

The user manual

1 Introduction

1.1 The statement

Welcome to ScanWorldV2.1 system, which is a marking control software based on vector graphics with extended word processing, accurate drawing and exquisite marking. This version mainly realizes PLT vector graph import and fill, text input, text jump, etc., details please see the manual. This version of the software supports Windows7 and is compatible with Windows XP, enabling the software to run in a more stable and reliable environment and increasing the reliability of software operation. The operation of ScanWorldV1.0 control software requires corresponding hardware support.

1.2 About registered trademarks and trademarks

Company names and product names recorded in this manual are registered trademarks or trademarks of each company.

2 Manual Composition

Chapter 1 Overview

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

Chapter 2 Preparation before operation

Explains IP configuration, marking software installation and interface

Chapter 3 Drawing Instructions

Explains graphic creation and graphic editing of marking software

Chapter 4 Marking Control

Explain the marking mode and related parameters of the software

Chapter 5 Parameter Setting

The laser and motion control parameters in the marking software are introduced.

Chapter 6 Calibration Configuration

Introduce 2D manual calibration and calibration parameters

Chapter 7 3D operation

Introduces the operations related to 3D mapping and model.

Chapter 8 Network Configuration

Content

1 Foreword	I
1.1 Statement.....	I
1.2 About registered trademarks and trademarks	I
2 Manual Composition.	II
Chapter 1 Overview.....	6
1.1 ScanWorldV1.0 Function	6
1.1.1 The relationship between marking software and computer.....	7
1.1.2 The relationship between the marking software and the whole marking machine.....	7
1.2 IntroductiontoLaserMarking.....	8
1.2.1 Features of Laser Marking	8
1.2.2 Classification of Laser Marking.....	9
Chapter 2 Software Installation and Interface Description	10
2.1 IP Configuration	10
2.2 Software installation requirements	10
2.2.1 Installation Environment Requirements	10
2.2.2 Installation Precautions.....	11
2.3 Software installation process	11
2.3.1 Software installation process	11
2.4Software inter face introduction.....	14
2.5 Menu and Toolbar	15

2.5.1 Title bar.....	15
2.5.2 Menu bar	16
Chapter 3 Graphic Editing.....	32
3-1 Graphic Creation	32
3-2 Vector Fill Settings	59
Chapter 4 Document Marking.....	79
4.1 Marking	79
4.1.1 Software Operation.....	79
4.2 Marking Preview.....	83
4.3 Multi-document marking	84
4.4 On-the-fly marking.....	86
4.5 Multi-card marking	90
4.6 Signal marking	91
4.7 Offline marking	95
Chapter 5 System Settings	99
5.1 Lasers.....	100
5.2 Marking parameters	101
5.3 Visual Settings	111
Chapter 6 Calibration Settings	116
6.1 2D square box correction.....	116
6.2 3D Correction	121
Chapter 7 3D Operations.....	128

7.1 3D texture related operations	128
7.2 Marking test	134
7.3 Introduction of other functions of 3D interface	134
7.4 Layered marking	134
Chapter	8
Network	8
Configuration	136

Chapter 1 Overview

1.1 ScanWorldV1.0 Function

ScanWorldV1.0 provides the following functions:

- 1、 Free to design the graphics and patterns to be processed.
- 2、 Support TrueType font, single line font (SHX), dot matrix font (DMF), one-dimensional bar code and two dimensional bar code.
- 3、 Powerful graphics editing function, you can draw the required graphics according to the actual situation.
- 4, support multi-graph layer editing, can set different processing parameters for different objects.

Compatible with common image formats (BMP, JPG, GIF, TGA, PNG, TIF, etc.).

6, Compatible with common vector graphics (PLT, DXF, AI, etc.).

7, Support user rights function, different users can use different functions of the software.

8, Powerful filling function, support linear filling, bias filling, spiral filling, inside and outside filling.

9, Avariety of control objects, users can freely control the system and external devices interaction.

10, Directly support IPG fiber laser, IPG CO2 fiber laser, IPG YAG laser and end pump laser.

11, Open multi-language support function, currently support Chinese and English two common languages.

12, Support visual marking mode, the interface can display the camera shooting objects in real time.

13, Support 3d marking mode, can be marked on uneven objects.

1.1.1 Relationship between marking software and computer

It is no exaggeration to say: "If there is no computer, there can be no laser marking machine".

The computer is responsible for editing and making the marking file (including image collection after the user is equipped with image scanner and other image acquisition equipment), controlling the movement of galvanometer to scan the content of the marking file on the surface of the workpiece by laser, controlling the modulation frequency of acousti-optic Q switch, controlling the marking speed and so on.

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 function of the special interface board for computer marking is to convert the digital signal sent by the computer into analog signal or directly send out the digital signal of the computer, drive the X axis and Y axis two galvanometer, so that the laser beam moves in space. The synchronous Q switch modulation signal is generated, and the pulse laser is sent out, so that the graphic content to be marked can be accurately and completely etched on the surface of the processed object. In the computer control system, the core part is marking control software. At present, there are many laser marking machine manufacturers in the world, the production of marking machine is a variety of. If you look closely, you will find: their hardware composition is much the same, the key is the marking software is different. Marking software is the technical core of the marking machine manufacturers, is the key to all kinds of marking machine, it determines the function of the marking machine (performance?).

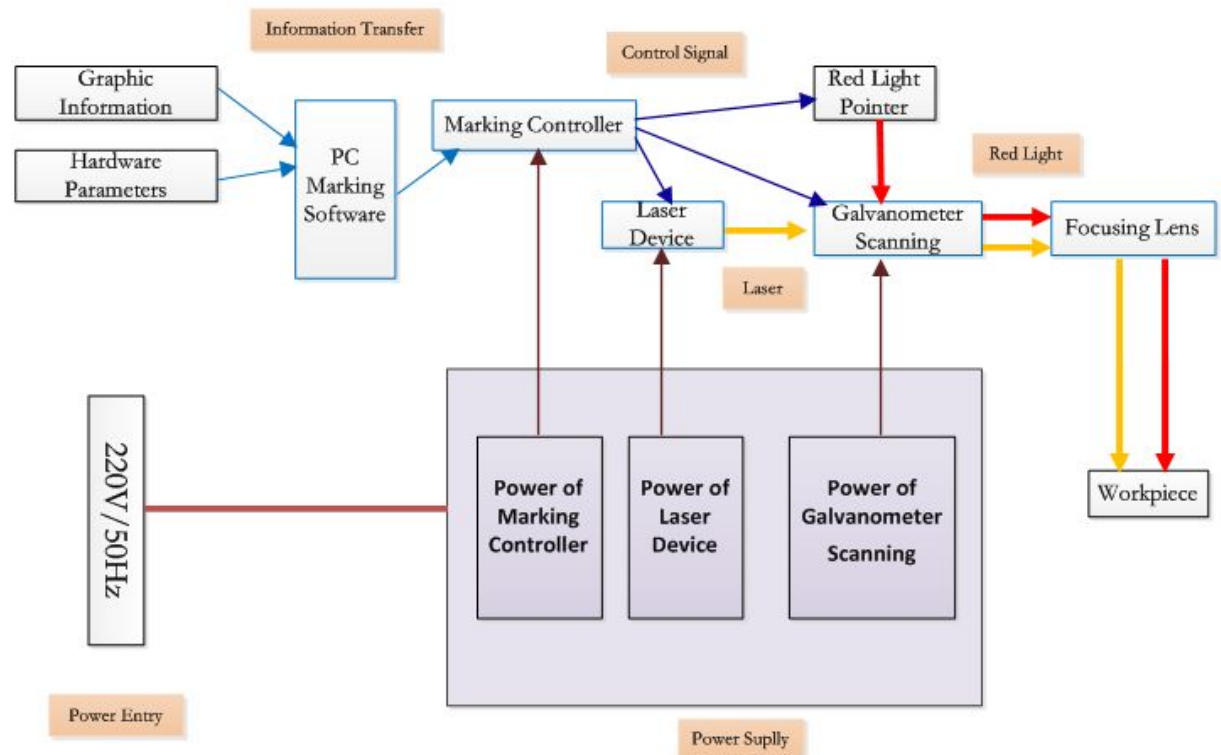


Figure 1. Marker system operation diagram

1.2 Introduction to laser marking

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

1.2.1 Characteristics of laser marking

According to different processing materials choose different lasers and their power size or power density, the vast majority of metal or non-metal materials can be 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 the atmosphere or in a protective atmosphere; Does not produce X - ray, will not be affected by electric and magnetic field interference. Can pass through the transparent material to its internal zero part processing; Material consumption is minimal; No thermal deformation; The inner surface or inclined surface can be machined through a prism or mirror.

The operation is simple, the use of microcomputer NUMERICAL control technology can realize automatic processing, can be used in the production line of parts for high speed, high efficiency processing; Good processing quality, the use of precision table can be fine processing.

In addition, it has the following unique advantages:

- 1、 Can mark bar code, serial number characters, graphics, images, etc.
- 2、 It will not disappear naturally due to environmental relations (such as humidity, acid and alkaline atmosphere), but will remain permanently and will not be easily counterfeited.
- 3、 Mark quality is good -- belongs to non-contact processing, does not damage the product.
- 4、 High efficiency -- can easily use the computer for automatic control, automation;No downtime rest or heating curing;Can mark one or a group of characters and patterns at a time;Several parts can even be marked at the same time.
- 5、 Low processing cost - although the one-time investment of equipment is higher, but through continuous, a large number of processing, can eventually make each part cost is very low, so as to create high efficiency. Due to the advantages mentioned above, it is highly counterfeited.

8

In particular, color markers can have different shades of color.General metal material marking, because of the ablation of the line depth and thickness is different, and the color and reflective rate is not the same as the original, resulting in contrast effect;Contrast and matt effect for glass and plastic materials.

1.2.2 Classification of laser markers

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

Mask mode marking method: the whole system is not required to make a marking device can be added, can reduce the cost;High processing efficiency, a pulse can mark a group of characters, bar code or record, the fastest processing of more than one thousand parts (semi-finished products or products, packaging bags) (up to 30 seconds/s) the slowest also up to 3 seconds /.The disadvantage is that the mask needs to be made (one for each part), and the characters or patterns on the mask cannot be changed immediately with the product changes (that is, the flexibility is poor).

Dot matrix marking method: generally, it is a 7×5 matrix with 7 vertical strokes and 5 horizontal strokes.

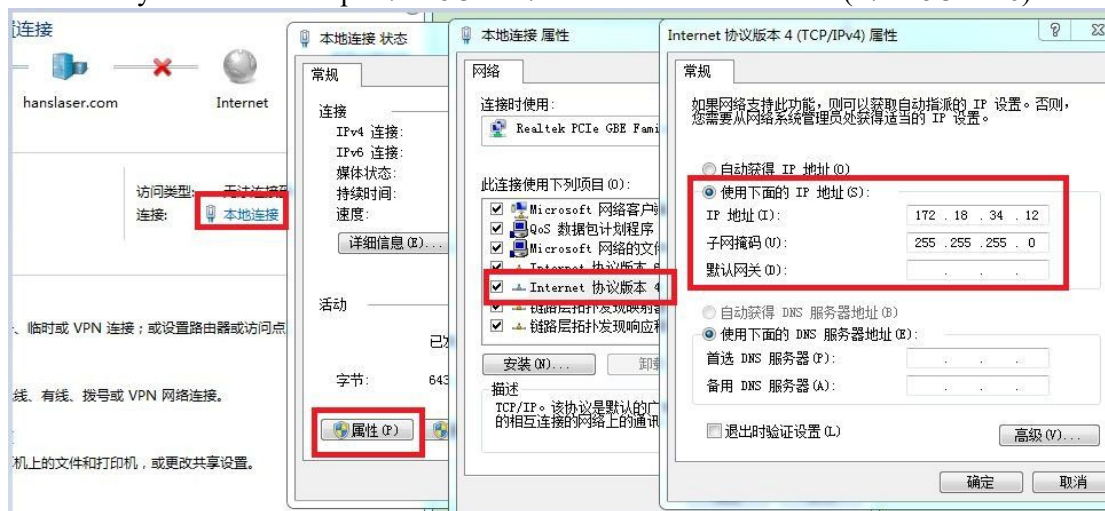
Galvanometer linear scanning marking method: The area can be large or small, the range is generally 50mm×50mm to 300mm ×300mm area, can mark various characters, graphics and images, can mark several small parts at the same time, can also mark a variety of words and graphics for a part, flexible and convenient change, can mark complex graphics and images. Slower than the mask.

Chapter 2 Software installation and interface description

2.1 IP configuration

The control card communicates with the computer through Ethernet. Therefore, before using the control card, you need to set the IP address of the computer. The IP address segment ranges from 172.18.34.2 to 172.18.34.255. The initial IP address of the controller card is 172.18.34.227 (the IP address can be changed, but the network segment cannot be changed). When the external controller card is powered on, a temporary 172.18.34.226 address will be generated. The IP address will disappear after the card is powered on and initialized. Do not use the initialized IP address. So in addition to the IP of the card

Set any IP address except 172.18.34.227 and the initial IP address (172.18.34.226).



In addition, this control card can support the function of a host computer software to control multiple control cards to type different graphics at the same time. To achieve this function, you need to change the default 172.18.34.227 address of one card to 172.18.34.228. If multiple cards have the same IP address, the host software cannot distinguish between different cards. If you have multiple control cards and need to use a router or switch, it can be problematic to plug in different network cards to your computer, so try to use a switch or a router.

2.2 Software Installation Requirements

This chapter describes the installation requirements and precautions of ScanWorldV1.0.

2.2.1 Installation Environment Requirements

The installation and use of this software requires the computer to have at least the following hardware and software configurations:

➤ **Operating system:**

Windows2000/Windows XP/Windows 7 (64 Bit)。

➤ **Minimum configuration**

CPU: Celeron 2G or above;

Memory: at least 512 memory. If you want to process large graphics files, more than 4G memory is recommended.

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

Hard disk: The available space must be at least 500 MB. You are advised to reserve more space.

2.2.2 Installation Precautions

①If virus protection software has been installed and enabled, ensure that the protection software allows the installation of this marking software;

②If the previous version has been installed on the same computer, make sure to uninstall it before installing the new software.

③To ensure a quick and error-free installation process, it is recommended that all other Windows programs be closed before installing this software.

2.3 Software Installation Process

This section describes how to install ScanWorldV1.0.

