

HAN'S LASER

Han's Laser Marking Control Software V4.0

Please read this manual before use. After reading this manual, please keep it properly for future reference.



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Preface

The statement

Welcome to use Han's Laser Marking Control Software V4.0.1 system. This software system is a marking software based on vector graphics, and has the functions of extended word processing, accurate drawing and fine marking. It helps users to work in a faster and more precise way. At the same time, Since this version works in Windows XP, the system can run in a more stable and reliable environment, greatly improving the reliability of software running.

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Revision history

Revision Date	Version number	Update contents
July 2022	V4.0	<ol style="list-style-type: none">1. Mode for setting laser parameters.2. 3D correction Settings.3. Flight marking parameter setting and flight marking.4. Port Settings.5. One machine multi - card and multi - card marking.6. Laser test.7. Processing dialog box and red light display outline, red light continuous mode.

Manual contents

Chapter one Marking software function and laser marking characteristics are explained.

Chapter two Describes the marking software installation and interface.

Chapter three Describes the file menu of marking software.

Chapter four Describes the editing menu in marking software.

Chapter five Describes the drawing menu in the marking software.

Chapter six Describes the modification menu in the marking software.

Chapter seven Describes the view menu in the marking software.

Chapter eight Describes the 3D transform function of the software.

Chapter nine Describes the software and hardware Settings.

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Chapter 1 Software overview

The function of marking software and the characteristics of laser marking are described.

1-1 An overview of marking software

1-1.1 Relationship between marking software and computer

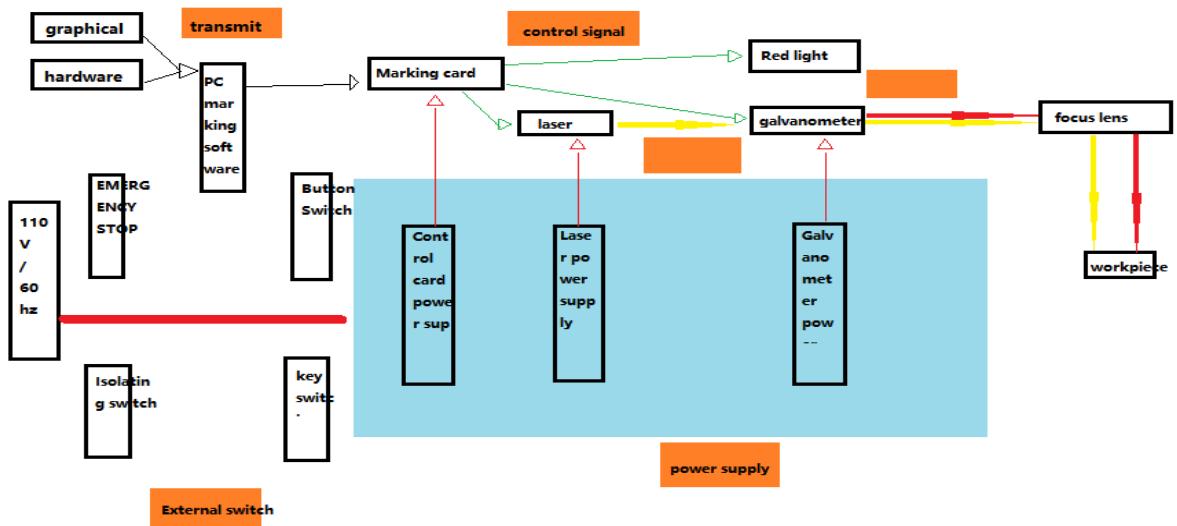
It is no exaggeration to say that "if there were no computer, there would be no laser marking machine". The computer is responsible for editing and making marking files (including image acquisition when the user is equipped with image acquisition equipment such as image scanner), controlling the movement of the galvanometer scanner so as to scan the content of the marking file on the surface of the workpiece by laser, controlling the modulation frequency of the acousto-optic Q switch, controlling the marking speed, etc. The computer control system of laser marking machine includes computer, computer marking special interface board and marking software.

1-1.2 Relationship between marking software and marking machine

The role of the computer marking special interface board is: To convert the digital signal sent by the computer to analog signal, or directly send out the digital signal of the computer, and then the signal drives the vibration of the two galvanometer scanners, so as to make the laser beam moves in space. A synchronous Q-switch modulation signal is generated and sent to the laser, and a pulsed laser is emitted. Hence to make the marked graphic content accurately and completely etched on the surface of the processed material.

In computer control system, the core part is marking control software. At present, there are many laser marking machine manufacturers in the world, they produce a variety of marking machines. The hardware structure of these marking machines is similar, but the marking software is different. Marking software

is the technical core of each marking machine manufacturer, is the key of each marking machine, it determines the function of marking machine.



1-2 Introduction to laser marking

This chapter introduces the principle, characteristics and classification of laser marking.

1-2.1 Characteristics of laser marking

The vast majority of metal or non-metal materials can be processed by selecting the laser and its power size or power density suitable for the materials being processed. Laser is non-mechanical "tool" processing, the material does not produce mechanical extrusion or mechanical stress, no "tool" wear, non-toxic, no environmental pollution; Can be processed in atmosphere or protective atmosphere; It produces no X-rays and is not disturbed by electric and magnetic fields. The laser can process the internal parts of the equipment through the transparent material; Minimal material consumption; No thermal deformation; It can be machined through prisms or mirrors on internal surfaces or tilted surfaces. Simple operation, the use of computer numerical control technology can realize automatic processing, can be used for parts on the production line for high speed, high efficiency processing. As a part of the flexible machining system, the processing quality is good. With the help of precision table laser marking can achieve fine machining.

Laser marking also has its unique advantages:

- (1) can mark bar codes, serial number characters, graphics, images, etc.
- (2) will not be due to environmental relations (such as humid, acidic and alkaline atmosphere) naturally fade, but permanent, not easy to be counterfeit.
- (3) Good marking quality - belongs to non-contact processing, do not damage the product.
- (4) high efficiency - easy to use the computer for automatic control, automation; Do not stop to rest or heat curing; One or a group of characters and patterns can be marked at a time. Several parts can even be marked at the same time.
- (5) Low processing cost -- although the one-time investment of equipment may be high, but through continuous and large amounts of processing, the cost of each part can be extremely low, thus creating high benefits.

Because of the above advantages, make its strong security, especially color markers can have different shades of color. General metal material marking, due to the ablated line thickness is different, so that the color and reflective rate is not the same as the original, resulting in contrast effect; For glass and plastic materials, also have contrast and matte effect.

1-2.2 Classification of laser marking

Laser marking can be divided into three categories: mask mode marking, dot-matrix marking and galvanometer scanner linear scanning marking.

(1) Mask mode marking method: processing can be carried out without the whole system, namely making a marking device by oneself, which can reduce the cost; High processing efficiency, a pulse can mark a group of characters, bar codes or record, the fastest to more than one thousand parts (semi-finished products or products, packaging bags) processing (up to 30 units/second), the slowest can also be up to 3 seconds/unit. The disadvantage is that it needs to make a mask (one part corresponds to one mask), and the characters or patterns on the mask cannot be changed immediately following the changes of the product (that is, poor flexibility).

(2) Dot matrix marking method: It is generally a 7×5 matrix with 7 vertical strokes and 5 horizontal strokes.

(3) galvanometer scanner linear scanning marking method: the area can be large or small, the range size is generally $50\text{mm} \times 50\text{mm}$ to $300\text{mm} \times 300\text{mm}$, can mark a variety of characters, graphics and images, can mark several small parts at the same time, can also mark a variety of text and graphics for a part, flexible and convenient change, can mark complex graphics and images. The speed is slower than the mask mode marking.



Chapter 2 Software Installation

This section describes the marking software installation and interface

2-1 Requirements for Software installation

This chapter describes the installation requirements and preparation of Han's Laser Marking Control Software V4.0.1.

2-1.1 Installation Environment Requirements

Before installing this software, please check that your computer meets the following minimum software and hardware requirements:

Operating system: Windows2000/Windows XP/Windows 7(32-bit)

Minimum configuration:

CPU: Celeron 1G or above;

Memory: At least 512 MB memory. If large graphics files need to be processed, at least 4 GB memory is recommended.

Graphics card: If 3D function is used, independent graphics card with strong performance is needed for graphics processing;

Hard disk: At least 200 MB free space. You are advised to reserve more free space.

2-1.2 Preparing for Installation

If you use and have virus protection software enabled, set to allow the installation of new software; If a previous version of the software has been installed on your computer, please uninstall it before installation; To ensure a quick and correct installation, you are advised to close all other Windows programs before installing this software.

2-2 Software Installation Procedure

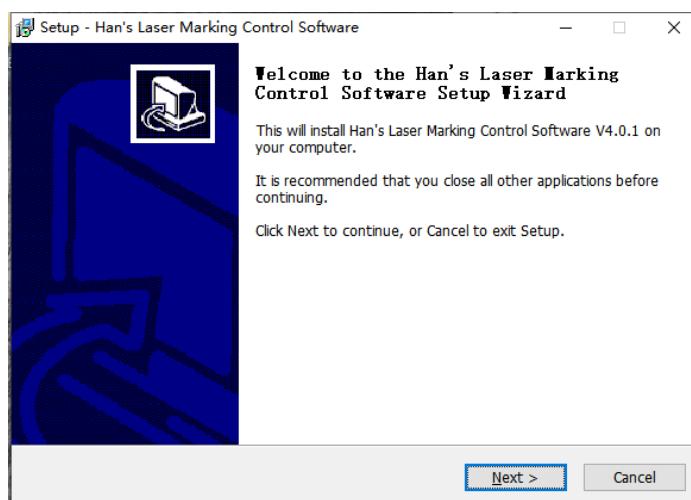
This chapter describes the installation process of Han's Laser Marking Control Software V4.0.1.

2-2.1 Installing Software

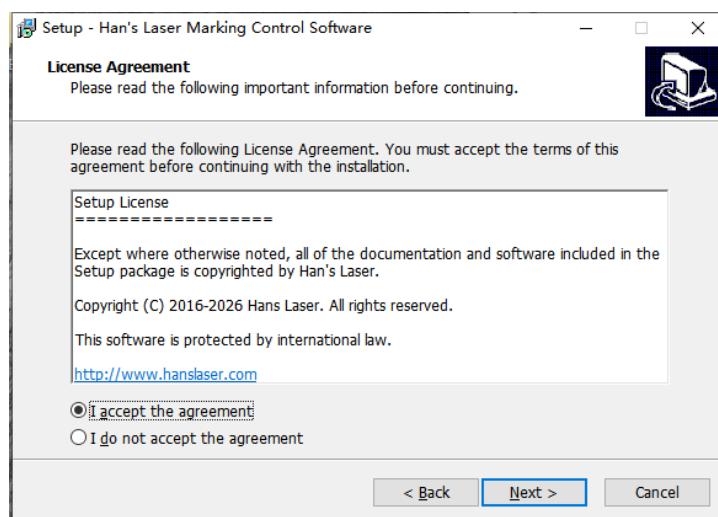
Double-click the installation package or right-click and open the installation package. The language selection dialog box appears, as shown below:



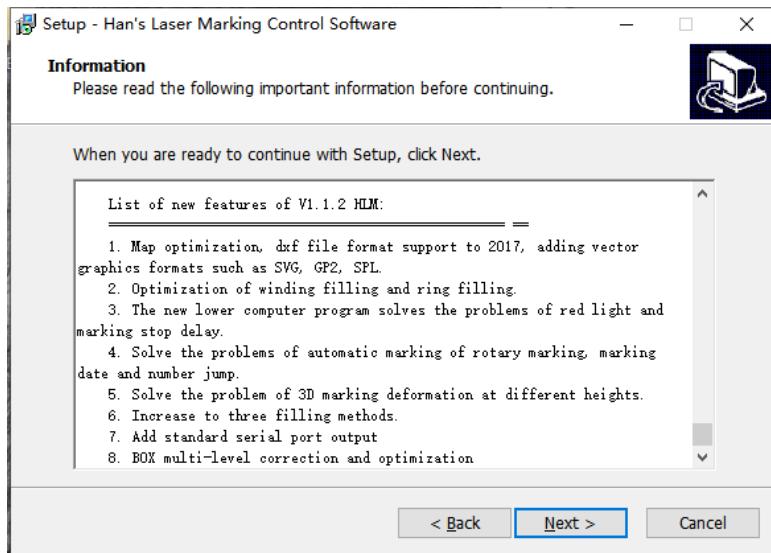
After choosing the language, confirm;



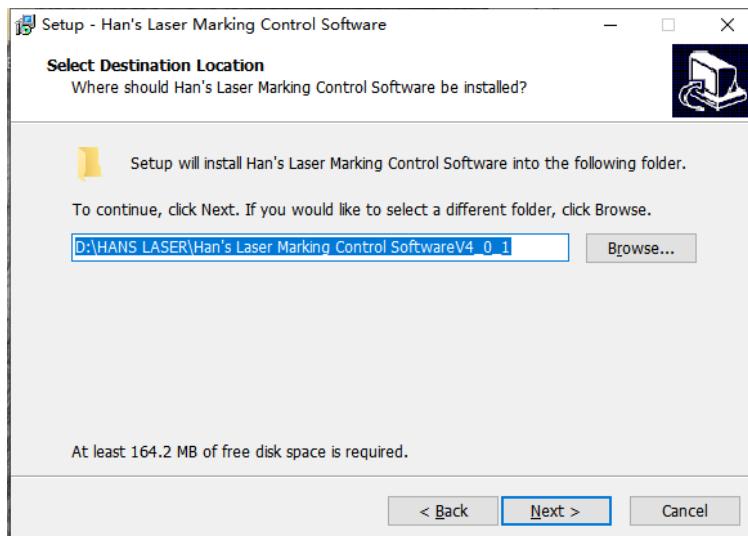
Click "Next"



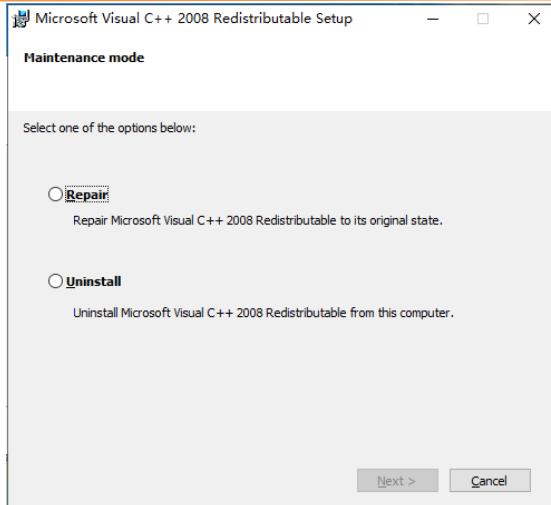
Click "I accept", then click "Next";



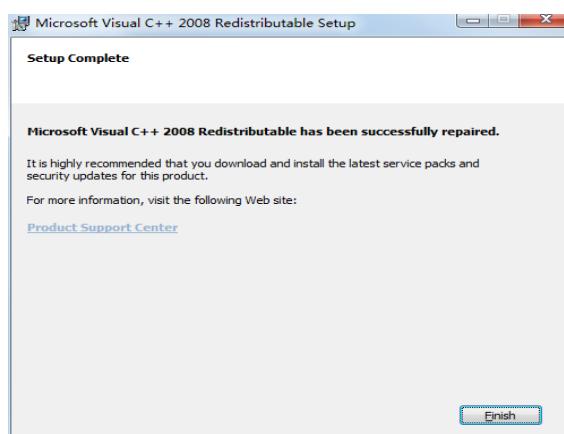
Click "Next" and select the installation path of the software. The default installation path is D:\\Han's Laser MarkingControl SoftwareV4_0_1



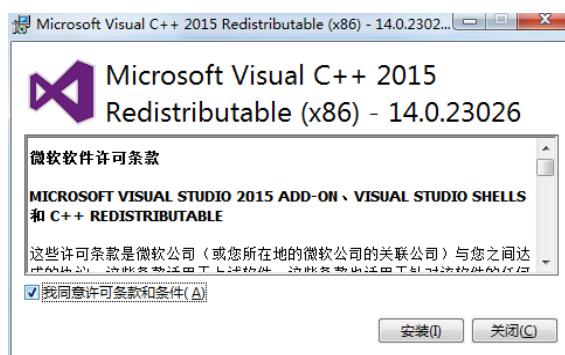
Click "Next" to display the installation of the Visual C++ 2008 library as shown below. The main function of this page is to install the Microsoft library file required by the software. When installing the software for the first time, this part must be installed, and the subsequent installation of other versions of the software can be unnecessary:



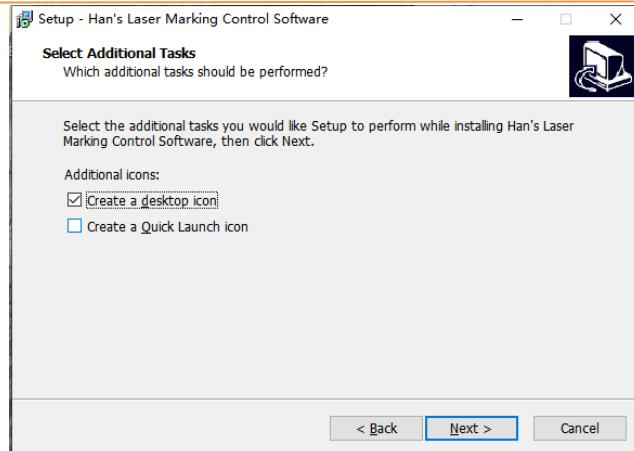
Click Install or Repair, and then click Next to wait for the installation.



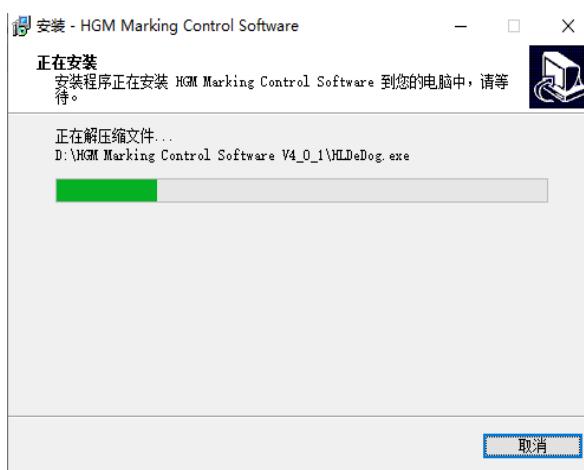
Click "Finish" after installation, the following dialog box will pop up:



Check "I agree to the License Terms and conditions", click "Install" and wait for that section to complete. Select whether to create a desktop shortcut. Desktop shortcuts are created by default.



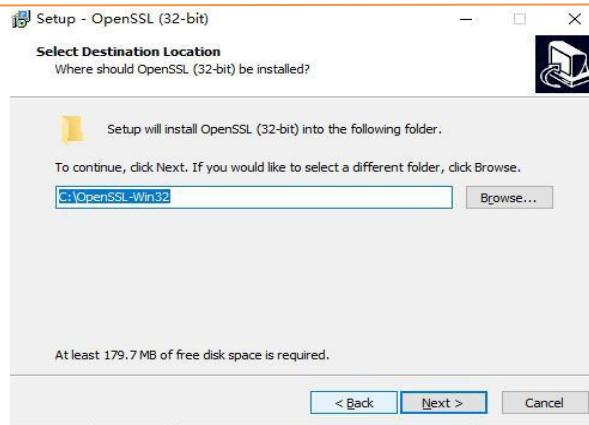
Click "Next" to install the HBM software:



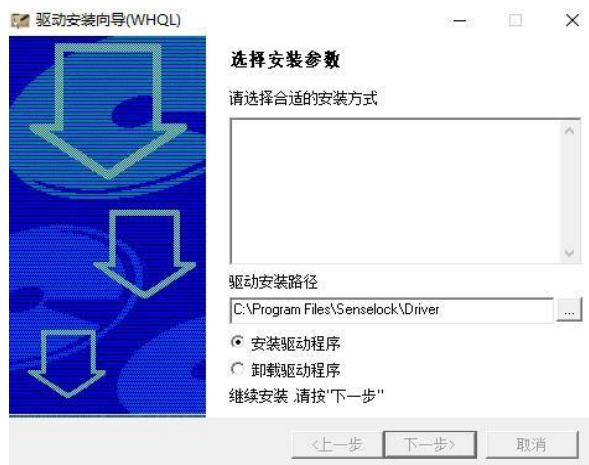
During the software installation, the driver installation program is displayed, as shown below. If the HBM software is installed for the first time, you need to install the EMCC card driver. You can skip this part in the subsequent installation.



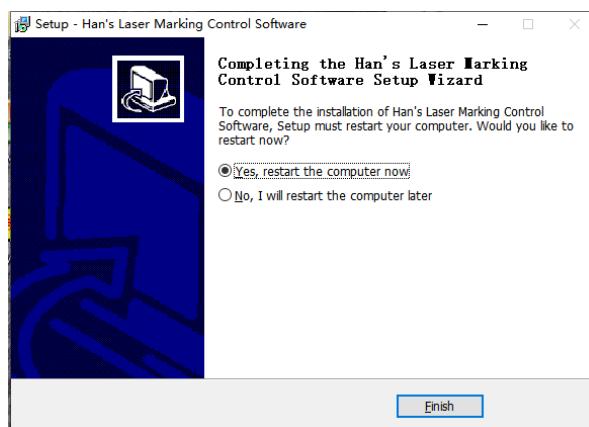
Proceed to the next installation and install OpenSSL-32, which is also a Microsoft library required for the software.



Click "Next" to display the driver installation wizard interface. Select all default Settings.



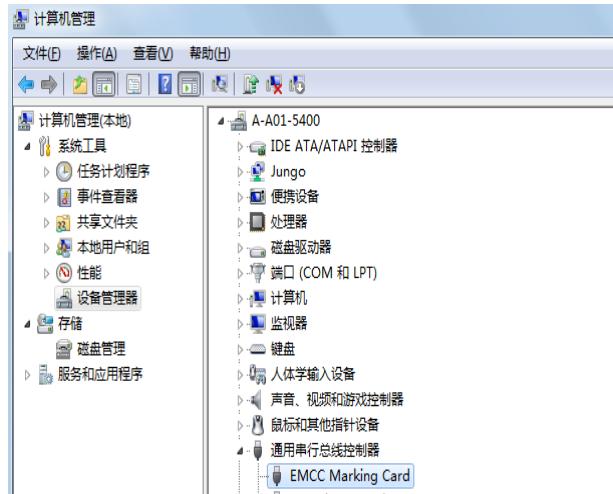
Click "Yes" and wait for the installation of the distribution package. Finally, the following screen pops up:



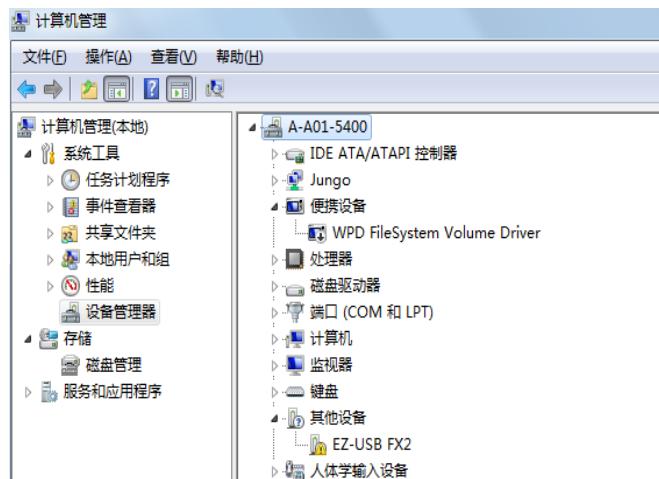
Select "No, restart the computer later" and click "Finish" to complete the software installation.

2-2.2 Install the EMCC card Driver

Open the computer device manager → Universal Serial Bus controller → Find the USB driver (EZ-USB or EMCC Marking Card) and check whether the EMCC card driver has been installed, as shown in the picture below.

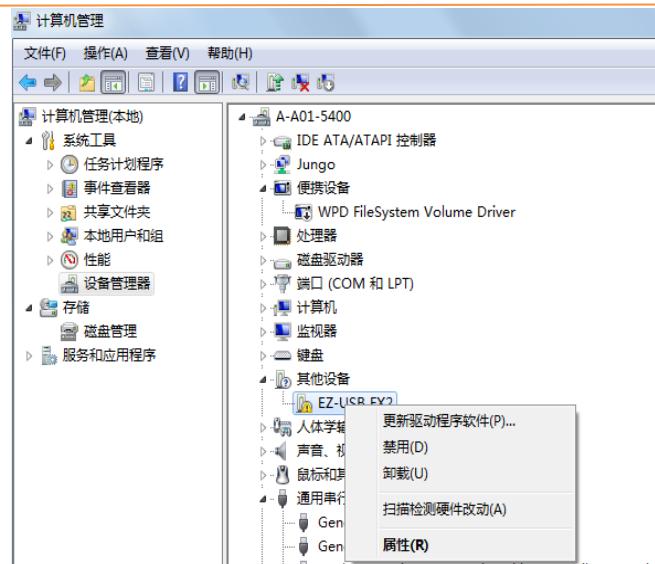


If the card driver is not installed successfully, an exclamation mark or another yellow exclamation mark appears (the yellow exclamation mark that responds to inserting or removing the EMCC card), as shown below:



You will need to follow these steps to install the EMCC card driver:

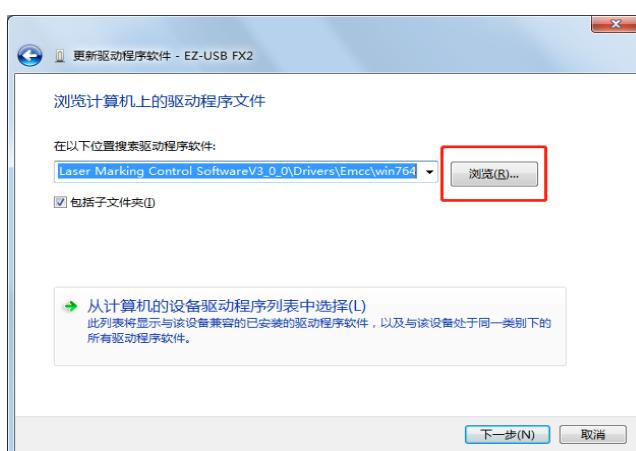
- (1) Right click the driver EZ-USB-FX2 with exclamation mark ;



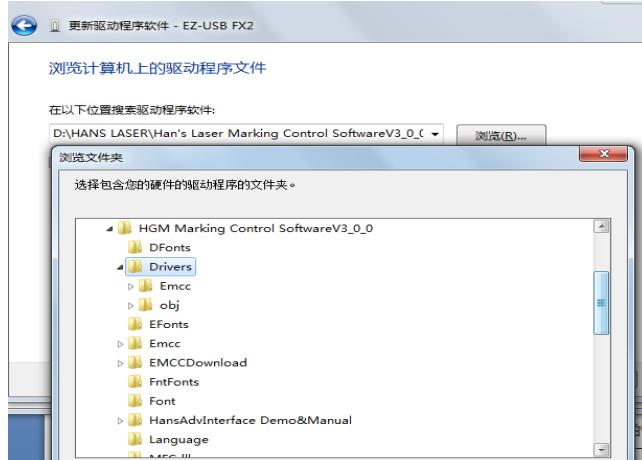
Pop-up dialog box, select update driver software;



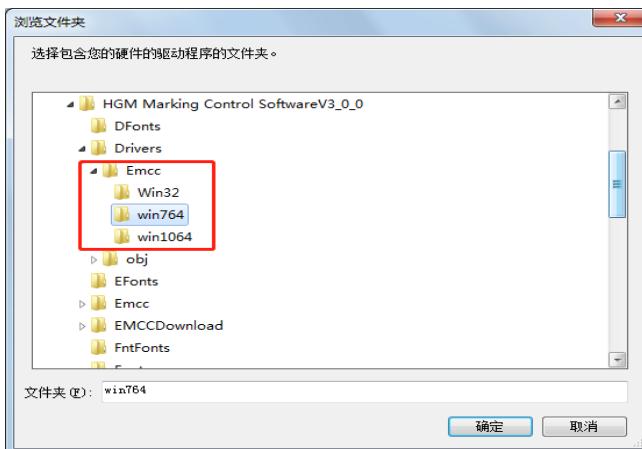
(2) Select the second item: "Browse your computer for driver software";



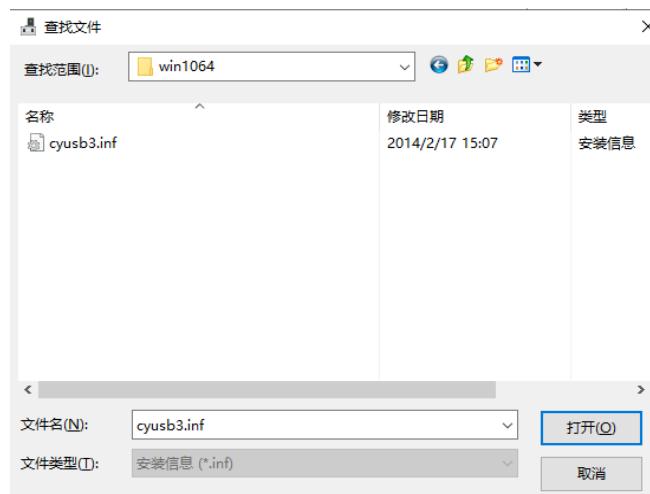
(3) Click "Browse" to find the marking software installation directory;



(4) Find the driver file in the Drivers\Emcc folder in the marking software installation directory, and select the driver according to the computer system:



(5) Find the driver file under the EMCC folder under the Drivers folder. Select the corresponding driver according to the computer system. Select the driver in the WIN32 folder for 32-bit systems. For Win7 64-bit system select the driver in the Win7 64 folder. For WIN10 64-bit system select the driver in the WIN10 64 folder.



(6) After the path is specified, click Next;



(7) Click the second item "Always install this driver software". Close the dialog box after the installation is complete.



If the EMCC Marking Card driver is found on the Universal Serial Bus controller, it indicates that the driver has been successfully installed.

2-3 Software interface

This chapter introduces the operation interface of Han's Laser Marking Control Software V4.0. The opening interface after HBM software installation is shown in Figure 2-3-1:

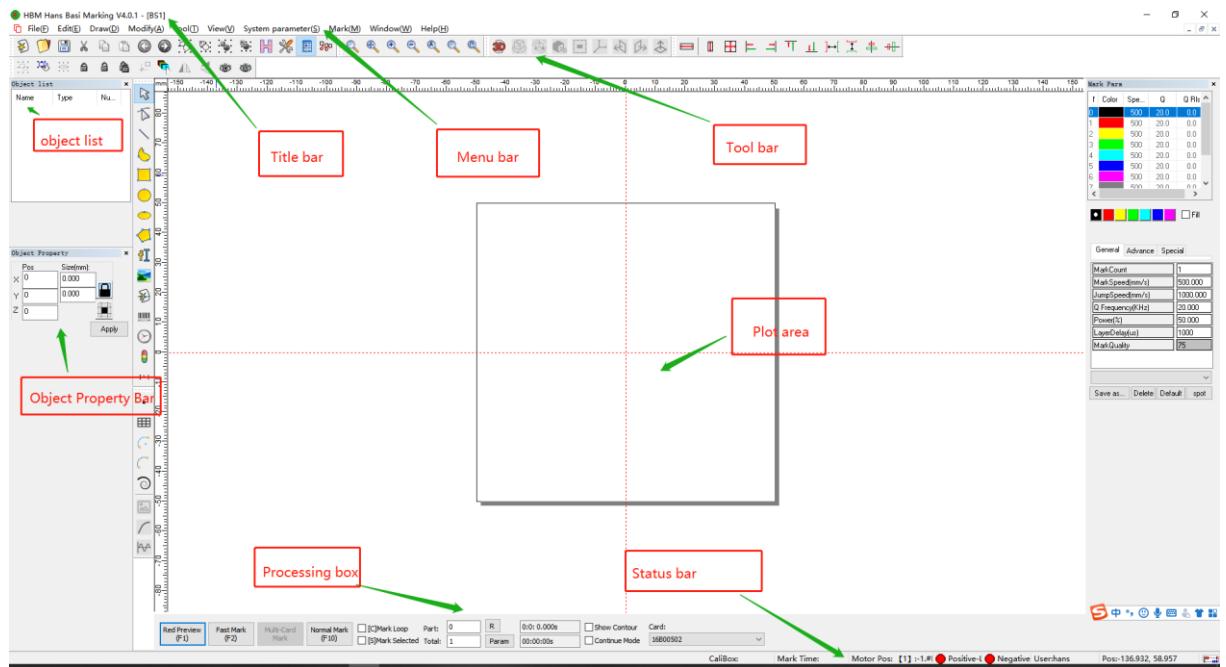


Figure 2-3-1 Main interface

Chapter 3 File menu

The File menu implements common file operations, such as creating, opening, and saving files. See Figure 3-1-1

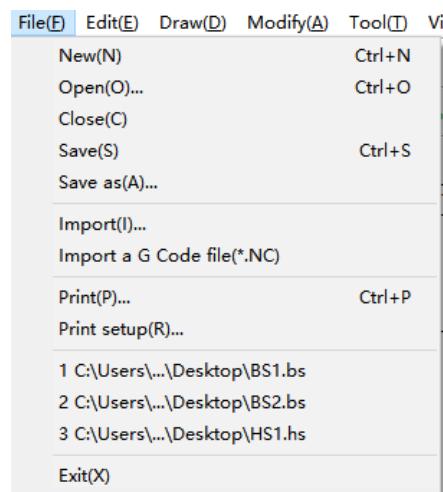


Figure 3-1-1 File Menu

3.1 Create a new file

Use this command to create a new document in Han's Laser Marking Control Software V4.0. You can open an existing document with the open command.



