure 15-1.

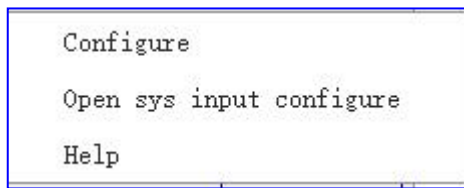


Figure 15-1

Currently support sogou input method and Android automatic English input method. Check the corresponding input method to complete the switch.

Configure: Used to set the current input method. Sogou input method supports English, Chinese (Simplified, Traditional, Wubi), after the configuration, you need to restart the system to take effect.

Help: Display the help of the current input method. If the current input method is Sogou, click Shift+Space on the keyboard to switch between Chinese and English. If the current Android keyboard (AOSP), only supports English input.