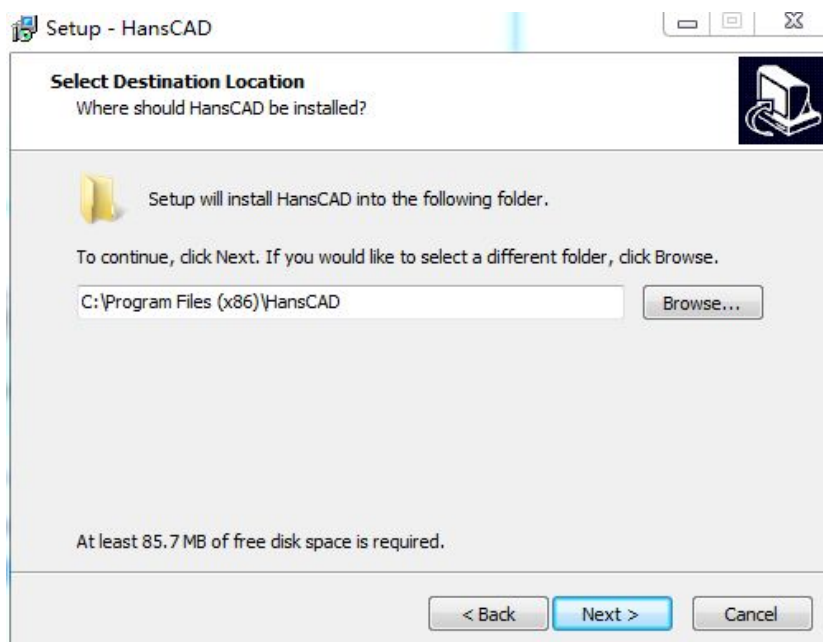
2.3.1 Software Installation Process

Double-click or right-click to open the installation package:

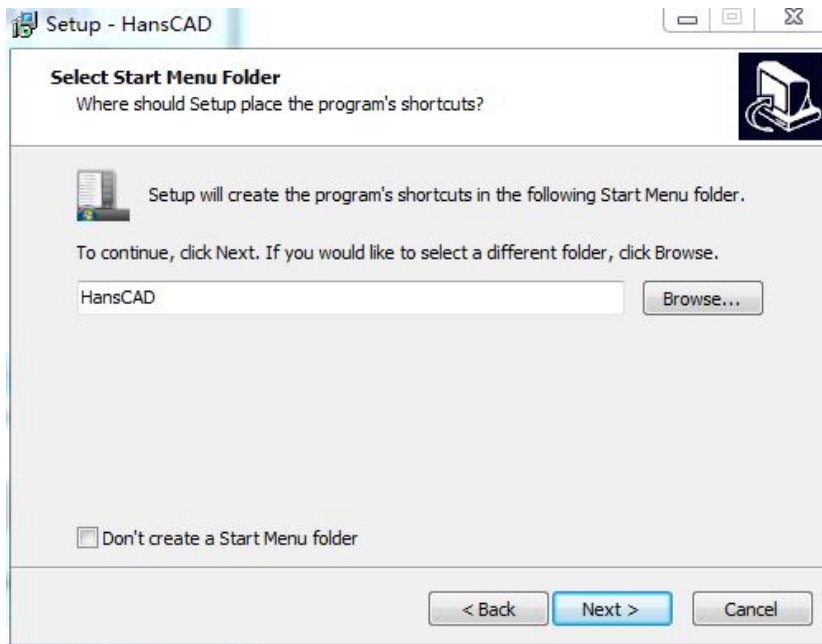
The installation wizard pops up:



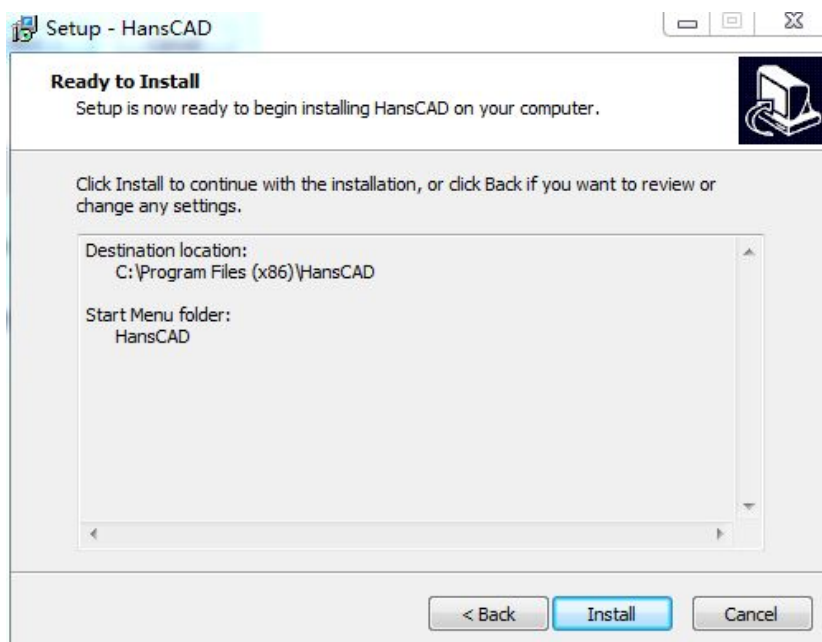
Click "Next";



Continue to click "Next"



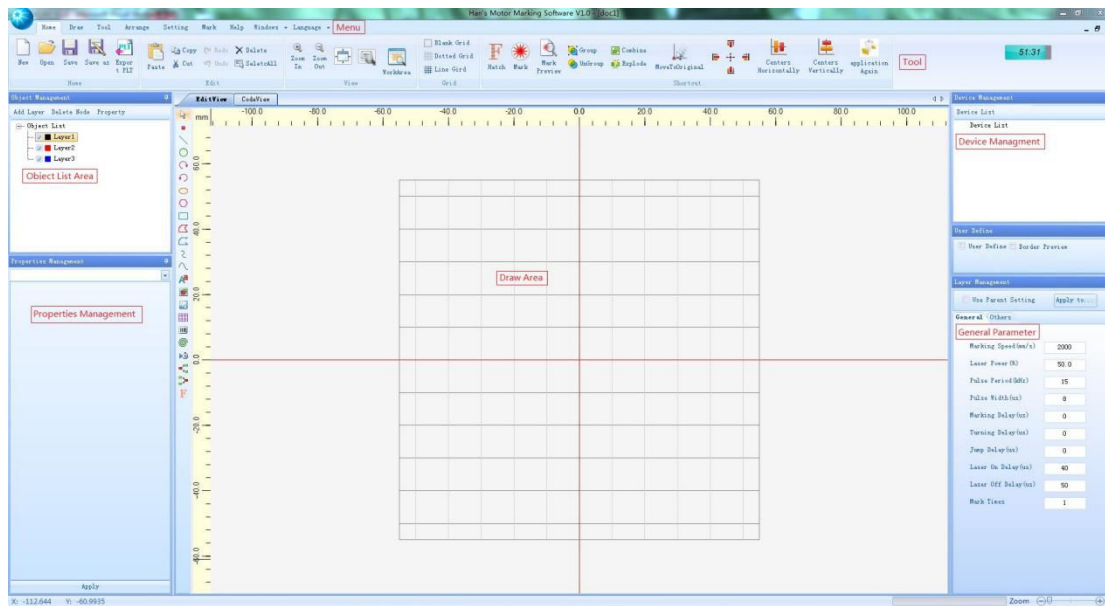
Follow the wizard and click on the next step until the last step;



Wait until the installation is complete.

2.4 Software Interface

This section describes the operation interface of ScanWorldV1.0.



2.5 Menu and Toolbar

This section describes the title bar, menu bar, and toolbar of ScanWorldV1.0.

2.5.1 Title bar

The title bar, at the top of the ScanWorldV1.0 window, shows the file name the user is using. Drag the title bar to move the entire document window. The ICONS on the right of the title bar indicate "minimize" -- to minimize the window so that it appears on the taskbar, "maximize" -- to maximize the software window so that it fills the computer screen, and "close" -- to exit the software.

If the drawing window is not maximized, it also has a title bar of its own, which functions like the ScanWorld V1.0 title bar, except that the ScanWorld V1.0 window does not display the document name. Instead, the title bar of the drawing displays the document name. If you maximize the drawing window, its title bar appears on the title bar of the software.

2.5.2 Menu bar

The menu bar stretches across the top of the Applications window, just below the title bar, and displays the name of the menu. A single menu name pops up with a drop-down menu command for the user to select.



Figure 2.7 Menu Bar

➤ The software menu bar includes the following:

【Home menu】 Provides file, edit, view, grid command operations

【Drawing menu】 Provides drawing control commands

【Tools menu】 Provides graphics mirroring, filling, array, and combination commands

【Arrange menu】 Provide graphics alignment, transformation and other commands

【Setting menu】 Provides marking machine hardware configuration commands

【Marking menu】 Provides marking and marking preview commands

【Permissions menu】 Provide permission switch login command

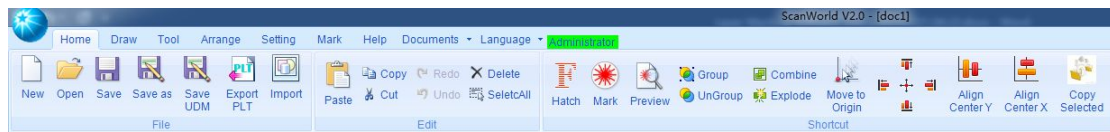
【Help menu】 Provide Han's Motor Software V1.0 help commands

【Window menu】 Provides an open document view

【Language menu】 Provides language switching commands

【Document close button】 This command is used to close the current document

➤ Home menu

Figure 2.8 Home menu bar **【New】**

New document

【Open】 Open a document that exists on your computer

【Save】 Save the document currently being edited with the same filename

【Save as】 Save the current document as a document with a different filename

【Save UDM】 Save the marking instructions of the current document to the local directory, and select the mode (2D, 3D or 2.5D) for saving the data. If you need to save 2.5D or 3D commands, you need to switch the interface to the 3D marking interface

【Export PLT】 Export the current drawing to a file in PLT format

【Closure】 Close the document currently being edited

【Paste】 Paste data (objects) from the clipboard into the document

【Copy】 Copy data (objects) from the document and save it to the clipboard

【Cut】 Delete data (object) from document and save it to clipboard

【Redo】 Redo undone edits

【Revoke】 Undo the previous edit operation

【Delete】 Delete the currently selected object

【Select all】 All objects in the selected workspace

【Enlarge】 Zoom in view

【Zoom out】 Zoom out

【Workspace observation】 Initial work area size

【Empty grid】 Job pages have no grid

【Point grid】 Job pages are drawn by dots

【Line grid】 Job pages are drawn by lines

【Filling】 Shape Fill Tool

【Marking】 Carry out the marking operation

【Mark preview】 Preview the marking timing when the marking machine is working

【Group】 Group selected objects

【Ungroup】 Ungroup selected objects

【Combination】 Group selected objects

【Break up】 Break the selected objects into multiple objects

【Move to origin】 Moves the selected object's reference point to the origin.

【Mirror mode】 There are horizontal mirroring and vertical mirroring.

【Center horizontal alignment】 Arrange all selected objects in a horizontal row according to the center point of the first selected shape **【Center vertical alignment】** Arranges all selected objects in a vertical line according to the center point of the first selected shape

【For remanufacturing】 Copy and paste a copy of the currently selected graphic, which is consistent with the properties of the original graphic.

New: This command creates a new document in ScanWorldV1.0 system.

18



Launch method: Toolbar button:

Shortcut operation: CTRL + N

Open: This command opens an existing



document.

Start method: Toolbar buttons:

Shortcut operation: CTRL + O

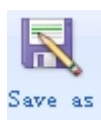
Save: This command saves the edited document to its current filename and directory. If it is the first time to save the document, Han's Motor Software V1.0 will pop up the Save As dialog box to name the user's document with the suffix .hsd. When doing this, you must ensure that at least one document is open.



Launch method: Toolbar button:

Shortcut operation: CTRL + S

Save As: This command will change the file name and directory of the current document, and a dialog box will pop up for the user to choose the save directory and name the document.



Launch method: Toolbar button:

Copy: The Copy command copies the currently selected object to the clipboard. This command is unavailable if there is no currently selected object. Copying data to the clipboard will replace the original clipboard content. The copy command can both save the original object and copy an identical object to the same document or to another document.

Launch method: Toolbar button:



Shortcut operation:CTRL + C

Export PLT: This command saves the contents of the canvas in PLT format, and a dialog box will pop up for the user to choose the save directory and name the document.



Start method: Toolbar button:

Paste: This command pastes the contents of the clipboard to the insertion point. This command is not available if the clipboard is empty. You can use the cut and copy commands to put objects on the clipboard and paste them where needed. When performing paste, move the object to be pasted with the mouse until the left mouse button is clicked, and the object is pasted at the clicked position.



Launch method: Toolbar button:

Shortcut operation: CTRL + V

Cut: The Cut command removes the currently selected object from the document, view, and places it on the clipboard. This command is unavailable if no objects are currently selected. Cutting data to the clipboard will replace the original clipboard content.



Launch method: Toolbar button:

Shortcut operation: CTRL + X

Undo: If after modifying the document, you want to be able to undo the previous changes without making any changes, then this command can accomplish this effect.

Within the scope of the undo step, the last edit operation can be undone, and the command will change according to the previous operation performed. Currently our software undo steps are unlimited (only for the current document).

For example:


Suppose the following operations are performed:

Select the "Rectangle" tool and draw a rectangle in the work area;

1. Set the rectangle's LocationX to 0 and LocationY to 0 in the property area;
2. Rotate the rectangle;
3. Select the "Circle" tool and draw a circle in the work area;
4. Delete the drawn circle;

Now add a 4-step undo command:

5. Undo delete
6. Undo the circle drawing (delete the circle)
7. Undo the rotation of the rectangle
8. Undo the setting of the rectangle Location

Launch method: Toolbar button: 

Shortcut operation: CTRL + Z

Redo: If you want to undo the changes after undoing the changes to the document, you can use this command to redo the changes.

Within the scope of a redo step, you can redo an undone operation with the redo command, which changes based on the previous operation performed.

For example:

Suppose the following operations are performed:

Select the "Rectangle" tool and draw a rectangle in the work area;

Select the "Rectangle" tool and draw a rectangle in the work area;

Rotate the rectangle;

Select the "Circle" tool and draw a circle in the work area;

5. Delete the drawn circle;

Now add a 4-step undo command:

6. Undo delete

7. Undo the circle drawing (delete the circle)

8. Undo the rotation of the rectangle

9. Undo the setting of the rectangle Location

Then the redo command can perform 4 steps:

1. Redo the settings of Location

2. Redo the rotation of the rectangle

3. Redraw the circle

4. Redo delete circle command

Launch method: Toolbar button:



Shortcut operation: `CTRL+Y`


Delete: This command is used to delete the currently selected object. This command is unavailable if there is no currently selected object.

Launch method: Toolbar button:



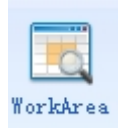
Shortcut key operation: Del

Select All: This command is used to select all objects in the workspace.

Launch method: Toolbar button: 

Shortcut operation: CTRL + A

Work area observation: This command makes the screen display the most original work area



Start method:

Zoom In: This command can zoom in on a part of the object. Press and hold the left mouse button at the upper left corner of the area to be enlarged, drag the mouse, and release the left mouse button at the lower right corner of the area to be enlarged.



Start method:

Empty Grid: This command makes the workspace blank.

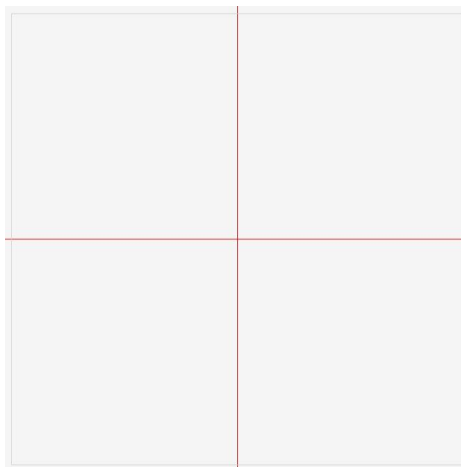


Figure 2.9 Drawing area rendered blank

Start method: 

Point Grid: This command causes the workspace to render the point format.

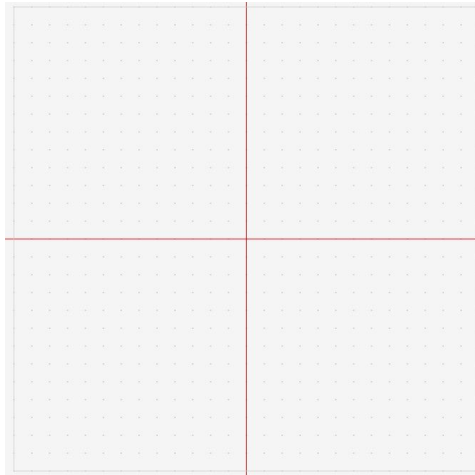


Figure 2.10 Drawing area as a grid of dots

Start method: 

Line Grid: This command formats the work area with lines.