Shortcut / Toolbar Button:

Shortcut Key: CTRL+N

3.2 Open

Open a saved document with this command. Multiple documents can be opened simultaneously. Use the window menu to switch between multiple open documents. You can create a new document using the new command.



Shortcut / Toolbar Button:

Shortcut Key: CTRL+O

3.3 Save

Use this command to save the active document to its current file name and directory. When saving a document for the first time, Laser Marking Control Software V4.0 displays the Save As dialog box to name your document. If you want to change the file name and directory of the current document before saving it, you can use the save as command to save the file as *.hs or *.hd (three-dimensional file).



Shortcut / Toolbar Button:

Shortcut Key: CTRL+S

Note: This command can only be used when at least one document is opened.

3.4 Close

Use this command to close the current document. Han's Laser Marking Control Software V4.0 recommends that you save the document before closing it. If you close the current document without saving it, the system displays a Save or Not dialog box. If you exit the system without saving, all changes made since the last save are lost. Before closing an untitled document, Han's Laser Marking Control Software V4.0 displays the Save As dialog box, advising you to name and save the document. If you want to exit the current document, but not Han's Laser Marking Control Software V4.0 system, click this command. You can also close the document using the Close icon on the document window. As follows:



Note: This command can only be used when at least one document is opened.

3.5 Save as

Use this command to save and name the active document. Han's Laser Marking Control Software V4.0 displays the Save As dialog box to name your document. If you save the document with the current file name, use the save command. Back up to a different file name, click this command.

Note: This command can only be used when at least one document is opened.

3.6 Opening Multi-Document Files

Used for marking multiple documents. The multi-document file has the extension MUL.

Note: This menu is valid only when all single documents are closed.

3.7 Import

This command is used to import a file in common formats such as BMP, PLT, DXF, NC, JPG, and PNG. A dialog box is displayed for you to select the file to import. For details, see Section 1, Chapter 3, Creating Graphics.

Shortcut / Toolbar Button:



3.8 Export

Using this command, you can export the marking file in PLT format so that you can modify the marking graph.

3.9 Exit

Use this command to end the running of Han's Laser Marking Control Software V4.0. You can also use the close command on the application control menu. Han's Laser Marking Control Software V4.0 prompts you to save unsaved changes (see figure).

Chapter Four Edit menu

This chapter describes the use of "Edit" menu bar, including undo, redo, combine, group and other object editing operations. As shown in Figure 4-1-1 below:



Figure 4-1-1 edit menu

4.1 Undo/Redo Operations

Undo

Han's Laser Marking Control Software V4.0 provides the possibility to experiment with the operation. If you make a change to a document and want to be able to leave it alone, you can undo the change. In the cancel level range, you can undo the previous editing operation using undo, and the name of the command changes based on the previous operation. If the previous operation cannot be undone, the undo command on the menu turns gray, indicating that it is unavailable. For example, to set the undo/Redo level to 3(which can be set in the options under the Edit menu), do the following:

1. Select the Ellipse tool and draw an ellipse in the workspace
2. Select the "Pick Up" tool and move the ellipse
3. Pull the ellipse

4. Open the Rotation Transform dialog box and rotate the ellipse. The undo command can be repeated to restore the original appearance.

1. Undo rotation

2, undo pull change

3. Undo the move. Because the undo/Redo level is 3 and you can only recover three steps, the "draw a circle" operation cannot be undone.

Shortcut key operation: CTRL +Z Toolbar icon:



Redo

Han's Laser Marking Control Software V4.0 provides the possibility to experiment with the operation. If, after making undoing changes to a document, you want to be able to leave the changes intact, you can redo the change action. Within the redo level, you can redo the undone actions using Redo, and the command name changes based on the last action performed. If the redo cannot be done, the redo command on the menu will gray out, indicating that it is unavailable.

For example, to set the undo/Redo level to 3 (which can be set in the options under the Edit menu), do the following:

1. Select the Ellipse tool and draw an ellipse in the workspace.

2. Select the "Pick Up" tool and move the ellipse.

3. Pull the ellipse.

4. Open the Rotation Transform dialog box and rotate the ellipse. The undo command can be repeated to restore the original appearance.

1. Undo rotation.

2, undo pull change.

3. Undo the move. You can repeat the redo command to restore the undone action.

1, redo the movement.

2. Redo the pull.

3. Redo the rotation.

Shortcut key operation: CTRL +Y Toolbar icon:



Note: Undo/Redo operations also work for 3D model editing.

4.2 Cut, copy, or Paste

Copy

The copy command copies the currently selected object to the clipboard. If no object is selected, this command is unavailable. Copying data to the clipboard replaces the contents of the clipboard.

If you want to transfer objects from the current document to another document without deleting objects from the current document, you can select this command to copy objects from the current document, then open the desired document and paste it. You can also use this command to create two identical objects in the same document.

Shortcut toolbar button:



Shortcut key operation: CTRL+C

Cut

The cutting command deletes the currently selected object from the document, view, and places it on the clipboard. If no object is currently selected, this command is unavailable. Cutting data to the clipboard replaces the contents of the clipboard. If you want to move objects from the current document to another document, you can select this command to cut objects from the current document, then open the document you want to put in, and paste.

Shortcut toolbar button:



Shortcut key operation: CTRL+X

Paste

Paste command Pastes the contents of the clipboard to the insertion point. If the clipboard is empty, this command is unavailable. By placing the object on the clipboard with the cut and copy command, you can paste where you want.

Shortcut toolbar button:



Shortcut key operation: CTRL+V

4.3 Combine/Undo Combine

Combine

This command is used to group objects in a selection set so that they can be processed as a single object.



Shortcut toolbar button:

Shortcut key operation: CTRL+G

Undo combine

This command is used to split an assembly into multiple objects that no longer have an overall connection to each other.



Shortcut toolbar button:

Shortcut key operation: CTRL+U

4.4 Group or Split Group

Object group

This command is used to compose the objects in the selection set as a whole, so that they can be treated as a single object. The group object can retain the original layer parameter attributes of the object.



Shortcut toolbar button:

Split group

This command is used to split a group into multiple objects that no longer have an overall relationship with each other.



Shortcut toolbar button:

4.5 Filling

Filling allows you to fill a specified figure. The filled figure must be a closed curve. The toolbar icon corresponding to the "Fill" menu item is . Click it and the following dialog box will pop up:

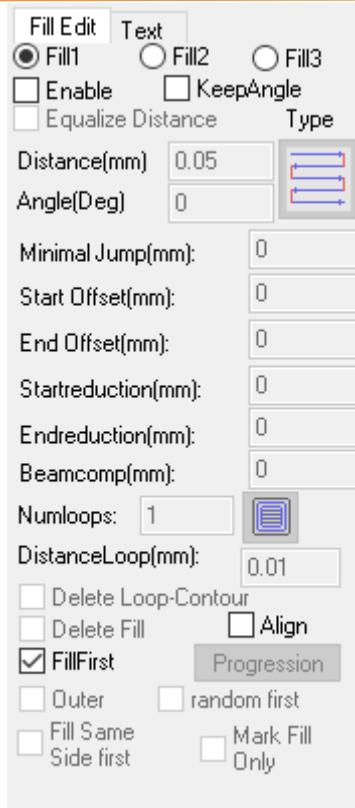


Figure 4-5-1 Filling setup

【 Enable Filling 】 Whether to enable filling;

【 Filling line rotates with contour 】 When the figure is rotated, the contour line rotates with the object;

【 Equal spacing filling 】 Spacing automatic fine tuning, so that all filling line spacing is the same;

【 Filling spacing 】 Set the spacing of filling lines, unit: mm;

【 Angle 】 Set the Angle of the filling line, unit: degree;

【 Type 】 Set the filling type. Currently, four modes are supported: one-way, reciprocating, reciprocating end to end, and back shape.



One way: The filling line is always filled from left to right.



Two-way reciprocating: the filling line is filled from left to right, then from right to left, and the rest is filled in a cycle.

Bow line filling:  Similar to two-way filling, but with connecting lines between the ends of the filling lines.

Shape filling:  The filling line is a circular offset fill of the object's outline from outside to inside.

【 Minimum Jump spacing 】 When the filling mode is head to end, it will be connected only when the head to end spacing is less than this value:

【 Starting Offset 】 The distance at which the starting part is not filled.

【 Trailing offset 】 The distance from which the trailing part is not filled.

【 Line indent 】 Length of indent at both ends of filling line.

【 Spot size 】 laser spot size, overall indent;

【 The number of turns for shrink and expand filling 】 The number of indent or expand turns for shrink and expand filling, only useful for closed objects;

【 Shrink and expand spacing 】 The size of a single shrink and expand, only useful for closed objects;

【 Filling times 】 The number of cycles during progressive filling;

【 Progressive spacing 】 During progressive filling, the change value between the current filling spacing and the previous filling spacing, 0 means the same as the previous filling spacing;

【 Progressive Angle 】 During progressive filling, the change value between the current filling Angle and the previous filling Angle, 0 means the same as the previous filling Angle;

【 Filling line border 】 During progressive filling marking, whether to fill the border after a group of filling line marks.

Note: The shrink and expand operation only works on closed objects. More complex fillings can be performed by progressive filling.

4.6 Turning into a Curve

Convert a text object to a point information curve. You can use this command to convert a text object to a curve. After clicking this command, the text object becomes a composite, as shown below:

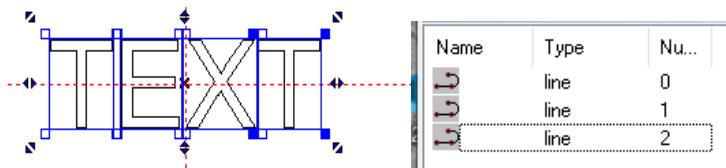


Figure 4-6-1 turns into a curve

4.7 Bold lines

As the name implies, users use this command to bold lines. Click this command, and the following dialog box 4-7-1 will pop up:



Figure 4-7-1 Bold Settings

The comparison of line thickening effect is shown in Figure 4-7-2:



Figure 4-7-2

4.8 Filter Points

Set the precision of the point object. When the point spacing is less than the set value, the points within the set value will be filtered out. When the point spacing is greater than the set value, the points remain unchanged.

4.9 Options

This command is used to set filter point precision, point moving step, micro moving step, pick up precision, undo level, polygon break precision, extend precision, round precision, and layer count (as shown in the figure below):

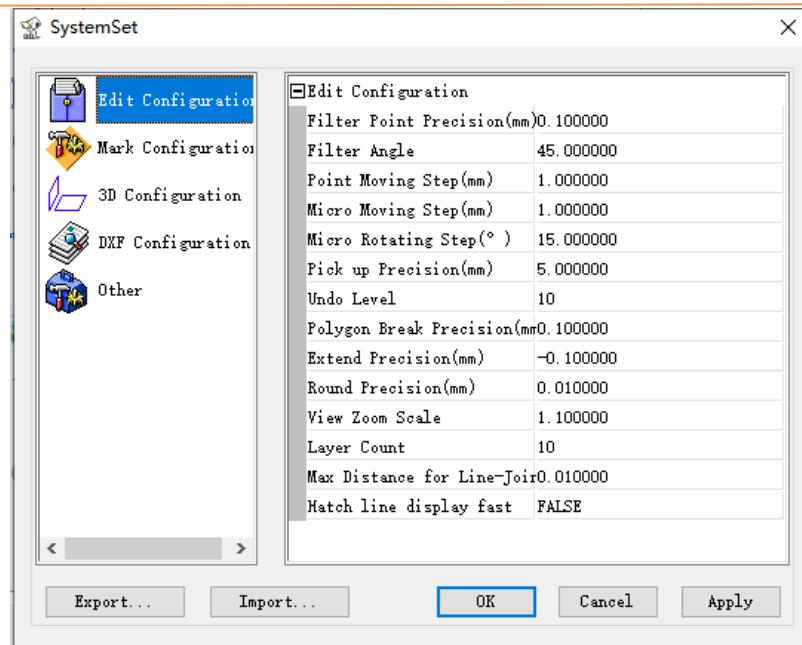


Figure 4-9-1 System Settings

1. Filter Point Precision

Shortcut key: Ctrl+F

Sets the precision of the point object. When the point spacing is less than the set value, the points within the set value will be filtered out. When the point spacing is greater than the set value, the points remain unchanged.

2. Point Moving Step

Set the step length of each move of the point. The shortcut key is (M). Press "M" to enter the editing state and move the point in the following dialog box.

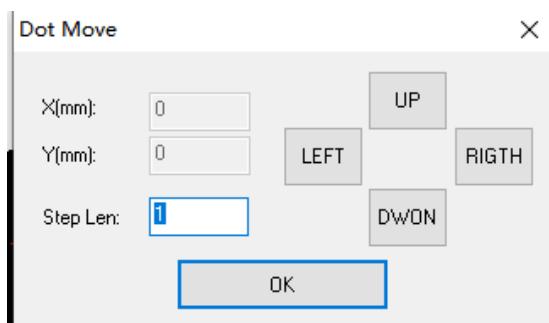


Figure 4-9-2 Precise movement

3. Micro Moving Step

The distance to move the selected object with each click when you click the keyboard arrow keys.

4. Pick Up Precision

Sets the sensitivity of the mouse when picking up objects. The higher the value, the higher the sensitivity, but it is more difficult to distinguish two overlapping objects. The smaller the value, the lower the sensitivity. It is more difficult to select the object, but it can distinguish two overlapping objects more accurately.

5. Undo Level

Set undo/redo progression. The higher the progression, the higher the memory consumption. After the modification is confirmed, it takes effect after a new document is opened.

6. Polygon Break Precision

Select a point, click the breakpoint operation, the point will become two break points, the distance from the point to the center is the Polygon Break Precision set value.

7. Round Precision

Round operation is to smooth the sharp corners to improve the marking effect of the software, enter the click state (point select state), and then press the shortcut key "V".

8. Layer Count

Set the maximum number of layers in the marking interface. The maximum number is 256.

9. Min Distance for line-join

When curves are merged, if the distance between two adjacent points is lower than this value, the curves are automatically merged. The default value is 0.0001.

10. Whether to continue marking after the safety door is closed

False: disable. If you choose in the marking process, the safety door opens, marking pause. Close the safety door, marking will not automatically start.

True: Enable. If you choose in the marking process, the safety door opens, marking pause. Close the safety door, marking automatically start.

11. Whether the red light is automatically turned off when marking

False: disable. The red light does not turn off during marking and automatically accompanies.

True: Enable. Red light is turned off before marking. For IPG lasers with red light indication, this option must be turned on.

4.10 Replacing Text in Batches

The user uses this command to replace text. This command needs to know the alias of the text, which it replaces with the text alias. The dialog box 4-10-1 will pop up after the user clicks the command:

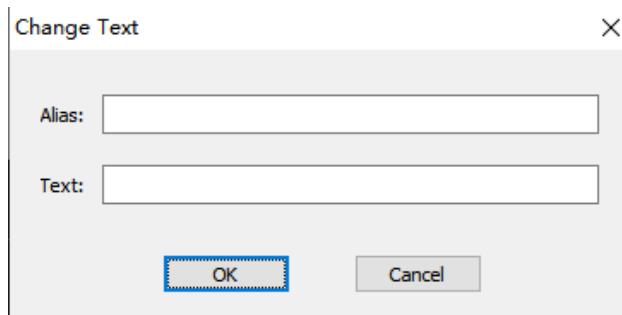


Figure 4-10-1 Batch replacement text

4.11 Converting Excel to TXT text

This command is used to convert Excel to TXT text. The procedure is as follows:

- ① Import Excel to the software.
- ② Select Excel rows and columns that you want to convert to TXT.
- ③ Convert to TXT text.

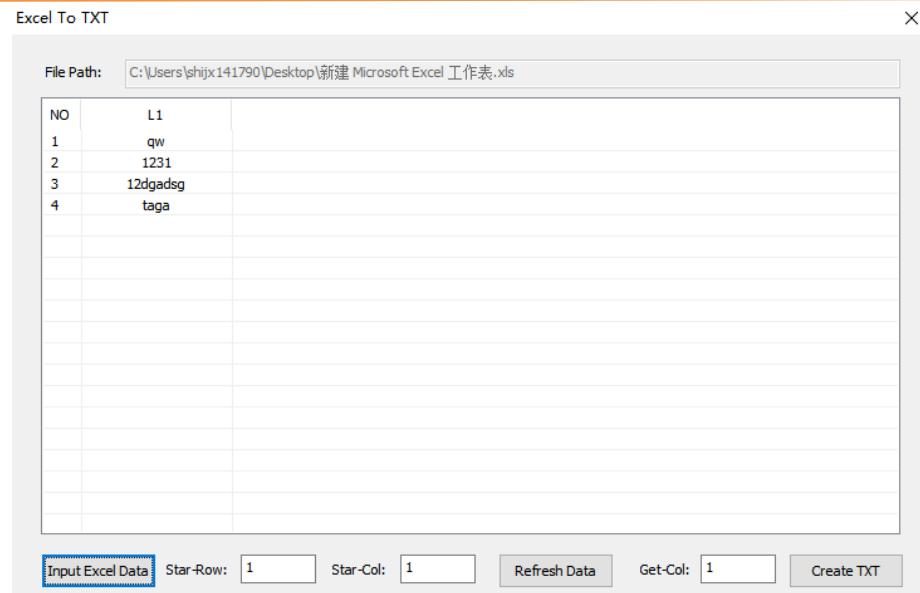


Figure 4-11-1 Converting Excel to TXT

4.12 Delete Duplicate Lines

This command is used to delete duplicate lines. Click the command to display the following dialog box 4-12-1:



Figure 4-12-1 Deleting duplicate lines

Chapter 5 Draw menu

The Draw menu is used to draw common graphics, including points, lines, curves, polygons, and so on. The menu should have a toolbar, and all operations can be performed using the buttons on the toolbar. When you select the corresponding draw command or toolbar button, the toolbar above the workspace (the current command toolbar) changes accordingly to display the options corresponding to the current command.



Figure 5-1-1 Draw toolbar



Figure 5-1-2 Object operation toolbar

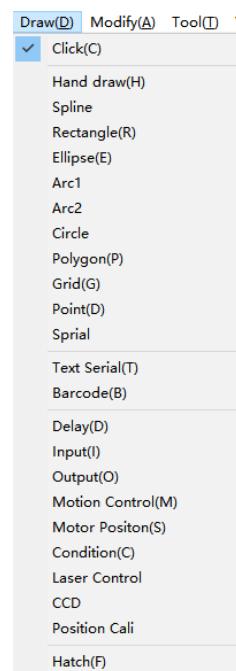


Figure 5-1-3 Draw menu

5.1 Click

The click tool is used to select, move, and pull objects. Before you can edit, you must first determine the selection set. A selection set is a collection of selected objects. There is one and only one selection set in a view. During the drawing process, the system automatically clears the selection set and adds the last drawn objects to the selection set. When the selection set contains objects, the view displays a tracker with 8 control points (as shown in the figure). For the size of the control points and the shape of the tracker, please refer to the Tracker Settings under the view menu.

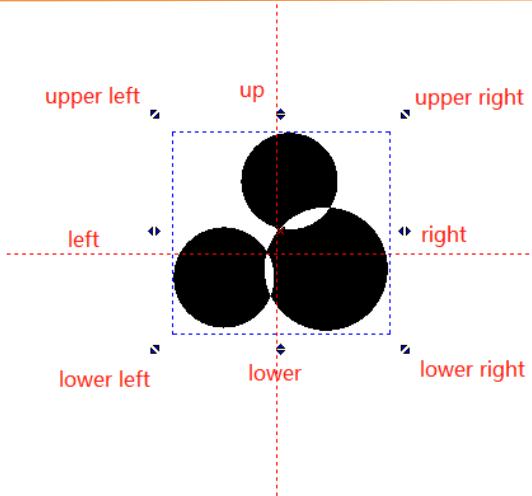


Figure 5-1-4 Draw menu

5.2 Selecting Objects

(1) Click object: Click any position of the outline of the object to be added to the selection set. Then the system automatically clears the selection set and adds the selected object to the selection set. Click to add Object: Hold down the Shift key, click anywhere in the outline of the object you want to add to the selection set, and release the Shift key when finished. The selected object is added to the selection set.

(2) Box select object: Hold down the left mouse button and drag the mouse, a rectangular box will be displayed dynamically in the view. Completely enclose the single or multiple objects that you want to add to the selection set, and then release the left mouse button. The system automatically clears the selection set and adds the box object to the selection set. Box Add object: Hold down the Shift key to box the object you want to add to the selection set, then release the Shift key. The framed object will be added to the selection set.

5.2.1 Removing Objects from the Selection Set

(1) Click to remove object: Hold down Shift key, click any position of object outline to remove, release Shift key after finished. The object is removed from the selection set.

(2) Box selection to remove objects: Hold down the Shift key, frame the object to be removed, and release the Shift key when finished. The framed object is removed from the selection set.

5.2.2 Clearing the Selection Set

Click the mouse in the blank area.

5.2.3 Moving Objects

1. Move the mouse to the tracker and show a cross cursor .
2. Hold down the left mouse button.
3. Drag the mouse. The move location is displayed dynamically in the view.
4. Move the object to the appropriate position and release the left mouse button.

Note: To move objects more accurately, you can use the keyboard's arrow keys to move them (see "Options" in the Edit menu for movement Settings).

5.2.4 Lateral stretching

1. Move the mouse to the horizontal stretch control point of the tracker and direct the mouse to present the cursor .
2. Hold down the left mouse button.
3. Drag the mouse to dynamically display the horizontal stretching state of the object in the view.
4. Stretch to the right size and release the mouse.

5.2.5 Longitudinal stretching

1. Move the mouse to the longitudinal stretch control point of the tracker and direct the mouse to present the cursor .
2. Hold down the left mouse button.
3. Drag the mouse to dynamically display the longitudinal stretching state of the object in the view.
4. Stretch to size and release the mouse.

5.2.6 Zoom

1. Move the mouse to the control point at the corner of the tracker and direct the mouse to present the cursor  or .
2. Hold down the left mouse button.

3. Drag the mouse to dynamically display the zooming state of the object in the view.

4. Zoom to the right size and release the mouse.

5.2.7 Left and Right Mirroring

1. Move the mouse to the horizontal stretch control point of the tracker, and the mouse will present the cursor .

2. Hold down the left mouse button.

3. Drag the mouse over the relative control point to dynamically display the object mirror status in the view.

4, in the appropriate position, release the mouse.

5.2.8 Upper and Lower Mirroring

1. Move the mouse to the longitudinal stretch control point of the tracker, and the mouse will present the cursor .

2. Hold down the left mouse button.

3. Drag the mouse over the relative control point to dynamically display the current mirror status of the object in the view.

4, in the appropriate position, release the mouse.

5.2.9 Origin Mirroring

1. Move the mouse to the control point at the corner of the tracker, and the mouse displays the cursor  or .

2. Hold down the left mouse button.

3. Drag the mouse over the relative control point to dynamically display the object mirror status in the view.

4, in the appropriate position, release the mouse.

5.2.10 Rotation

1. Double-click the object, move the mouse to the control point at the corner of the tracker, and the mouse will display the cursor  or .

2. Hold down the left mouse button.

3. Drag the mouse over the relative control point to dynamically display the object rotation status in the view.

4, in the appropriate position, release the mouse.

5.2.11 Shear

1. Double-click the object, move the mouse to the longitudinal or lateral control point of the tracker, and the mouse displays the cursor  or .

2. Hold down the left mouse button.

3. Drag the mouse over the relative control point to dynamically display the object shear state in the view.

4, in the appropriate position, release the mouse.



Shortcut toolbar button:

5.3 Manual Drawing

Draw lines and curves on the current layer.

5.3.1 Drawing Curves

1. Hold down the left mouse button at the beginning of the curve.
2. Drag the mouse. The view dynamically displays the trajectory of the curve.
3. Let go of the left mouse button at the end point to get a curve with the same trajectory of the mouse.

5.3.2 Drawing Straight Lines

1. Click the left mouse button at the beginning of the line.
2. Move the mouse to dynamically display the track of a straight line.
3. Let go of the left mouse button at the end point to end the line drawing.

Horizontal line or vertical line

1. Click the left mouse button at the beginning of the line.
2. Move the mouse to dynamically display the track of a straight line.

3, hold down the Ctrl key, the line will remain in the horizontal or vertical direction.

4. Release the left mouse button at the end, then release the Ctrl key.
Ends horizontal or vertical line drawing.



5.4 Spline Curve

The method of drawing a spline curve on the current layer is exactly the same as that of drawing a curve.



5.5 Rectangle

Draw rectangles and squares on the current layer.

5.5.1 Setting the Rectangle Properties

Double-click the polygon Tool button to pop up the polygon Settings dialog box (as shown in the figure).

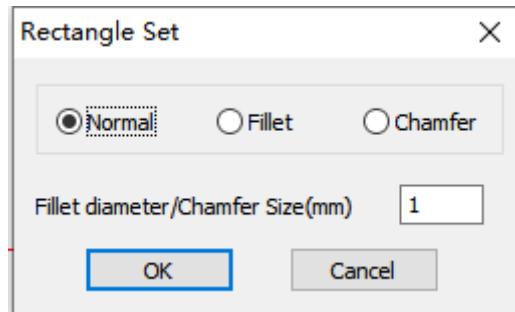


Figure 5-1-5 Rectangle setup

5.5.2 Drawing a Rectangle

- 1, Hold down the left mouse button.
2. Drag the mouse to dynamically display the drawn rectangle.
3. At the right point, let go of the mouse. Ends drawing the rectangle.

5.5.3 Drawing a square

- 1, Hold down the left mouse button.

2. Drag the mouse and hold down the Ctrl key to dynamically display the drawn square.

3. At the appropriate point, release the mouse, then release the Ctrl key. End the drawing of the square.

Shortcut toolbar button:



5.6 Ellipse

Draw the ellipse and circle on the current layer. Double-click the circle icon to set the precision of the circle, as shown in the figure.

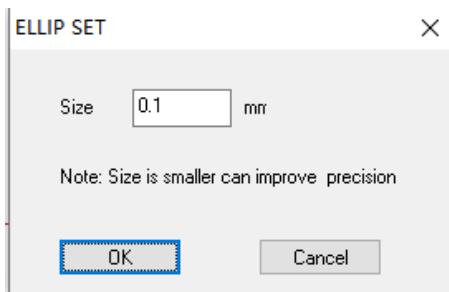


FIG. 5-1-6 Ellipse setting

1. Hold down the left mouse button.

2. Drag the mouse to dynamically display the drawn ellipse.

3. At the right point, let go of the mouse. Ends the drawing of the ellipse.

Shortcut toolbar button:



5.7 Drawing a Circle

1. Move the mouse to the target position, click the mouse, and then release.

2. Move the mouse to dynamically display the circle drawn.

3. Click the mouse at the appropriate point to end the circle drawing.

Shortcut toolbar button:



5.8 Polygon

Draw polygons, star polygons, or cross star polygons on the current layer.

5.8.1 Setting Polygon Properties

Double-click the polygon tool button to pop up the dialog box of Polygon Settings (as shown in the figure).

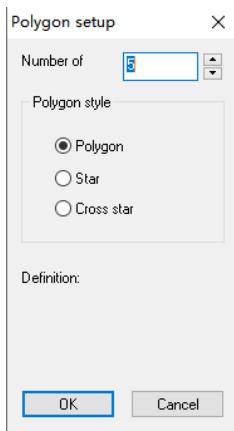


Figure 5-1-7 Polygon Settings

Polygons come in three styles (as shown below). Ordinary polygons have no clarity. The clarity of a star polygon is the degree to which the midpoint of two adjacent points sinks towards the center. When the clarity is 100, it approximates a straight line. When clarity is 0, it is a straight line from the center point to the vertex. The clarity of a crossed star polygon refers to the number of separated vertices between the vertices of the line.



Figure 5-1-8 Polygon types

5.8.2 Draw polygons, star polygons, and cross star polygons

- 1, Hold down the left mouse button.
2. Drag the mouse. View dynamically displays drawn polygons.
- 3, At the appropriate point, release the left mouse button. End polygon drawing.

Shortcut toolbar button:



5.9 Delay Device

Click the delayer icon to add a delayer object.

Delay function: delay between multiple object marking. Unit: ms. Property setting:



Figure 5-1-9 Delay device

Shortcut toolbar button:

5.10 Input signal waiting

Click the Input Signal Wait icon to add an input signal wait object. Input signal wait function: wait for a group of inputs in marking before continuing.

Property setting: Set the effective signal bit first, and then select the level of signal bit (high level if selected, low level if not selected).

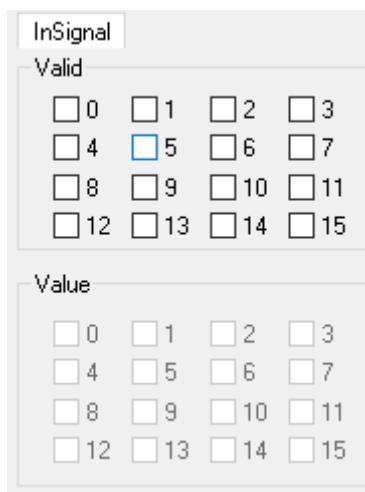


Figure 5-1-10 Input signal

Shortcut toolbar button:

5.11 Output Signals

Click the Output Signal icon to add a signal output object.

Output signal function: Output I/O signal during marking. Property setting:

Set the effective signal bit first, and then select the level of signal bit (high level if selected, low level if not selected).

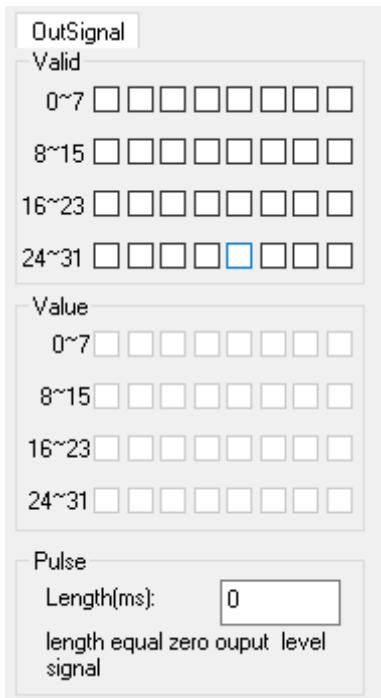


Figure 5-1-11 Output signal

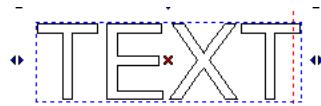


5.12 Text and Serial Setup

Create text on the current layer.

5.12.1 Text Rendering

Click where you want to start typing text or a serial setup, and the software will generate the default text.



The left object properties are shown below;

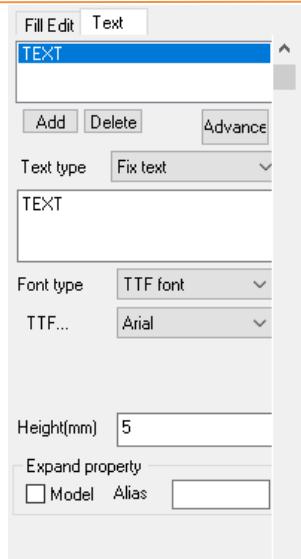
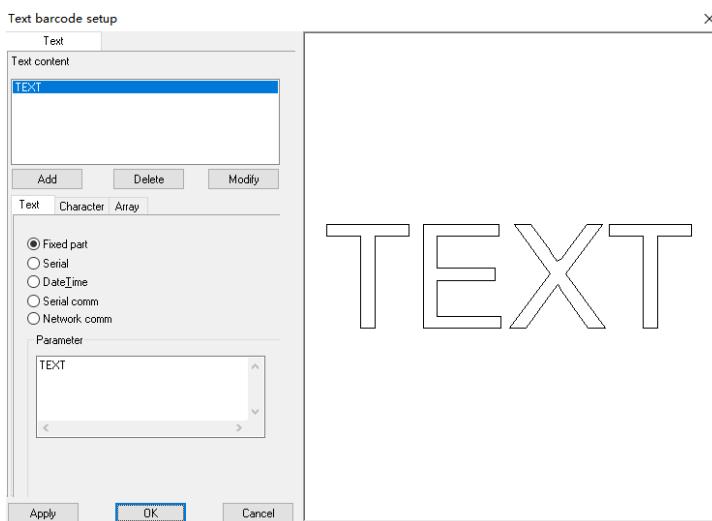
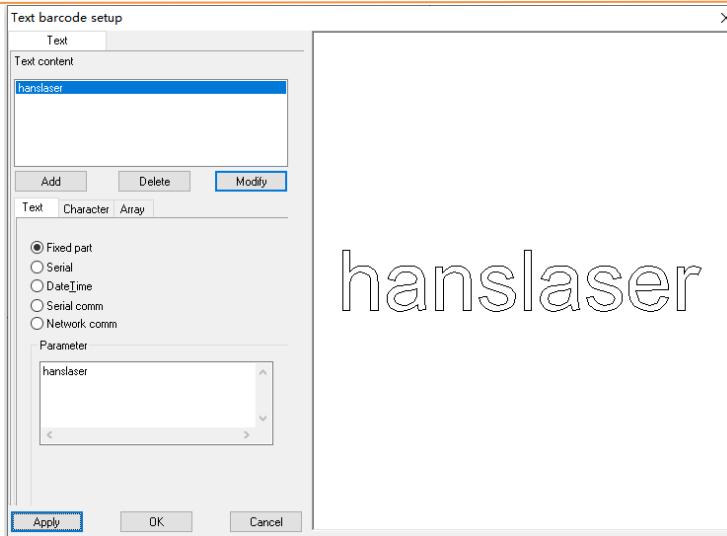


Figure 5-1-12 Text editing

In the property bar, you can quickly set common functions, such as text type, font, and font height. If the Settings cannot be met, you can press Advanced to enter the complete parameter Settings. As for the text type, you can set three types: plain text, serial setup, and date and time.

Text preview is available in advanced Settings. Select the text to modify, font layout, etc., and then click Apply to generate a preview effect on the left side of the advanced interface.





5.12.2 Serial Setup

If the type is serial setup, the following interface is displayed:

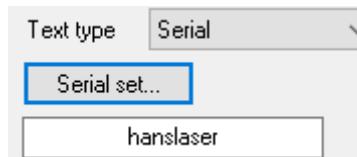


Figure 5-1-13 Serial Setup

Click the "Serial Setup" button to do the serial setup part.

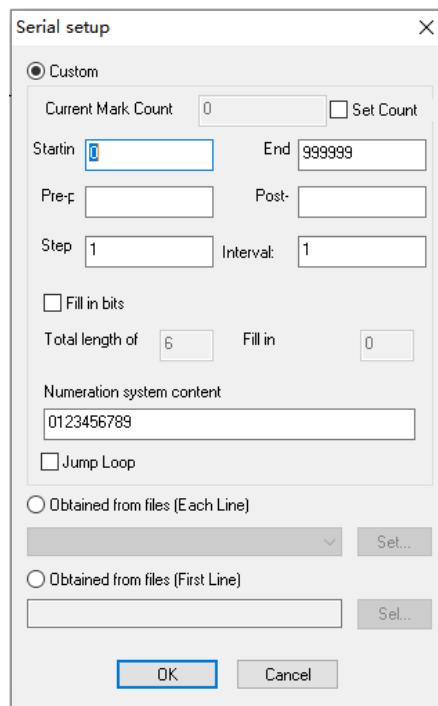


Figure 5-1-14 Serial Setup

1. Custom mode: In this mode, users can enter the information of serial setup.

Start, end: User-defined serials are marked from the start value to the end value.

Note: The starting point and the ending point can be entered in any decimal system without conversion. For example, if it is set to hexadecimal system, 0–9 and A–F can be entered. If it is set to decimal system, only 0–9 can be entered.

Prefix: Indicates the content added before the user-defined serial number.

Postset: The content added after the user-defined serial number.

Step size: The value of a number that automatically increases or decreases with each marking.

Interval: that is, the number of marking times required to jump a step.

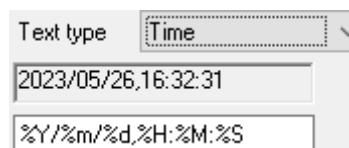
Fill in bits: Set the length of the serial part and the prefix character.

2, from the document

Users can take out the data to be marked from the text file, take one line of data each time for marking, line by line check.

5.12.3 Time

If the type is Time, the following interface is displayed.



%a	Abbreviation for Week
%A	Full name of the week
%b	Abbreviation for month
%B	Full name of the month
%c	Date and time
%d	date
%H	Time in 24-hour format
%I	Time in 12-hour format

%j	Day of the year
%m	month
%M	minute
%p	Morning or afternoon marker in 12
%S	second
%U	The week of the year. Sunday is a
%w	week
%W	The week of the year. Monday is every
%x	date
%X	time
%y	An unmarked year
%Y	Year marked in the AD
%z	Full name of time zone marker
%Z	Time zone marker abbreviation
%%	Percentage sign

Table 5-1 Time formats

5.12.4 Fonts

Users can set the font of the text, including TTF font, SHX font, custom font;

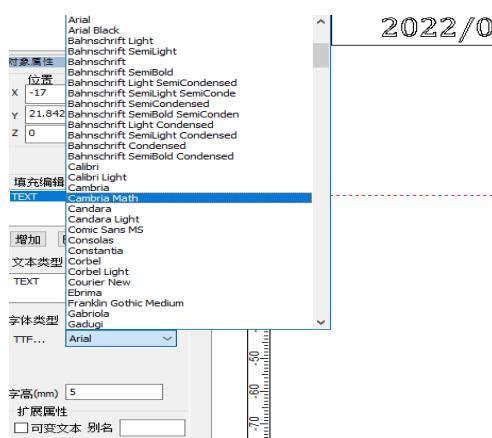


Figure 5-1-15 TTF font

When you mouse over the font list, you can see a preview of the font font, as shown in Figure 5-1-15.

Note: Click the "Advanced" button in the left property bar, and all parameters set in the text will pop up for more Settings.

Accuracy: Text optimization mainly improves the accuracy of text generation. The highest accuracy is 500. The accuracy is optional, which is mainly to improve the marking effect.

Array: Here, the user can set the layout mode of text.

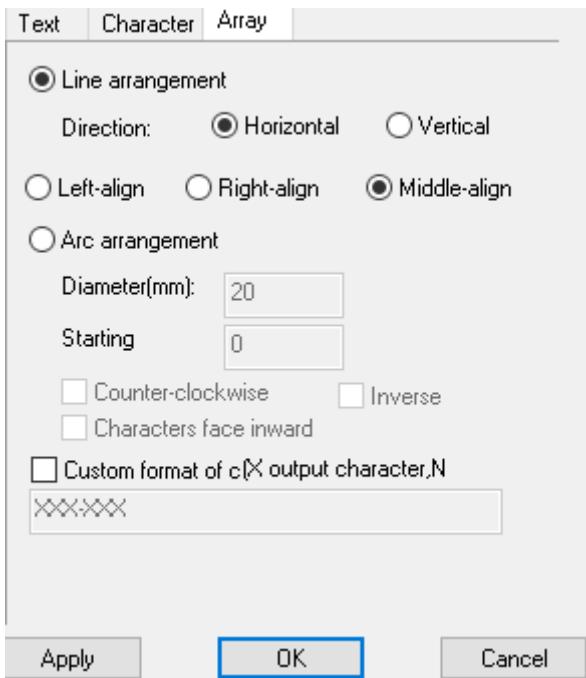


Figure 5-1-16 Text Settings

For example: linear arrangement (0 degree Angle), the effect is as follows:



Figure 5-1-17 Line arrangement

The arc arrangement (for example, if the starting Angle of the arc is set to 0 degrees and the radius is 20, in clockwise form) will result in the following effects.

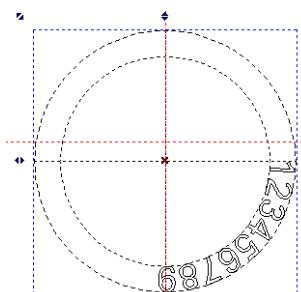


Figure 5-1-17 arc arrangement

5.12.5 Modifying the Text

1. Select the text you want to modify.
2. Right-click the mouse button and choose Text Settings.
3. Modify.



Shortcut toolbar button:

5.13 Bar Code

Select 【Draw/Barcode】 from the menu bar or the button  on the left of the workspace. Click the left mouse button in the workspace to generate the default bar code. The left property bar is shown in Figure 5-1-18 below.

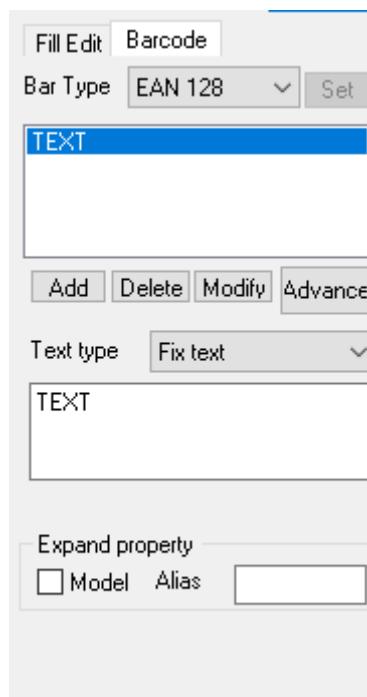
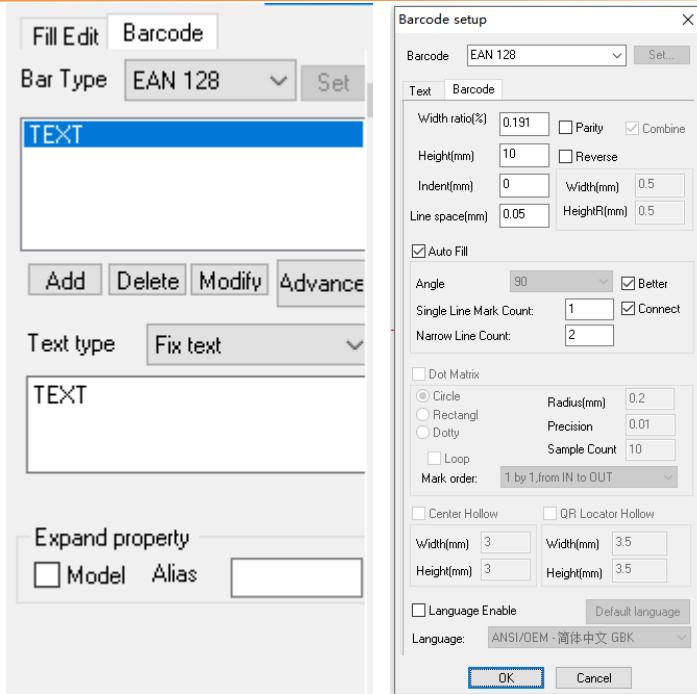


Figure 5-1-18 Bar code editing

Bar code data consists of three types, can be mixed and matched, its Settings and text Settings are exactly the same. Click "Advanced" button, the bar code complete parameter setting dialog box appears, as shown below.



[width ratio] The ratio between the wide bar and the narrow bar in the fixed bar code; With the barcode size changes, the value changes accordingly;

[Line spacing] The distance between lines in the bar code;

[Height] Vertical length of the bar code;

[Angle] Set the display Angle of the bar code object in the software interface;

[Better] If checked, the filling line inside the bar code will be changed from one-way to reciprocating, which can improve the marking efficiency of the bar code;

[Connect] If this check is checked, the filling line inside the bar code will be connected from end to end, which can reduce the marking time.

[Dot matrix] Check this, the bar code filling block will be filled round or single point or rectangle mode.

[Dot matrix radius] The radius of the bar code filling block when the two-dimensional bar code is displayed in dot matrix mode. If the radius is less than 0.04mm, only one point is marked; if the radius is greater than 0.04mm, a filling circle with a specified radius is generated.

[Parity] For some bar codes with check bits, check this item to generate check bits.

[Single line mark count] When the bar code is narrow and only a single line, the marking times of the line.

[Narrow line count] Set the minimum number of narrow lines. Bar Code Type: Select a bar code type from the combo box. PDF417, QR and DataMatrix are two-dimensional codes, and the rest are one-dimensional codes.

Fixed text: Related Settings for added fixed text.

Serial setup part: Related Settings for serial setup part.

Date-time section: Sets the date and time to be added. At the same time, you can set the text in the Font Settings column.

Note: Text is not generated at the same time when the bar code is created. Select the bar code, right-click it, and choose Create Bar Code Text from the menu that is displayed. After text is created, bar code data segments are locked. You cannot insert or delete data segments, but you can modify the content.

5.13.1 TTF Font

The standard font used by the WINDOWS operating system is supported by the marking software. Click the "Set" button. The following dialog box appears. Here the user can select a standard TTF font and font style.

Note: It is not recommended to set the font in this way. You can directly select the font in the text shortcut Settings.

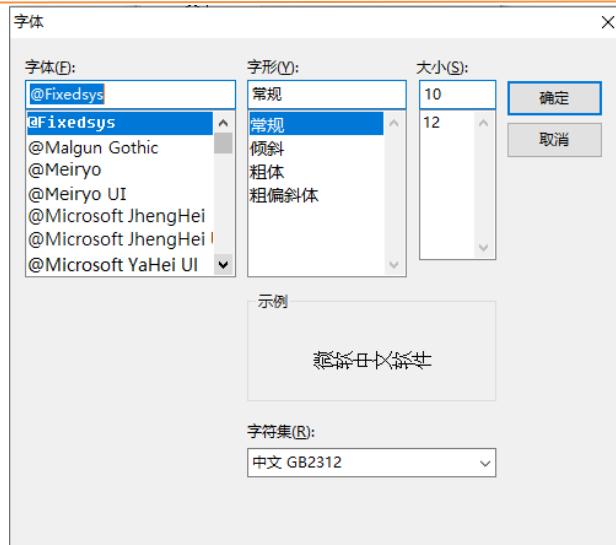


Figure 5-1-20 TTF Font Setting dialog box

5.13.2 SHX Fonts

SHX fonts are AutoCAD fonts. In the HAN'S LASER Marking System standard edition, there is less SHX font library, so users can expand it themselves. The font directory is located in the installation directory of HAN'S LAS Marking System (you can copy the SHX file directly to the Chinese font of PFONTS, or the English font of EFONTS).

5.13.3 Customizing Fonts

The custom font is a set of fonts defined within Han's Laser. You can add or edit fonts through the fonts editing software delivered with the product.

Note: The fonts editing software of Han's Laser custom font can be run by clicking the menu "Settings" -> "Edit Custom Font". See Chapter 5 for details.

Character height: The height of the text or serial setup to be marked, in mm

Width factor: For every standard font, the aspect ratio is fixed. If you want to change the ratio, you can choose this option. The unit is percentage, and 100 is the standard ratio.

Word spacing: The distance between two adjacent characters in mm. If the value is 0, the internal spacing of the font is used. If the value is not 0, the current spacing is used.

Row spacing: The distance between two adjacent rows, in mm. 0 indicates normal spacing. When we select the bar code object, there are box selection and point selection. The so-called box selection is to select a starting point, hold down the left mouse button drag out a dotted rectangle box, so that the rectangle contains the selected object; The so-called point selection, that is, by clicking the left mouse button to select the object. Each part of the bar code (bar code, fixed text, and serial setup part) supports point selection and box selection. When a box selects one part of the bar code, it selects the rest of the entire bar code.

Note: Bar code can be rotated, but it may not be pulled after rotation (it can only be pulled when placed horizontally or vertically). The new software allows drag and drop while editing inside the red box.

5.13.4 Bar Code Instances

5.13.4.1 PDF417 is a multi-layer, variable length, continuous two-dimensional barcode with high capacity and error correction capability.

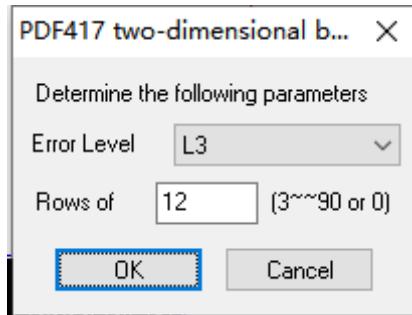


Figure 5-1-21 PDF417 Two-dimensional code Settings

Bar code line number: Each PDF417 bar code symbol is composed of multiple layers, the number of layers is 3-90. However, the bar code area is fixed. If the number of bar code lines is increased, the bar code will become dense and unclear.

5.13.4.2 DataMatrix

Two-dimensional code DataMatrix is a matrix two-dimensional bar code symbol. It comes in two types: ECC000-140 and ECC200.

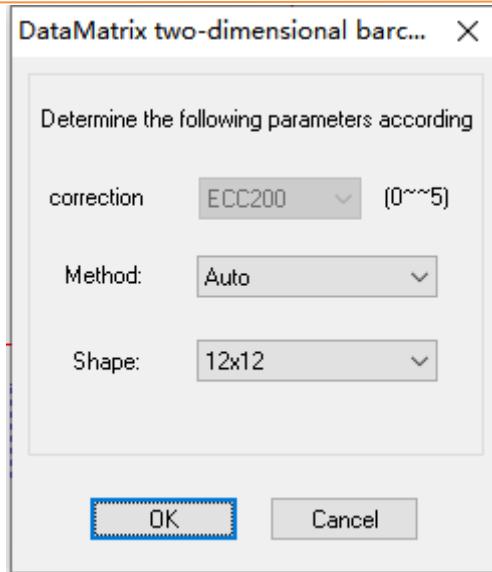


Figure 5-1-23 DataMatrix Two-dimensional code setup

Error correction type: ECC000–140 symbol is used by convolutional code error correction, providing five error correction levels. This is shown in the following table. An increase in the level of error correction will inevitably increase the length of the bitstream, resulting in an increase in the DataMatrix symbol size. The ECC200 uses the Reed–Solomon algorithm to generate polynomials to calculate the error correction code.

Error correcting code level	Recoverable information (%)	The number of incremental user bit streams
000	None	none
050	2.8	33
080	5.5	50
100	12.6	100
140	25	300

Table 5-2 Error correction types

Bar code size: For ECC000–140 symbol only odd rows and columns are available. The symbol is a square with dimensions ranging from 9 by 9 to 49 by 49. ECC200 symbols have only even rows and even columns. There are squares and rectangles. Square sizes from 10*10 to 144*144; Rectangular dimensions range from 8*18 to 16*48. For details, see the following table: ECC200 has 24 squares.

Symbol size (row)	Symbol size (column)	Data area size
10	10	8*8
12	12	10*10
14	14	12*12
16	16	14*14
18	18	16*16
20	20	18*18
22	22	20*20
24	24	22*22
26	26	24*24
32	32	14*14
36	36	16*16
40	40	18*18
44	44	20*20
48	48	22*22

	52	24*24
64	64	14*14
72	72	16*16
80	80	18*18
88	88	20*20
96	96	22*22
104	104	24*24
120	120	18*18
132	132	20*20
144	144	22*22

Table 5-3 Bar code dimensions Square appearance

Six rectangular symbols for the ECC200:

Symbol size (row)	Symbol size (column)	Data area size
8	18	6*16

8	32	6*14
12	26	10*24
12	36	10*16
16	36	14*16

Table 5-4 Bar code dimensions Rectangular appearance

5.14 Importing Bitmap Files

Users can quickly import the required bitmap file. Toolbar button: 

After clicking this button, the following dialog box will pop up:

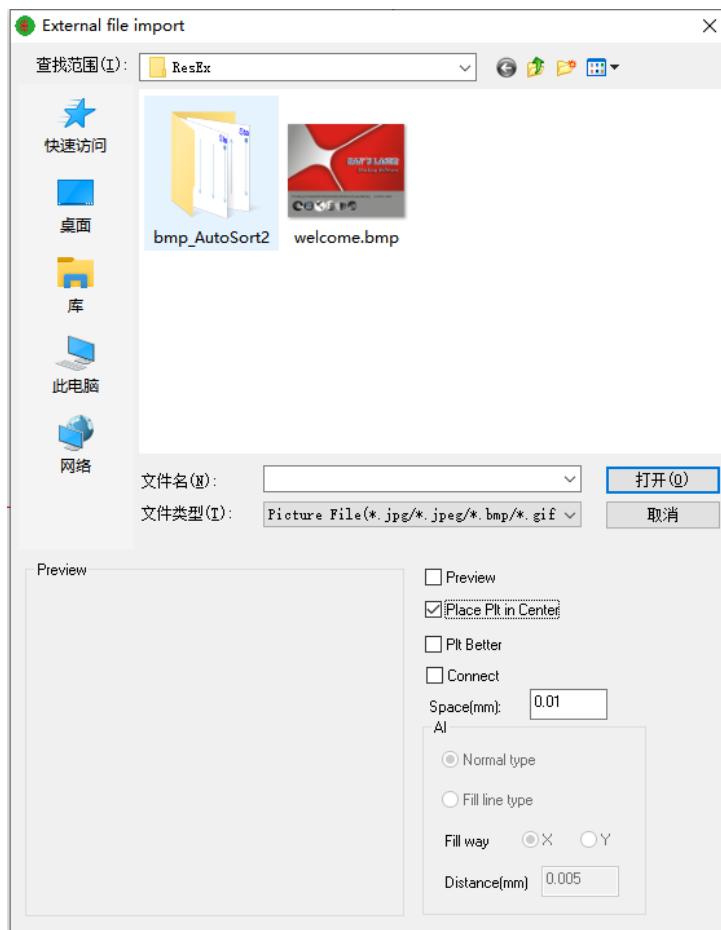


Figure 5-1-23 Importing a bitmap file

The graphics files that can be imported include BMP, JPG, PNG, GIF, ICO, TIF, TGA, and PCX. Select "Import" from the "File" menu, and the following dialog box will appear. Select the corresponding file type from the file dialog box, and then select the file. Click "Open" button to import the data into the software.

[Preview] You can preview the current object in real time to facilitate file selection.

[Import Center] Display the imported PLT object in the center;

[Import Optimization] The PLT object to be imported is optimized. In general, this option is not enabled. The specific difference is shown in the following figure:



The case that optimization is not enabled;



When optimization is enabled, character A changes;

In Han's Laser Marking Control Software V4.0, you can not only draw your own graphics, but also receive graphics image files in other standard formats. For specific support for importing object types, you can click the "File Type" drop-down menu in the dialog box. If you press the "Uncombine" key, it will be broken up into multiple unconnected objects.

Note: Current software support for older versions of DXF has been greatly improved. However, due to the complexity of DXF file format, it is impossible to ensure that all graphics can be correctly imported. If the import fails, use PLT format for interaction.

5.15 Importing a Vector File

Users can import the required vector files quickly. Toolbar button: .

The following dialog box appears after clicking the button

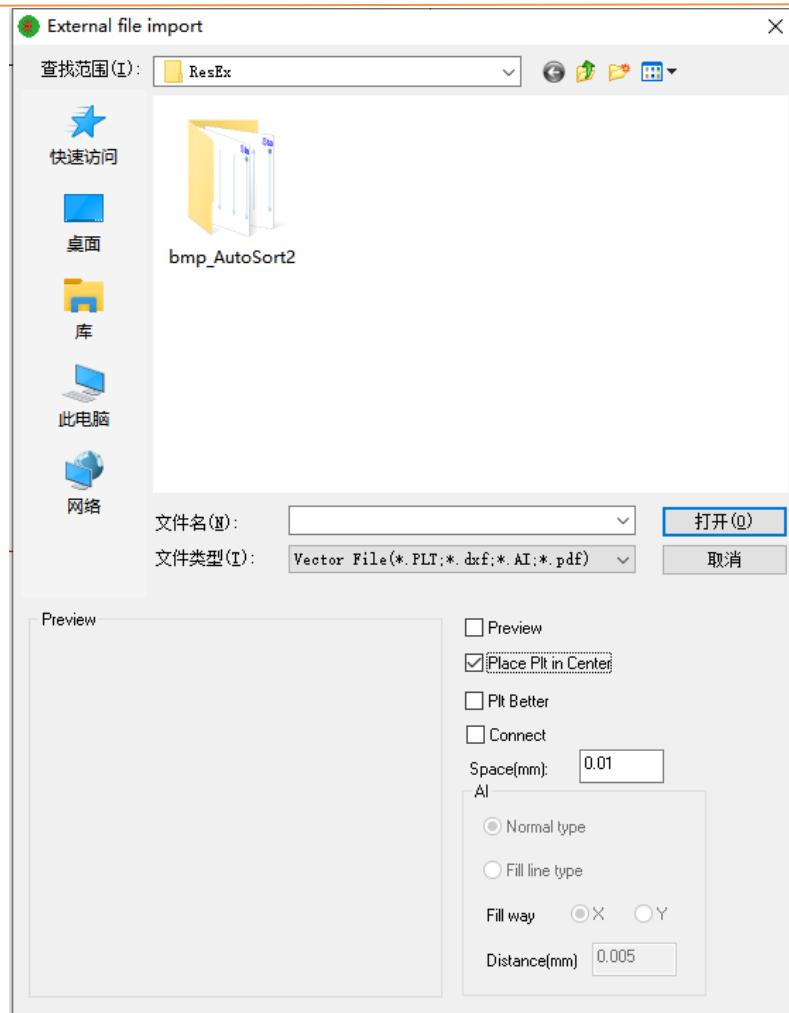


Figure 5-1-24 Importing a vector file

The graphics that can be imported include: PLT, DXF, SVG, SVGZ, GP2, RTL, SPL, AI, DST, PDF, etc. Select Import from the File menu, and the following dialog box will appear. In the File dialog box, select the corresponding type from the file type, then select the file, and click the Open button to import the data into the software. For details about parameters such as preview, import centering, import optimization, and auto connect, refer to the previous section.

Note: This software also supports other functions such as arc drawing, grid drawing, point drawing, spiral drawing, etc. Please refer to "Drawing" menu bar for details.

Chapter 6 Modifying the menu

The commands in the Modify menu perform simple modification operations on the selected object, including array arrangement, transform object, transform, styling, sort, curve edit, point filter, and so on. Figure 6-1 shows the details:

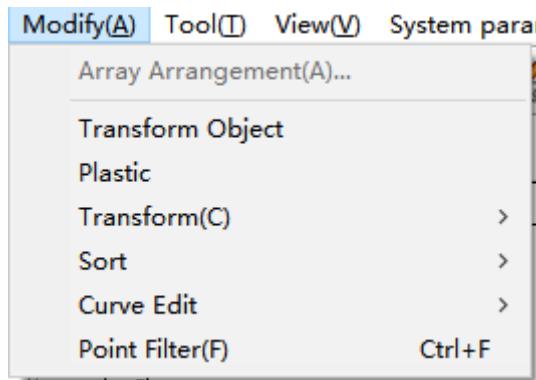


Figure 6-1 Modify menu

6.1 Array Arrangement

This command is used to form an array of objects in a selection set according to a certain rule. Select this command, and the “Array Arrangement” dialog box is displayed, as shown in Figure 6-2:

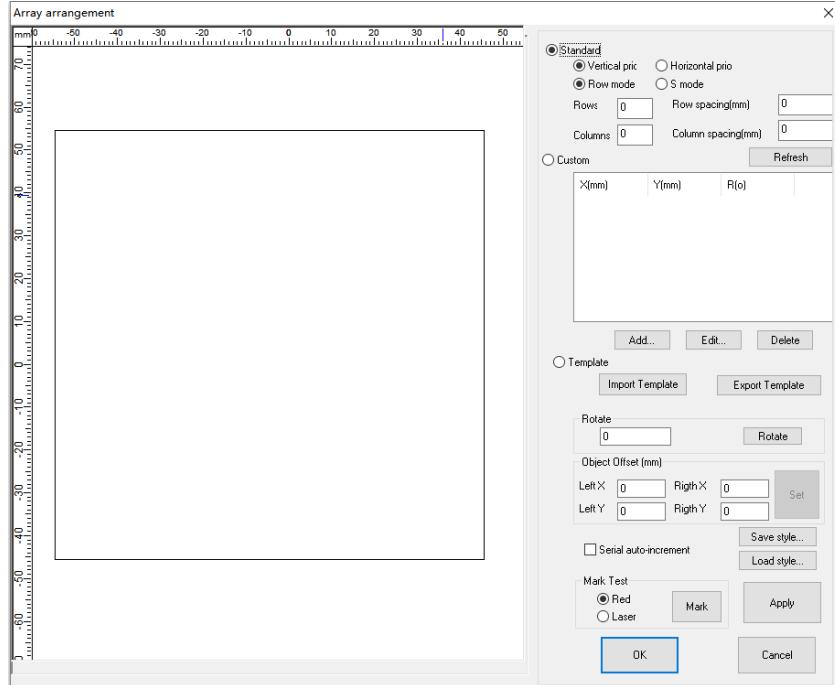


Figure 6-2 Array Arrangement

Standard mode: Define vertical priority, horizontal priority, row mode, s mode, row number, row spacing, column number, column spacing according to

the standard format. Users can enter negative values in the row spacing and column spacing editing boxes, and the objects are arranged in the opposite direction. When you click Apply, an array of objects will appear.

Custom method: Click the "Refresh Screen" button to record the position coordinates of all objects on the screen.

Add: Adds coordinates to the list box.

Edit: Select a coordinate value and click this button to modify its value.

Delete: Select a coordinate value and click this button to delete it.

Object Offset: Sets the position of some objects.

Template: If you select this command, you can save or import the template of the array into the array mode.

Save style: Select this command, the save style dialog box is displayed. You can save the location parameter set this time for the next use.

Load style: Select this command to load the location information stored with the "Save Style" command.

Automatic serial setup number increment: If the selected object has a serial setup number, the array object can be incremented by one each time.

Red light: Red light location of the object.

Application example

Example 1 Common text array

1. Draw a target object in the drawing area, centered.
2. Select Array arrangement commands, and the dialog box shown above will appear. Select the standard method and input the data as shown in the figure. Select Save Style, The Save dialog box is displayed. Enter the file name E1 and click OK. Go back to the Array arrangement dialog box and click OK. You can see that the array of objects in the drawing area is complete.
3. Adjust these objects appropriately to meet the error requirements of the fixture. Click the blank area, select Array and Arrangement command when no object is selected in the drawing area, and the dialog box above will pop

up. Select custom mode, click the "Refresh screen" button, then the following list box lists the position coordinates of all objects in the drawing area. Select Save Style The Save dialog box is displayed. Enter the file name E2 and click OK. Go back to the Array arrangement dialog box and click OK.

4. Create a new document, draw a target object in the drawing area, select array arrangement command, pop up the dialog box above. Select Load Style Command, respectively select just named file name, take a look at the screen display for the array effect.

Example 2 Serial setup text array

1. Draw a serial setup text in the drawing area and make an array according to the steps of Example 1.

2. Compare the difference between selecting and not selecting "serial setup number autoincrement". If this option is not selected, the contents of the array objects are the same. When this option is selected, the array of objects is incremented by the set step size.

3. Return to the drawing screen, arbitrarily change the position, size and rotation of the serial setup text, and try marking. It can be seen that the serial setup attribute is unchanged.

6.2 Object Transformation

Object transform dialog box can rotate, mirror, shear operation on the object. Figure 6-3 shows the following dialog box:

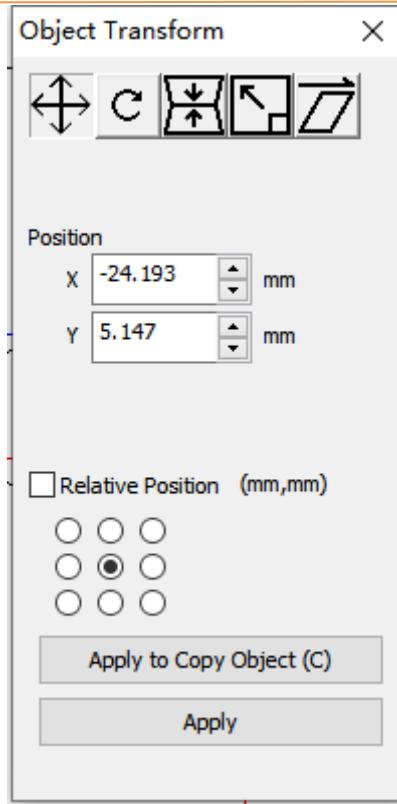


Figure 6-3 Object transformation

Position: corresponding icon []. The user can click the button and modify the coordinate of the view object, which is the actual coordinate of the object. Notice that the coordinates here are starting at the center of the work area.

Rotate: corresponding icon []. The user can click this button to change the rotation Angle of the object and the position information of the current object.

Mirror image: corresponding icon []. After the user clicks the button. Users can modify the scale and image of the object. Proportion: In the process of modifying the proportion, it is related to the button icon []. If the button is pressed, the X and Y of the object will change in equal proportion. If the button is not pressed, only X or Y is modified.