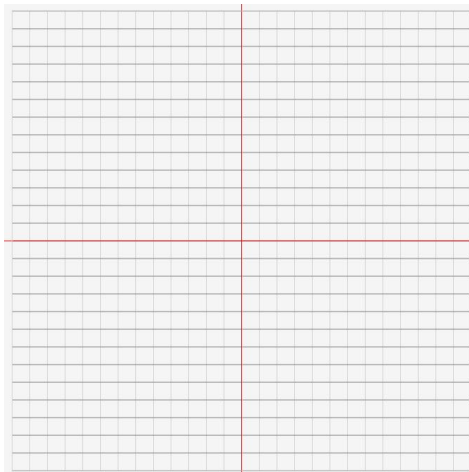


Figure 2.11 Drawing area as a grid of lines

Start method: 

Shortcuts: Contains some commonly used tools.

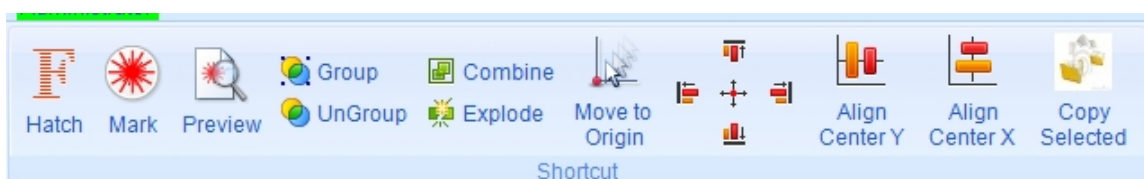


Figure 2.13 Common editing shortcuts

Fill, Mark, Mark Preview, Group, Ungroup, Group, Break, Center, Align Left, Align Right ,
 "Align Top", "Align Bottom", "Align Center", "Align Center Horizontally", "Align Center
 Vertically", "Apply to Reproduction" and other commands will be described in detail in later
 chapters.

➤ Drawing menu

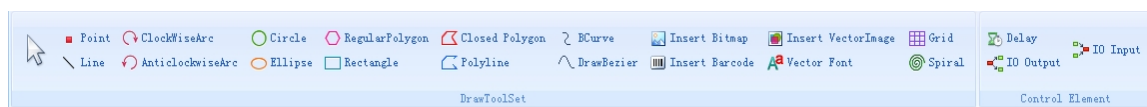


图 2.14 图形变换工具

【Pick up】 Select, move, deform objects

【Point】 Draw points

【Straight line】 Draw straight lines

【Clockwise arc】 Draw a clockwise arc

【Counterclockwise arc】 Draw a counterclockwise arc

【Round】 Draw circle

【Oval】 Draw ellipse

【Regular polygon】 Draw regular polygons

【Rectangle】 Draw rectangle

【Closed polygon】 Draw closed freeform

【Not closed polygon】 Draw a non-enclosed arbitrary polygon

【B-like curve】 Draw B-like curves

【Bezier curve】 Draw bezier curves

【Bitmap】 Import bitmap

【Barcode】 Draw barcodes and QR codes, etc.

【Vector】 Import vector graphics

【Vector text】 Draw vector text

【Grid】 Draw grid

【Helix】 Draw a spiral

【Time delay】 Add delay

【IO output】 Add a signal output object

【IO input】 Add an input signal wait object

For details, please refer to Chapter 3 Introduction to Graphic Editing.

➤ Tools menu



Figure 2.14 Graphic Transformation Toolbar

【Mirror mode】 Mirror the selected objects with reference to the X and Y axes

【Flip mode】 Flip the selected object with reference to the X and Y axes

【Move to origin】 move object to origin

【Rectangular array】 Rectangular array of selected objects

【Circular array】 Circular array of selected objects

【Group】 Group selected objects

【Ungroup】 Ungroup selected objects

【Combination】 Group selected objects

【Break up】 Break the selected objects into multiple objects

Mirror mode: horizontal mirror and vertical mirror. **Mirror**

Horizontal: Flip the object relative to the Y axis **Launch**

method: Toolbar button:  Mirror on Y Axis


Mirror Vertical: Flip the object relative to the X axis **Launch**

method: Toolbar button:  Mirror on X Axis

Horizontal flip: flip the symmetry axis relative to the object's own vertical direction

Launch method: Toolbar button:  Turn on Y Axis

Vertical flip: flip the symmetry axis relative to the horizontal direction of the object itself

Launch method: Toolbar button:  Turn on X Axis

Move to Origin: Move the selected object to its reference point to the origin position.



Start method:

For the introduction of other commands, please refer to the detailed introduction in Chapter 3.

➤ ~~The Arrange menu includes the following commands:~~

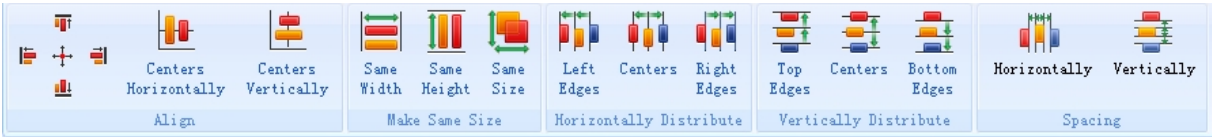


图 2.15 排列方式工具栏

【Align Left】 Align all selected objects to the left edge of the first selected shape

【Align right edge】 Align all selected objects to the right edge of the first selected shape

【Bottom edge alignment】 Aligns all selected objects to the lower boundary of the first selected shape

【Top edge alignment】 Align all selected objects to the top edge of the first selected shape

【Center aligned】 Align all selected objects with the center point of the first selected shape

【Center horizontal alignment】 Arrange all selected objects in a horizontal row

according to the center point of the first selected shape **【Center vertical**

alignment】 Arranges all selected objects in a vertical line according to the center

point of the first selected shape

【Equal width】 Make all selections the same width

【Equal height】 Make all selection objects the same height

【Equal size】 Make all selection objects the same height and width

【Left horizontal distribution】 According to the left distance of the leftmost object and the rightmost object, distribute the left distance of all selected objects horizontally at equal intervals

【Right horizontal distribution】 According to the right distance of the leftmost object and the rightmost object, the right distance of all selected objects is equally spaced horizontally.

【Center horizontal distribution】 According to the center point distances of the leftmost and rightmost objects, the center distances of all selected objects are equally spaced horizontally.

【Vertical distribution】 According to the top edge distance of the topmost and bottommost objects, the top edge distances of all selected objects are equally spaced and vertically distributed

【Vertical distribution】 According to the distance of the bottom edge of the topmost and bottommost objects, the distance of the bottom edge of all selected objects is equally spaced and vertically distributed

【Center vertical distribution】 According to the center point distance of the uppermost and lowermost objects, the center distance of all selected objects is equally spaced and vertically distributed

【Horizontal spacing】 According to the distance from the right of the leftmost object to the left of the rightmost object, the spacing of all graphics is equally spaced horizontally.

【Vertical spacing】 According to the distance from the bottom edge of the topmost object to the top edge of the bottommost object, the spacing of all graphics is equally spaced and vertically distributed

For details, please refer to Chapter 3.

➤ The settings menu includes the following commands:

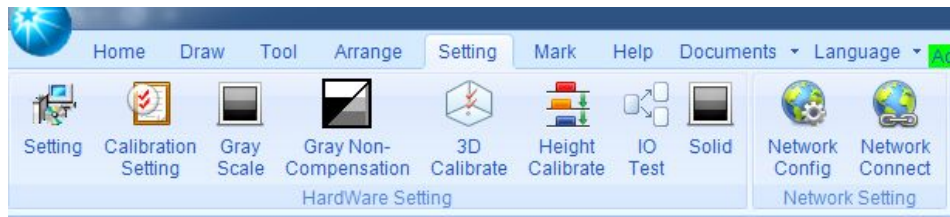


Figure 2.16 Hardware Configuration Toolbar

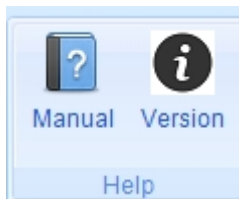
See Chapter 5 for details.

- The marking menu includes the following commands:



For details, please refer to Chapter 4.

- The Help menu includes the following commands:



【User's manual】 Index of topics to start help

【About】 Display the version information of the application

Displays the names of all open documents.

- The language menu includes the following commands:

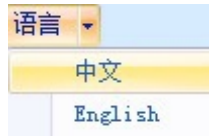


Figure 2.21 Language menu bar

There are two languages, Chinese and English, for users to choose.

- Document close button



Figure 2.22 Close the document

Close: This command is used to close the current document. ScanWorldV1.0 recommends saving the document before closing the document. If the current document is closed without saving, the system will pop up a dialog box of whether to save. If you exit the system without saving, all editing operations since the last save will be lost.

Before closing an untitled document, ScanWorldV1.0 will display the Save As dialog, suggesting that the user name and save the document.

Chapter 3 Graphic Editing

3-1 Graphic Creation

Introduction to Drawing Editing Window



Figure 3.1 Drawing Shortcut Toolbar

The drawing bar provides the following drawing functions

From top to bottom: point, point, line, circle, clockwise arc, counterclockwise arc, ellipse, regular polygon, rectangle, irregular closed polygon, irregular polygon, B-spline, Bessel Curves, Text, Vectors, Bitmaps, Grids, Barcodes, Spirals, Delays, IO Out, IO In, Fill, Intercept Visual Templates.

Click, select, move, deform objects, corresponding icons

The Pick tool is used to select, move, and pull objects. The selection set must be determined before editing. The so-called selection set refers to a collection of selected objects, and there is only one selection set in a view. During the drawing process, the system automatically clears the selection set and adds the last drawn object to the selection set. When an object is included in the selection set, the view shows a tracker with 10 control points (as shown in the blue and red boxes). For the size of the control points and the shape of the tracker, please refer to the tracker settings under the View menu.

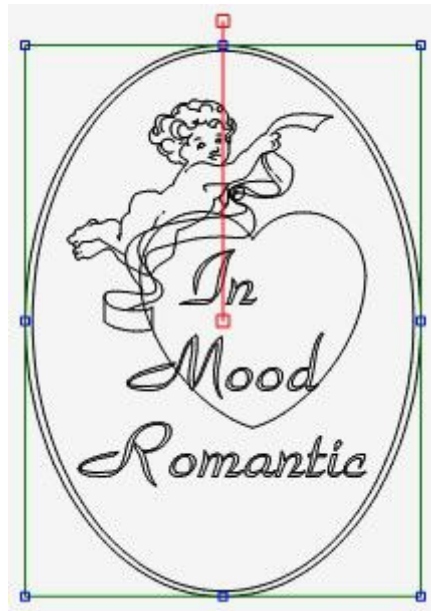


Figure 3.2 PLT Vector Diagram

Click object: Click anywhere on the outline of the object to be added to the selection set, the system will automatically clear the selection set and add the clicked object to the selection set.

Frame selection object: hold down the left mouse button and drag the mouse, a rectangular frame will be dynamically displayed in the view. Release the left mouse button so that the rectangle completely encloses the object or objects to be added to the selection set. Then the system will automatically clear the selection set and add the frame selection object to the selection set.


To clear the selection set: Just click the mouse in the blank area.

➤ Graphic drawing part

Point

To draw a point, click the button on the left toolbar, and click the left mouse button at the appropriate position.

Shortcut toolbar buttons:

 Straight line

1. Click the left mouse button at the starting point of the line.
2. Move the mouse, the view will dynamically display the trajectory of the straight line.
3. Click the mouse at the end point to end the line drawing.

Shortcut toolbar buttons: 

Round

1. At the center of the circle, click the left mouse button.
2. Move the mouse, and the view will dynamically display the trajectory of the circle.
3. Click the mouse at the end point to end the circle drawing.

Shortcut toolbar buttons: 


Clockwise arc

1. Click the shortcut key of the helix with the mouse, a dialog box will pop up, and select the "Clockwise" option.
2. Move to the target position, then release, move the mouse, the view will dynamically display the drawn

arc.3. At the appropriate point, click the mouse to end the drawing of the arc



Counterclockwise arc

1. Click the shortcut key of the helix with the mouse, a dialog box will pop up, and select the "Counter Clockwise" option.
2. Move to the target position, then release, move the mouse, the view will dynamically display the drawn arc.
3. At the appropriate point, click the mouse to end the drawing of the arc. Shortcut toolbar buttons: 

Oval

1. Move the mouse to the target position, click the mouse to determine the center point of the ellipse, and release it;
2. Move the mouse and click the second point, release the first axis that determines the ellipse;
3. Move the mouse and click the third point, release the second axis that determines the ellipse, and end the drawing.

Shortcut toolbar buttons: 

Regular polygon

Click the tool button of the regular polygon on the left, and the dialog box shown below will pop up to set the corresponding regular polygon properties.

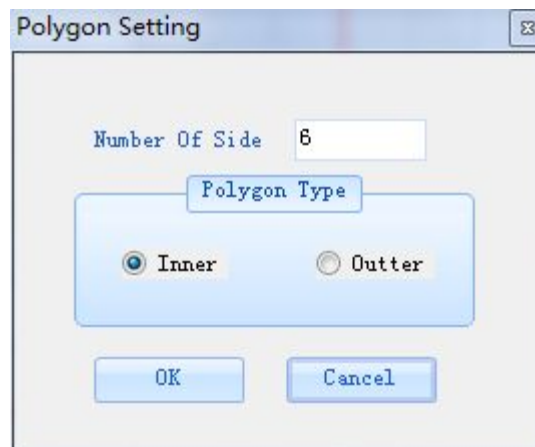


Figure 3.3 Inserting regular polygons

1. Press and hold the left mouse button.
2. Drag the mouse. The view dynamically displays the drawn polygon.
3. At the appropriate point, release the left mouse button. End polygon drawing.


Shortcut toolbar buttons: 

Rectangle

1. Click the left mouse button.
2. Drag the mouse, the view will dynamically display the drawn rectangle.
3. At a suitable point, end the drawing of the rectangle.

Shortcut toolbar buttons: 

Closed polygon

Repeat the actions of clicking, releasing, and moving the left mouse button until it reaches a suitable position, ending the drawing of the closed polygon. V Shortcut toolbar buttons: 


Unclosed polygon

Repeat the actions of clicking, releasing, and moving the left mouse button until it reaches a suitable position, ending the drawing of unclosed polygons.

Shortcut toolbar buttons: 


B-spline curve

Repeat the actions of clicking, releasing, and moving the left mouse button until it reaches a suitable position, ending the B-spline curve drawing.

Shortcut toolbar buttons: 

Bezier curve

Repeat the actions of clicking, releasing, and moving the left mouse button until it reaches a suitable position, ending the Bezier curve drawing.

Shortcut toolbar buttons: 

Text

1. Click the text button on the left toolbar, the following dialog box will pop up

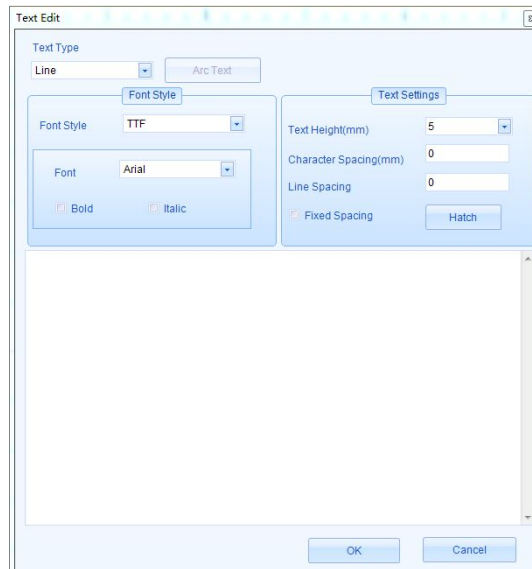


Figure 3.4 Text Edit Box

2. Select the corresponding parameters, enter the text, and click OK.
3. Click the left mouse button at a suitable position on the canvas, and the text will appear.

Shortcut toolbar buttons: 

Text related content

There are three font types, namely: TTF, SHX font, dot matrix font

WINDOWS (TTF) font: a standard font commonly used by the WINDOWS operating system, and the marking software supports this font.

Here the user can select standard TTF fonts and font styles, which can be filled (see Fill in the Graphic Editing section for details).