Mirror image: The object is symmetric about the X or y axis, corresponding to the icon [] or []

Size: corresponding icon []. The user can click this button to change the size of the object, which is the same as the previous one. This button is also related to the button after it, and its function is the same as the previous one, without making a statement.



Shear: corresponding icon []. Users can use this command to shear the X or Y of an object.

6.3 Transformation

The "Transform" menu item is shown below:

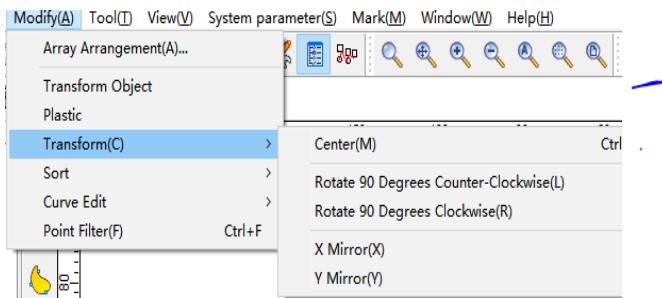


Figure 6-4 Transformation menu items

Center: This command is used to move the selected object to the middle of the marking area.

Shortcut toolbar button: Shortcut key operation: CTRL+M

Rotates 90 degrees counterclockwise: This command is the same as the rotation command described earlier.

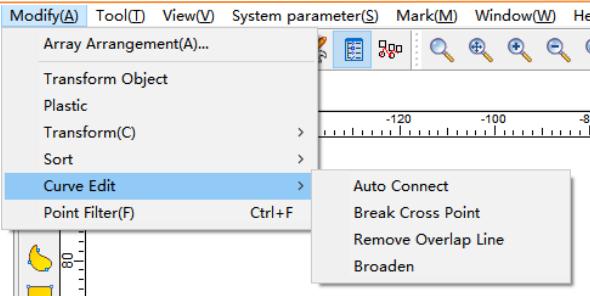
Rotates 90 degrees clockwise: This command is the same as the rotation command described earlier.

X mirror: This command is used to flip the selected object left and right.

Y mirror: This command is used to flip the selected object up and down.

6.4 Styling

The "Styling" menu item is shown below:



(This figure should be wrong)

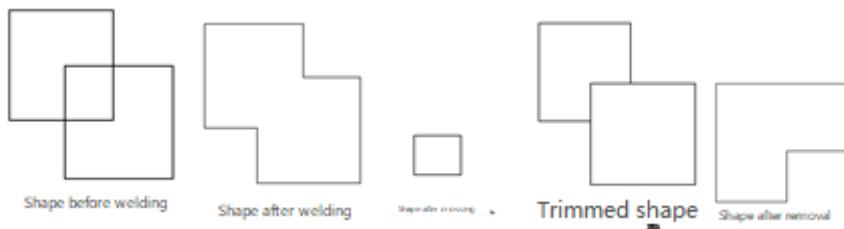
Welding: Two intersecting closed areas can be merged into one closed area.

Trim: You can trim a closed area to remove graphics contained in another area.

Crossover: Two intersecting closed areas can be merged into one closed area, leaving only the intersecting part.

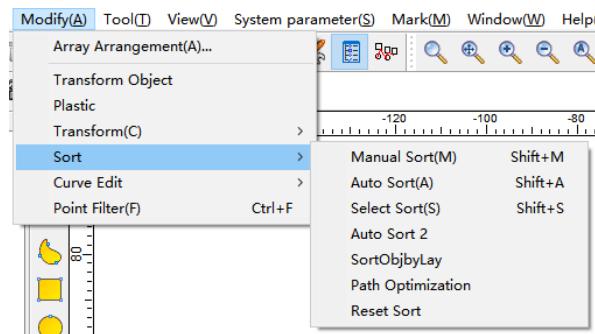
Remove: An object can be transformed into a combination after the transform command.

Their effect on the object is as follows:



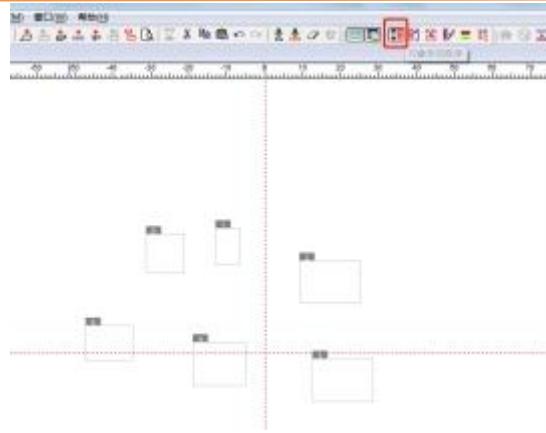
6.5 Sort

The Sort menu item is shown below:



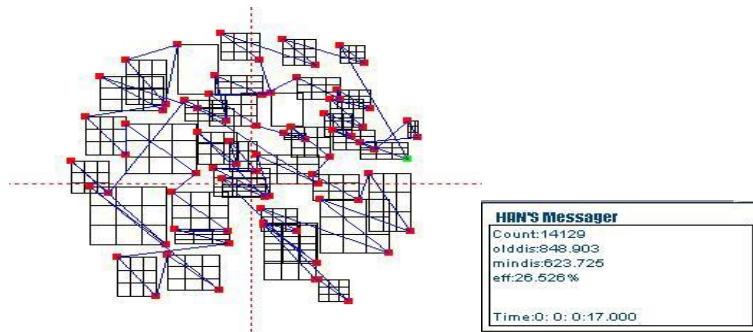
6.5.1 Manual Sorting

Sort objects by clicking the mouse, and determine the sort order of objects according to the order of clicking the mouse. Manual sorting also allows you to adjust the order of objects and insert objects dynamically.



6.5.2 Automatic Sorting

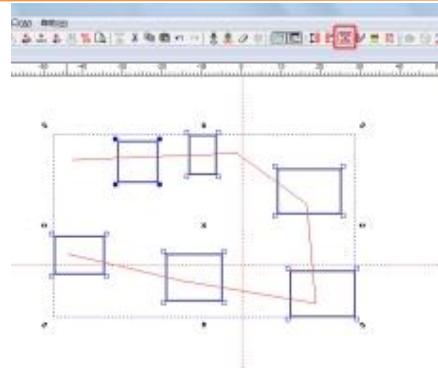
When the number of objects in the view is greater than 6, choose automatic sorting if you want the most efficient path optimization. Automatic sorting takes a long time, but the optimization efficiency is high. The sorting process is displayed in real time, as shown below, and you can interrupt at any time.



Note: This sort needs manual intervention to stop. If eff item changes little or does not change, it indicates that the sorting efficiency is close to the peak. At this time, you can double-click the sorting object to stop the sorting.

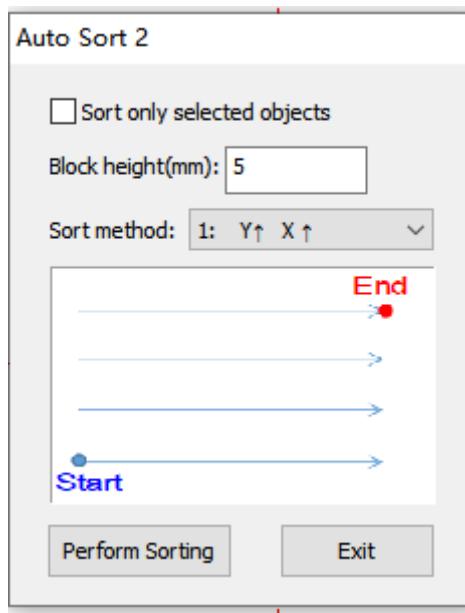
6.5.3 Selective Sorting

First select the sort objects, then click the trend sort icon, draw a straight line to guide all the sort objects on the interface, and then double-click.



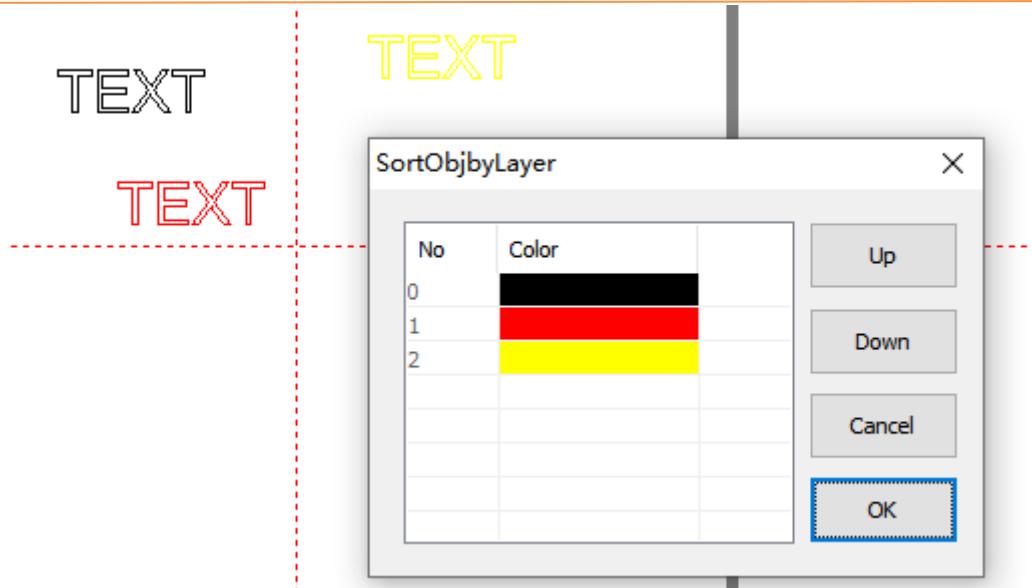
6.5.4 Automatic Sorting 2

The user clicks Automatic Sort 2 to automatically sort the current objects. As shown in the picture below:



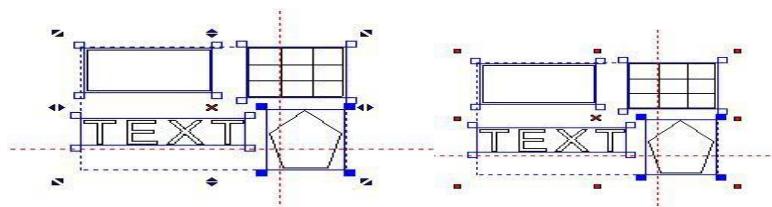
6.5.5 Sort by Layer

The user clicks this command and the objects are sorted by layer. The dialog box is as follows:

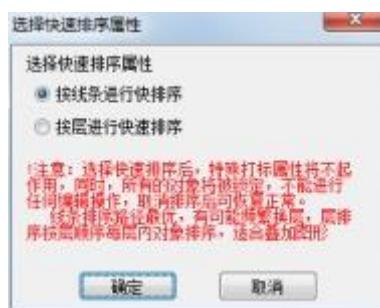


6.5.6 QuickSort

Quick sort is a kind of sorting method specially set up for PLT, DXF and other external imported graphics. The sorting speed is super fast. Because its processing is based on line level, after quick sort, objects will be locked and no other operations are allowed. If you need to release the lock, click the "Quick Sort" button again to restore the original data and unlock the object automatically. As shown in the following figure, the icon is without quicksort, and changes to after quicksort.



When the object is locked, the reference point becomes a red box. There are two options for quicksort:



If "Quick sort by line" is selected, marking will be carried out according to the motion optimal path, which may cause frequent layer changes. If you

select Quicksort by layer, objects in each layer are marked in the order of layers first. Objects in each layer are marked in the optimal path. Then switch to the next layer, the next layer of objects are sorted and marked.

6.6 Curve Editing

6.6.1 自动连接:

6. 6. 1 Automatic Connection:

When curves are merged, if the distance between two adjacent points is lower than this value, the curves are automatically merged. The default value is 0. 0001. Clicking this command produces the following effect:

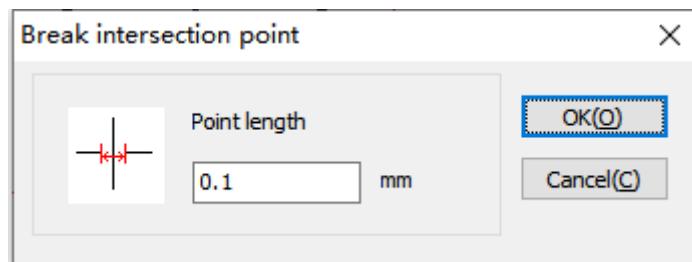


(a) Before the merger

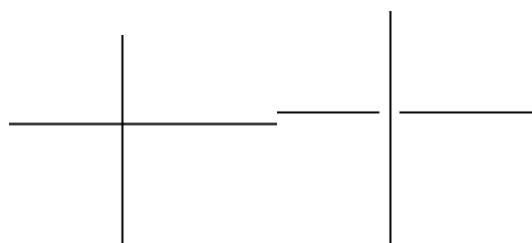
(b) After the merger

6.6.2 Break intersection point:

You can use this command to remove intersections. After clicking this command, the following dialog box will pop up:



The effect of the command is as follows:



(a) Before intersection break

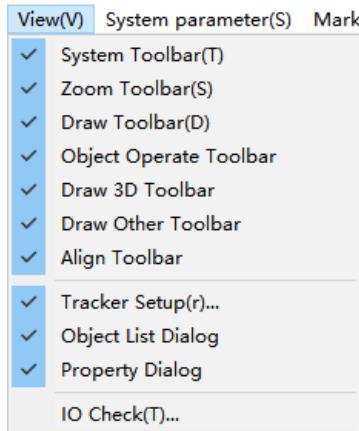
(b) after intersection break

6.7 Alignment

This command is used to perform the following operations for objects in the selection set: equal width, equal height, equal size, align up and down, align left and right, align horizontal and equal spacing, align vertical and center, align horizontal and center.

Chapter 7 Viewing the Menu

The view menu bar is used to set the hiding and display of various toolbars in the software. As shown in the picture:



7.1 System Toolbar

The toolbar of the system is shown in the figure below. It has been emphasized before that the toolbar is the buttonization of menu item functions, that is, it just turns the functions of menu items into buttons, so it is called the toolbar. The system (common) toolbar is shown below:



The functions of these buttons are new, open, save, cut, copy, paste, undo, redo, combine, split combine, group, split group, fill, System Settings, display the left list dialog box, and automatically sort objects. The content of each part has been stated in the previous section, and will not be stated here.

7.2 Scaling

You can use this command to zoom in and out of the software page. The toolbar is as follows:



Local amplification: Corresponding to icon [], which is used to zoom in on the view, including center click zoom in and box Select Zoom in. After the zoom command is selected, it is in the continuous working state and makes the drawing tool unavailable. You can exit the zoom state by pressing the right mouse button.

Click center point to enlarge

Enlarge view with mouse click point as center by 1.5 times.

Box selection amplification

Hold down the left mouse button in the upper left corner of the area you want to enlarge, drag the mouse, and release the left mouse button in the lower right corner of the area you want to enlarge. The area you want to zoom in on will be in view to maximize display.

Drag view: corresponding icon [] Use the mouse to move the current view in parallel.

Enlarge: Corresponding icon [], enlarge the current view. Note: The software supports a maximum range of 14m and a minimum range of 0.1um for stepless scaling.

Zoom out: Zoom out the current view corresponding to the icon [].

Scale all objects: Corresponding to icon [], all objects in the current workspace fill the entire view area for viewing.

Scale the selected object: Corresponding to icon [], the currently selected object fills the entire view area for viewing.

Scale all pages: corresponding to icon [], the current workspace fills the entire view area for viewing.

7.3 Drawing

The drawing toolbar has already been stated in the previous section and will not be stated here. Refer to Chapter 5 Draw Menu.

7.4 Status Bar

The status bar (pictured) provides the user with information about the selected object or the current action. The status bar appears by default at the bottom of the screen.



The left area of the status bar – the prompt area

1. The description of the operation of the menu item when you skim the menu with the mouse.
2. Move the mouse to the button on the toolbar and press the mouse. The description of toolbar operations is also displayed in this area before release.
3. When operating a tool, prompt the status of the current operation in this area.

The right area of the status bar

From left to right, the status bar is divided into many columns, showing the last marking time, the current motor position, positive and negative limit status, the current user, the length of the selected graph and the position of the mouse.

Marking time unit is ms, motor position unit is mm/ degree, will be automatically converted according to the shaft setting. If the limit indicator is red, it indicates that the current position is limited. If the limit indicator is green, it indicates that the current position is normal. Current User displays the current user name. Figure frame length Displays the length of the selected figure(unit: mm). The current position displays the current mouse position, which is synchronized with the ruler.

7.5 The List dialog box

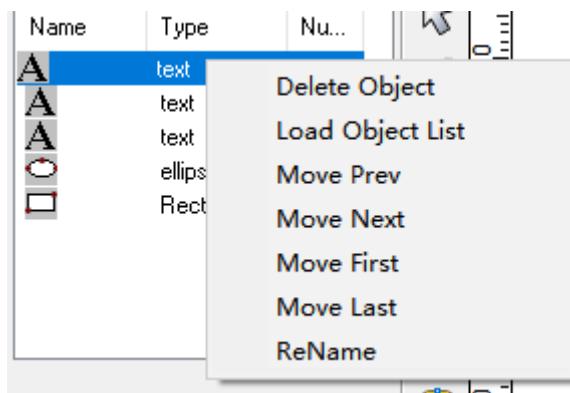
The list dialog box contains two parts: the object list bar and the object Properties bar. The following describes the two parts respectively.

List of objects:

It is mainly used to display a list of objects in the current document, as shown in the figure:

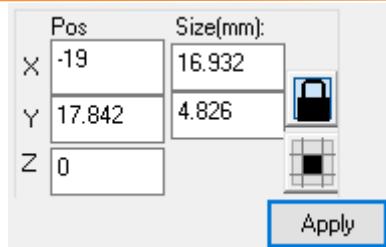
Name	Type	Nu...
A	text	0
A	text	1
A	text	2
O	ellipse	3
□	Rect	4

In addition, users can operate the object list dialog box to change the order of objects, delete objects, and rename objects. The specific operation is to put the mouse on an object in the object list, and then click the right mouse button to pop up the shortcut menu. The user can use the menu command, as shown in the figure below:



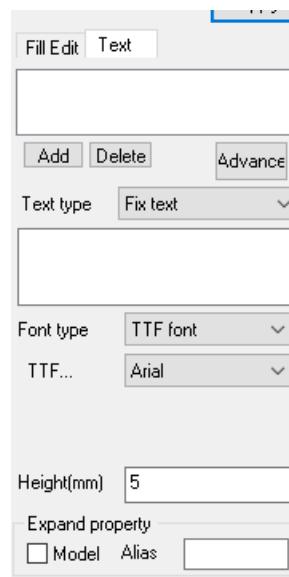
Object properties bar:

The object property bar is divided into two parts: the upper part is used to display the position and size of the current object, and the lower part is used to display the specific information of the current object. As shown in the picture:



(a) The upper part

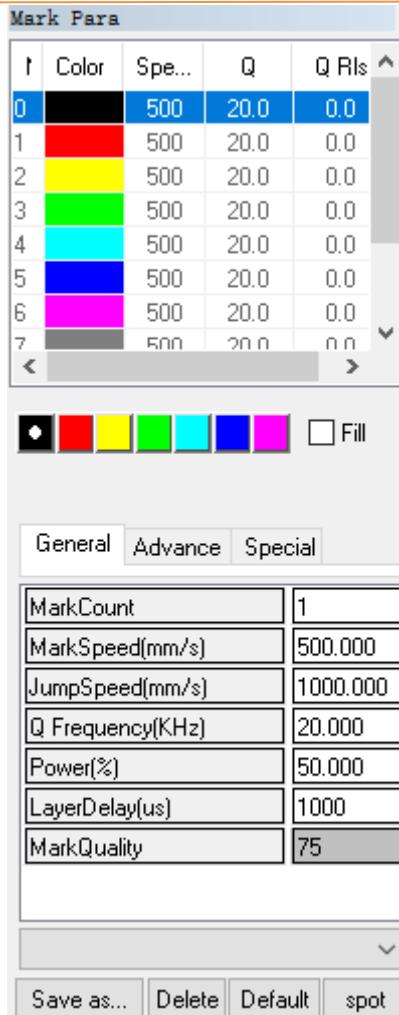
The bottom half, shown in the figure, shows the current information for the "TEXT" node, where the user can modify the object's fill edit properties and text properties. The fill edit operation is in the Fill dialog box. See the previous description for detailed parameters. The text dialog box operation is also referred to the previous description.



(b) The lower part

7.6 Properties Dialog box

In the Properties dialog box, the user can set the current layer of the object and modify the marking parameters. The properties dialog box is shown below:



The Properties dialog box consists of two parts: the layer list and the marking parameters. The following are introduced:

Layer list:

A table showing 8 layers with columns: ID, Color, Speed, Q, and Q Rls. Layer 0 is selected (highlighted in blue). A context menu is open over the table, listing the following options:

- Modify Color
- Lock Layer
- Unlock Layer
- Select layer
- Unselect layer

ID	Color	Spe...	Q	Q Rls
0	Black	500	20.0	0.0
1	Red	500	20.0	0.0
2	Yellow	500	20.0	0.0
3	Green	500	20.0	0.0
4	Cyan	500	20.0	0.0
5	Blue	500	20.0	0.0
6	Magenta	500	20.0	0.0
7	Grey	500	20.0	0.0

The layer information is used to set the layer add, remove, color Settings, etc. Layer is a function designed for users to flexibly control the marking pattern in the marking area. Users can control as many different objects in the drawing area as they like and mark them with different parameters. The following operations are included:

1. Set the current layer

Click the layer you want to use to set the current layer.

2. Change the current layer color

Click the current layer, click the right mouse button, pop up the menu as shown in the above picture, select "Color Change" and select a new color in the pop-up dialog box. The color of all objects in the workspace that belong to the current layer will automatically remain the same as the changed color.

3. Move the object to the specified layer

Select the object to be processed; Double-click the specified layer button in the layer list with the left mouse button to complete the move of the object outline; Select "Fill" and double-click the specified layer button in the layer list with the left mouse button to finish moving the object fill.

4. Lock the current layer

The function of locking the current layer has been greatly changed compared with the previous version of the layer locking function. Users only need to click the button on the object operation toolbar, corresponding icon [], to lock the object of the current layer.

5. Unlock the current layer

The unlocking function of the current layer has been greatly changed compared with the unlocking function of the older version. When there is only one object, the user only needs to click the button on the object operation toolbar, corresponding icon [], to unlock the object of the current layer. Of course, the user can also click the button to unlock all objects, the corresponding icon [].

6. Select the current layer

Click the current layer, click the right mouse button, and the menu as shown in the above figure pops up. After selecting "Select Current Layer", all objects in this layer in the workspace will be selected.

7. Select a layer other than the current layer

Click the current layer, click the right mouse button, pop up the menu as shown in the above figure, select "Select a layer other than the current layer", and all objects other than this layer in the workspace will be selected.

Note: There are many advanced application features for layers that can be found by right-clicking in the layer list.

Marking parameter:

Marking parameter definition and function

MarkCount	1	LaserMode	8
MarkSpeed(mm/s)	500.000	LaserPulse(ns)	200
JumpSpeed(mm/s)	1000.000	SimmerPower(%)	50.000
Q Frequency(KHz)	20.000	LaserOnDelay(us)	100
Power(%)	50.000	LaserOffDelay(us)	100
LayerDelay(us)	1000	JumpDelay(us)	300
MarkQuality	75	CornerDelay(us)	10
		MoveLineDelay(us)	100

Because of different lasers and different control methods, marking parameters will be different. This article will introduce the description of all the parameters that may be used in the software. Please use it according to the actual situation.

Number of marking

Definition: The number of consecutive marks on a single object after firing.

Marking speed (mm/s)

Definition: the running speed of the galvanometer scanner during marking, marking speed = effective vector step length/effective vector step delay; The limits are set in the system parameters. Too big: not fine enough strokes, sparse, no depth, fast marking speed. Too small: fine, dense, deep, slow marking speed. Marking speed generally with Q frequency and power debugging. Recommended value: 1000mm/s.

Note: For dot matrix characters, marking speed has no effect. Point energy is adjusted by laser power and switch delay.

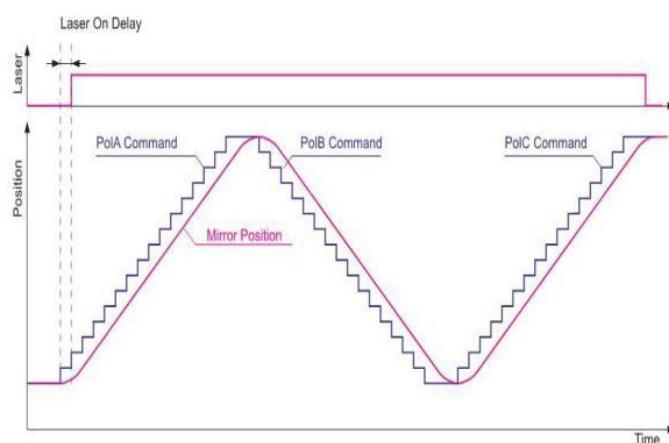
Jump speed (mm/s) definition:

The speed at which the galvanometer scanner runs during the jump. The jump speed = the nullvector step length/the delay between the null vector steps. Too large: "empty" stroke processing time is short, the total marking time is reduced, but there will be connected strokes, the galvanometer scanner motion is unstable. Too small: Long processing time for empty strokes, increasing the total marking time. The jump speed is generally adjusted with the jump delay. The larger the jump speed is, the larger the jump delay is. Recommended value: 1500mm/s.

Laser on delay (us)

Definition: The adjustment time combining the laser starting point with the galvanometer motion starting point, the galvanometer scanner advance or delay time before the laser light is switched on ($-\infty$, 0, $+\infty$).

Function: How long after the effective vector is executed, the laser begins to output. This value can be positive or negative, if it is positive, it does not affect the marking time. If the value is negative, the system executes the effective vector after the laser emits light at the current position for a corresponding time. Too big: The galvanometer scanner has gone too far forward before the laser is turned on, and the start of the stroke will not be long enough. Too small: Before the galvanometer goes far forward, the laser is turned on, and the beginning point of the stroke will form a focus.

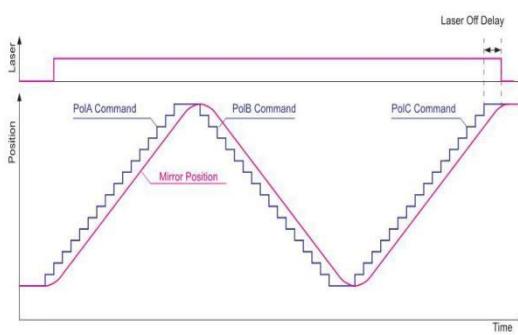


Laser Off delay (us)

Definition:

The adjustment time combining the laser tail point and the moving tail point of the galvanometer scanner, the galvanometer scanner advance or delay time before the laser light off (0, $+\infty$);

Function: How long to turn off the laser output after the effective vector has been executed. This value is not negative and does not affect the marking time. After the last stroke command is given, due to the lag of the galvanometer, it will take some time to reach the specified position. Too big: The galvanometer scanner has been fully turned to, and stays for a period of time, then the laser is turned off, so the end point of the stroke will form a focus, increasing the marking time. Too small: Before the galvanometer scanner is fully turned, the laser will be turned off and the end of the stroke will not be long enough.

**Stoke delay (us)**

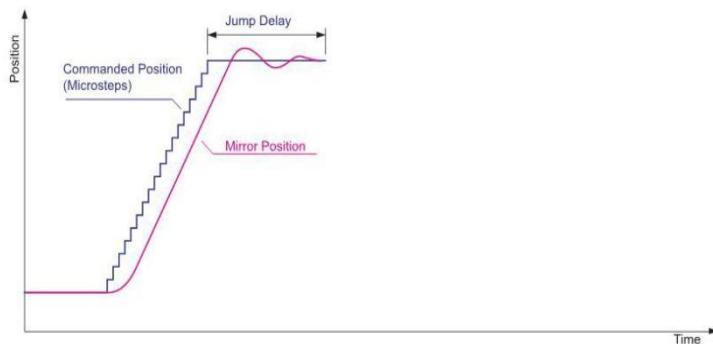
Definition: galvanometer scanner delay after laser light off (150, $+\infty$).

Function: To ensure the accuracy and accuracy of the end point position of the galvanometer scanner track, to a certain extent can reduce the IPG laser tailing phenomenon. If it is too small, at high speed, the untailed part of the effective vector trajectory is incomplete and prone to deformation; When it is too big, it has no effect on the marking effect, but the corner has a focus, and the marking time is increased.

Jump delay (us)

Definition: The adjustment time that makes the galvanometer scanner movement gradually stop in place after the jump, the range is (0, $+\infty$).

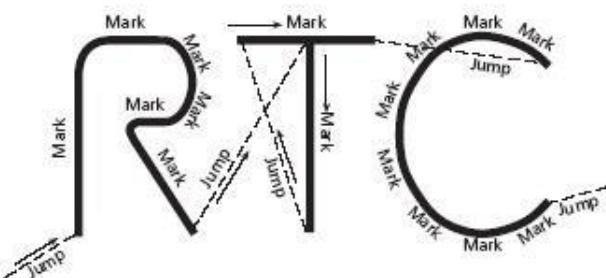
Function: Wait for the galvanometer scanner to jump to the target point and continue to execute the next vector command. Too big: the galvanometer scanner has been fully turned to, and stays for a period of time before processing the next stroke, increasing the marking time. Too small: Before the galvanometer scanner is fully turned, the PC begins to process the next stroke, the beginning of the stroke will appear scattered, and the stroke will appear jitter.

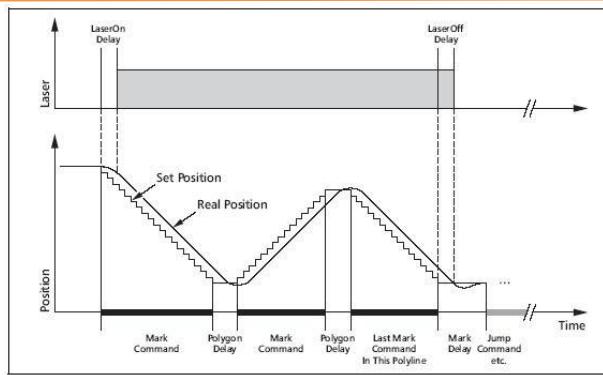


Polygon delay (us)

Definition: At the corner, the adjustment time to make the galvanometer scanner motion curve in place, the range $(0, +\infty)$;

Function: After the last command of the line segment is given, due to the lag of the galvanometer, it will take some time to reach the specified position. Too big: the galvanometer scanner has been fully turned to, and stays for a period of time, then the PC begins to process the next line of strokes. So the turning point will form a focus point and also increase the marking time. Too small: Before the galvanometer is fully turned, the PC begins to process the next line of the strokes, the arc will appear at the corner.





Note: a. The laser delay and galvanometer scanner delay must match the marking speed and jump speed. Inappropriate delay will reduce the marking effect and lengthen the marking time.

b. The order of adjustment: first adjust the laser delay (the jump delay and the galvanometer scanner in place delay are set to be large enough), and then adjust the galvanometer scanner delay (jump delay, galvanometer scanner in place delay, polygon delay).

Q frequency (KHz)

Definition: The number of pulses output by the laser per second, such as 20KHz means 20,000 pulses output per second;

Function: Changing the Q frequency can improve the laser output frequency, reduce the single point energy and peak power, and improve the marking speed to a certain extent. Too big: short energy gathering time, weak energy, marked points dense. Too small: long energy gathering time, strong energy, marked points sparse.

Q Release (us)

Definition: at a certain Q frequency, the light time of the laser in a cycle;

Function: Used to adjust the emission energy and peak power of the laser, the parameter has little effect on the fiber laser: the Q release value is automatically adjusted according to the Q frequency ($Q \text{ release} = 1000/Q \text{ frequency}/2$) to ensure that the normal light can be emitted.

Current (A)

Definition: laser working current, used for YAG, DP, Ep and other lasers that control energy through current;

Function: Set the laser current when marking the current layer, unit A.

Layer delay (us)

Definition: The delay when switching between layers, before the current layer starts marking:

Function: Used for parameter adjustment time between layers, such as current, power, galvanometer scanner in place, etc. Adding the layer delay increases the overall marking time.

Duty cycle (%)

Definition: CO2 laser regulates energy through duty cycle, duty cycle of 50% means the use of 50% power;

Function: control laser output power;

First pulse compression time (us)

Definition: digital Q-drive first pulse compression time;

Function: compress the first point pulse;

First point ratio

Definition: The energy released at the first point when analog Q-drive first pulse is compressed. 1.0 complete release, 0 complete inhibition, partial release between 0 and 1;

Function: Adjust the first pulse with "suppression length coefficient" and "peak energy";

Suppression length coefficient

Definition: The ratio of the energy released from the next point to the current point when the analog Q-drive first pulse of is compressed;

Function: Adjust the energy change frequency, make the energy smooth and gradually strengthen;

Peak energy

Definition: When the analog Q-drive first pulse is compressed, the maximum energy released under control of suppression.