Single Line Font (SHX): SHX font is the SHX file of AutoCAD, this font cannot be filled. It includes English font library and Chinese font library. Users can copy SHX fonts to HansCAD V1.0\bin\Debug\shxFonts in the installation directory. If it is a Chinese font library, copy it to the CH file directory.

If it is an English font, copy it to the EN file directory and restart the software to read the corresponding font.

Dot matrix font: Dot matrix font is a font composed of dots, and the words printed by laser are composed of dots.

Font Height: Indicates the height of the font in millimeters (mm).

Word spacing: 0 by default, otherwise it will follow the distance entered by the user.

Line spacing: Indicates the distance between two lines of characters during carriage return and line feed

Equal spacing: When the user selects this option, the length of the text will remain unchanged, and the distance between two characters is equal.

Arrangement Type

The layout methods of text are divided into linear layout and arc layout. Select the layout type as follows:

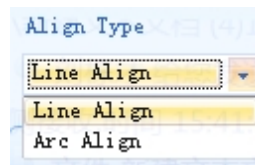


Figure 3.5 Text Arrangement

Select Arc Arrangement to activate the Arc Text button:



Figure 3.6 Arrangement in Circular Arrangement

Click the "Arrange Arrangement" button, the following interface will appear:

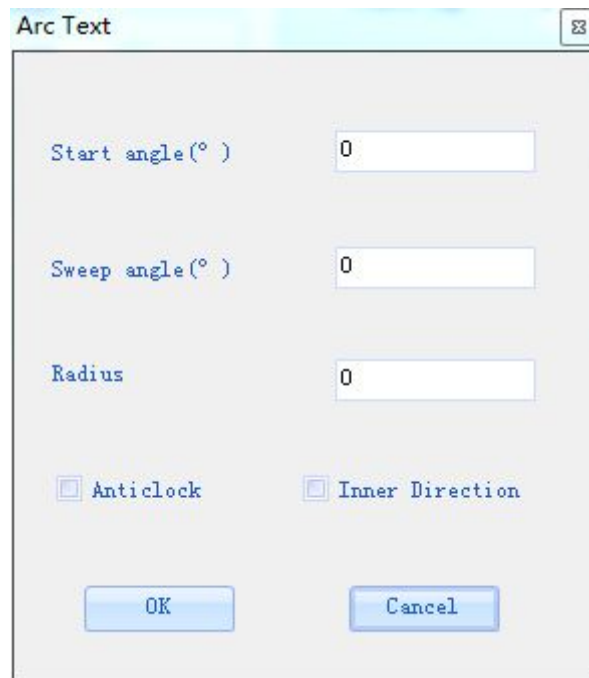


Figure 3.7 Arc Text Setting Dialog Box

Start angle: the angle at which the first text appears;

Termination angle: the termination angle of the arc;

Radius: the radius of the arc;

Clockwise: that is, the direction of the text is clockwise;

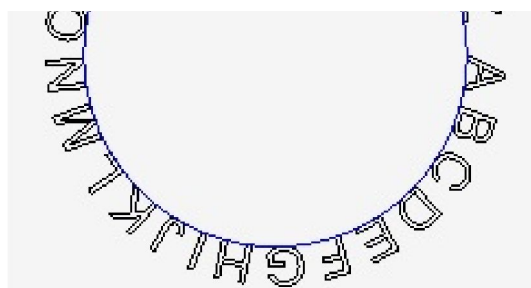
Counterclockwise: that is, the direction of the text is counterclockwise;

Text orientation: that is, the top of the text faces inward or outward

Figure 3.8 Arc text rendering

Variable text

- Continue with the above steps, select the arc text in the canvas, and a "jump sign" will



appear in the "Attribute Management" pair in the lower left corner of the main interface.

2. Check "Jump Number" and the following interface will appear:



Figure 3.10 Jump number setting window

Jump number: for the jump number setting, the use of the jump number will be explained in detail later; Add: Add a text type, including time and date, jump number, normal text, etc.; Delete: You can delete the object in the "Jump Number" dialog box.

Modify: You can modify the objects in the "Jump Number" dialog box, and the function is similar to adding.

Move Up: Allows you to resize objects in the Tick dialog box up.

Move Down: Allows you to adjust the objects in the Tick dialog box down.

Jump number

Click the "Add" button in "Variable Text" to pop up the following dialog box;

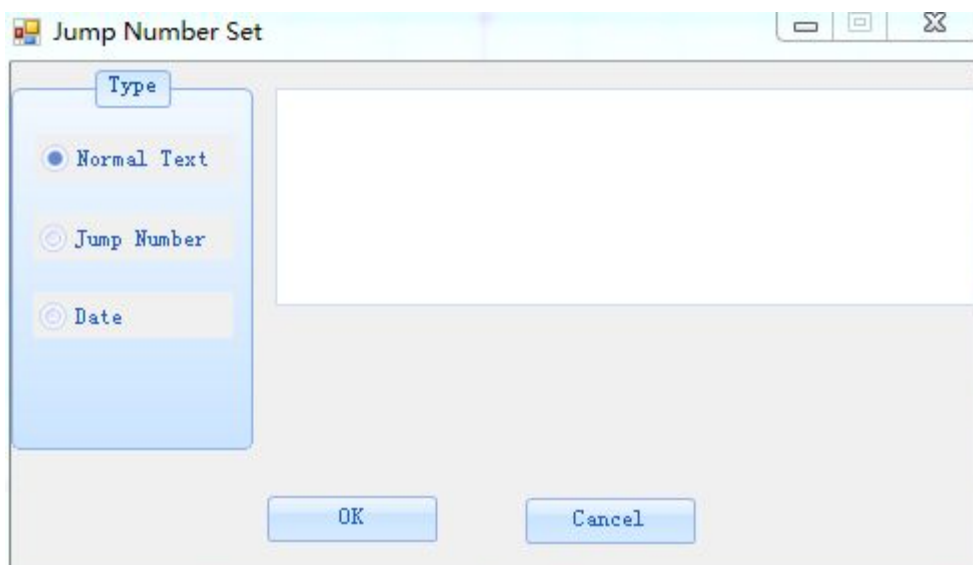


Figure 3.11 Jump Number Setting Dialog Box

Jump number: When you select a jump number, the following dialog box will pop up:

The screenshot shows a 'Jump Number Set' dialog box. It features a 'Type' section on the left with three radio buttons: 'Normal Text', 'Jump Number' (selected), and 'Date'. The main area contains several input fields: 'Mark Times' (0), 'Start' (0), 'End' (999999), 'Prefix' (empty), 'Suffix' (empty), 'Step' (1), 'Gap' (1), a checked 'AppendString' checkbox, 'Total Length' (6), and 'Append Prefix' (0). At the bottom are 'OK' and 'Cancel' buttons.

Figure 3.12 Jump number setting interface

Current number of markings: count the number of ongoing markings.

Starting point: The initial size of the jump number, only numbers can be entered.

End point: the size at the end of the jump number, only numbers can be entered.

Prefix: the content added before the user-defined jump number, such as: "Hans000000", Hans is the prefix, and 000000 is the number to be jumped.

Suffix: The content added after the user-defined jump number, such as "000000Hans", "Hans" is the suffix, and 000000 is the number to be jumped.

Step length: the value interval of automatic incrementing or decrementing of the number for each marking: that is, the difference between the previous value and the next value. For example, the starting point is 100, the interval is 10, the number in the first text is 100, the second is 110, the third is 120, and so on.

Number of padding digits: Set the total length of the skip part and the preceding characters.

The total length of the hop number: the length of the entire hop number.

Filling up the leading characters: If the total length of the jump number part is greater than the total length of the end point, then fill in the vacancies by filling the leading characters. For example: the starting point is 0, the end point is 100, the interval is 10, the total length of the jump number is 6, and the leading character is H, then the first number of the jump number is HHH000, the second is HHH010, and the last number is HHH100.

After setting the parameters, click OK, then the text box will appear "000000", and finally click the OK button of the text box. Right-click on the canvas and the following will appear:



Figure 3.13 Text content

Select this text, click the right mouse button, and select the jump button, as shown in the following figure:

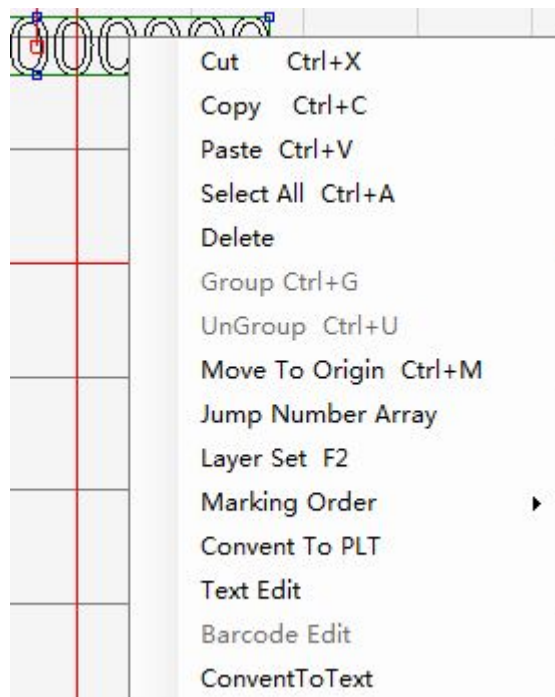


Figure 3.14 Setting the Jump Number Matrix

When you click the jump number, the following dialog box will pop up:

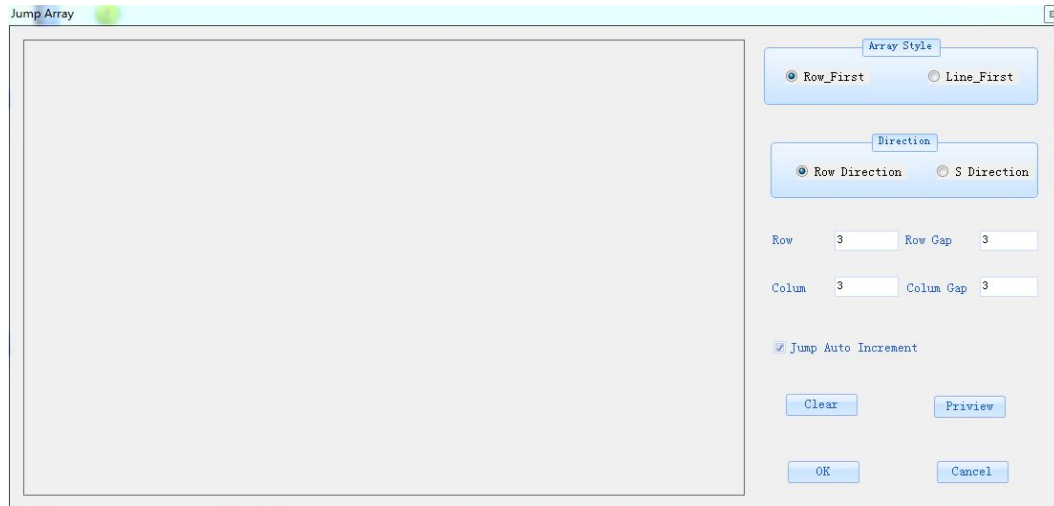


Figure 3.15 Jump Number Preview Dialog Box

The left side is the skip number preview window, and the right side is the parameter setting, which can set the priority method and direction. The number of rows multiplied by the number of columns must be equal to the number of jumps, otherwise an error will occur

After selecting the corresponding parameters, here we set the row spacing to 20, the column spacing to 25, and other parameters by default, click the OK button, and the following graphics will appear on the canvas:

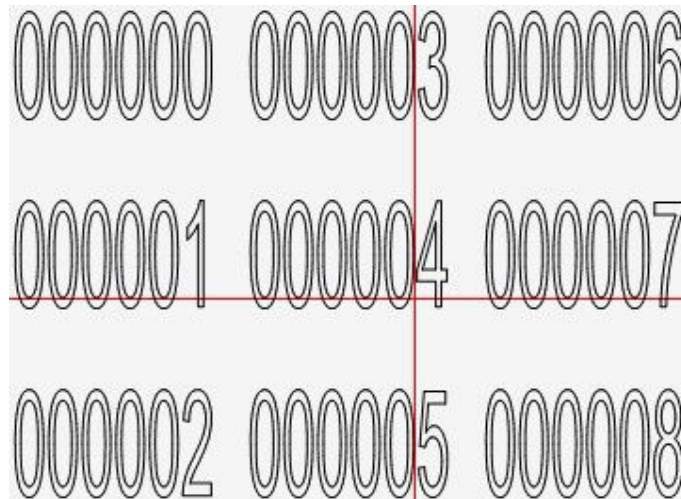


Figure 3.16 Effect of text jumping

In addition, we can also watch it through the preview, at this time, the jump number settings are all completed.

Date and time

Click the "Add" button in "Variable Text" to pop up the following dialog box;

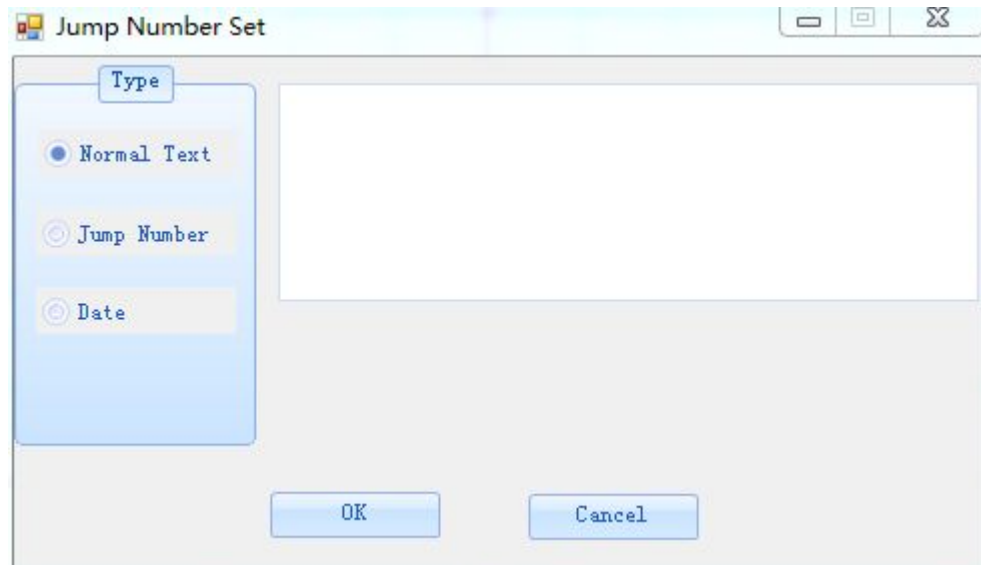


Figure 3.17 Normal text setting dialog

Date: When selecting a date, the following dialog box will pop up, and users can select the corresponding time format according to their needs.

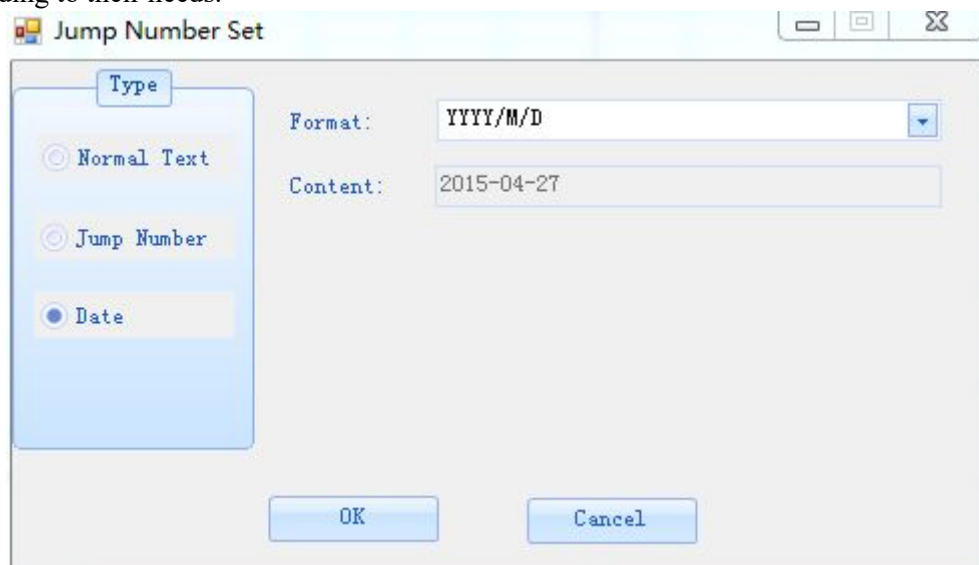


Figure 3.18 Jump Number Setting Dialog Box

Text attribute

When creating a new text, select the text, and the relevant information of the text will appear in the lower left corner of the interface, as shown in the following figure



text attribute

X and Y represent the coordinate position of the text. It should be noted that when the text is arranged in a straight line, it represents the position of the lower left corner of the text.