Function: Adjust the maximum peak value. As the laser energy storage gradually decreases, the inhibition will gradually weaken, and the first pulse suppression will stop when the released energy reaches the peak value.

First pulse current coefficient

Definition: The ratio of energy of the laser relative to normal power when using a fast response power supply for first point compression.

Function: The best effect can be achieved by adjusting the energy stored by the laser before light opening and compressing the first pulse with Q-drive;

Marking quality coefficient

Definition: Polygon coefficient when using compact mode;

Function: The larger the coefficient, the smoother the turning, if the coefficient is set too small, it may produce tailing;

Laser mode

Definition: YLP-M laser pulse control parameters;

Function: Adjust the pulse width, adjustable range 1~8.

模式	对应脉冲宽度 (us)
1	4
2	8
3	14
4	20
5	30
6	50
7	100
8	200

Maintenance current (%)

Definition: SPI laser light control parameters;

Function: If the maintenance current is too small, the first point will lack light, and if it is too big, light will leak during the jump process.

Waveform

Definition: SPI laser special parameters;

Function: The full-featured SPI laser has 63 waveforms, each corresponding to a different center frequency. The peak power of a single pulse is maximum at the center frequency.

7.7 Object Operation Toolbar

What is added in the software: Object operation toolbar. Users can use the toolbar to select all, unselect, delete, lock, unlock, mirror, and display or hide objects. The object operation toolbar is as follows:



Select All : Select All objects: Select all objects in the current workspace.

Unselect : All objects other than the currently selected object are selected.

Delete : Delete the selected object.

Lock indicates that the current object is locked and you cannot edit it. At this time, some dots will appear around the object.

Unlock : Releases the currently selected locked object.

Unlock All objects : Releases all locked objects.

Select the current objects by pen number : The user can select the current objects by layer.

X mirror : represents the vertical centerline mirror of the currently selected object.

Y-mirror : indicates the horizontal centerline mirror of the currently selected object.

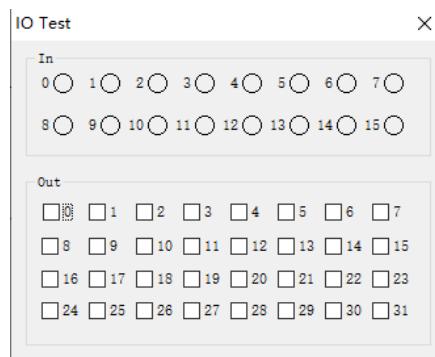
Display : When the object is hidden, the user clicks the button to display the current object.

Hide : When the object is displayed, the user hides the current object after clicking the button.

7.8 IO Detection

Users can use the IO detection function of the software to detect the input or output of the external signal of the marking card.

The IO detection dialog box is as follows:



Open the dialog box. When the signal of the external I/O port is valid, the corresponding input I/O signal is displayed in red.

Chapter 8 3D transformation

8-1 3D modeling

This chapter describes how to create a 3D model.

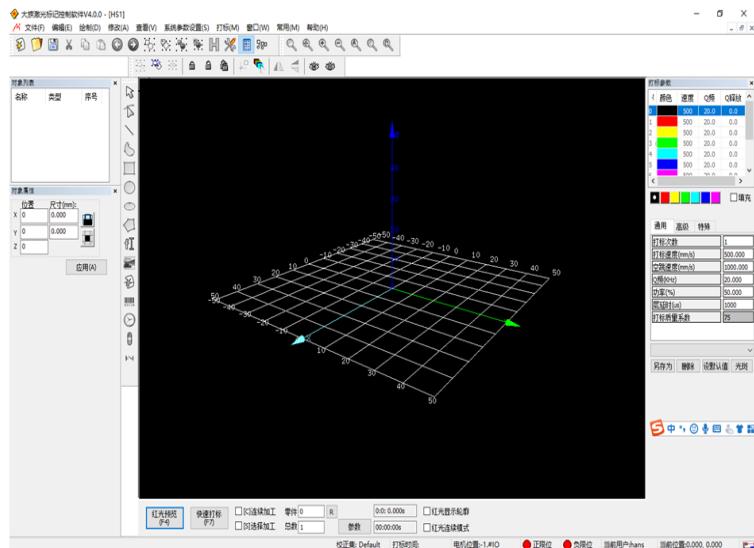
8-1.1 About modeling

The working mode of 3D data processing of the software: first create a 3D model, then map 2D data to the surface of the 3D model to generate 3D marking data, and then accurately mark the 3D data to the surface of the physical object through the marking control function.

Modeling is the first step of 3D marking, the software divides the model into three kinds: custom, STL file and composite model, and then introduces their modeling methods one by one.

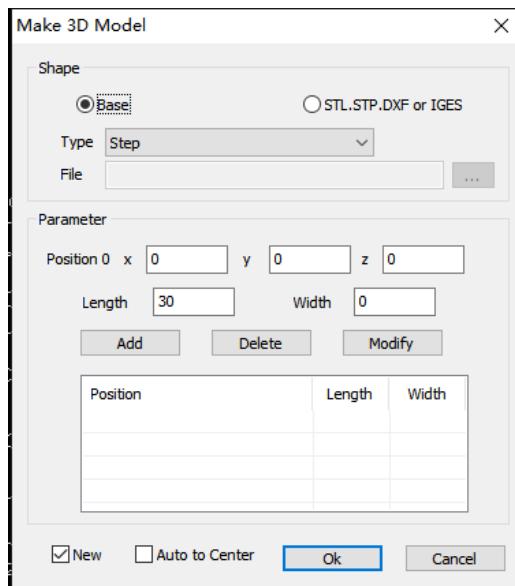
Custom model

1, Start the software, click the common menu bar, click 3D/2D switch, enter the 3D field of view:



The grid line scale in the figure is generated according to the marking range, which plays an auxiliary positioning role and does not participate in marking. The three color axes are also auxiliary displays. The four coordinate buttons in the toolbar are used to quickly change the Angle of view and facilitate positioning and viewing.

2. Click the common menu button "Load 3D model" to pop up the model loading dialog box:

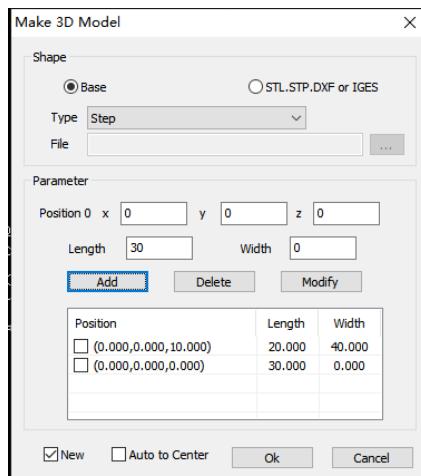


Select "Base" in the shape bar, click the "Type" list box, there are five types of "Step \ Incline \ Column \ Sphere \ Taper" to choose from. After each

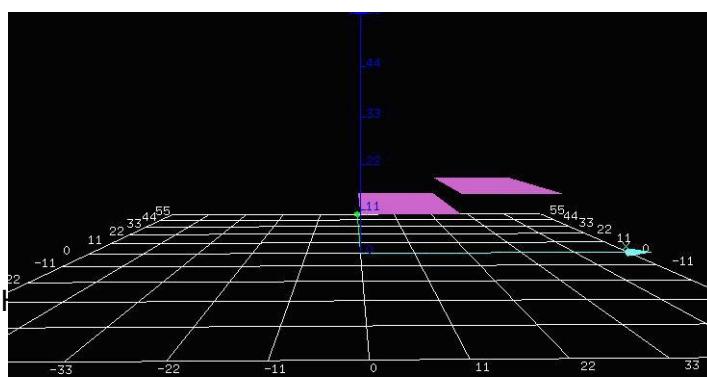
model is selected, the Parameters column below is updated with the parameters required to create that model. Here are the five models and how to create them.

3. When you select "Step", the content in the "Parameter" column becomes as shown in the following figure. "Ladder" can be understood as the composition of planes with different heights, and defining a plane with heights requires the coordinate parameters of the height, length and width of the plane, which correspond to "Z", "length", "width", "x" and "Y" in the parameters respectively. The ladder can be one or more levels, and the "Add", "delete", and "modify" buttons are used for the operation of the ladder. Suppose you want to build a two-level ladder now, the first level starts from (0, 0), the length and width of 20*40, the height of 10, the second level starts from (20, 0), the length and width of 20*40, the height of 15, input the corresponding parameters accordingly, click Add, the parameters of each level will be displayed in the following list. If any error is found, you can select the corresponding item, re-enter it, and click the "Modify" button.

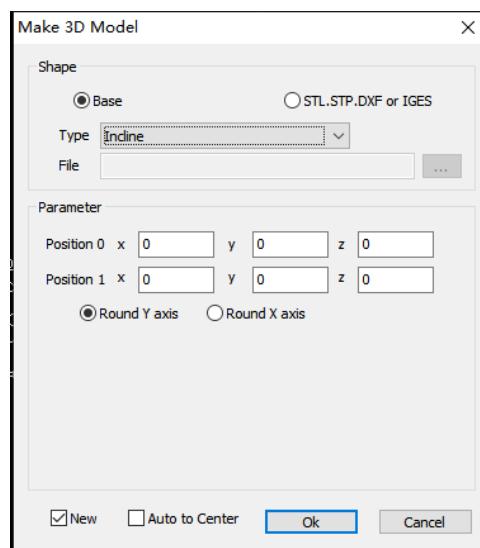
Here's what happens when you enter it correctly.



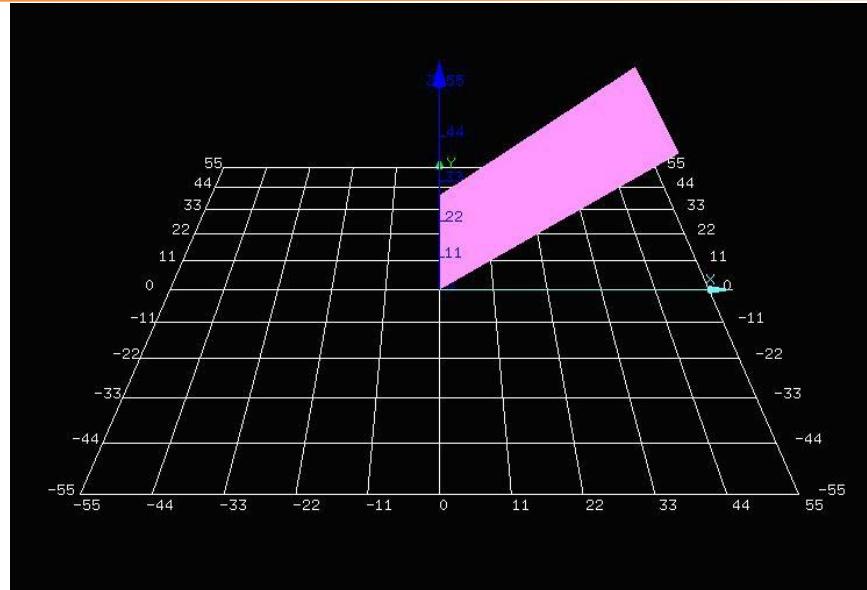
After the input is completed, hook the "New" button in the lower left corner, click "OK", and the 3D field of view will see the created ladder.



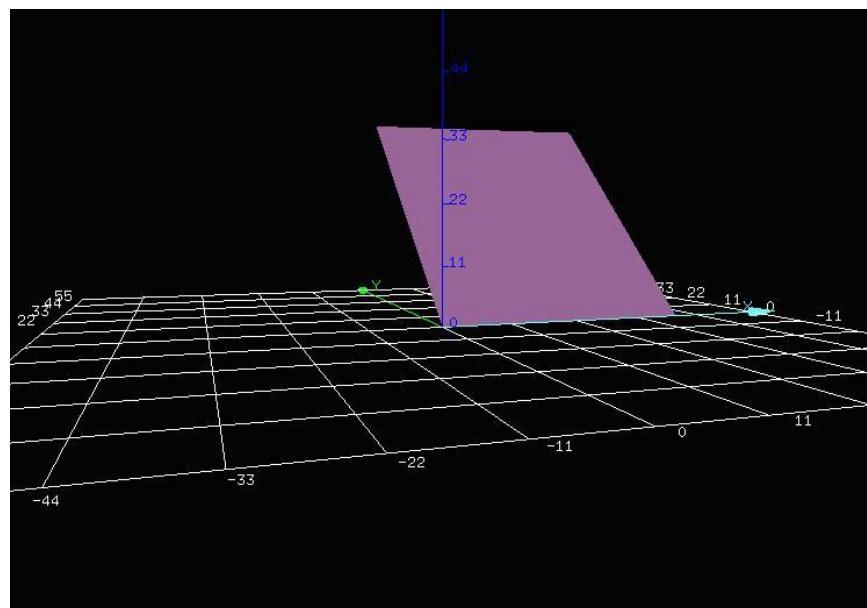
4. When you select “Incline”, the content in the Parameter column changes as follows:



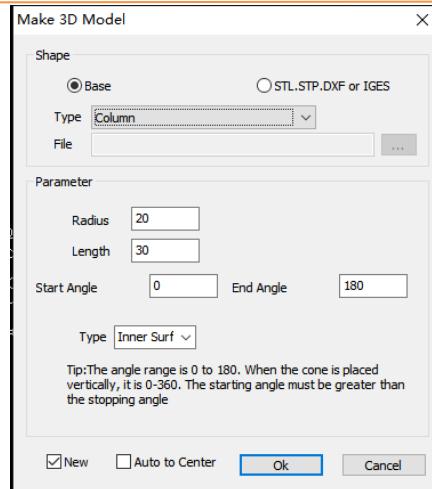
There are two coordinates input, plus a rotation option. Since two coordinates do not determine a space surface, the direction parameter of a surface's rotation about the axis is added. The following is the case of the incline of (0, 0, 0), (40, 40, 40), rotating about the Y axis:



The incline around the X-axis is as follows:



5. When you select "Column", the content of the "Parameter" column becomes as follows:



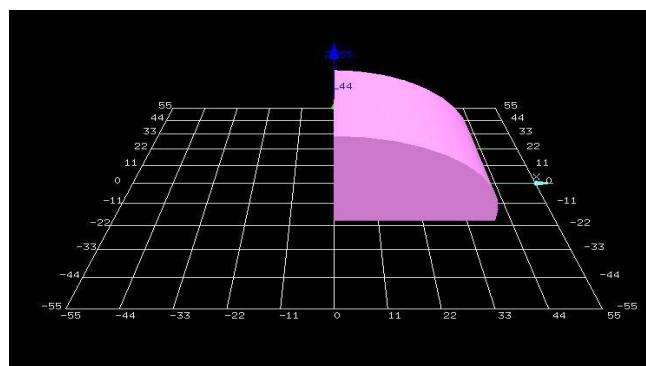
The column is laid horizontally in a direction parallel to the Y-axis, and the parameters are explained as follows:

Radius: The radius of the base of the column.

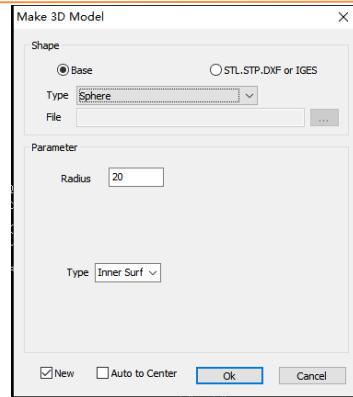
Length: The height of the column, which is called length because it is laid horizontally.

Start Angle/end Angle: A full column of 360 degrees takes up a lot of space, and there are meaningless repeating surfaces (explained later when generating data), so the cylinder is cropped through these two angles.

The following are column with a radius of 40mm and a length of 40mm, starting at 0 degrees and ending at 90 degrees

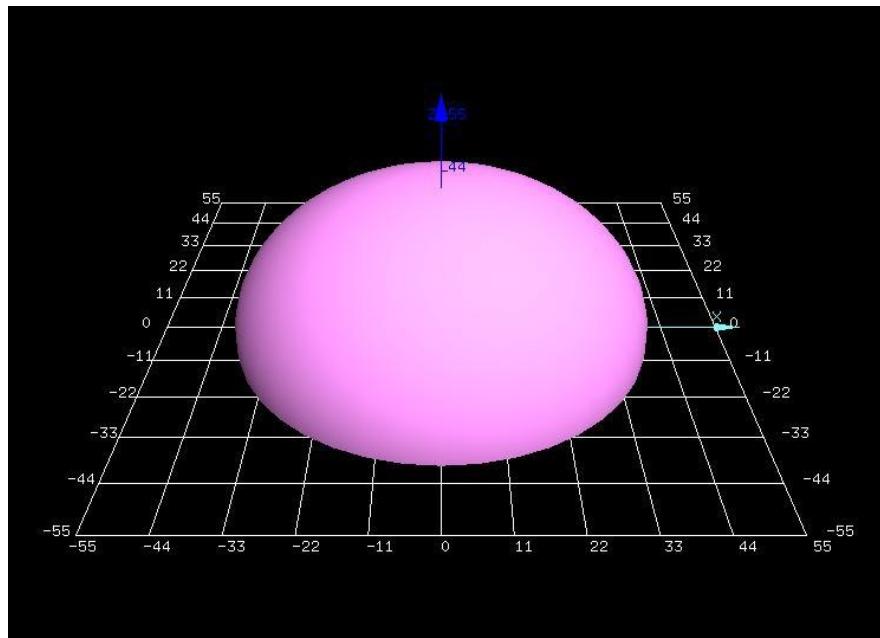


6. Select "Sphere", and the content of the "Parameters" column becomes as follows:

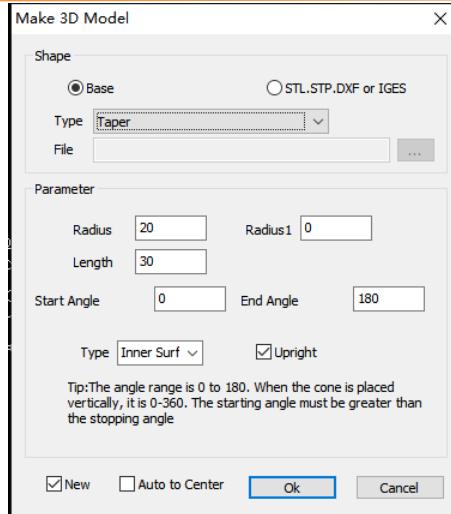


A radius parameter, plus the option "Inner Surf", the option represents the upper and lower hemispheres of the logo, selected as the lower hemisphere (inner surface).

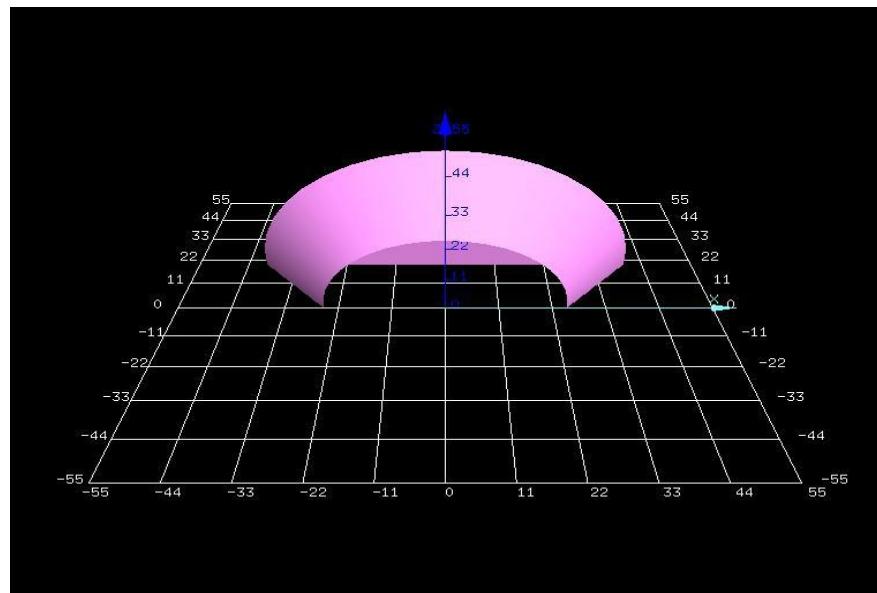
Below is a rendering of the upper hemisphere with a radius of 40mm:



7. Select "Taper", and the content of the "Parameters" column becomes as follows:



Very similar to the "Column", the taper also has "radius", "length", "starting Angle", "ending Angle" and the meaning is the same. "Radius 1" means the other base radius of the taper; When "Upright" is selected, the "Inner Surf" option is meaningless. The following are taper of radius 40mm, radius 1 10mm, length 40mm, start 0 degrees, end 180 degrees, non-inner surf, non-upright marking, :



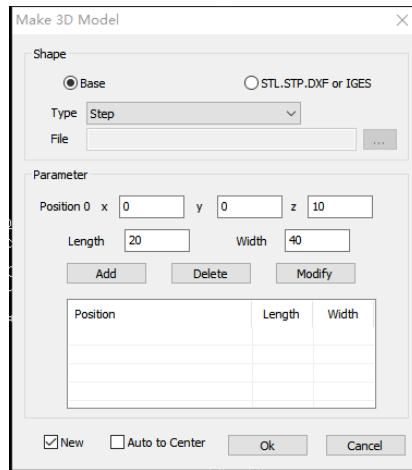
Note: A span greater than 160 is not supported currently, such as starting 0 degrees and ending 270 degrees.

STL file model

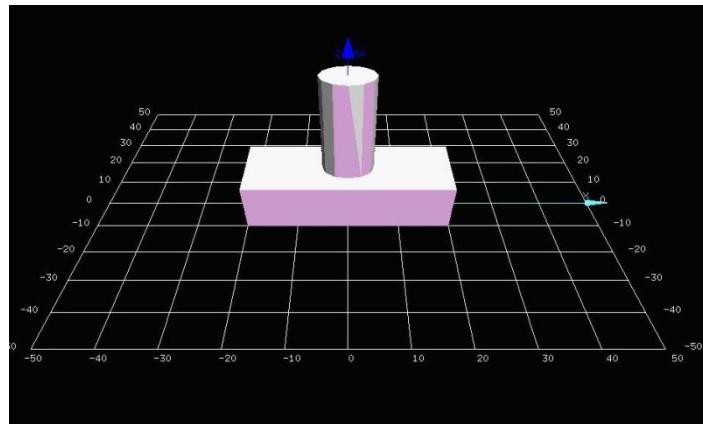
There are many kinds of 3D model interactive formats, and this software only supports STL format at present. First, you need to edit the model in 3D modeling software such as Pro/E, inventor, UG, etc., and then export the model

in STL file format. Finally, it is imported into the software for use. 3D model import steps are as follows:

1. Switch to 3D field of view and enter the 3D model loading dialog box. Select "STL Model" in the shape bar, click the button behind "File", and select the STL file you want to import, as shown below:



After selecting the file, click the "OK" button to import the STL model. The following is the STL sample diagram:

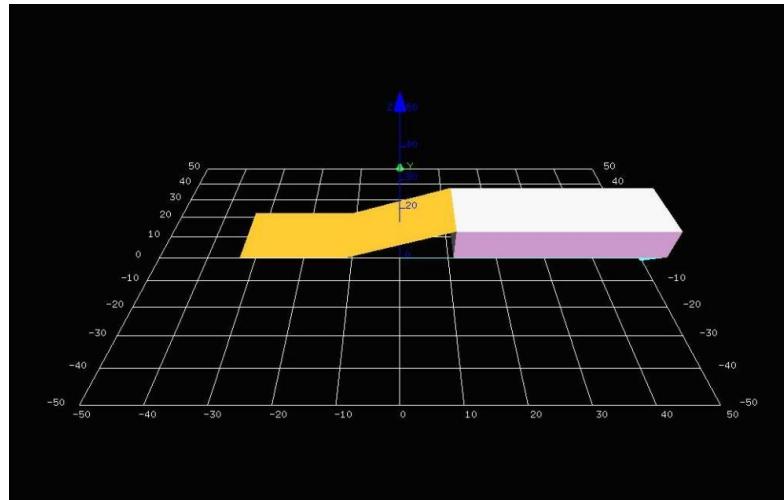


This workpiece model is designed by a third party 3D professional software, which takes only a few seconds to import.

Composite model

A composite model is a combination of multiple models. The models introduced above are all single models and cannot meet the needs of complex situations.

The composite model is to create multiple single models and form a complex model through appropriate arrangement. You can create multiple objects by simply checking the "Add object" option in the loading dialog box. Here is an example of a composite model:



It is composed of "step", "incline" and "STL model".

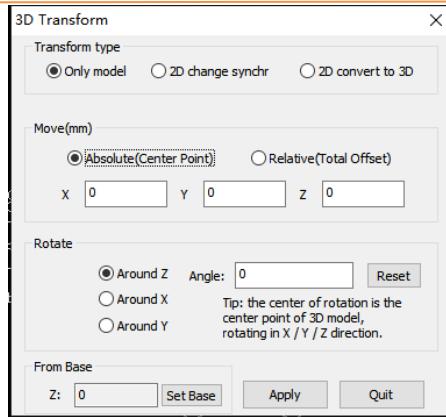
Note: When there are multiple models in a field of view, selected models are shown in pink and unselected models are shown in gold. You can quickly switch between models with the TAB key, and all editing operations on the model are only valid for the selected model.

8-2 Model adjustment

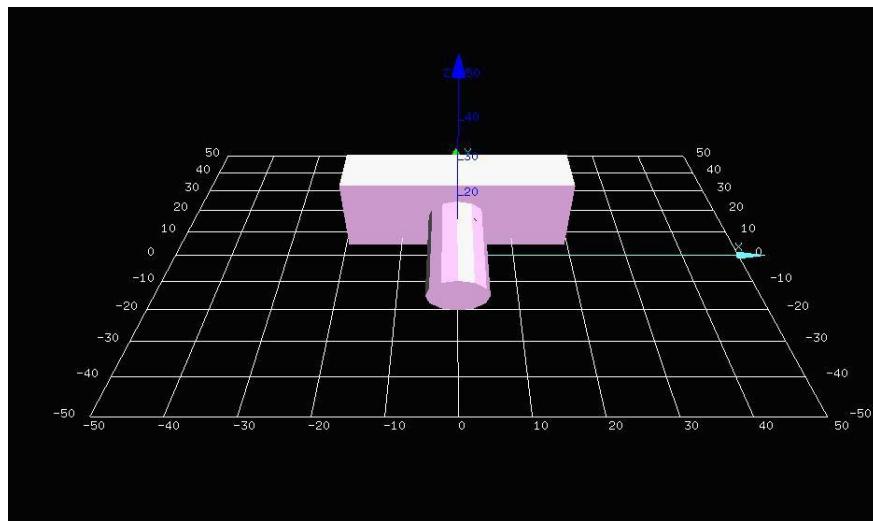
This section describes how to adjust the model, including offset, selection, and refactoring.

8-2.1 Offset rotation

1. Click the button next to the loading model to pop up the "3D Transform" dialog box.

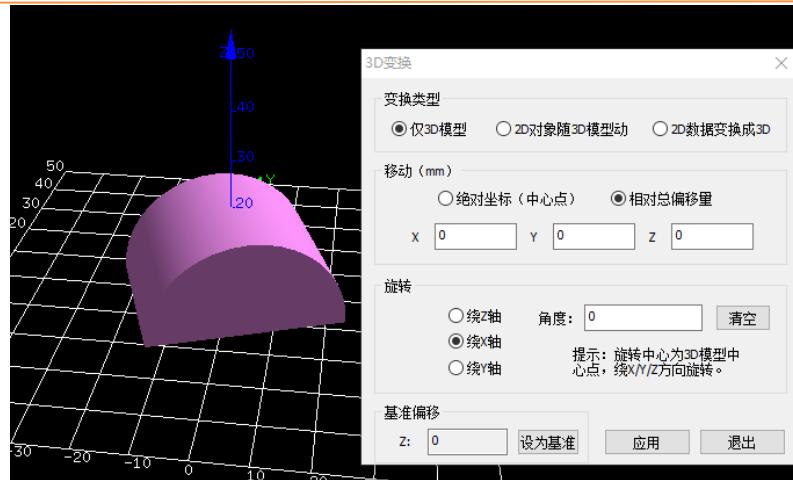


The following is the input diagram of the previous STL workpiece 90 degrees around the X-axis, Z-offset -15: Click "Apply", the workpiece is inverted and basically centered:



Since this model is out of the marking range before the transformation, the absolute position is recalculated and zeroed when the transformation is applied. In this case, using "relative position" and "absolute position" produces the same effect.

If the model is always transforming within the marking region, the absolute position is not cleared and the change relative to the initial position is always displayed. The following figure shows the absolute position of an unbounded cylinder model after multiple transformations.



8-2.2 Modification

After the model is created, if you find that it is not the model you want at all, for example, you have created a column and then found that you need a sphere, or you have just created a sphere with a radius of 10mm and then found that you need a radius of 15mm, you should reconstruct the model.

Enter the loading dialog box again, the parameters of the currently created model are displayed in the dialog box, re-enter the new parameters, tick the "New model" option, click "OK", the model reconstruction is completed, and change to a new model.

8-3 Data generation

This section describes how to generate 3D marking data

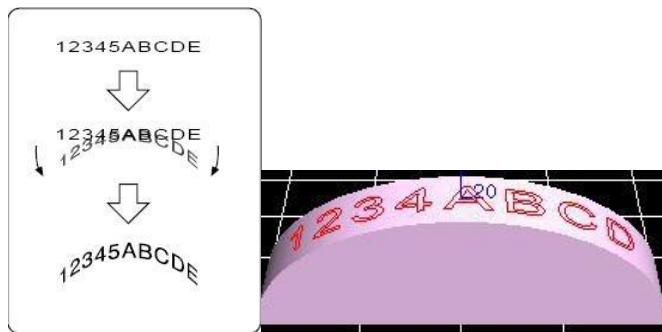
8-3.1 Converting 2D data

The basic process of 2D conversion is to first make flat data under the 2D field of view, and then paste the 2D data along the surface of the 3D model. When 2D data is attached to overlapping parts of multiple models, the uppermost plane model prevails.

There are two types of data conversion: lossless conversion and projection conversion. The former is used for various custom models, while the latter is used for STL models and the intersection part of composite models.

Lossless conversion

Take a custom model column as an example, which is a lossless transformation:



After conversion according to the conversion principle, it can be seen that the converted data is lossless, and there is no distortion or deformation from any angle.

Projection conversion

The so-called projection, the x and y coordinates of the original 2D data remain unchanged, and the corresponding Z on the model is found through the coordinates to form a new 3D coordinate. This is not the same as lossless conversion, which adjusts the x and y coordinates of the 2D data. Take STL model column as an example:



According to the conversion principle, the image after the conversion is compared with the lossless conversion, and the projection data is sparse, and the "1" and "D" are severely deformed. Therefore, it is recommended to use the custom model as the basis of data conversion as far as possible, and the data conversion effect is better. For the conversion of composite models, the converging part of each model adopts the projection conversion mode, and the non-converging part is converted according to the actual situation of the model. The custom model is converted by lossless mode, and the STL is converted by projection mode.

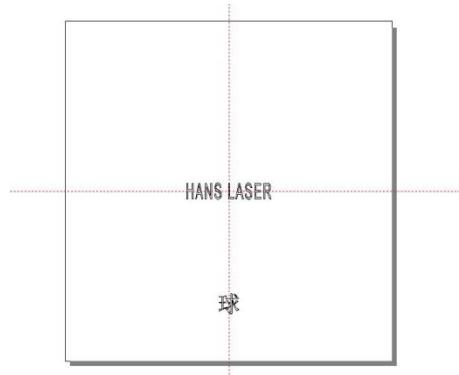
Mode selection

Whether to use a custom model or an STL model for data transformation should be determined by usage requirements and ease of use. If there are very strict requirements for the size of the 3D mark pattern, it should be converted with a custom model as far as possible. If the model itself is very complex and cannot be represented by a model, it is necessary to divide the marking content into blocks, and then create different models for each piece to map separately, which can achieve very good results. If there is no very clear requirement for the size of the 3D marking pattern, the STL model is a very good choice. STL model can map data on any complex 3D surface.