When the text is arranged in an arc, it represents the center coordinate of the arc text.

The height, width, and angle are information representing the height, width, and angle of the text.

Dot time: This property is only available when the text type is selected as a dot matrix font, and it indicates the time information required for the dot.

Custom string: X stands for character, space stands for hollow, for example, input text 123456789, custom string format is XXX XXX XXX, then the character displayed on the interface is 123 456 789.

Variable text: At present, variable text is only valid for electronic supervision code marking.

Vector

1. Click the vector icon on the left toolbar, the following dialog box will pop up, and you can select the file to be imported (PLT, DXF).

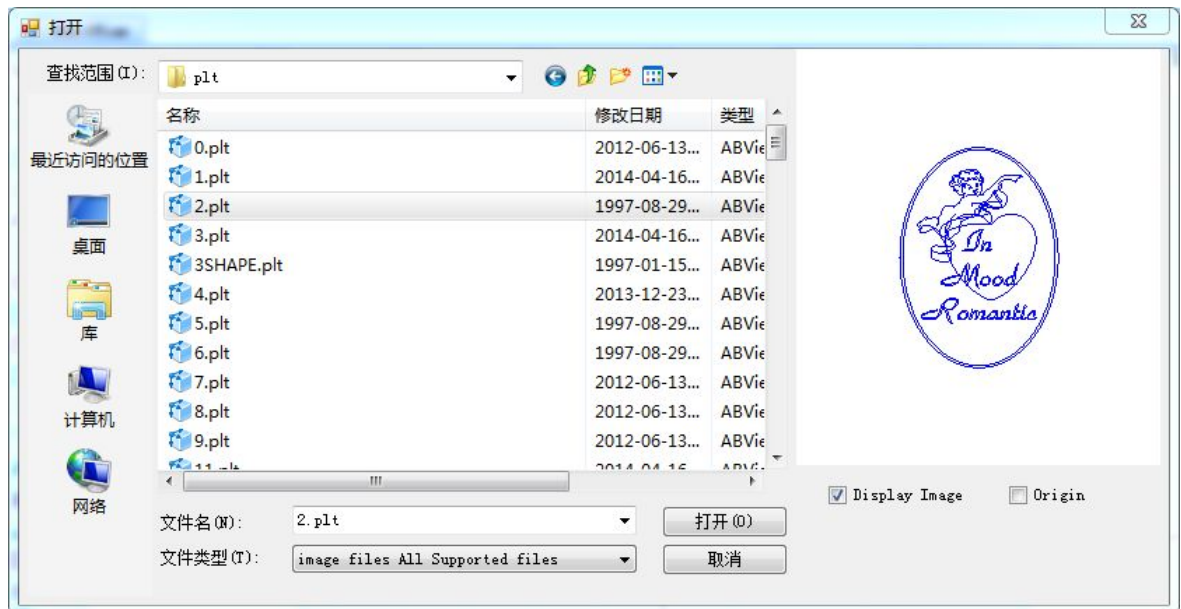


Figure 3.19 Import Vector Graphics Dialog Box

2. Select the file in the dialog box, you can preview the vector diagram on the right side of the dialog box
3. Click the left button of the mouse at the corresponding position of the canvas. After releasing, the vector diagram will appear on the canvas in a 1:1 ratio.

Shortcut toolbar buttons: 

Bitmap

1. Click the Bitmap button on the left toolbar, the following dialog box will pop up, and you can select the image to be imported

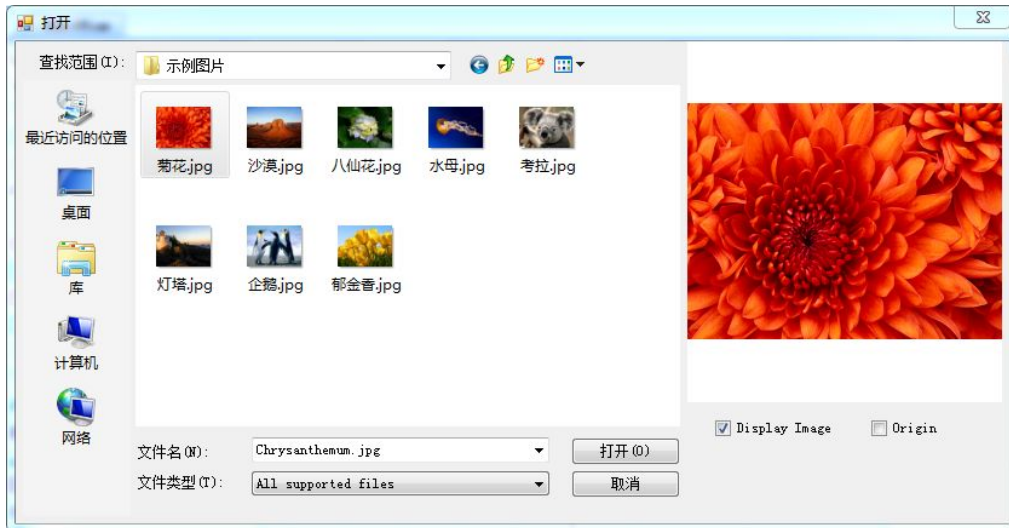


Figure 3.20 Import Picture Dialog Box

2. Select the file in the dialog box, you can preview the picture on the right side of the dialog box
3. Click the left button of the mouse at the corresponding position of the canvas. After releasing, the bitmap will appear on the canvas in a 1:1 ratio.

Shortcut toolbar buttons: 

Note: In this system, in addition to drawing graphics by yourself, you can also receive graphics and image files in other standard formats. For specific types of imported objects, you can click the [File Type] drop-down menu in the dialog box. Such as PLT files in HP-GL format, DXF files in graphics interchange format (only some files are supported), and bitmap BMP files. These files can be generated by more general processing software, such as PLT files, DXF files generated by AutoCAD, PLT files, DXF files, BMP files generated by CorelDRAW, BMP, JPG, PNG, ICO and other files generated by Photoshop.

The above-mentioned files generated by these software can be directly called in this system through the import function, and the correct size ratio can be maintained without adjustment.

Grid

-
- 1、点击左侧网格按钮，设置网格属性，点击确定，如图所示：

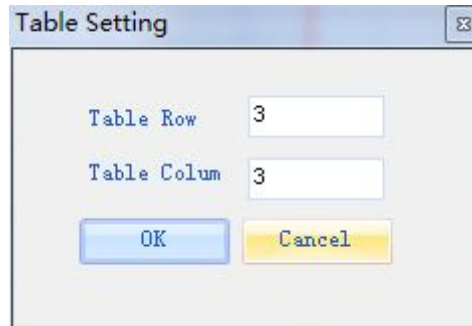



图 3.21 插入网格对话框

2、在画图界面点击鼠标左键，拖动鼠标，视图动态显示绘制的矩形。

3、在合适的点，结束网格的绘制。 快捷工具栏按钮： 

Barcode

1. Click the barcode button on the left, and the following dialog box will pop up:

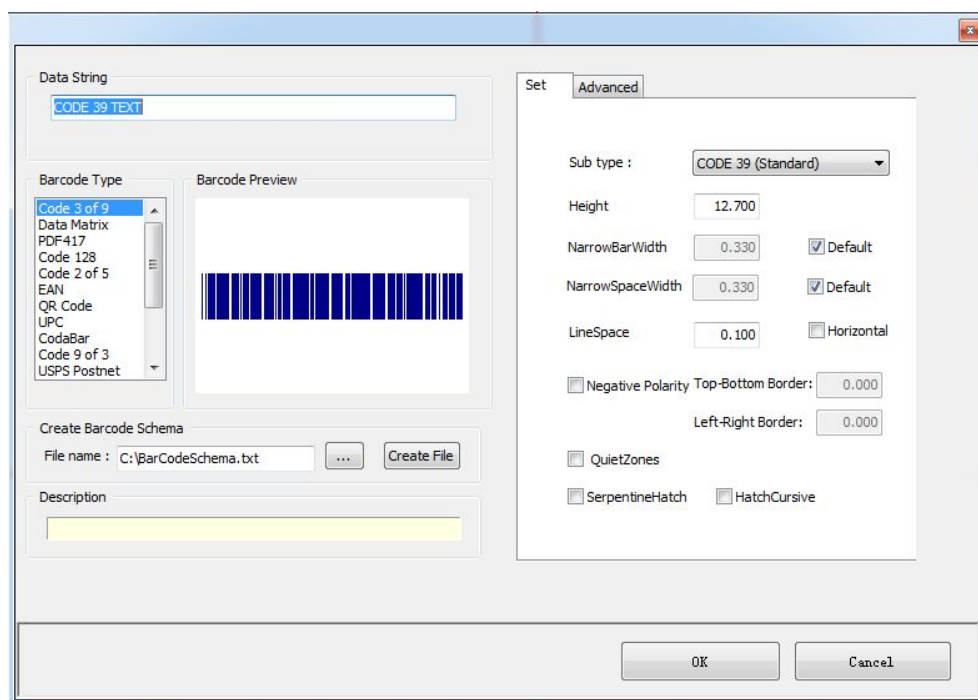



Figure 3.22 Insert QR Code dialog box

2. After setting the parameters, click the OK button
3. Click the left mouse button on the drawing interface, drag the mouse, and the view will dynamically display the drawn barcode.
4. At a suitable point, end the drawing of the barcode.

Shortcut toolbar buttons: 

Note: Barcode example

1.PDF417

PDF417 is a multi-layer, variable length, continuous 2D barcode with high capacity and error correction capabilities.

Number of barcode lines: Each PDF417 barcode symbol is made up of multiple layers, and the number of layers is 3--90.

However, the area of this kind of barcode is fixed. If you increase the value of "Barcode Lines", the barcode will become dense and unclear.

2.CODE 39(standard)

CODE 39 is usually used in asset management, membership card, in-store code management, product labeling, etc. because the data content supports 0~9, A~Z, etc., because the bar code density ratio can be adjusted, there are fewer restrictions on use and flexibility higher.

CODE 39 (standard) The data length can be 1~N code. There is no special restriction on the data length. Before and after the data, "*" must be added as the start and end code, so that the code reader can use it, so "*" cannot be used. as data content. Example: *123ABC* is correct, while *123*ABC* is incorrect.

3、 CODE 39(full ASCII)

CODE 39 (full ASCII) is an enhanced version of CODE 39 (standard), and the data content has increased support for a~z, !@#\$%^&... etc. The use of the above is the same as that of CODE 39 (standard).

4、Codabar

When using Codabar, you need to add A, B, C, D start & end codes to both ends of the data content. There is no limit to the length of the data, but the data content only supports 0~9, "+", "-", "*", "/", "\$", ".", ":", and other 7 special symbols. Example: b567890c.

5、EAN8

EAN supports numbers 0~9, the length is 8 codes, and the last code is the check code.

6、UPC

UPC is mainly used in the United States and Canada. It only supports numbers 0-9 and has a check code. It is generally used on smaller products and is the predecessor of EAN code. Features of UPC: Only provide digital code, limit the number of digits to 7, and need to check the code.

7、Code128

Code 128 has three start code forms: A, B, and C. Form A and form B support roughly the same data range (0x00~0x7F). Form C only supports numbers and the data length must be an even number of digits. Unlimited, this barcode is less restrictive and more flexible.

8、Data Matrix

Datamatrix is a matrix two-dimensional barcode, and its development idea is to store more data on a smaller barcode label. The smallest size of Datamatrix is currently the smallest of all barcodes. It is especially suitable for the identification of small parts, as well as direct printing on the entity.

9、MaxiCode

Maxicode is a medium-capacity, fixed-size, matrix-type 2D barcode consisting of closely connected hexagonal modules and a locator graphic at the center of the symbol. Maxicode is specially designed for high-speed scanning, mainly used for package search and tracking.

Helix

1. Click the spiral button on the left, and the dialog box shown below will appear.

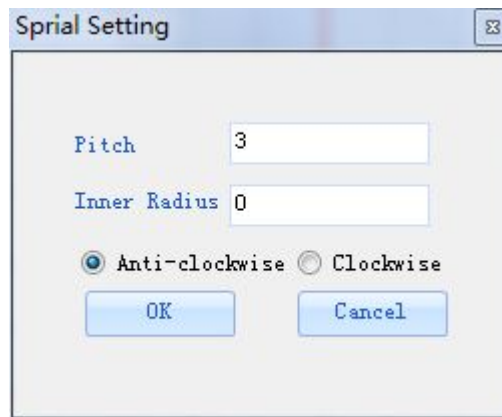


Figure 3.23 Insert Helix dialog box

2. After setting the parameters, click the "OK" button, and click the left mouse button on the drawing interface.
3. Drag the mouse, the view will dynamically display the drawn spiral.

Shortcut toolbar buttons: 

Delayer

Click the delayer icon to add a delayer object, as shown in the figure below:



Function: delay between multiple objects, unit: ms

The property settings are as follows:



Figure 3.24 Delay Setting Dialog Box

IO output

Click the "IO Output" button to add an IO output object, as shown below:



Figure 3.25 IO output

Function: Output IO signal during marking.

Attribute setting: first set the valid signal bit, then select the high and low level of the signal bit (selected is high level, unselected is low level) and set the signal duration, the effect is as follows:

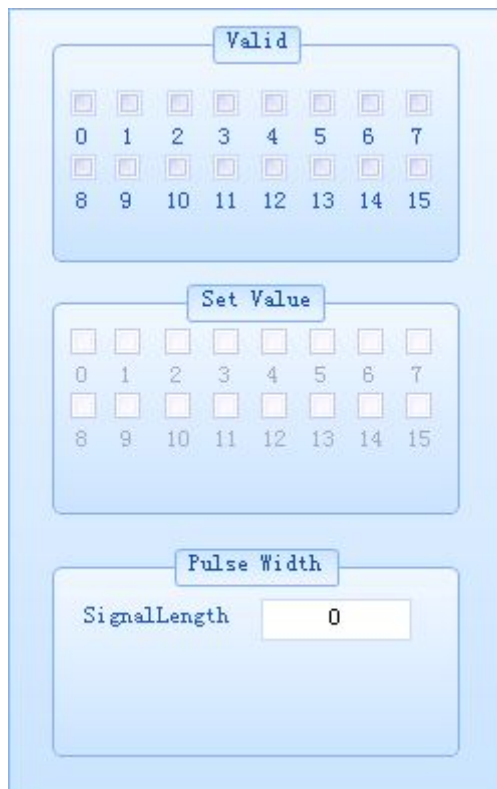
A dialog box for setting IO output parameters. It has a light blue background and contains three main sections. The first section is titled 'Valid' and contains a 2x8 grid of checkboxes labeled 0 through 15. The second section is titled 'Set Value' and contains a 2x8 grid of checkboxes labeled 0 through 15. The third section is titled 'Pulse Width' and contains a label 'SignalLength' followed by a text input field containing the value '0'.