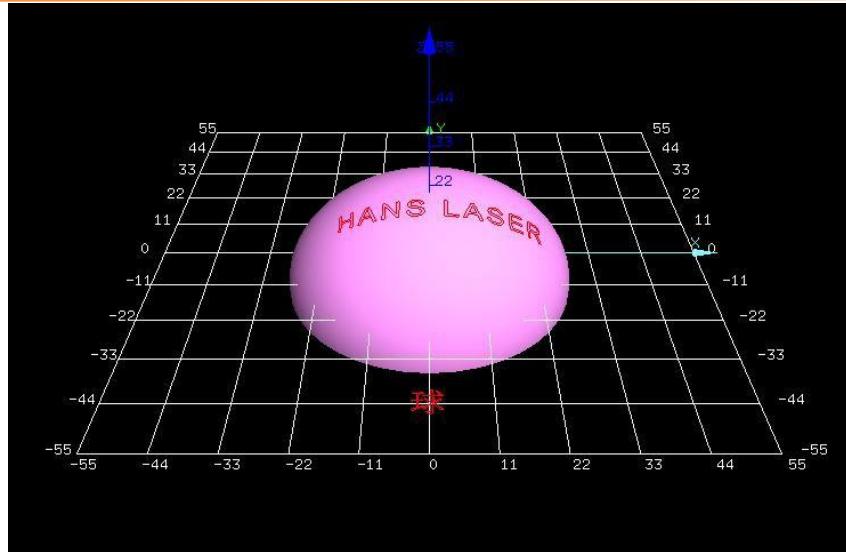
Conversion example

The following are examples of spherical pasting. Requirements: Paste a string of text on the positive hemisphere of a sphere, the text content is "HANSLASER", the half diameter of the sphere is 20mm. There is also a string of words "Sphere", not attached to the sphere. The steps are as follows:

- 1, Start the software, create a blank document, add two text "HANS LASER", "Sphere", the former is in the center position, the latter is in the lower center position:

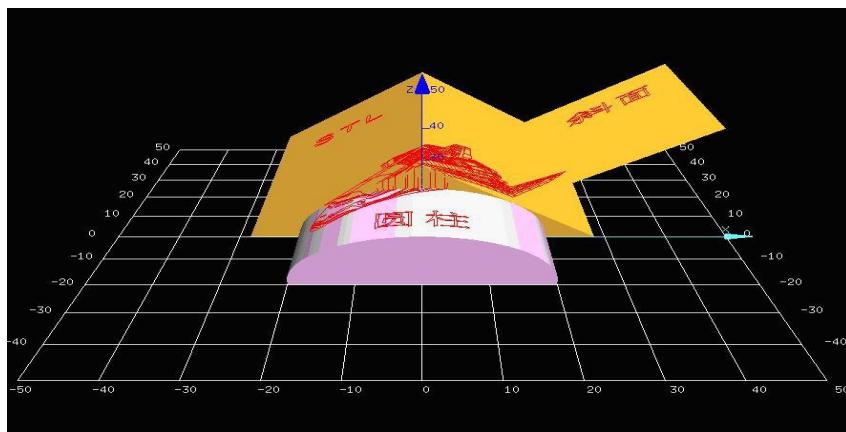


2. Switch to the 3D field of view, create the sphere model, enter 20mm, tick "mark inside", click OK, the model is created and the mapping is completed:



The "HANS LASER" is attached to the sphere, and the "Sphere" remains on the zero plane.

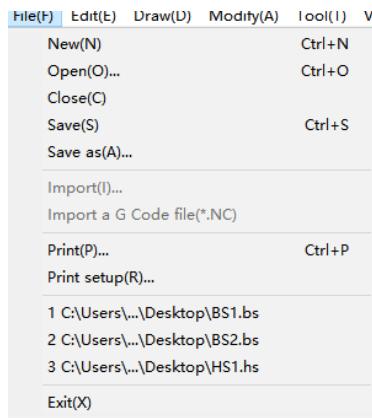
The above operations have no strict order requirements, you can also build the model first, and then switch back to the 2D field of view to produce text, and when you switch back to the 3D field of view, the data will be attached to the model. The following is a composite model map for multiple objects:



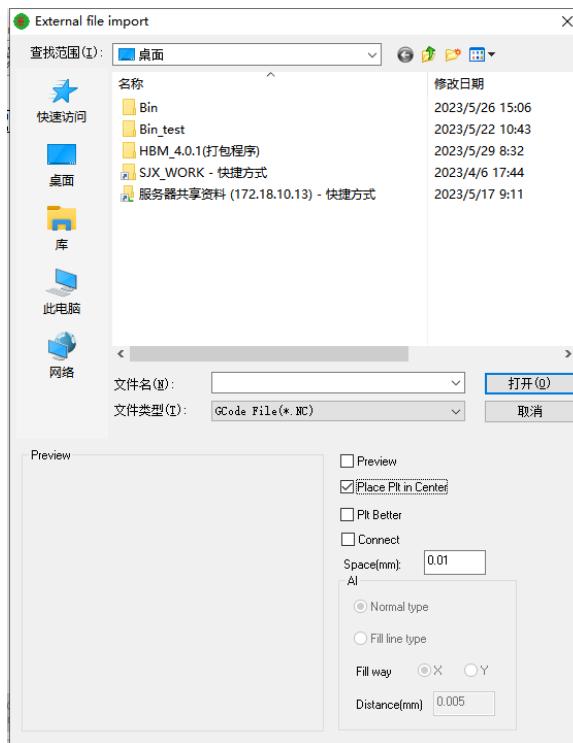
The model is a composite model of "STL" + "incline" + "column". Three text "STL", "incline" and "column" were created in 2D environment. Also included is the imported shuttle PLT diagram, which spans three models and is attached to a composite model of three models. When introducing column modeling, it was mentioned that the 360-degree column has meaningless duplicate faces, because the data is affixed to the surface of the model, and the 360-degree column has two faces at any position, and the software will attach the data to the face at the higher position of the Z-axis, and abandon the low face. So this lower half column between 160 and 360 degrees has no meaning.

8-3.2 Import NC File Data

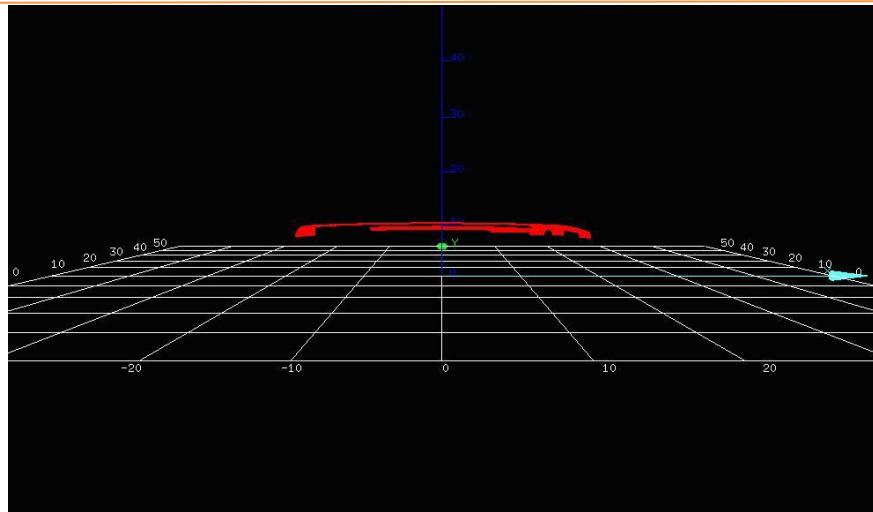
NC file is a CNC machining G code file, usually generated by 3D graphics software UG, can also be generated by other professional software. Launch the marking software and click on the menu:



In the displayed dialog box for selecting a file, set File Type to *.NC:



Here is an example import:

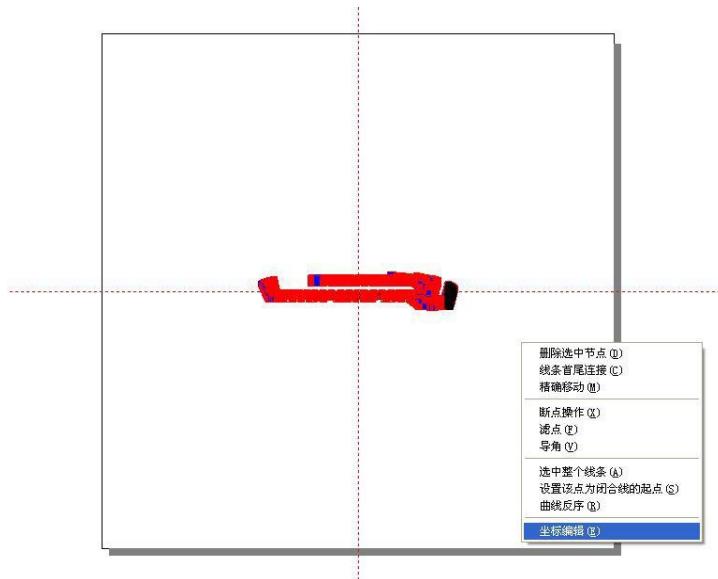


There is no 3D model in the figure, and the NC file data comes with Z coordinates, which can be directly used for 3D marking without the need for 3D models to be generated.

Single point modification

Mapping principle: If the Z coordinate of a point in the original data is not 0, then any line segment directly connected to that point will not participate in mapping operations.

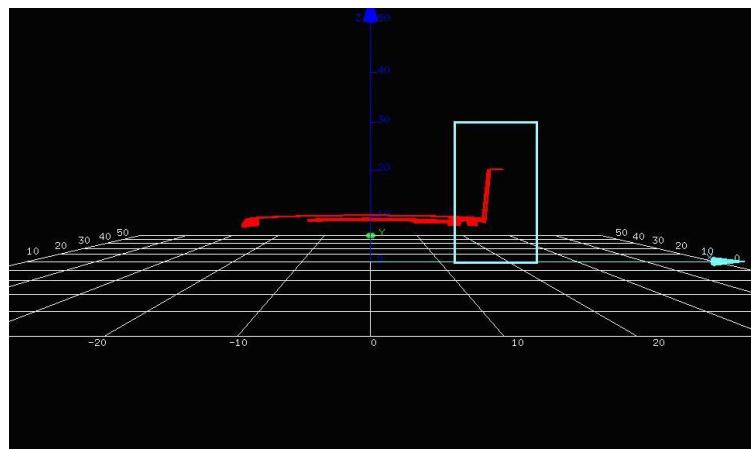
The above picture is an example to explain the operation steps: switch the 2D field of view, enter the point editing mode, select one or more points, right-click the pop-up menu, select "Coordinate editing (&E)" :



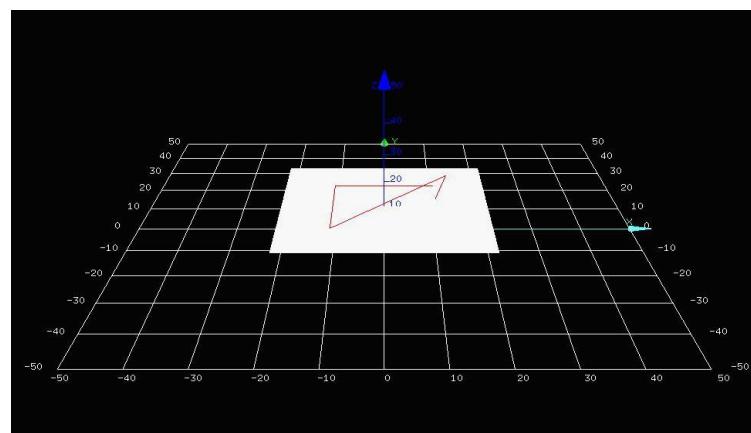
The input dialog box is displayed:



Only Z coordinates can be entered here, indicating that multiple points are selected, and their Z coordinates are allowed to be modified to the same value. X and Y coordinates are not allowed to be modified. Enter 20, click the "OK" button, and then switch to the 3D field of view, you can see that the Z-values of the previous selected points have all become 20mm. The result is shown below.



When 3D data is remapped in the model, the parts where Z does not equal 0 are not mapped again. As shown in the figure below, one of the quadrilateral points has a Z value that is not equal to 0, and when it is mapped again on the step model, without any processing, it produces a strange graph.



8-4 Editing assistance

This section describes auxiliary editing in 3D

Viewing Angle adjustment

Drag the left mouse button to complete the canvas movement. Press the right mouse button and drag to rotate the canvas up, down, left and right. Press the mouse wheel to zoom in/out the canvas. Double-click the left mouse button to return to the original canvas state

Model switching

TAB key to select the next model, SHIFT+TAB key to select the previous model

Data switching

The texture of the selected 2D object is shown in red, not in light blue. To switch to the next 2D object use the N key, and to switch to the previous 2D object use the L key

Undo redo

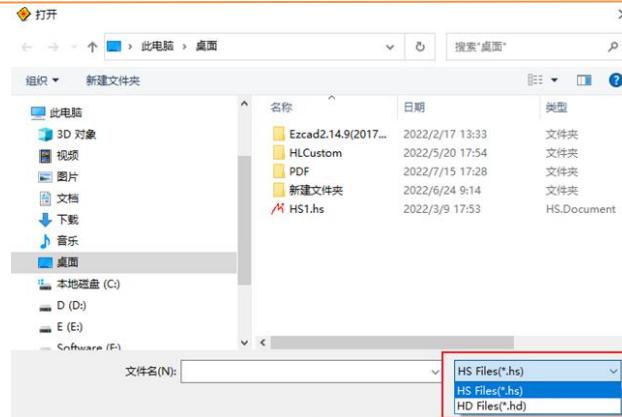
Undo redo in 2D field of view is only for 2D objects.

Undo redo in 3D field of view is only for 3D objects and is done via menu or shortcut keys. The maximum number of 3D undo redo steps is 10.

8-5 File Management

This section describes the new file formats HD, HS, and HD.

HS is an older version of the 2D file format, and the new software is fully compatible with older files. HD is a new version of the 3D file format that can simultaneously store 3D marking data, 3D models, and layer parameters. When opening or saving a file, select the file type in the File dialog box:



HD files can also be opened by double clicking and dragging, and it is a new file format that is only used in new versions.

8-6 3D marking

This section describes 3D marking, positioning, and focus tuning

8-6.1 Marking operations

In addition to rotary marking, 3D field of view is fully compatible with online and offline marking under 2D field of view, including ordinary marking, multi-document marking, I/O selection marking, quick marking, red light preview, and single and multi-document offline download marking.

Security doors, abnormal alarm processing is also the same as plane marking. From the operator level, there is no difference between the marking operation and the plane marking operation in Chapter 4. In simple terms, all marking under the 2D field of view is carried out according to the plane, and marking under the 3D field of view is carried out according to the 3D way. The only difference is that the positioning of the reference plane is not the same, the plane marking only needs to simply set the center point, and the 3D marking involves the spatial posture positioning, which is much more complex. Please refer to Chapter 4 for marking control methods.

8-6.2 3D base plane positioning

3D data involves Z coordinates, in order to make the model and the real object match, the base plane must be positioned before marking, if the positioning is not correct, it will cause the entire object to be out of focus.

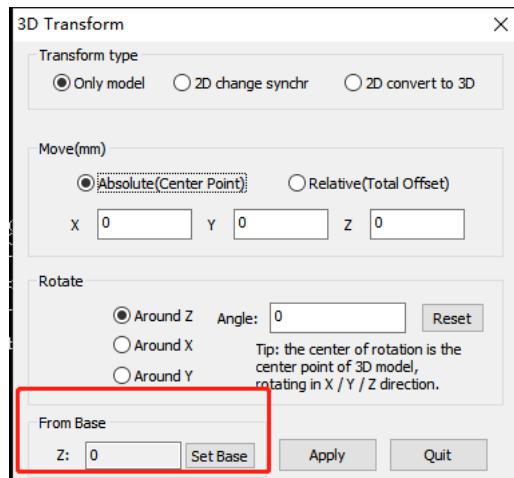
The usual practice is to find a good reference point or surface in the object, and adjust the model position or the object position to make the two match.

Base plane orientation method

A. Move the object or the object with the fixture away, adjust the main beam of the laser, find the focus on the support surface of the workbench, and record the position of the main beam of the laser.

B. Observe the 3D model and find the supporting bottom of the model. If the supporting bottom of the model is not a plane, it is best to import a model with an additional fixture, so that the bottom of the fixture can be used as the supporting bottom.

C. After determining the bottom surface of the support, select the 3D model, switch the 3D view to XZ or YZ view, adjust the Z offset of the model through the transformation of the dialog box, so that the support surface is at Z zero position, and click the "Set Base" button to set the current model position as the reference point, as shown in the following figure.



D, After determining the base position, adjust the Z offset of the model again, and move the model to the appropriate marking position (because the Z adjustable range of the marking machine is about 20mm, so the Z base plane should be adjusted as close to the marking content as possible). After adjusting to the desired position, record the Z base offset in the dialog box.

E. Adjust the main beam of the marking machine synchronously, and the adjustment amount is equal to the model base offset in step D, so that the focal plane of the model and the object are consistent. If the Z base offset is displayed in the software as -20mm, the main beam needs to be adjusted upward by 20mm, and if the Z base offset is 12mm, the main beam needs to be adjusted downward by 12mm.

F. After the Z position is adjusted, turn on the red light and observe the position of the red light falling on the object. Adjust the X, Y offset of the model, or the physical location, so that the model center point and the physical center point are exactly the same, so that the 3D base plane positioning is completed.

G. After the model positioning is completed, the plane marking data is moved to the model for mapping and marking can be performed.

Tip: First set the 2 position through the supporting bottom, and then set the X/Y position through the red light.

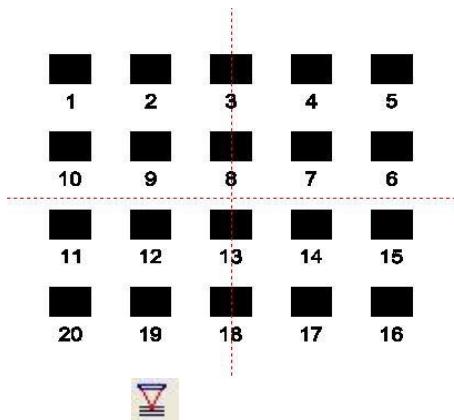
8-6.3 Microfocal positioning

Before marking, the distance between the laser marking machine and the marking plane should be adjusted so that the laser energy is fully focused on the plane as far as possible. Due to the lack of necessary adjusting equipment, the method of visual inspection or listening to the sound is usually used to determine whether it is in the focus position. If some applications need to change the product frequently, the focus position also needs to be adjusted frequently, which brings a lot of inconvenience to the use.

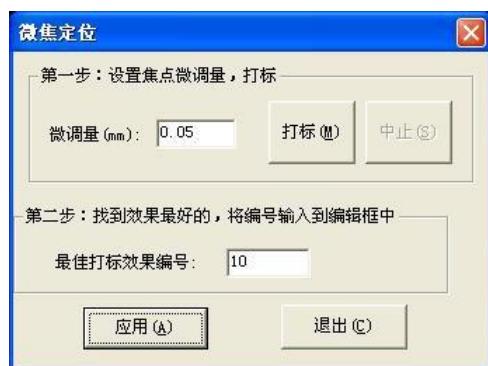
This software provides a quick processing method. The operator does not need to precisely adjust the focus position, by simply setting the marking, you can find an optimal marking focus.

Microfocal location method:

1. In the toolbar button, find the AutoFocus. HS file in the installation program Samples directory, open it, and see the following figure.



Set the marking parameters, and then click the toolbar button, the software first detects the number and sequencing of templates, if correct, enter the positioning dialog box.



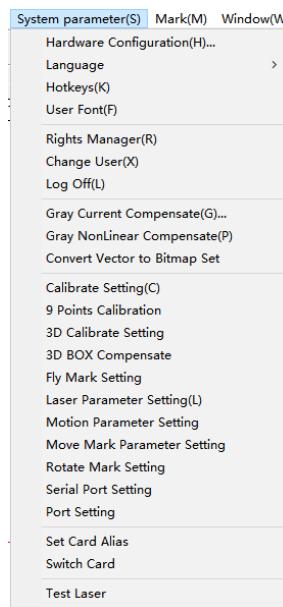
How it works: The software assigns a new Z offset to each small square object according to the set fine-tuning amount, and then marks them once on the same plane, at this time, the object with the best marking effect is the best focus.

【 Fine-tuning 】 Set the offset of Z between each two groups of objects, the default is 0.05mm;

[Best marking effect number] Set the group number with the best marking effect (1-20) : After the setting is completed, click the "Apply" button to set the setting to take effect. In the future, whether it is plane marking or 3D marking, the software will correct the focus with the current best position as a reference. If the position of the main beam changes, it needs to be positioned again.

Chapter 9 System parameter setting menu

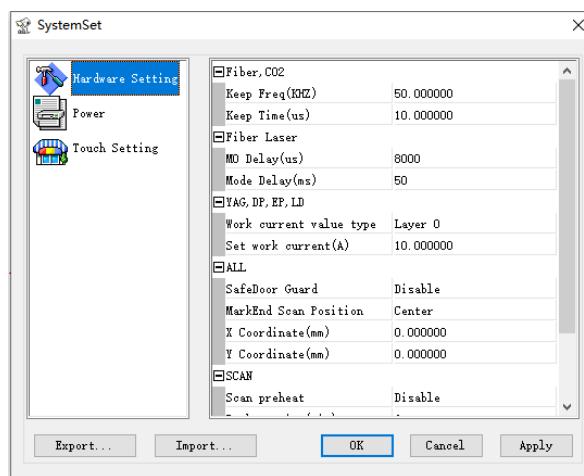
The system parameter setting menu bar has a variety of functions, which are described below. The menu bar of system menu Settings is as follows:



9.1. Hardware Configuration (H)

The user can use this menu item to set hardware, power and touch Settings.

Click the command to pop up the following dialog box:



Keep Freq (khz)

Definition: the output frequency of the laser when not marking;

Function: It is used to adjust the output frequency of the non-marking time laser, and has a certain improvement effect on the tailing and light leakage in the jump process of the IPG fiber laser.

Setting range: IPG laser control in 20–80KHz, CO2 laser frequency in 3–5K can be. The size of this parameter has no effect on the pulse frequency during

marking and does not affect the marking time. When using IPG to mark sensitive materials, the larger the parameter, the less obvious the tail.

Keep Time (us)

Definition: the release time corresponding to the keep frequency;

Function: Used to adjust the release time corresponding to the output pulse of the laser in non-marking, change the peak power of the pulse, and have no obvious effect on the fiber laser;

Setting range: Within the corresponding period.

Enter the dialog box working current

Definition: Set the working current after entering the marking state;

Function: The current is adjusted to the set working current before the marking starts, which has a greater impact on the first point energy.

M0 delay (us)

Definition: delay to PA signal after M0 signal is triggered;

Function: For adjusting, do not change during operation.

Safe door guard

Definition: related Settings of safe door protection in the marking process;

Disable: Open the safe door during the marking process, and the marking control system does not suspend or stop;

Pause: When the safe door is opened during the marking process, the marking control system is suspended, the galvanometer stops moving, and the laser does not come out. After closing the safe door, you can choose to continue marking or need to trigger the marking. For the corresponding Settings, please see "Edit/Options/Whether to continue after the safe door is closed".

Stop: in the marking process, open the safe door, the marking control system stops, the galvanometer scanner stops moving, the laser does not come out, after closing the safe door, if the marking is triggered, then restart the marking;

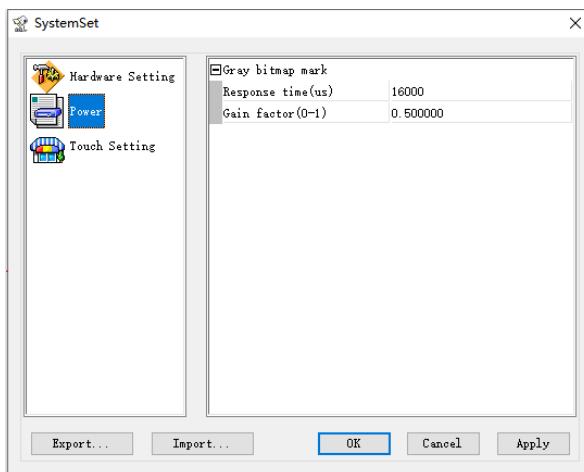
Function: Used to protect the personal safety of the operator.

Galvanometer scanner position of Marking end

Function: After the end of the marking, the galvanometer returns to zero position, the default is the center origin;

Power supply characteristic

Function: Quickly respond to power supply changes, adjust the marking trail of gray bitmap mark;



Response time

Definition: Response time after the laser current changes;

Function: To compensate the tail caused by the slow response of the laser.

Attenuation target

Definition: laser attenuation length;

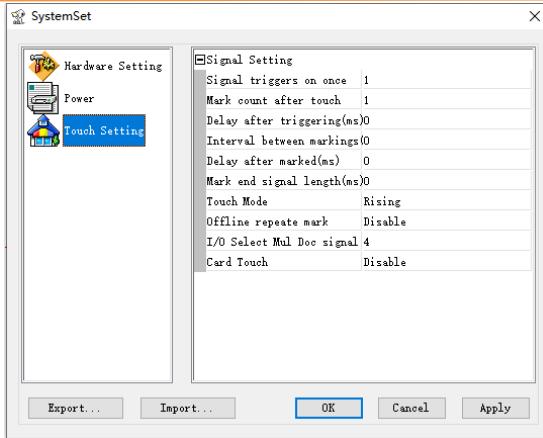
Function: To compensate the tail caused by the slow response of the laser.

Gain Factor

Definition: the ratio of the current to the set current;

Function: To compensate the tail caused by the slow response of the laser.

Touch setting



Signal setting

It is used to support the production line.

Signal Triggers on once

Used to set the number of acquisition signals (such as touch signals), triggering several times before giving a marking command.

Mark count after touch

Set the number of marks per trigger. If used together with the delay after triggering, you can control the number of marking and the time interval between each marking.

Delay after triggering (ms)

In some industrial control situations, the touch switch is connected to the photoelectric probe, when the object is detected to arrive, the touch switch generates a signal, but sometimes the object is not completely stable, and a certain time needs to be given as a delay signal to stabilize the object.

Interval between markings (ms)

When marking multiple times, it is used to set the time interval between two marking to facilitate loading.

Delay after marked (ms)

The delay after multiple marking ends at one trigger.

Mark end Signal length (ms)

Used to detect signal status after the end of marking, after all delays.

Touch mode

Edge trigger: When the trigger signal is received, the edge signal is collected, such as the rising edge as the trigger signal;

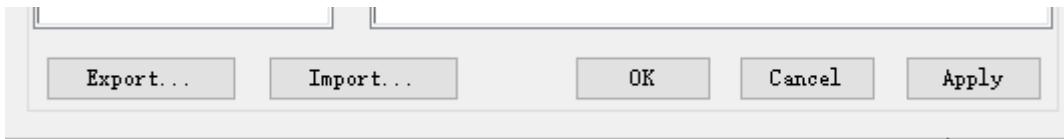
Level trigger: It is thought that there is always a trigger signal when encountering high electricity.

Offline repeat mark

Disable: Marking after offline, no cycle marking after signal triggering.

Enable: Off-line marking, after the signal is triggered, the system will continue to cycle marking, and the cycle interval is the delay between two marking.

Export and import system parameters



建议系统参数修改后要将其保存，作为备份，便于以后调用；导出：点击“导出参数”，修改文件名，保存即可； 导入：点击“导入参数”，选择文件，打开即可；

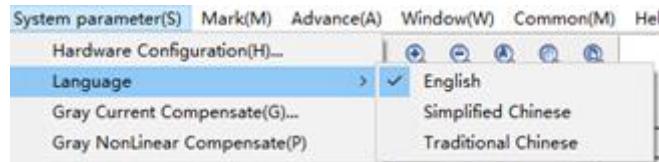
After modifying the system parameters, it is recommended to save them as a backup for future calls;

Export: Click "Export parameters", modify the file name, and save;

Import: Click "Import parameters", select the file, open it;

9.2 Language Switchover

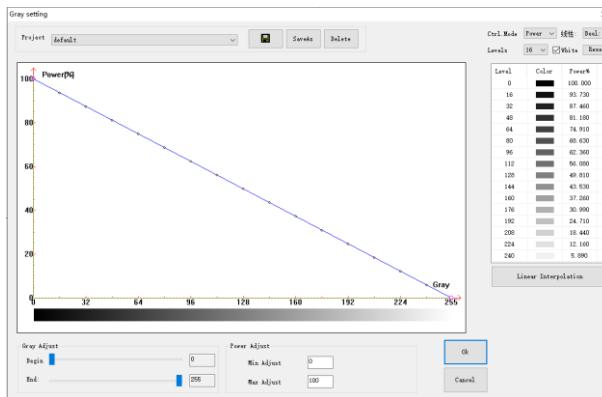
By clicking this command, the user can switch the language in the software, as shown in the picture below:



As shown in the figure, switch to English version. After the user selects the language version, the software needs to be shut down and restarted to take effect.

9.3 Gray Settings

The user clicks the command to set the gray bitmap, and the following dialog box pops up after clicking the command:



Control mode: There are four options: duty cycle, Q adjustment, current, AC, depending on the selected laser and related hardware parameters, the software will filter out the mode you can not use, you may actually use only one or two.

- 1) CO2 laser uses duty cycle for gray marking.
- 2) Lasers with Q drive (YAG, DP, EP, etc.) can be Q-adjusted for gray marking. Because the Q adjustment will leak light, it is not suitable for marking sensitive materials, and can play a good effect on metal materials.
- 3) A laser equipped with a fast response power supply can use current for gray marking.
- 4) Laser equipped with analog Q drive can use AC mode to complete gray marking. When applied to sensitive materials, it is necessary to cooperate with a fast response power supply to achieve the best results.

Note: The best collocation for grayscale bitmap marking: analog Q drive + fast response power supply +AC regulation.

Adjustment levels: gray adjustment precision, the more levels, the more gray color can be adjusted, if you choose 256 levels, each level of gray can be adjusted, if you choose 16 levels, only 16 levels of gray can be adjusted.

Note: The level is selected according to the material, the better the marking contrast, the higher the level of the material should be. For materials with poor contrast, there is no need to set the level high.

Linear relationship: Curve or straight line, according to the marking effect to decide which line to use. White background: Select when the background color of the marking material is white.

Gray adjusting method:

1, select the control mode and ensure that the hardware connection is correct.

2, select the grayscale, usually 256 levels.

3, select "Specify gray level", gray level is 0, set the marking speed and point spacing.

4, Use the mouse to select the point with left gray 0, adjust the energy up and down to a fixed value.

5. Press F7 to mark.

6, observe the marking effect, and adjust 4-5 steps repeatedly until a satisfactory effect is achieved.

7. Set the gray level to 255.

8, Use the mouse to select the point with left gray 255, adjust the energy up and down to a fixed value.

9. Press F7 to mark.

10, Observe the marking effect, and adjust 8-9 steps repeatedly until a satisfactory effect is achieved.

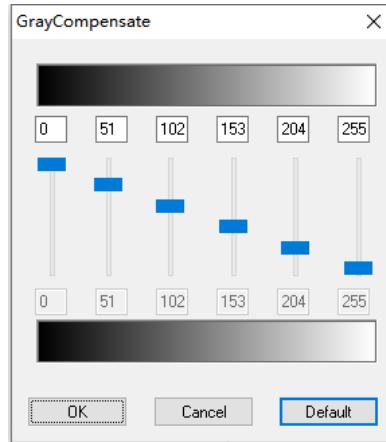
11, select "All gray", press F7 marking.

12, Observe the marking effect, if OK, click OK to exit. If you are not satisfied with some gray levels, you can use the mouse to click the curve point corresponding to the gray level you want to modify, when the point becomes a circle, you can use the mouse or keyboard to adjust.

Note: The marking speed and point spacing must be consistent with the bitmap Settings in the marking document, otherwise the actual marking effect will be different.

Tip: If you need to fine-tune the gray energy, first use the mouse to select the adjustment point, and then use the keyboard up and down keys for precise adjustment, the adjustment amount is 0.1.

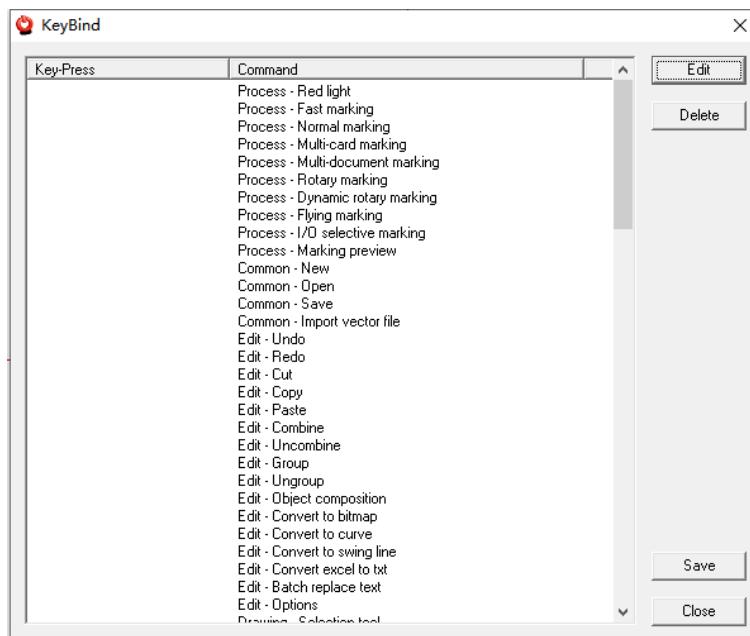
9.4 gray level nonlinear compensation



The user uses this command to adjust the gray value.

9.5 Key Bind

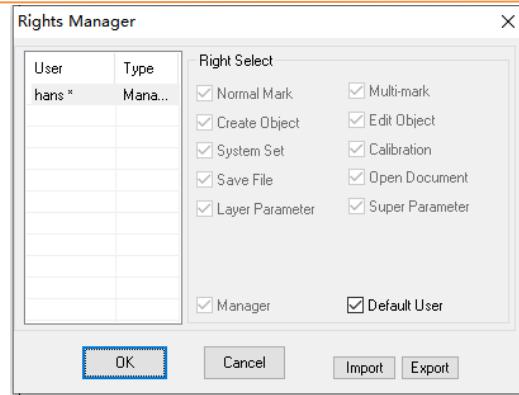
The user clicks this command to enter the key bind dialog box as shown in the figure:



After entering the key bind dialog box, the user can select the function used and bind it by using common keys. After editing, you need to save it.

9.6 Rights Manager

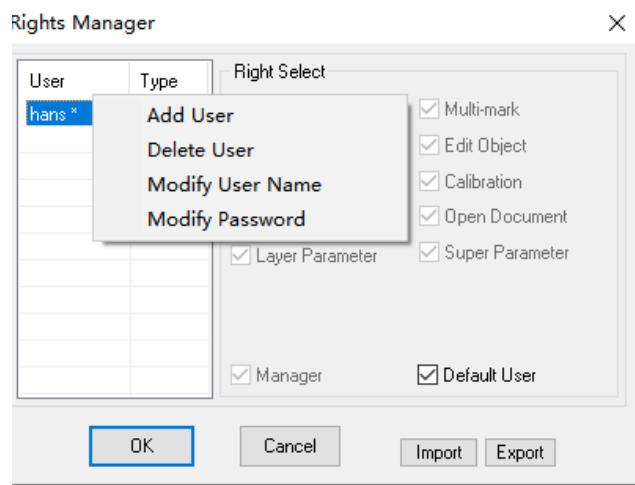
The rights manager dialog box is displayed:



Users are classified into administrator and common users. In addition to the function of setting, the administrator can assign permissions to ordinary users, and can also add, delete, and modify users and permissions;

According to the classification of operations, the operation rights of the software are divided into several kinds according to the function, as mentioned above, if checked, you have this right. The administrator can set any user as the default user, so that there is no need to enter a user name and password when entering the system. The default user is Hans. Hans is a system user and cannot be deleted or changed.

Add a new user In the left user list, click the right mouse button, the user management menu will pop up, as shown below:

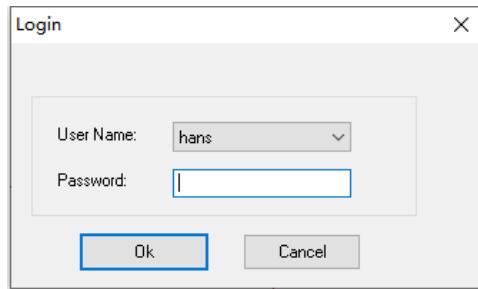


Users can be managed through the menu.

9.7 User Switchover

If you need to switch the user immediately, click the menu "Settings" to enter the "Switch user", the system will pop up the dialog box as follows, which will list all the user names, you only need to select the corresponding user

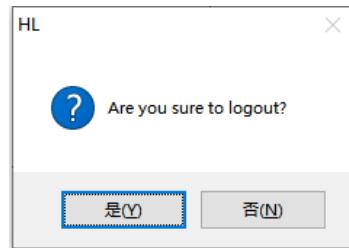
name, enter the corresponding password and click the "login" button, the system can complete the login after checking the password.



Note: The default password of administrator Hans is “8888”.

9.8 Deregistering the current user

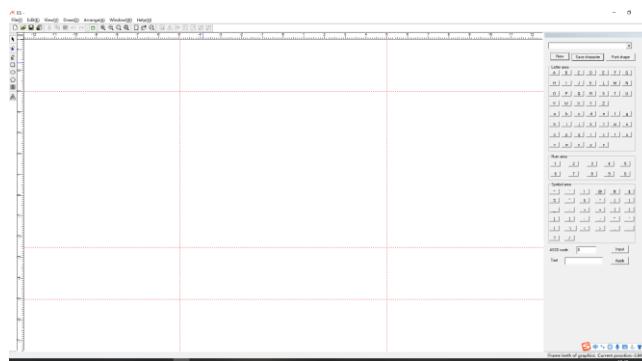
Click to log out the current user, and the following prompt dialog box will pop up:



You need to log in again the next time you open the software.

9.9 Editing a User-defined Font

Click the menu "Settings" and click "Edit User-defined font" in the pop-up drop-down menu to start the custom font editing program.



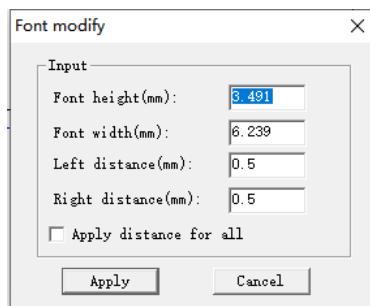
Edit steps:

- 1), select an existing font in the font drop-down list or click the "New" button to add a new font.

2), in the right shortcut button to select the character you want to modify, the left drawing area will display the character corresponding to the font.

3), edit the font, adjust the shape, size, position, etc., if you need to align all the words, please move the words close to the alignment line after drawing.

4) In addition to changing the font, you can also modify some features of the character arrangement by clicking the "font adjustment" button, as shown in the following figure.

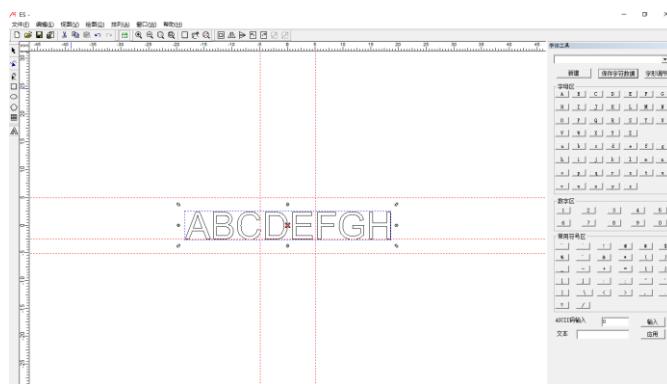


If the "Word spacing applies to all characters" button is checked, all characters of the font will use this parameter.

5) After editing, click the "Save character data" button to make the modification take effect, otherwise the current editing will be automatically abandoned.

6), select another character, follow the above steps in order to set.

After the creation, you can enter a string of test strings in the text editing box on the right and click the "Apply" button to view the typesetting and editing effects of the strings, as shown in the following figure.



Note: 1, before saving the character, if the character graph consists of many objects, you must combine all the character graphs into one object.

2. The four dotted lines in the drawing area are the reference lines, and the font adjustment parameters are based on this boundary.

9.10 Calibrating Parameter Settings

由于激光打标机光学系统的特定组成，为了更准确和更精细的标记，振镜必须经

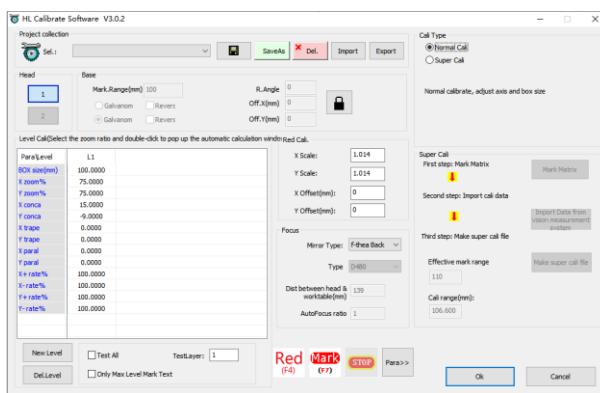
Due to the specific composition of the optical system of the laser marking machine, the galvanometer scanner must be calibrated for more accurate and fine marking. The causes of mark deformation are:

(1) The use of the scanning lens will cause the X\Y direction to be concave or convex;

(2) The deviation of the installation position of the galvanometer scanner causes the marked BOX to be trapezoidal or parallelogram;

(3) The unevenness of the scanning lens and the nonlinearity of the galvanometer scanner may cause the size ratio to be uneven in the entire marking range; The system adopts multiple levels of calibration to ensure better accuracy in the calibration range.

The software provides three optical calibration methods to choose from.



Functional features:

- (1) Support file management of multiple calibrating parameter sets.
- (2) Support for dual-head calibration (for the setting method of enabling dual-head, please refer to the LaserSet tool software manual).

- (3) Support calibration including range, coordinate system, rotation, offset.
- (4) Support single-stage grid calibration, multi-pole linear merging calibration algorithm.
- (5) Support red light calibration.
- (6) Automatic identification of different cards, multi-card mixing work will not go wrong.
- (7) You can insert multiple control cards on a PC for dynamic switching.
- (8) Support f0 rear focus, front focus, ordinary rear focus three lens calibration.
- (9) Convenient and fast light adjusting means. Support a variety of calibration methods.
- (10) Support 3D marking calibration.

Ordinary calibration: Ordinary calibration is the most basic calibration, and various deformation can be adjusted by simply entering some coefficients.

High precision alibration 1: For a relatively small range (200mm or less) of marking, provide a set of accurate calibration processing method, can achieve very high accuracy.

High-precision calibration 2: For the large range of marking, the scanner is difficult to deal with, you can obtain the point coordinates through a third-party professional instrument, and import into the calibration system, after processing can get a more accurate calibration.

Basic parameter

Different sizes of scanning lenses correspond to different sizes of marking ranges;

SN	Lense	marking range (mm)	Cali range (mm)
1	F=100	50*50	60*60
2	F=160	100*100	120*120
3	F=254	160*160	180*180

The calibration range should be larger than the marking range, it is recommended that different lenses correspond to different correction ranges as shown in the table above.

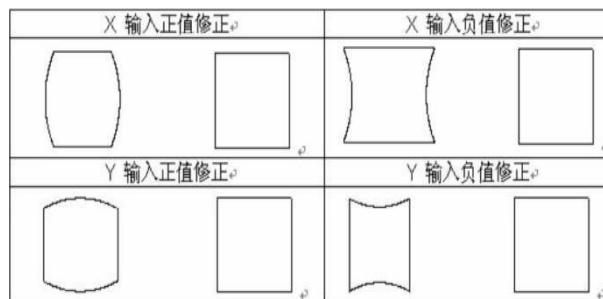
1. BOX size: that is, the size of the BOX to be calibrated, the maximum value is equal to the marking range;

2. X zoom ratio: Calibrate the length of the line along the x direction, the actual length = ratio * marking range, the general value is about 0.8;

3. Y zoom ratio: Calibrate the length of the line along the Y direction, the actual length = scale * marking range, the general value is about 0.8.

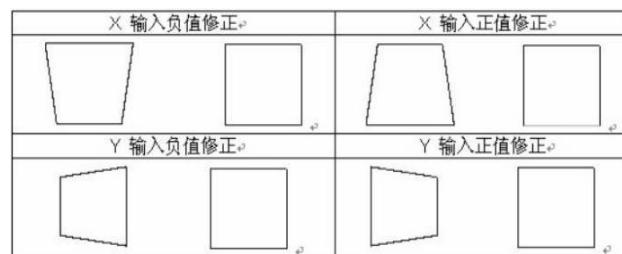
4. X concavity and convexity: Calibration of the concavity and convexity of the Y-axis line when adjusting the BOX;

5. Y concavity and convexity: Calibration of concavity and convexity of lines in the X axis direction when adjusting BOX;



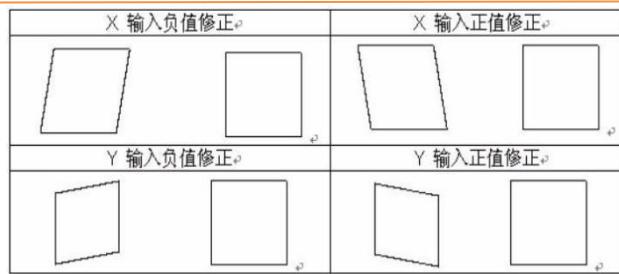
6. X trapezoid: Correct the length of the opposite side to ensure that the horizontal opposite side is equal;

7. Y trapezoid; Modify the length of opposite sides to ensure that the longitudinal opposite sides are equal;



x parallel: Correct diagonal length to ensure horizontal BOX;

Y Parallel: Corrects diagonal length to ensure horizontal BOX



10. X + rate: If the actual X + length is larger than the theoretical value, the change value will be reduced, otherwise it will be increased;

11. X - rate: If the actual X - length is larger than the theoretical value, the change value will be reduced, otherwise it will be increased;

12. Y + rate: If the actual Y + length is larger than the theoretical value, the change value will be reduced, otherwise it will be increased;

13. Y - rate: If the actual Y - length is larger than the theoretical value, the change value will be reduced, otherwise it will be increased;

Related Settings

Add a level: If multiple levels of calibration are required, click this button to add a level, and then modify the BOX Size in the corresponding level.

Delete a level: If you do not need to add a level, delete it. Overall effect: If you want to see the calibration effect of the entire marking range, select this option to use with the "Test Layer";

Test Layer: The level of fineness used to see the overall effect. The more series, the smaller the line spacing;

Parameters: Set marking parameters, such as marking times, marking speed, power, etc., can be saved for next use;

Calibration marking

After selecting the correction level (such as L1), click the "Test" button, or press the "F7" key, you can mark according to the calibration graph within the specified marking range. After marking, you can measure the size of the BOX, the length of X\Y axis, concavity and convexity, diagonal, half-cycle length, etc.

If you need to stop during the calibration marking process, please click the "Stop" button;

Calibration parameter save and call

After the calibration is completed, please save the calibration parameters in a safe location; After replacing the lens or related accessories, call the desired calibration parameter.

Calibration procedure

General calibration

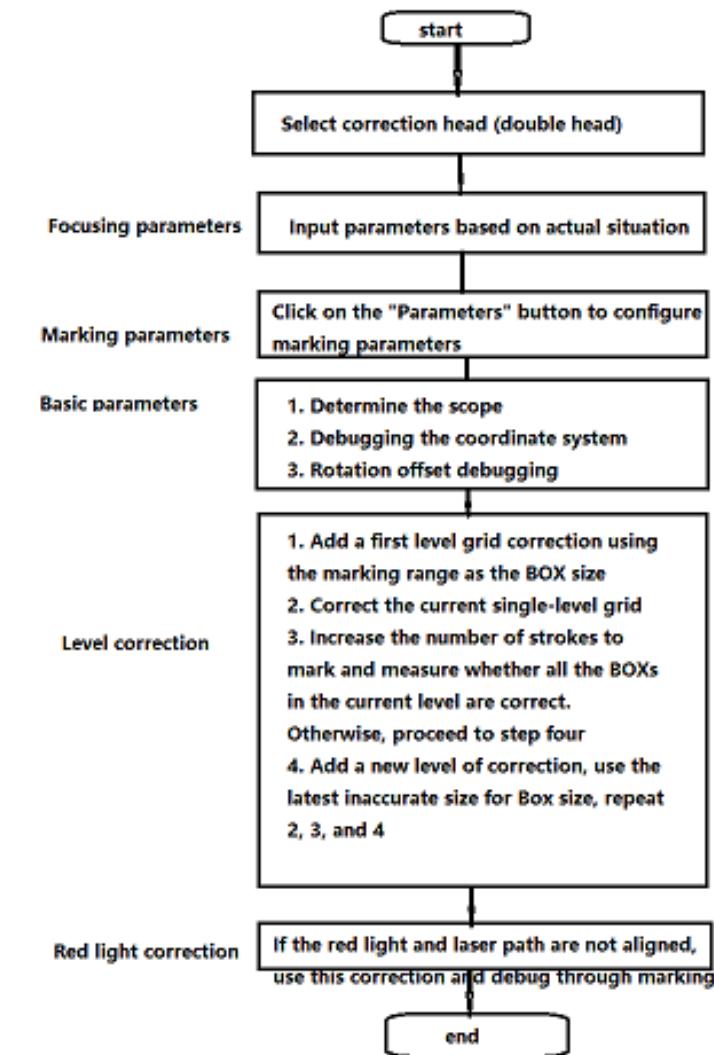
1, set the most basic parameters: calibration range, marking range, focusing mode.

2, adjust the coordinate system, so that marked graphics and input graphics match.

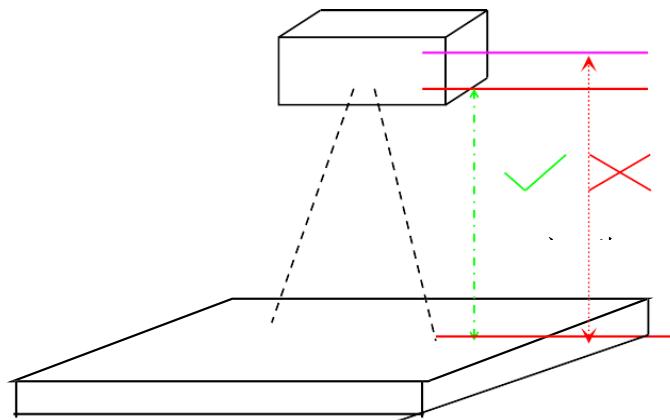
3, adjust deformation and offset, correct the size and deformation of marking graphics.

4. After laser calibration is completed, red light calibration is performed.

5, save exit. For a new uncalibrated machine, generally adopt the following operation process:



Note: For lasers with dynamic focusing, such as CO2 pre-focusing and 3D marking machines, be sure to adjust according to the following steps. Select the focusing mode as "front focus", and use the ruler to accurately measure the distance from the square head to the working surface, as shown in the green line in the figure below, remember that the line is not red.

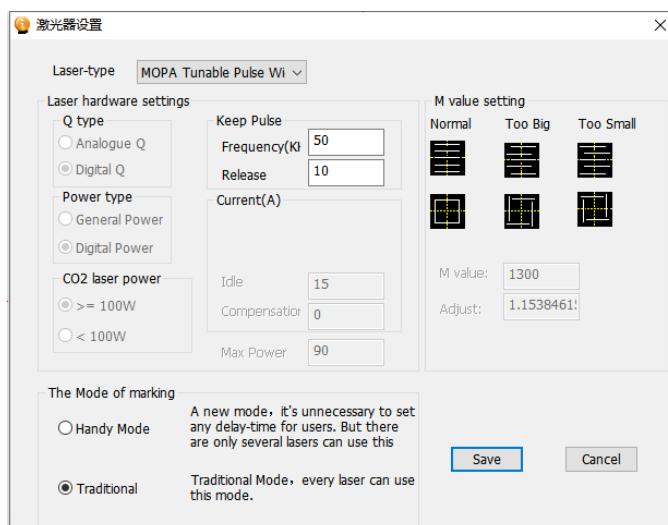


Fill in the measurement value in the "Distance between head and worktable" field.

Adjust the BOX calibration parameters for BOX calibration. When calibrating the BOX, only check the size and deformation of the BOX, regardless of whether it is off-focus. After BOX correction is OK, if the marking BOX graphics are out of focus, adjust the value of "AutoFocus ratio" and then mark until the focusing effect is satisfactory.

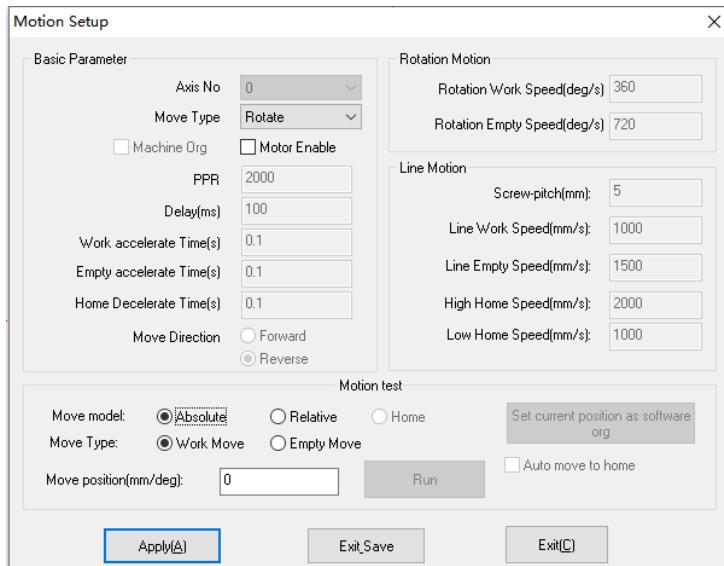
9.11 Laser Parameter

Laser parameter Settings, is a big change in the software, the user clicks the menu item, the following dialog box pops up.



The user selects the laser type from the drop-down box, and then modifies the parameters corresponding to different lasers. In addition, the user can also modify the M value in the dialog box. After modification, click "Save" to close the dialog box directly.

9.12 Setting Motion Parameters



[Basic Parameters] Set basic information about the motion.

Axis number: The serial number of the current set axis (note: the marking system temporarily supports only one axis).

Move type: Sets the type of axis, such as translation or rotation.

Machine Org: Check to determine whether the current axis is enabled.

Pulse per revolution: Set the number of pulses per revolution.

Delay: Set postmotion delay. The default value is 100ms.

Work accelerate time: The time required for the motor to accelerate from rest to working speed. The default value is 0.9s.

Empty accelerate time: The time required for the motor to accelerate from rest to empty load speed. The default value is 0.9s.

Home decelerate time: when the motor returns to zero, the time required to decelerate from the return to zero speed to zero. The default value is 0.1s.

Move direction: Set the motor rotation direction.

[Rotation motion] Sets rotational motion speed parameters.

Rotation work speed: The working speed of the rotating shaft. The default value is 360 degrees /s

Rotation empty speed: The empty speed of the axis of rotation. The default value is 720 degrees /s

[Linear motion] Set the linear motion speed.

Screw-pitch: screw spacing.

Line work speed: the movement speed of the translation shaft when it is working. The default value is 1000mm/s.

Line work speed: the speed of the translation shaft when it is not loaded. The default value is 1500mm/s.

High home speed: High speed during the translation axis return to zero. The default value is 2000mm/s.

Low home speed: Low speed during the translation axis return to zero. The default value is 1000mm/s.

[Motion test]

Test motion function and software positioning. Move model: Set the move model, such as absolute, relative, return machine zero, etc. Move type: Set the move type, such as empty move, work move, etc.

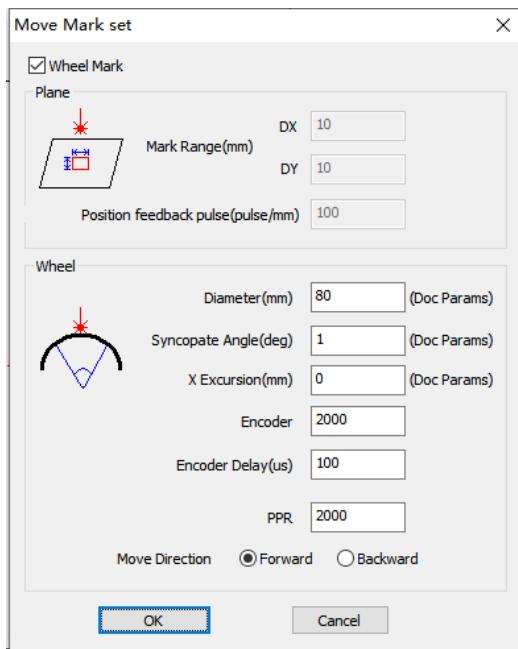
Move position: The value of motor movement. (Note: The system will determine the input unit of the amount of movement according to the type of the current shaft. For example, if the current axis is a translation axis, the system will consider the movement to be 3 mm, and if the current axis is a rotation axis, the system will consider the movement to be 3 degrees). Set the current position as the software origin: Set this position as the software origin of the system. This function can only be used after the machine returns to zero.

The steps are as follows: return the machine to zero point → Move to target position → Set the current location to the software origin. Software startup automatically return to software origin: After this option is selected, the system automatically returns to zero each time the marking software is opened.

[Note]: The mechanical return to zero function can only be used on devices with mechanical origin. If a device without this hardware blindly returns to zero, it may cause the device to keep moving and not respond for a long time.

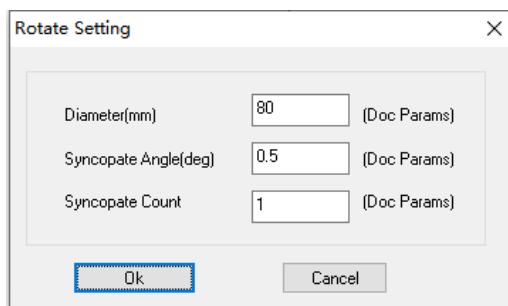
9.13 Setting Dynamic Marking

When the user clicks on the menu bar, the following dialog box pops up:



9.14 Setting Rotary Marking

Expand the menu and enter "Settings" ->"Rotate Marking Settings" in turn, the system will display the following dialog box:



Diameter: workpiece marking surface diameter, circular rotation marking are used.

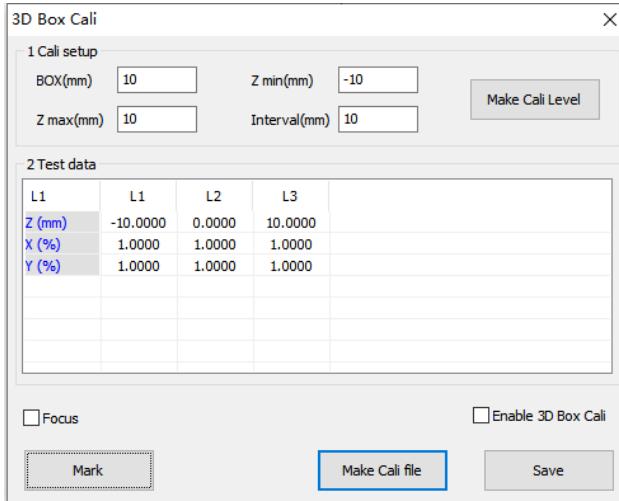
Syncopate Angle: When the contour cutting is equal Angle, the cutting Angle of each rotation of the motor. The smaller the Angle, the better the segmentation effect, but the slower the speed. It needs to be adjusted according

to the actual marking effect, and is used in the occasion of equal Angle contour and equal Angle comprehensive marking mode.

Syncopate Count: The number of filling lines marked at each turn of the workpiece, must be odd (1... 3.. 5.. 7.). is used in Equal Angle comprehensive marking method.

9.16 3D Box compensation

Click the 3D box compensation on the "Settings" menu bar, as shown below:



The dialog box shown in the figure above is displayed. Here are the meanings of each parameter:

1. Calibration setup
 - (1) Box (mm) : size of pre-marked Box;
 - (2) ZMin (mm) : 2-axis compensation minimum value, set the minimum value in the SystemSet.ini file to -10, users can customize the modification.
 - (3) ZMax (mm) : Z-axis compensation maximum value, set the minimum value in the SystemSet.ini file to 10, users can customize the modification.
 - (4) Internal (mm) : The interval of Z-axis compensation increments. The increment size of each compensation increment. Figure 5-347 Set the value to 10. You can set the value to an integer ranging from 2 to 100 based on site requirements.

(5) Make Calibration level: Click this button, you can generate the value of the Z-axis compensation between the minimum value and the maximum value. Figure 5-3-47 generates calibration levels from -10 to 10 in increments of 10.

2. Test Data

Users adjust the X and Y values of different levels to achieve the purpose of calibration. For example, for a -10 Box, if X or Y is too large or too small, you can adjust the size of X and Y until the size of the Box is appropriate.

3. (1) Focus

(2) Enable 3D Box calibration: This item must be checked during the calibration process to make the calibration effective. Otherwise it is invalid.

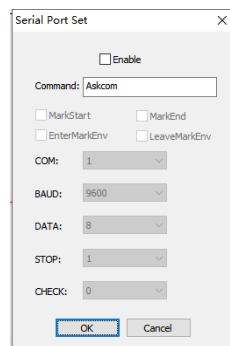
(3) Mark: Type a Box.

(4) Make Calibration fill: This function is prepared for multiple machines. After the user has adjusted all the current levels of X or Y, the calibration table can be generated and imported to the next machine, saving calibration time.

(5) Save: After the calibration table is generated, you need to click Save to save the data to the SystemSet.ini file.

9.17 Serial Port Output Settings

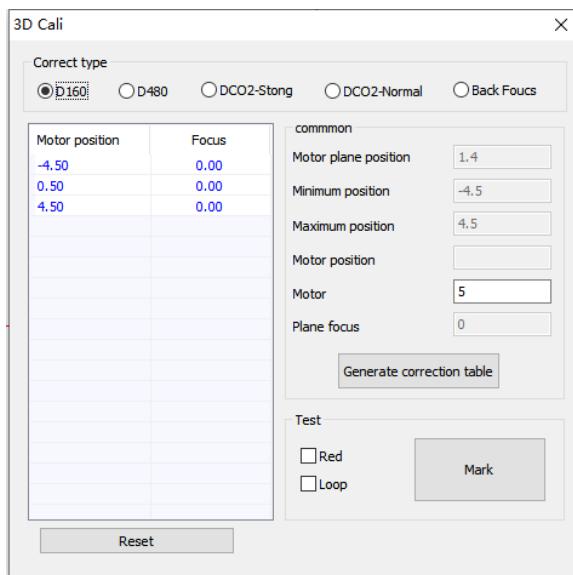
You can use this command to set the serial port, as shown in the following figure:



If you select Enable, you can output and print the start and end information when marking starts or ends.

9.18 3D Correction Settings

Users can use this command to set 3D correction. The 3D correction dialog box is shown in the figure



- Purpose: Due to the different height of the object, the focal length of the high and low parts of the object is different when marking, which cannot achieve the ideal effect. Therefore, it is necessary to adjust the method to achieve the ideal effect even if the height of the object is inconsistent.
- Principle: Through the Z axis of the galvanometer scanner to achieve this function. When the Z-axis deviates from a certain Angle, it corresponds to the change of focal length, so that the correction of focal length can be realized.

3, correction type: there are front focus mode and back focus mode.

- Front focus mode: D160, D480, DC02-Stong, DC02-Normal.
- Back focus mode: Back focus 3D.

The advantages and disadvantages of the front focus mode and the back focus mode are introduced:

- Front focus mode

Advantages: Increased scanning area, is an excellent solution for large format high-speed scanning, fast, much faster than the traditional way.

Disadvantages: The price is high and the control software is more complex.

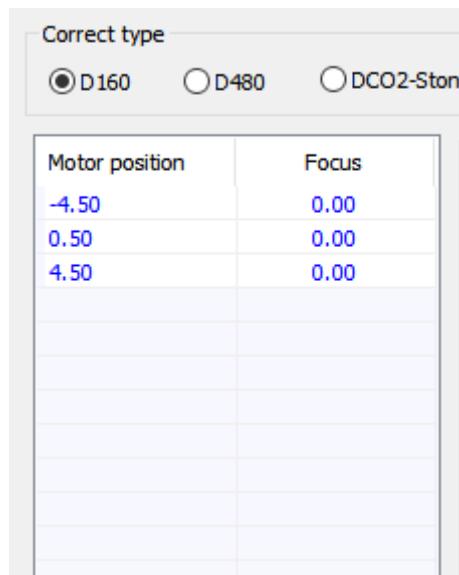
(2) Back focus mode

Advantages: Simple control software, fast speed, low cost.

Disadvantages: The scanning area is greatly affected by the galvanometer scanner, which is easy to produce distortion. According to the usual use habits and from the perspective of cost, we generally use the back focus mode.

4. Motor position and current focal length

We can adjust the focal length of the current laser according to the position of the current motor. Then fill in it, and finally generate a correction table. Then according to the motor plane position, to adjust the different positions of the motor corresponding to different focal lengths.



The screenshot shows a software window titled "Correct type". At the top, there are three radio buttons: "D160" (selected), "D480", and "DCO2-Stong". Below this is a table with two columns: "Motor position" and "Focus". The table contains four rows of data:

Motor position	Focus
-4.50	0.00
0.50	0.00
4.50	0.00

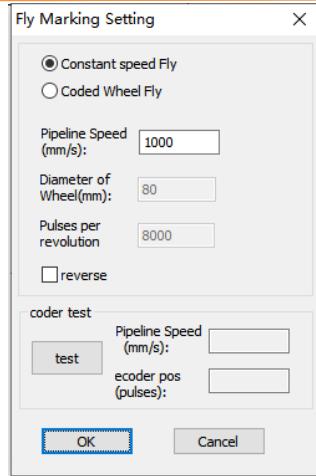
As shown in the figure: the sliding range of our motor is -4.50~4.50, and the reference point of the motor is 1.4.

5. Import and export correction files

Our 3D Cali supports importing and exporting correction files, a feature that increases the reusable lines of the software. If you encounter the same problem the next time, you do not need to reset the correction, you can directly import the previous correction file.