Figure 3.26 IO output setting dialog box

IO input

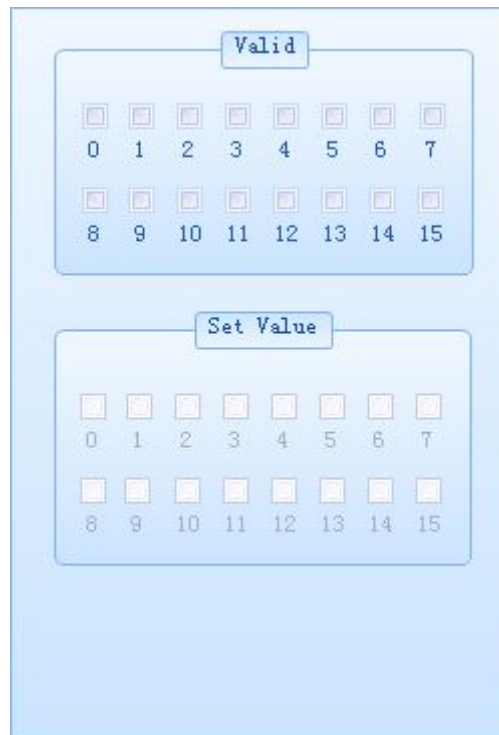
Click the "IO Input" icon to add an IO input object, as shown below:



Figure 3.27 IO input

Function: Continue after waiting for a certain group of input during marking.

Property setting: first set the valid signal bit, and then select the high and low level of the signal bit (selected is high level, unselected is low level), as shown below:



The dialog box is titled "Valid" and "Set Value". It contains two sections, each with a grid of 16 checkboxes arranged in two rows of eight. The top section is labeled "Valid" and the bottom section is labeled "Set Value". The checkboxes are numbered 0 through 15. In the "Valid" section, all checkboxes are unchecked. In the "Set Value" section, all checkboxes are unchecked.

Valid							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0	1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	9	10	11	12	13	14	15

Set Value							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0	1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	9	10	11	12	13	14	15

Figure 3.28 IO Input Setting Dialog Box

Filling

1. Click the Fill button on the left, and the dialog box shown below will appear.

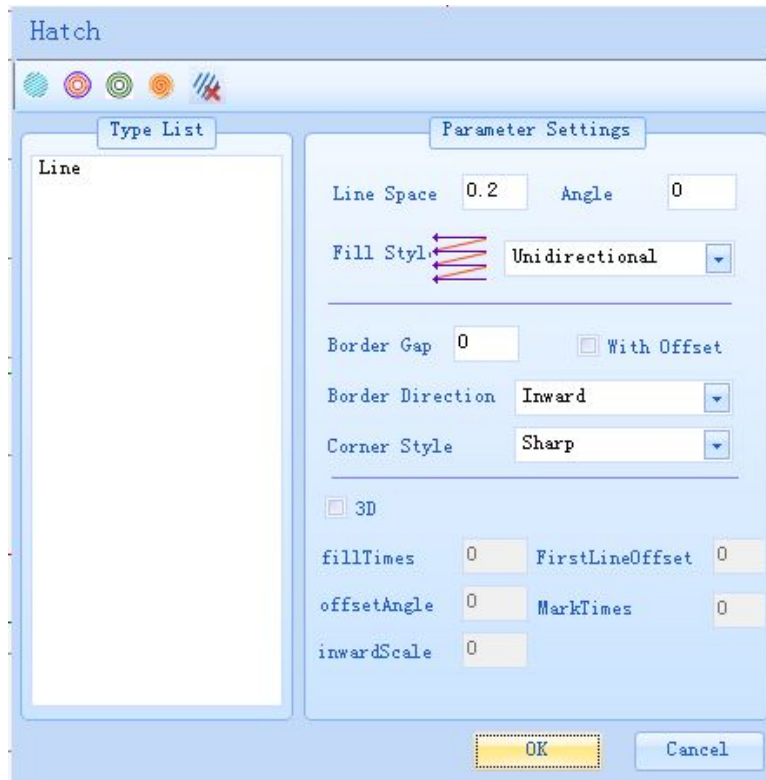


Figure 3.29 Fill Settings Dialog

How to use the fill tool will be explained in detail in Section 2, "Vector Fill Settings" in this chapter.

Shortcut toolbar buttons: 

Filling

In visual mode, click the left-side visual interception template button, left-click the template in the canvas to intercept irregular graphics for template comparison, and right-click to indicate the end of interception.

Shortcut toolbar buttons: 

➤ Graphics Operation Section

Moving object

1. Move the mouse into the graph until the mouse displays a finger cursor.

2. Press and hold the left mouse button.
3. Drag the mouse. The move position is dynamically displayed in the view.
4. Move the object to the appropriate position and release the mouse. Or you can press Ctrl+up, down, left and right keys to fine-tune

Lateral stretch 

1. Move the mouse to the horizontal stretch control point of the tracker until the mouse displays the cursor.
2. Press and hold the left mouse button.
3. Drag the mouse to dynamically display the horizontal stretching state of the object in the view.
4. Stretch to a suitable size and release the mouse.

Longitudinal stretch 

1. Move the mouse to the vertical stretch control point of the tracker until the mouse displays the cursor.
2. Press and hold the left mouse button.
3. Drag the mouse to dynamically display the longitudinal stretching state of the object in the view.
4. Stretch to a suitable size and release the mouse.

Zoom 

1. Move the mouse to the control point on the corner of the tracker until the mouse displays the cursor.
2. Press and hold the left mouse button.
3. Drag the mouse to dynamically display the zoom status of the object in the view.
4. Zoom to an appropriate size and release the mouse.

3-2 Vector Fill Settings

➤ Preliminary Setup of Objects

After selecting the vector diagram of the drawing area, click the "Home" button in the menu bar, select the "Fill" tool in the "Shortcut" option, or select "Fill" in the "Drawing Editing Window" - "Drawing Bar" tool. The following dialog box pops up.

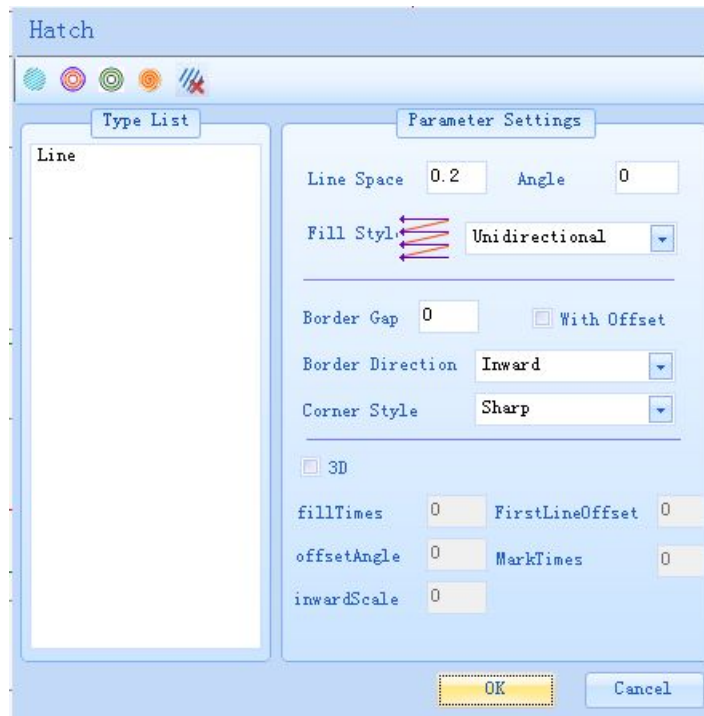


Figure 3.30 Fill Settings Dialog

The Fill dialog box provides five operations, namely Line Fill, Offset Fill, In/Out Fill, Spiral Fill, and Delete Fill, as shown in the following figure from left to right.

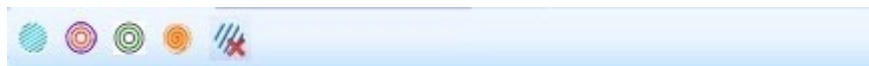


Figure 3.31 Fill Button Shortcut Toolbar

If you import a PLT file on the drawing board at this time, as shown in the following figure.

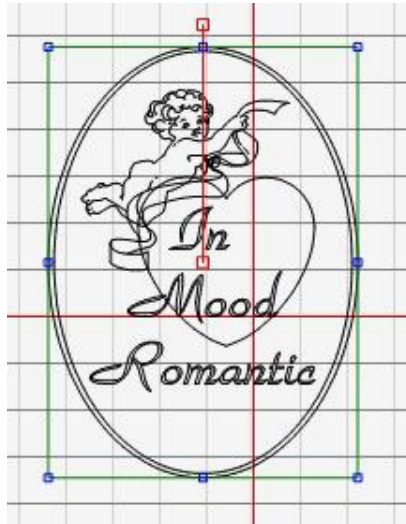


Figure 3.32 PLT Vector Illustration

After selecting the PLT graph, click the Line Fill button, and the Fill dialog box as shown below will pop up. The filling method can be selected in the dialog box. The default open interface is determined by the user clicking the offset type. The user can modify the corresponding filling parameters to achieve the desired effect.

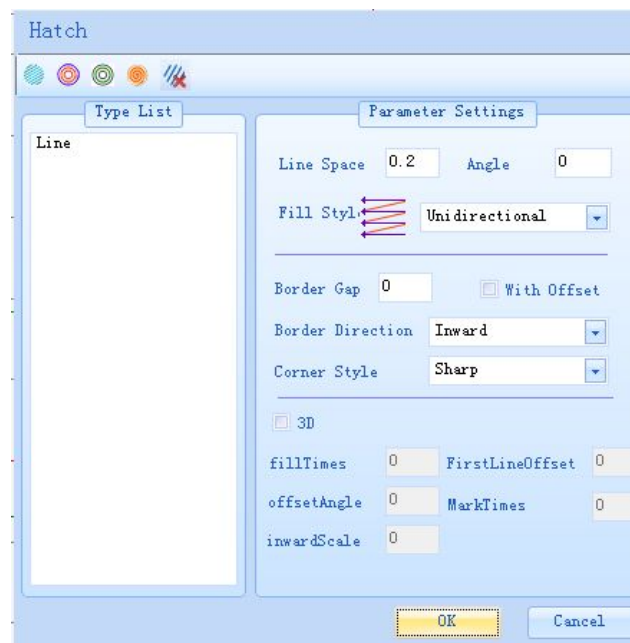


Figure 3.33 Line Fill dialog box

The filling effect is shown in Figure 3-4:



Figure 3.34 Filling effect diagram

➤ Definition of padding parameters

Line Fill Parameter Definition

The Line Fill dialog box is shown in the figure.

【Padding】 Set the spacing of fill lines, unit: mm.

【Fill angle】 The angle of the fill line, the default is 0 degrees, the range is (-360, 360).

【Way】 The trajectory of the filling line can be divided into one-way, two-way, serpentine and other ways, and users can choose according to their own needs.

【Border spacing】 The distance between the padding content and the outer frame, unit: mm.

【Is it offset】 Whether to fill the outline of the line after drawing the offset.

【Border direction】 The offset direction of the filling line, divided into inward and outward.

【Corner style】 When the boundary direction is selected to be outward, this function is effective, divided into sharp and smooth transitions.

【3D fill effect】 Fill special application, equivalent to a shortcut for multiple filling

【Fill times】 That is, the number of filling times when the same parameter is.

【Offset angle】 The offset of the angle each time it is filled

【Indentation】 Each time it is filled, the fill data is reduced by the amount

【First line offset】 When filling for the first time, where to start filling in the graph

【End row offset】 When filling for the first time, where in the graph to end the filling

Offset Fill Parameter Definition

The Offset Fill dialog box is shown in the figure.

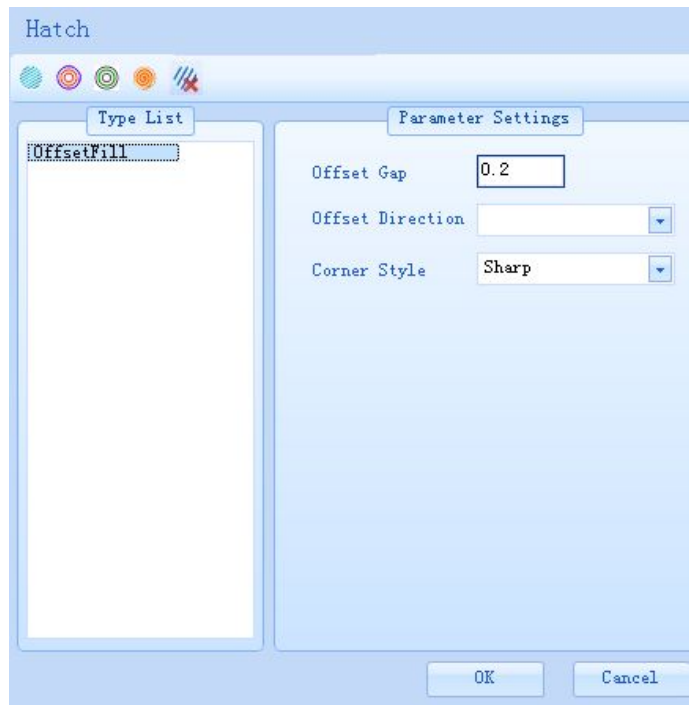


Figure 3.36 Offset Fill Dialog

【Offset spacing】 Set the spacing of fill lines, unit: mm.

【Offset method】 The offset starting position is divided into two types: from the inside to the outside and from the outside to the inside.

【Corner style】 There are two types of transition methods for filling the corners of graphics: sharp and smooth.

Inner and Outer Offset Fill Parameter Definition

The Offset Fill dialog box is shown in the figure.

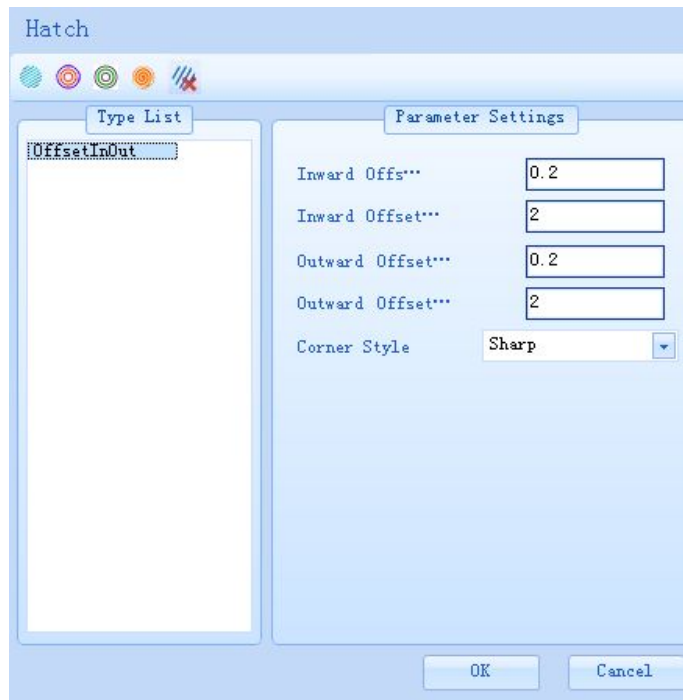


Figure 3.37 Inner and Outer Fill dialog box

【Inner offset spacing】 The inward offset distance of the graphics, unit: mm.

【Number of inner offsets】 The number of times the graph is shifted inward.

【Outer offset spacing】 The distance that the graphic is offset outwards, unit: mm.

【External offset times】 The number of times the graph is offset outward.

【Corner style】 There are two types of transition methods for filling the corners of graphics: sharp and smooth.

Spiral fill parameter definition

The Spiral Fill dialog box is shown in the figure.

【Helix pitch】 Set the spacing of fill lines, unit: mm. 【Spiral

way】 The offset starting position is divided into two types:

from the inside to the outside and from the outside to the inside. **【Corner style】** There are two types of transition methods for filling the corners of graphics: sharp and smooth.