9.19 Fly Parameter Settings

The fly marking parameter interface is shown as follows:



1. The fly marking mode in this software is divided into two types: constant speed fly and coded wheel fly.

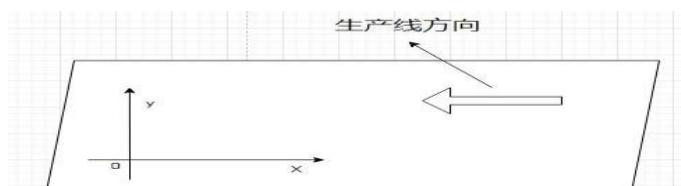
Constant speed fly: As the name implies, the line maintains a constant speed during the marking process. This method does not require starting the coded wheel. The user can change the pipeline constant speed in the edit box to fit the current laser marking.

Coded wheel fly: The user needs to switch to coded wheel speed measurement fly mode. When the user is not clear about the running speed of the current production line, the speed can be measured in this way.

The specific method is: the user needs to know the diameter of the coded wheel (d), and the current number of pulses per revolution of the coded wheel (the number of pulses per revolution is also called frequency f).

The circumference of the coded wheel: $L=nd$; Cycle per revolution of the coded wheel : $T=1/f$; Speed of coded wheel: $v=s/t=L/T$; Finally, you only need to control the marking card and mark it once after time T .

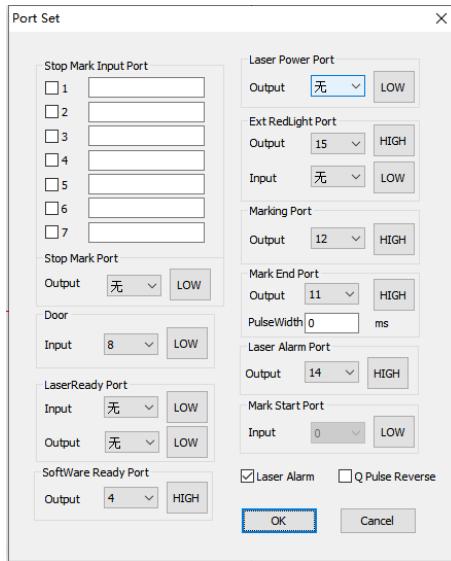
2. Pipeline reversal: The user needs to determine whether the direction of the production line is "left to right" or "right to left". The customer needs to establish the coordinate system first, as shown in Figure 5-3-42. In the following cases, the direction of the pipeline is opposite to the coordinate system (X to the right, Y to the left), then the pipeline reverse (from right to left) operation needs to be checked.



If the speed of the current pipeline is not uniform, it can be tested using the encoder test function. The user can click the "Start" button directly, and the pipeline speed and encoder position can be displayed in the edit box in real time.

9.20 Port Settings

1, the software supports port setting options, the purpose of port setting is: can change the output signal of the port, in order to achieve the role of external instructions. The port setup dialog box is shown below:



2. The port Settings dialog box contains a variety of port signal Settings, such as:

Stop Mark Input Port,

Stop Mark Port,

Door,

Laser Ready Port,

Software Ready Port,

Laser Power Port,

External Red Light Port,

Marking Port,

Mark End Port,

Laser Alarm Port,

Mark Start Port,

Laser Alarm,

Q Pulse Reversal.

The following is a detailed explanation of the meaning.

(1) Stop Mark Input Port: Select one or several of ports 1 to 7. During processing, the control software externally transmits a high level to this or these ports, triggering a stop processing signal. Information can be entered in the edit box and printed to indicate the port that triggered the high level signal, stopping the processing.

(2) Stop Mark Port: When the software stops processing, it outputs a signal to the outside. You can choose to output a low level signal or a high level signal to inform the user that the processing has stopped, and the user can use it to deal with other problems.

(3) Door: The user specifies a port, and the safety door signal is connected to this port. When the user opens the safety door, the processing is automatically stopped. Only when the safety door is closed can it be processed. Used to protect operators from laser burns.

(4) Laser Ready Port:

① Input port: The user can specify a port on the marking card to send a low or high level signal to the laser to detect whether the laser is ready.

② Output port: When the laser receives the level signal, it detects its own internal state. After the detection is completed, a high level or low level signal is sent back to the marking card, and the marking card processes the signal.

(5) Software Ready Port: The software opens the marking dialog box to inform the marking card that the software is ready to start processing.

(6) Laser Power Port: The user can specify a port as the laser power signal output, through the port to send a low level or high level signal to the laser, control the power supply of the laser.

(7) External Red Light Port: The user can specify a port, using the port to send high or low levels, control the switch of red light.

(8) Marking Port: The user can specify a port, using the port to send high or low levels. When the software is in the marking process, the user can output a high level or low level signal through the port to output status information. When marking does not start or ends, the port will not function.

(9) Mark End Port: The user can specify a high level or low level signal output after the marking end. Indicates that the marking has finished and can proceed to the next step.

(10) Laser Alarm Port: The user can specify a high level or low level signal output after the end of the marking to indicate the alarm of the fiber laser. In general, if the port is high, it means that the laser alarm, and vice versa.

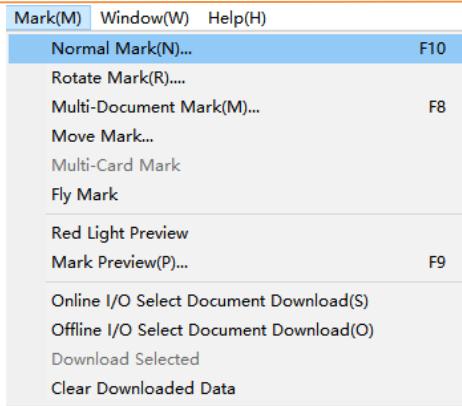
(11) Mark Start Port: The opposite of the Mark End Port. Indicates to start marking and outputs a high level.

(12) Laser Alarm: Check this item, the laser can detect the alarm signal. If this item is not selected, the laser does not detect alarm signals. Generally, the default is to check the item so that the laser can detect the alarm signal.

(13) Q Pulse Reversal: Some lasers are light when receiving a low level signal, and some lasers are light when receiving a high level signal. So we can give a high or low level depending on the type of laser.

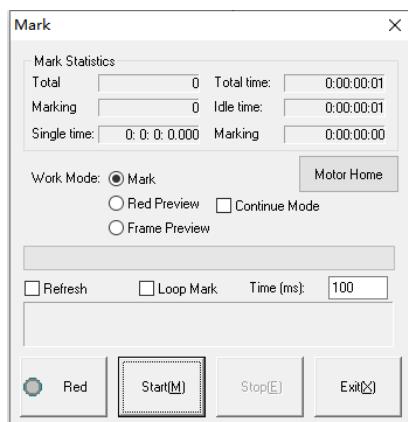
Chapter 10 Marking menu

The software supports a variety of marking methods, including Normal Mark, Move Mark, Rotate Mark and other commonly used marking, as described below. The marking menu bar is shown in the figure:



10-1 Normal mark

This command initializes the marking machine and the system enters the normal marking state (as shown in the figure).



10-1.1 Marking

Select Mark and click Start to start the marking process. The progress bar dynamically displays the current marking data transfer status. At the same time, the Mark button changes to Pause.

During the marking process, "pause" and "Stop" operations can be carried out. After pause, the galvanometer scanner will stop at the paused position. If you click "Start" again, the galvanometer scanner will continue to start at the paused position. After stop the operation, the galvanometer scanner stops in the center position, and if you click "Start" again, the galvanometer scanner restarts from the initial position.

The "Select" marking is available below the layer.

Note: If the icon  appears on the button during the marking process, it means that the laser is currently coming out. Because the laser is invisible, please pay attention to your own safety.

10-1.2 Red Light preview

For the marking machine with infrared indication, before laser marking, you can watch the entire marking process through the red light preview function. Select the red preview, click the button "Start", you can watch the whole marking process, the process bar will dynamically display the current marking completion. At the same time, the Mark button changes to Pause.

10-1.3 Frame preview

For the marking machine with infrared indication, before laser marking, the marking area can be previewed through the frame preview function; The frame preview speed can be set through the frame preview speed in Hardware configuration in System Settings. Select the frame preview and click the "Start" button to preview the marked area.

10-1.4 Loop mark

When selected, the objects in the marking task are always marked or continuously marked. Click "Stop" when you need to stop or remove the selection of "Loop mark".

10-1.5 Time

In loop mark, the delay between the completion of each marking and the start.

10-1.6 Mark statistics

In the marking process, the system automatically statistics the marking situation, such as the total of marking, marking number, single time, total time, idle time, marking time.

10-1.7 Refreshing the page

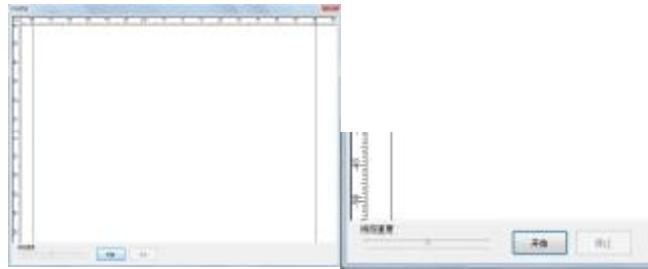
When you select this item, the objects on the screen change in real time with the serial setup number marking, but it will affect the computing efficiency of the computer.

10-1.8 Motor reset

If motion control is enabled, use this button to force the work to reset to the origin position.

10-2 Marking preview

This command is used to preview the marking sequence of the marking machine (as shown in the figure).



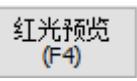
When the progress bar of preview speed is pulled to the rightmost end, the preview speed is the highest. If you pull to the leftmost end, the preview speed is the slowest. The user can use the mouse wheel to continuously scale the preview object, or drag the object by the mouse.

Shortcut toolbar button: Shortcut key operation: F9

10-3 Red Light preview

This function is mainly to accurately position the marked object, and the object needs to be selected. The user only needs to click the red light preview

button in the processing dialog box. As shown in the figure:

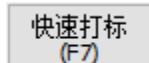


10-4 Quick marking

This function is mainly to realize the quick marking of the object, and the marking object is the selected object.

Users simply click the quick marking button in the processing dialog box

to quickly mark. As shown below:



10-5 Multi-document mark

This chapter describes the multi-document mark of Han's Laser Marking Control Software V4.0 software

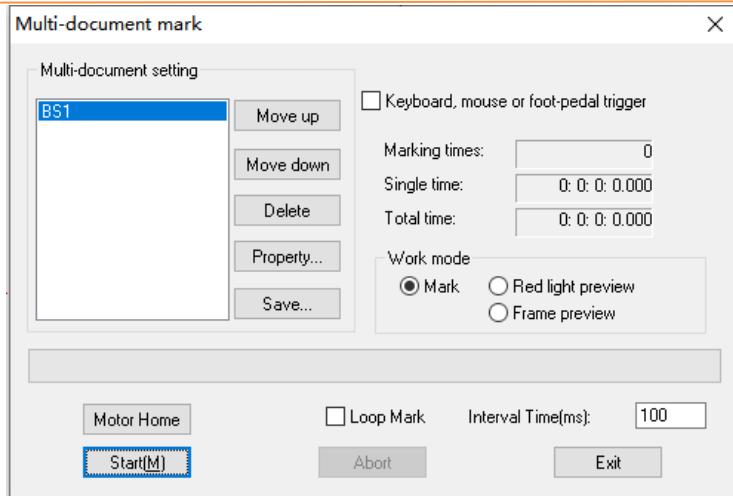
10-5.1 Overview of Multi-document mark

The normal workbench is: after one marking, the workbench moves a certain distance (or rotates at a certain Angle), and then moves (or rotates) after another marking, and so on. The table does not involve the characteristics of two-axis interpolation, moving segment, marking continuous pattern, etc. As long as the workbench meets the above requirements, it can be directly controlled by the multi-document mark method. In the software, the user can open multiple documents (or for the same marking pattern, or for different marking patterns), and can set the workbench movement after the marking is completed for each document. The software calls out each document for marking in turn according to the situation set by the user, and controls the workbench to perform actions according to the requirements after each document is marked. When multiple documents need to be marked continuously, you can call this function to automatically process them.

10-5.2 Multi-document mark

Operation method

1. The pattern that needs to be marked in turn can be mapped by creating a new document or opening a document in turn.
2. Click the menu "Mark", "Multi-document mark", the following multi-document mark dialog box appears.



在对话框左上角的列表框中依次列出了当前打开的所有文档，排列顺序即为打标顺序。

根据需要 可以通过单击“上移”、“下移”按钮改变打标顺序。单击“删除”按钮可从列表框中删除当前选中的文档（但并不删除文档实体）。

【键盘、鼠标或脚踏开关触发】 选中此项，则每打完一个文档，需手动或脚踏触发下一文档打标。 否则，自动依次打标。

【打标个数】 指当前打标完成的文档个数。

【单个时间】 指打标一个文档所需的时间。

【整体时间】 指自动或手动打标多文档整个流程所需的时间。

【工作模式】 选择不同的工作方式。

In the list box at the upper left corner of the dialog box, all the documents currently open are listed in sequence. The order is the marking order.

You can change the marking sequence by clicking "Move up" or "Move down" as required. Click the Delete button to remove the currently selected document (but not the document entity) from the list box.

[Keyboard, mouse or foot-pedal trigger] If this item is selected, you need to manually or foot trigger the next document marking after each completed document. Otherwise, automatically mark in turn.

[Marking number] refers to the number of documents currently marked.

[Single time] refers to the time required to mark a document.

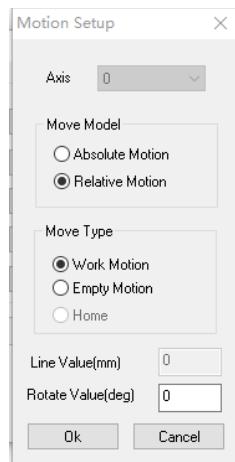
[Total time] refers to the time required for the entire process when multiple documents are marked automatically or manually.

[Work mode] Select different work modes.

Note: Marking begins with the currently selected document, that is, from the document displayed in white in the list box.

3. Property

Used to set the movement parameters of the workbench after each document is marked.



Move Model:

Choose relative motion or absolute motion, relative motion is easy to control, but may produce cumulative errors.

Move Type: Select different types of move, the working speed will be different. Move Value: The unit of move is mm for linear movement, and the unit of move is degree for rotational movement.

4. Save:

Save all the parameters of the multi-document mark (including the document and its properties, order, etc.) and open it again. The file extension name is mul.

Note: If there is an error message when saving, it is because the mark document is not saved separately. Please exit the multi-document mark state and save each document in sequence before saving multiple documents.

5. Open a multi-document file

In the case that there is currently no open document, click the menu "File", "Open multiple documents...", you can open a *.mul multi-document file.

10-5.3 Application Instances

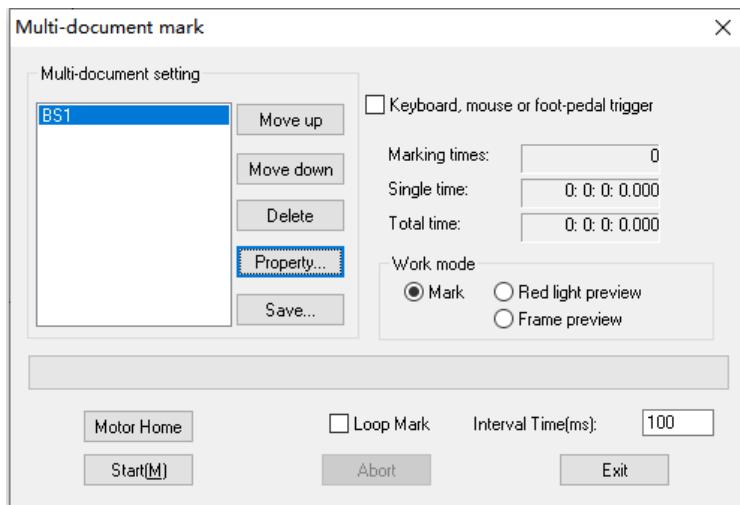
Example 1: Arc marking

When marking on the larger arc surface, the marking content can be divided into several pieces to make multiple documents. Then using this function, each time a pattern is finished, the motor rotates at a certain Angle, and continuous marking is achieved in this method. Such as carving drill symbols.

Example 2. Large format marking

When you need to make a larger range of patterns, you can divide the marking content into several pieces to make multiple documents. Then using this function, each time a pattern is finished, the motor moves a certain distance, so as to carry out continuous marking. Such as carving keyboard.

10-6 Online Document IO mark



In the list box at the upper left corner of the dialog box, all the documents currently open are listed in order, which is the marking order. You can change the marking sequence by clicking "Move up" or "Move down" as required. Click the Delete button to remove the currently selected document (but not the document entity) from the list box.

[Signal source] Mainly sets the sequence of the signal of the external IO port and the trigger signal of the touch, and the default is generally the document signal is issued after the trigger of the touch.

【 Adjust 】 Mark the currently selected document. When you click this option in the current IO signal state, the software automatically reads the status of the IO signal. When the signal state does not match the signal state in the property, the software does not mark. Only when the two are the same can the software recognize and mark them. Marking information can refer to the [marking document] prompt, as shown in the figure:

Mismatch case: 打标文档: 没有找到信号匹配的文档

Match: 打标文档: HS1

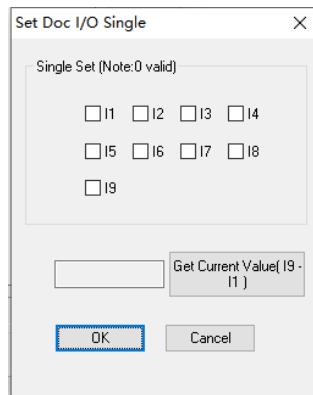
[Marking number] refers to the number of documents currently marked.

[Single time] refers to the time required to mark a document.

[Total time] refers to the time required for the entire process when multiple documents are marked automatically or manually.

[Working mode] Select different working modes.

[Property]



To set the document signal, you can click [get current value] to get the document signal status. Users can also set the signal value by themselves, click OK and exit.

[Save] Save all parameter information of this multi-document marking (including documents and properties, order, etc.), and you can open it again. The file extension is mul.

10-7 Offline Document I/O mark

This chapter introduces the off-line Marking operation process of Han's Laser Marking Control Software V4.0.

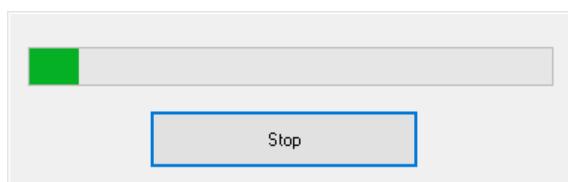
10-7.1 Overview of offline marking

Off-line marking: that is, cut off the connection with the host computer, the marking control card directly controls the marking, the marking content and parameters are stored in the marking control card. If you need to modify the marking content or parameters, you need to connect the computer, modify it in the computer, and then download it again.

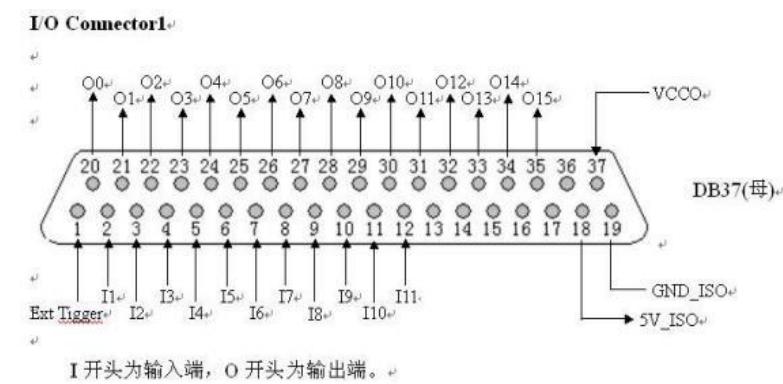
Offline marking is applicable in: When connecting the computer, the marking effect is adjusted well. Marking graphics and marking parameters do not need to be modified frequently, there is an external trigger signal.

10-7.2 Marking a single document offline

- 1) Connect the computer and adjust the marking effect well;
- 2) Select the object to be marked;
- 3) Click the Download tool button  , or click the "offline download" button in the lower right corner, or directly press "F11";
- 4) During the download process, the progress bar is displayed, and the operation can be stopped during the download process;



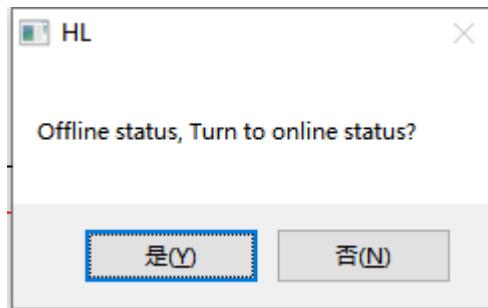
- 5) After downloading, you can use the touch signal on the marking control card to control the marking;



2. I/O Connector1 信号输入接口 (经光偶隔离进入系统)

脚位	方向	功能描述	说明
1	IN	INPUT0	脚踏标准 IO 输入 (下降沿触发)
2	IN	INPUT1	标准 IO 输入 (脱机时低电平终止打标)
3	IN	INPUT2	标准 IO 输入 (定制可用)
4	IN	INPUT3	标准 IO 输入 (定制可用)

-
- 6) If you start the download function again during the offline process, the following prompt dialog box will pop up;

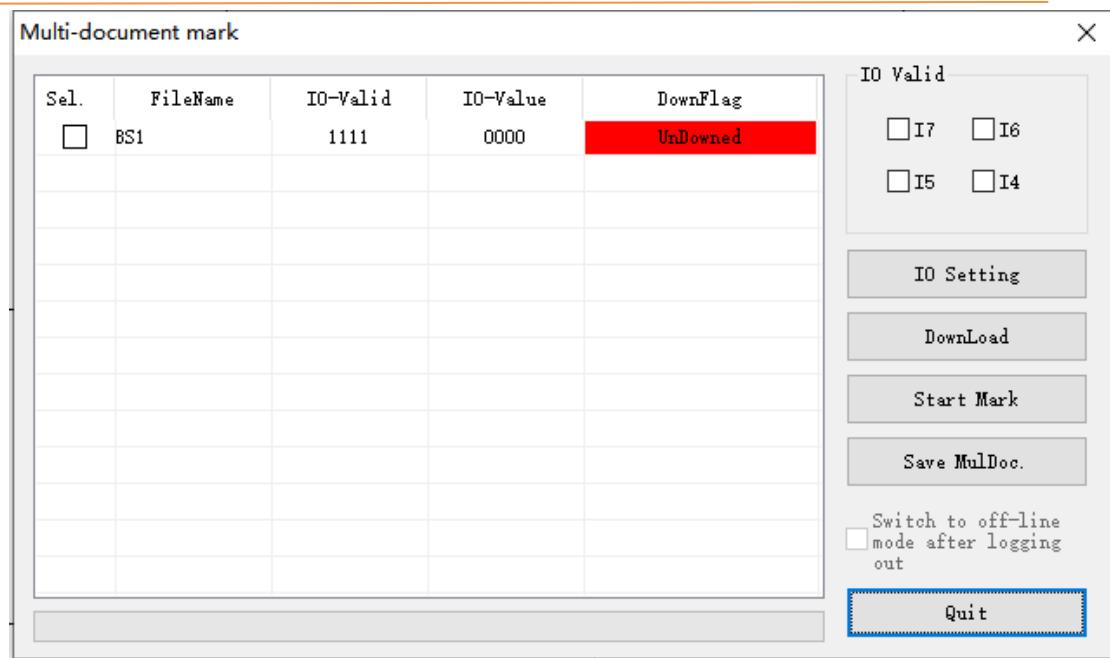


- 7) After offline download, you can unplug the USB communication cable, and the title bar in the upper left corner of the marking software will display "EMCC card has been disconnected";

- 8) During the offline process, reconnect the USB(" EMCC card is connected "will be displayed in the title bar of the upper left corner of the marking software), and then trigger the touch, the marking card will not send a marking signal. At this time, offline marking cannot be performed, you need to re-download, or unplug the USB cable and restart the marking control card.

10-7.3 Offline marking of external signal Select documents

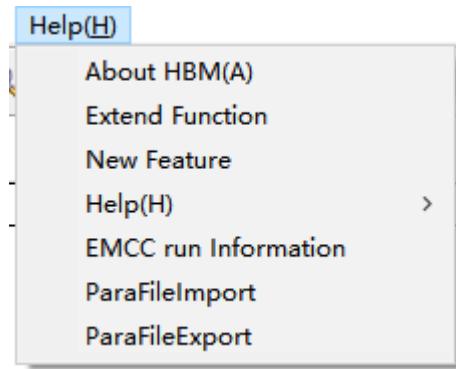
- 1) When connecting the computer, adjust the marking effect and position of each document respectively;
- 2) Click the Download tool button in the menu bar, and the multi-document download management window will pop up:



- 3) Set I/O signals for each document, and then download, as shown in the figure above.
 - 4) When all document download signs are displayed as "downloaded", select "Switch to offline mode when exiting", and then exit to automatically switch to multi-document offline mode.

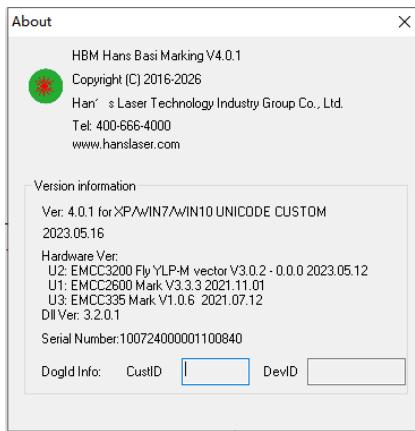
Chapter 11 Help Menu Bar

Users can click on the help menu bar to view information about the software, as shown below:



The menu bar includes about, software extension function information and other functions.

The "About" dialog box is shown in the figure, from which the user can know the version information of the software, dongle information, etc.



Software extension function information, this function mainly describes the functions supported by the current dongle, as follows:

Extend Function Information		
Card ID: <input type="text" value="16B00502"/>		Rename
Alias: <input type="text" value="16B00502"/>		
Function No	Function	Activation
0	Bitmap Mark	Enable
1	Motion	Enable
2	Precision Calibrate	Enable
3	Multi-Card	Enable
4	3D Mark	Enable
5	Large format power correction software	Disable
6	HE	Enable
7	Secondary development interface library	Enable

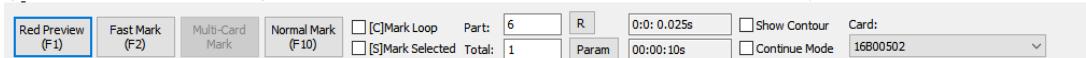
Save & Exit(C)

The functions of the dongle can be opened are gray bitmap mark, motion control, rotary marking, precision calibrate, 3D marking, large format power correction software, secondary development interface library and other modules. In addition, the user can also modify the alias of the marking card, click the Modify button, the following dialog box will pop up:



Chapter 12 Processing dialog

The processing dialog box is located in the area directly below the software:



This dialog box helps users quickly perform marking operations. Let's take a look at each one:

Red light preview: indicates the border of the graphics to be processed, but not the laser, which is used to indicate the processing area to facilitate the user's positioning of the workpiece. This function is used for marking machines with red light. This feature can also be used with the red light display profile in conjunction with the red light continuous mode.

Fast marking: Starts marking the selected graph.

Mark Loop: indicates that the current file is continuously processed and the current file is cyclically processed.

Mark Selected: Only the selected object is processed.

Part: Record the total number of machining.

Total: The number of times a process. Same as the number of marks.

Parameters: Quickly set the parameters related to the processing, which have been stated in the previous paragraph, and are no longer stated here.

Show Contour: When the user checks this item, together with the red light preview, the entire outline of the graph can be displayed.

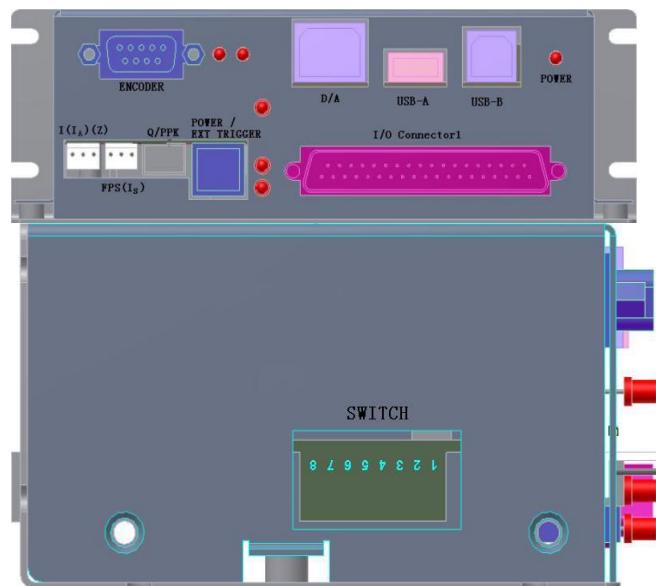
Red light continuous mode: When the user is in the process of red light preview, and then suddenly click the "quick marking" button, if the item is not checked, the red light preview will stop after the end

of the marking. If this item is checked, the red light preview function can continue when the marking is finished.

Chapter 13 Hardware Settings

13-1 EMCC Jumper Settings

The 3D model view of the marking card is shown as follows:



SWITCH Dip switch definition:

(1) For Switch 1
 (2) 1=ON, suitable for low level light locking Q drive, such as Gooch Q drive (default). For SPI lasers, IPG lasers, CO2 lasers, this dip switch should also be set to ON;

(3) 1=OFF, suitable for high level light locking Q drive, such as AAQ drive, homemade Q drive.

(4) Switch 2

(5) Switch 3, 4, 5 combination

switch3	switch4	switch5	I (IA) (Z)	Output voltage	application
OFF	OFF	OFF	GND_AN, Vs+	0~10V	SPI Laser Power amplifier active-state current set point

ON	OFF	ON	Vs-, Vs+	0~3V	Analog input for power of Laser fast response
	ON	ON	V		

(6) Switch 6

switch 6	FPS(IS)	Output voltage	Application
OFF	GND_AN, Vs+	0~5V	analog input port for Q driver
ON	GND_AN, Vs+	0~10V	SPI laser Power amplifier simmer current set point)

(7) Switch 7

7 = OFF (default)

7 = ON for the application of front focus and need Z axis

(8) Switch 8

Temporarily unused

13-2 Q Drive Settings

2, Q drive Settings (GOOCHQ drive)

Code switch definition:

	1	2	3	4
ON	Q pulse signal low effective, lock light, such as Gooch Q drive		Control mode selection	

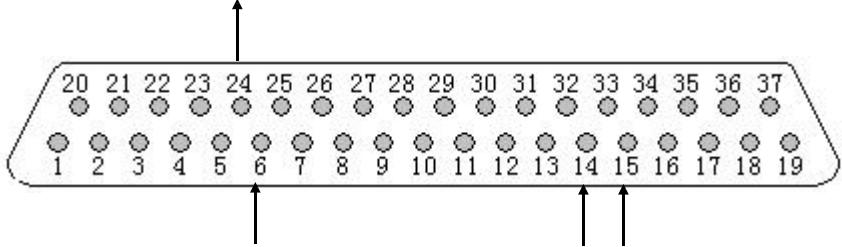
OFF	Q pulse signal high level effective, light lock, such as AAQ drive, self-made Q drive	default	
Control mode	3	4	
FPS	ON	OFF	
A05	OFF	ON	

Explanation of control mode:

1. FPS: digital pulse signal control (pulse signal needs >10us), the output result is the "or operation" of two signals, which shows that the first pulse compression and Q modulation are carried out simultaneously;
2. PPK: digital pulse signal control (pulse signal needs >10us), the output result is the "and operation" of the two signals, which is manifested as pulse compression first and then Q adjustment;
3. R05: The first pulse of analog signal compression, the first pulse compression signal and the Q-switching signal are simultaneously output, the "OR operation" of the two signals;
4. A05: The first pulse of the analog signal compression, the first pulse compression signal and the Q-switching signal are simultaneously output, the "and operation" of the two signals;
5. Normal select mode: digital mode choose PPK, analog mode choose R05.

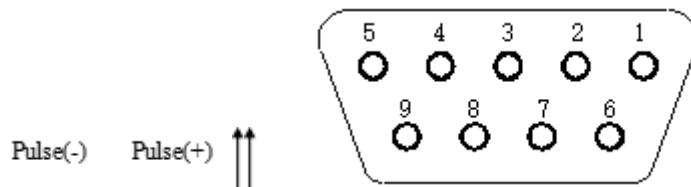
13-3 EMCC card connects to the motor driver

EMCC 卡 I/O Connector



Pin	direction	Function	Description
21	OUT	01	Lifting platform or motor direction output
11	IN	I10	INPUT10 Upper limit
12	IN	I11	INPUT11 Lower limit
3	IN	I2	Zero

EMCC DB9 port



Pin 8 -- Negative end of the output pulse

Pin 9 -- positive end of the output pulse