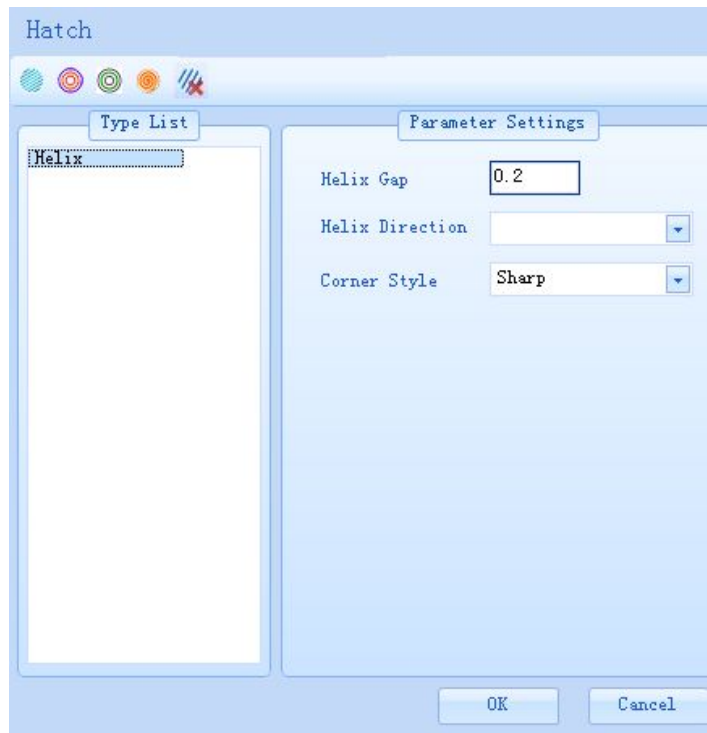


Figure 3.38 Spiral Fill Dialog Box

Composite object fill

1. Draw multiple overlapping objects (such as circles and rectangles).
2. Pick up multiple objects (such as circles and rectangles).
3. Combine all objects in the selection set (circles and rectangles are combined into a single object).
4. Filling the object will produce the following effect.

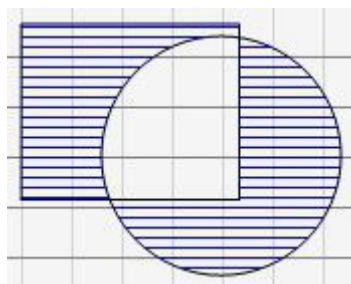


Figure 3.39 Combined object fill effect

Multiple overlapping object fills

1. Draw multiple overlapping objects (such as circles and rectangles).
2. Pick up multiple overlapping objects (such as circles and rectangles).
3. Filling the object will produce the following effect.

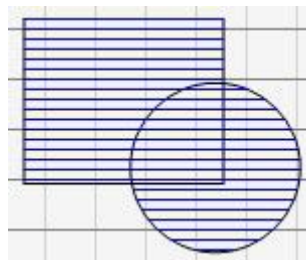


Figure 3.40 Group Object Filling Effect

Modify hatch settings

1. Pick the fill object you want to modify.
2. Select the "Fill" command or double-click the fill object.
3. Modify the fill properties.
4. Click "Confirm".

Remove fill line

1. Pick the fill object you want to modify.
2. Select the "Delete Fill" command in the graphics property bar.

➤ Graphics Transform Settings

~~Graphic mirroring~~

After selecting the vector graphics in the drawing area, click the "Tools" button in the toolbar, as shown in the figure below, there are two ways to transform the graphics: mirror mode and move to the origin.



Figure 3.41 Graphic Transformation Toolbar

There are two types of mirroring modes: horizontal mirroring and vertical mirroring, as shown in the following figure.



Figure 3.42 Graphic Mirror Toolbar

【Horizontal mirror】 Flip the object relative to the Y axis.

【Vertical mirror】 Flip the object relative to the X axis.

【Horizontal flip】 Flips relative to the object's own vertical axis of symmetry.

【Flip vertically】 Flips relative to the object's own horizontal symmetry axis.

【Move to origin】 The selected shape is moved to the center of the canvas.

➤ Graphics Array Settings

Rectangular array

Select one or more graphics, click the menu option "Tools" as shown below:

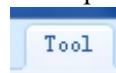


Figure 3.43 Array Toolbar

Then click the "Rectangular Array" button, as shown below:



Figure 3.44 Rectangular Array of Buttons

The Rectangular Array dialog box will pop up as shown below:

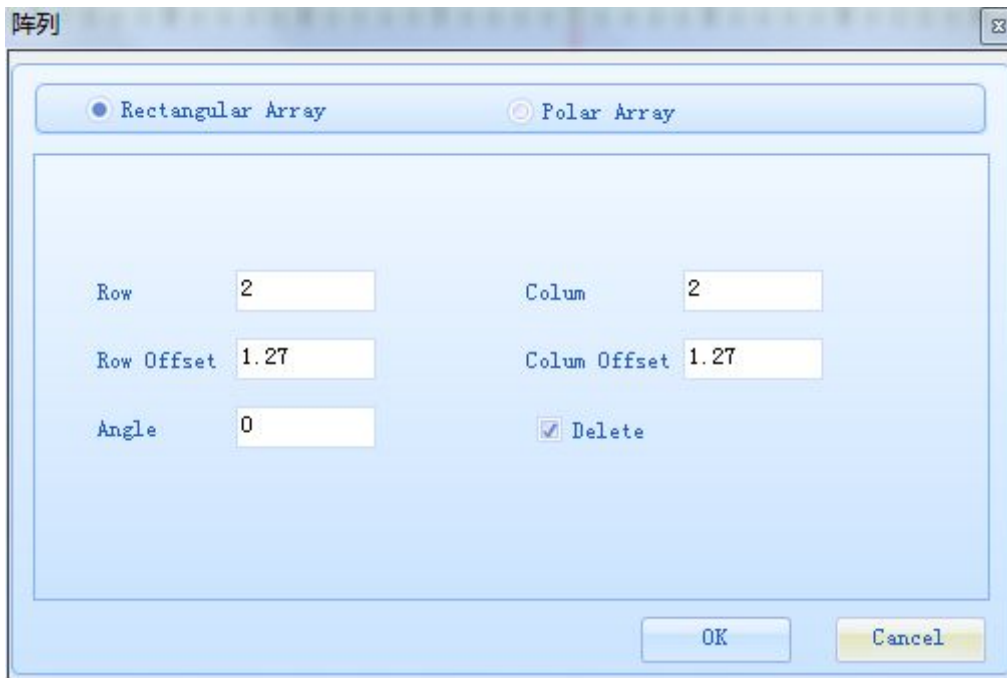


Figure 3.45 Rectangular Array Setting Dialog Box

Parameter Description

【Row】 The number of rows in the rectangular array.

【List】 The number of columns in the rectangular array.

【Line offset】 The edge distance between adjacent graphics in each row.

【Column offset】 The edge distance between adjacent graphs in each column. 【Angle】 The rotation angle of all graphics after the array is completed.

【Delete】 Whether to delete the original graphics.

Circular array

Select one or more graphics, click the menu option "Tools" as shown in the figure:

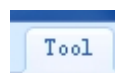


Figure 3.46 Array Toolbar

Then click the "Rectangular Array" button, as shown below:



Figure 3.47 Circular Array Button

The Rectangular Array dialog box will pop up as shown below:

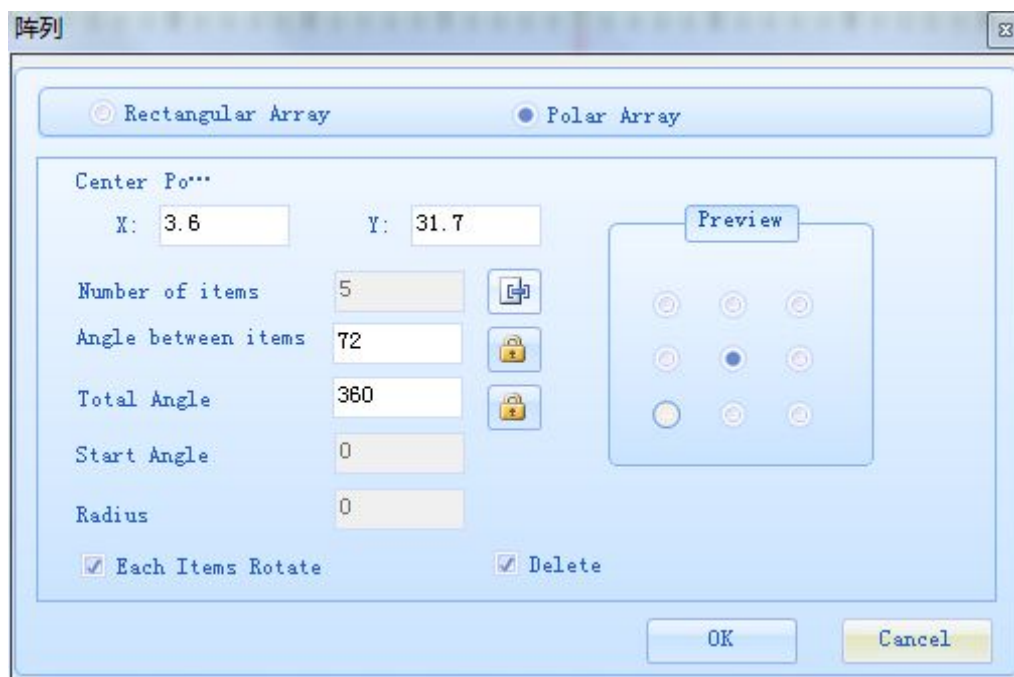


Figure 3.48 Circular Array Setting Dialog

Parameter Description

【Center point】 The X and Y coordinates of the rotation center point.

【Number】 Number of graphics.

【Spacing】 The angle difference between the rotated figures.

【Total angle】 Set the maximum rotation angle value.

【Rotate】 Whether the graphics also follow the rotation when the graphics are in a circular array.

【Delete】 Whether to delete the original graphics.

➤ Graphical arrangement

Arrange menu

Click the "Arrange" button in the menu bar, as shown in the figure below, you can see that the software provides users with various arrangement methods such as alignment, size adjustment, and horizontal distribution.

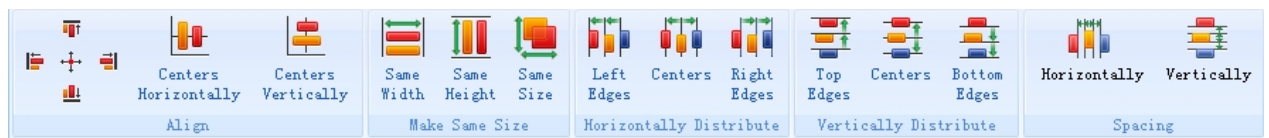


Figure 3.49 Graphics Arrangement Toolbar

Alignment

【Align left】 Based on the last drawn graphic, the left border of the remaining selected graphics is aligned with the left border of the graphic.

【Align right】 Based on the last drawn graphic, the right border of the remaining selected graphic is aligned with the right border of the graphic.

【Top align】 Based on the last drawn graphic, the upper boundary of the remaining selected graphics is aligned with the upper boundary of the graphic.

【Align down】 Based on the last drawn graphic, the lower boundary of the remaining selected graphics is aligned with the lower boundary of the graphic.

【Center horizontal alignment】 Based on the last drawn graphic, the center points of the remaining selected graphics are aligned with the center point of the graphic in the horizontal direction.

【Center vertical alignment】 Based on the last drawn graphic, the center point of the remaining selected graphics is aligned with the center point of the graphic in the vertical direction.

Resize

【Equal width】 The width of the two graphics is the same based on the last graphic drawn.

【Equal height】 The width of the two graphics is the same based on the last graphic drawn.

【Equal size】 The two figures are the same size based on the last figure drawn.

Note: If the selected graphic includes a circle, it is based on the size of the circle.

Horizontal distribution

【Left distribution】 Select more than two graphics on the canvas, keep the positions of the graphics at both ends unchanged, and adjust the position of the middle graphics so that the left borders of the three graphics are equally spaced.

【Right distribution】 Select more than two graphics in the canvas, keep the positions of the graphics at both ends unchanged, and adjust the position of the middle graphics so that the right borders of the three graphics are equally spaced.

【Center horizontal distribution】 Select more than two graphics on the canvas, keep the positions of the graphics at both ends unchanged, and adjust the position of the middle graphics so that the center points of the three graphics are equally spaced.

Vertical distribution

【Upper distribution】 For more than two graphics in the middle canvas, the positions of the graphics at the upper and lower ends remain unchanged, and the position of the middle graphics is adjusted to make the upper boundary of the three graphics equal.

【Down distribution】 Select more than two graphics in the canvas, the graphics positions at the upper and lower ends remain unchanged, and the position of the middle graphics is adjusted to make the lower boundary spacing of the three graphics equal.

【Center vertical distribution】 Select more than two graphics on the canvas, the positions of the graphics at the upper and lower ends remain unchanged, and the position of the middle graphics is adjusted so that the vertical distance between the center points of the three graphics is equal.

Equally spaced distribution

【Horizontal distribution】 Select more than two graphics in the canvas, and the distance between them is equal from left to right.

【Vertical distribution】 Select more than two graphics in the canvas, and the distance between them is equal from top to bottom.

➤ Graphic property management

After drawing a graphic, the property management interface will appear in the lower left corner, where you can modify graphic properties.



The image shows a 'Rectangle Property' dialog box with a light blue background. It contains several input fields and checkboxes. The 'X' coordinate is -24.089, 'Y' is -24.729, and 'Z' is 0.000. Below these, 'Rotate Angle' is 0.000. 'Height' is 36.027 and 'Width' is 44.981. There are checkboxes for 'Outline' and 'Hatch', both of which are checked. To the right of the 'Height' and 'Width' fields is a lock icon. At the bottom, there are two buttons: 'Hatch' and 'DeleHatch'.

Rectangle Property	
X	-24.089
Y	-24.729
Z	0.000
<hr/>	
Rotate Angle	0.000
Height	36.027
Width	44.981
<input checked="" type="checkbox"/> Outline	<input checked="" type="checkbox"/> Hatch
<hr/>	
Hatch	DeleHatch

Figure 3.53 Graph Properties Dialog Box

The X, Y, Z coordinates of the reference point represent the coordinates of the graphic on the canvas (unit: mm), the rotation angle represents the angle of the graphic, and the filling effect can be set or deleted.

Outline enable: When this option is checked, it means that the outline part will be marked during marking, otherwise it will not be marked.

Filling enable: When this option is checked, it means that the filling part will be marked when marking, otherwise it will not be marked.

Outline first, fill first: Indicates the priority order when marking

Visual property module: template parameters need to be set during visual marking, see visual settings for details

➤ Object management

Introduction: Object management is mainly used to operate layers and objects added by users, as shown in the following figure:

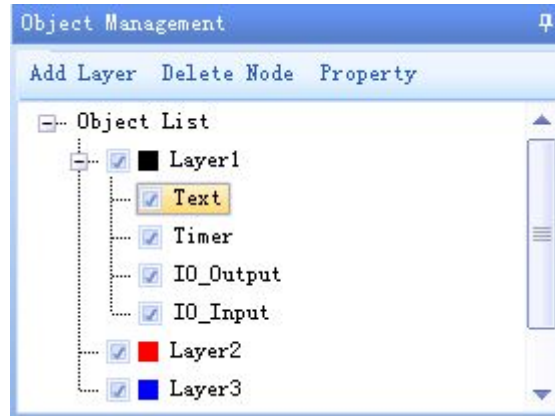


Figure 3.54 Node Management Window

【Add layer】 Add layer objects.

【Delete layer/shape】 Delete layers or user-added objects.

【Layer properties】 Used to manage the properties of each layer itself. Instructions for use: After clicking the "Layer Properties" button, the following property management window will pop up:

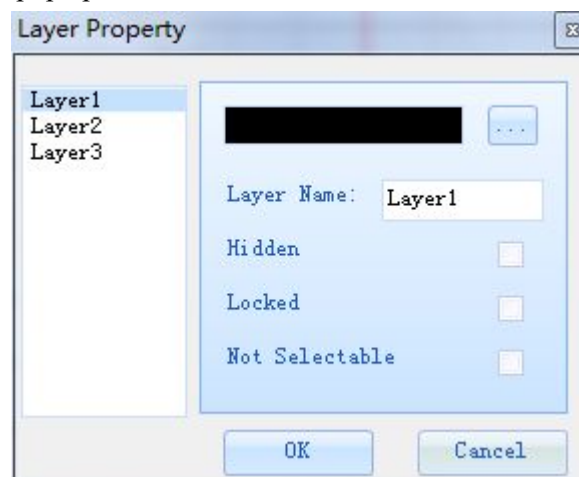


Figure 3.55 Layer Management Dialog Box

【Name】 Used to modify the layer name.

【Colour】 Used to modify the layer color.

➤ Parameter management

Introduction: Parameter management is mainly used to manage the relationship between object lists and layers, layers and graphics, and to customize user parameters. The operation interface is as follows:

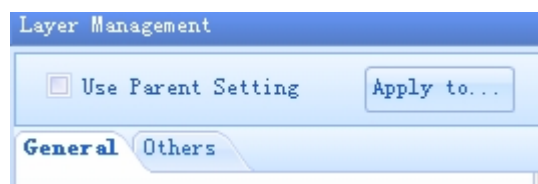


Figure 3.56 Parameter management window

This function divides the object list, layers and graphics into three layers for management, and the layers are from high to low: object list

→Layer → Graphics. When using the default parameters is checked, the layer should follow the marking parameters of the object list, and the graphics are the same.

Chapter 4 Document Marking

➤ Marking menu

The marking menu provides the following commands for marking:



Figure 4.1 Marking Toolbar

【Marking】 Initialize the marking machine to enter the normal marking state

【Mark preview】 Preview the marking process

【Multi-document marking】 Mark multiple open documents in a set order

4.1 Marking

4.1.1 Software Operation

➤ Marking window display

Select the "Marking" option on the menu, as shown below:



Figure 4.2 Marking Menu

Then select the "Mark" button, as shown in the figure:



Figure 4.3 Normal marking button

The following "Normal marking method" dialog box will pop up, as shown in the figure:

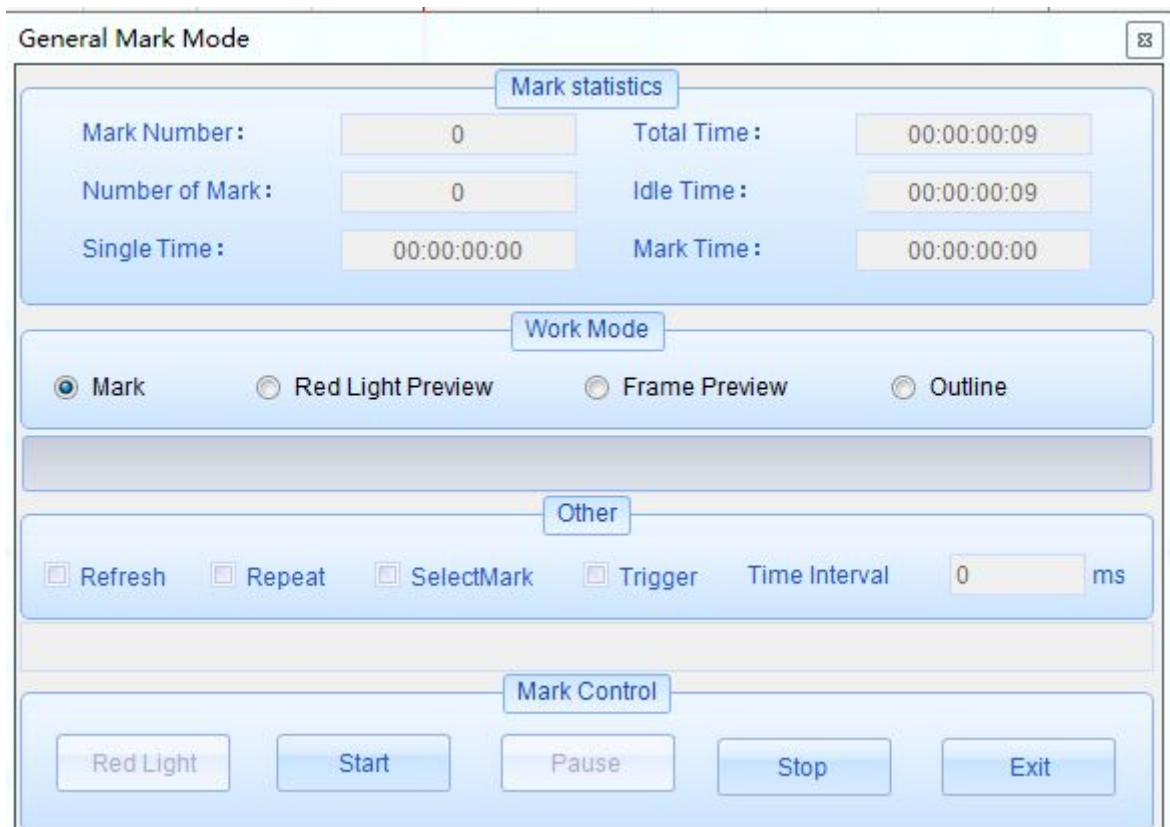


Figure 4.4 Common Marking Control Frame

Select "Marking" in the "Marking" option on the menu, and the "Normal Marking Method" dialog box will pop up, as shown in the figure above:

➤ Operation introduction

Total number of marks

Refers to the number of documents that have been marked currently.

Number of markings

Refers to the number of documents that are currently clicked to mark.

Single time

Refers to the time required to mark a document.

Overall time

Refers to the time required for the entire process of marking a document.

Free time

Refers to the time required for no marking.

Marking time

Indicates the time required for marking.

Marking

Select the "Marking" option, click the "Start" button to start marking, and the progress bar will dynamically display the current marking status.

Note: During the marking process, because the laser is invisible light, all personnel beside the machine must pay attention to their own safety.

Cyclic marking

Tick "Cyclic Marking", then click the "Start" button to connect the objects in the marking task. Continue marking. When you need to stop, you can click the "Abort" button or the "Pause" button to stop the work. **Time interval**

In cyclic marking, the delay time between the completion of each marking and the next marking.

Refresh the interface

When making a jump number, if this item is selected, the objects on the screen will change in real time with the actual marking situation, but it will affect the marking efficiency.

Red light preview

For the marking machine with red light prompt, before laser marking, you can watch the whole marking process through the red light preview function. Select the "red light preview" option, click the "Start" button, you can watch the entire marking process, in the preview state, the progress bar will dynamically display the current marking state.

Border preview

For the marking machine with red light indication, before laser marking, the marked area can be previewed through the frame preview function.

Red light

Switch red light display.

Marking Statistics

During the marking process, the system automatically counts the marking data, such as the total number of markings, the number of markings, single time, total time, marking time, and idle time.

4.2 Marking Preview

The marking preview is mainly used to preview the marking timing when the marking machine is working (as shown in the figure), restore the original graphics or text on the screen according to the graphics drawn by the user on the interface, and view the path of the laser marking. The marking preview module can control the marking speed, and the interface is simple and elegant, which is more user-friendly.

After clicking the refresh button, select the marking button in the upper toolbar, and select the marking preview, as shown in the following figure:



Figure 4.5 Marking Preview Button

Click the Marking Preview button and the following interface will pop up:

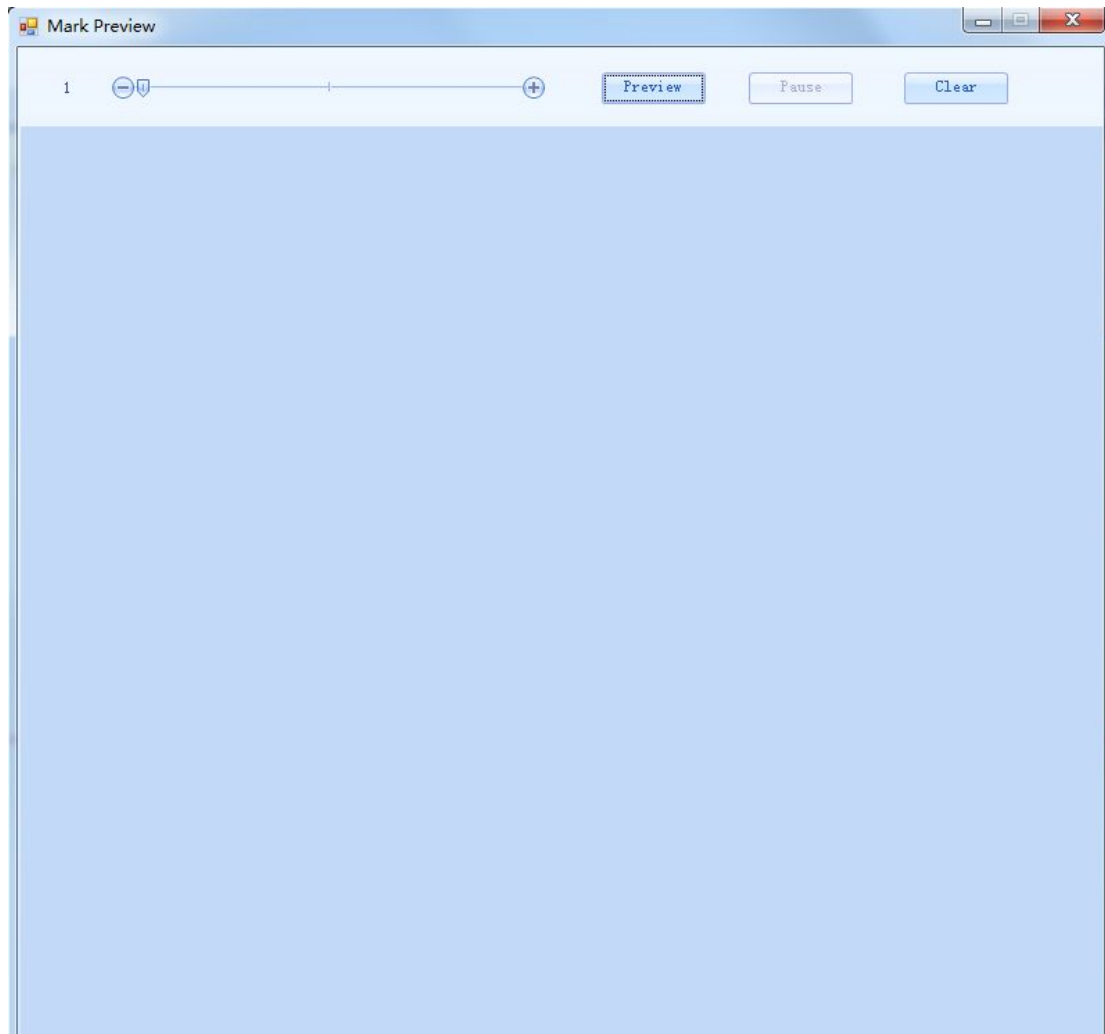


Figure 4.5 Marking Preview Window

First set the marking speed, click to start preview, you can see the effect after marking. When the preview speed goes up

When the degree bar is pulled to the right end, the preview speed is the fastest, and vice versa, when the degree bar is pulled to the left end, the preview speed is the slowest.

4.3 Multi-document marking

➤ How to operate

1. The graphics that need to be marked in turn can be drawn in turn by creating a new document or opening a document.
2. Click the menu "Marking", as shown below:



Figure 4.6 Marking Menu

Then select the "Multiple Document Marking" button, as shown below:



Figure 4.7 Multi-document marking button

Clicking "Multi-document marking" will pop up a multi-document dialog box, as shown below:

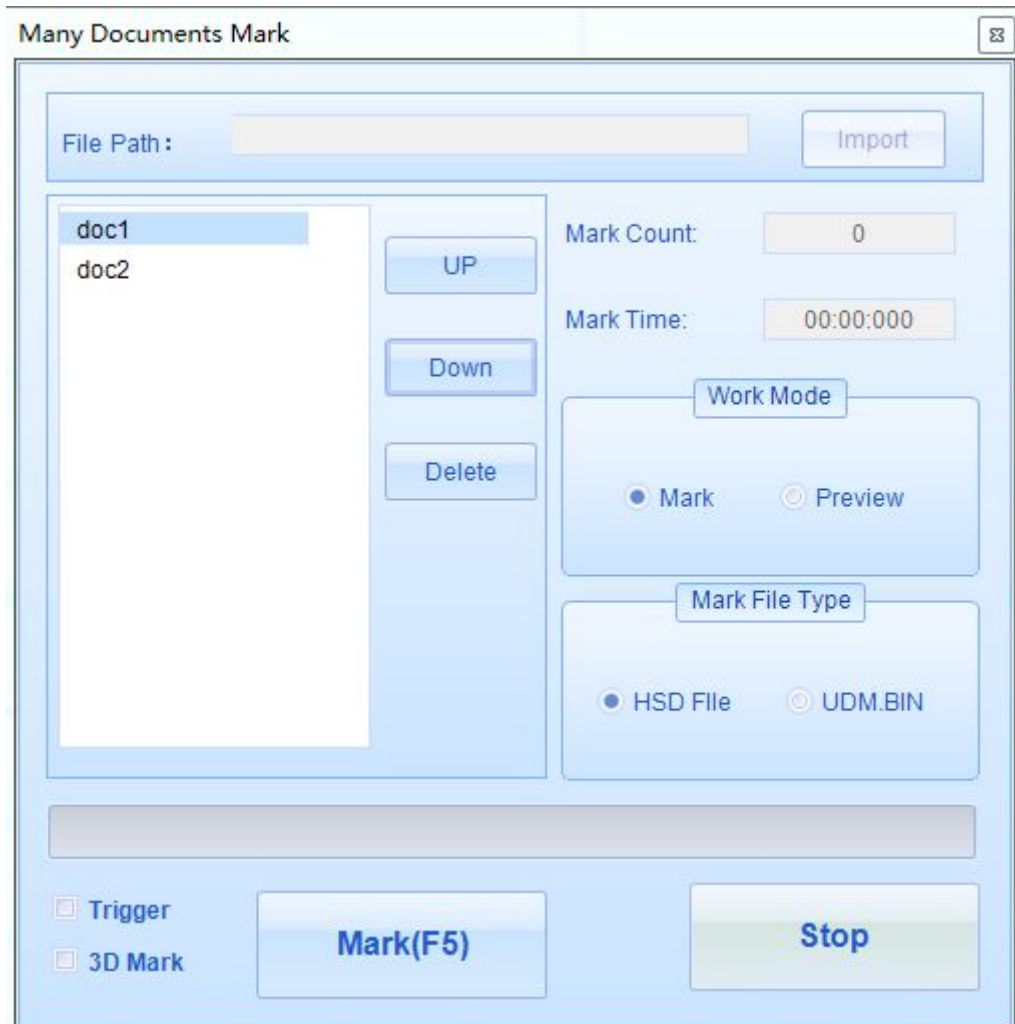


Figure 4.8 Multi-document marking control interface

In the list box in the upper left corner of the dialog box, all the currently opened documents are listed in sequence, and the sorting order is the marking order. The marking order can be changed by clicking the "Move Up" and "Move Down" buttons as required. Click the Delete button to delete the currently selected document (but not the document entity) from the list box.

➤ Operation introduction

Number of markings

Refers to the number of documents that have been marked currently.

Current page time

Indicates the time required to mark the currently selected document.

Operating mode

Choose from different ways of working.

Note: The other buttons are the same as the general marking functions, and will not be described in detail here.

4.4 On-the-fly marking

➤ How to operate

1. Click the menu "Marking", as shown below:



Its software design interface is as follows:

Fly Mark

Mark Info

Mark Count: 0

Time: H:M:S:MS 00:00:00:00

Current Count: 0

Idle M:S:MS 0:0.000

Work Status

Normal...

Clear Alarm

☒ Change Position IP: 172 . 18 . 34 . 227 Port: 5000

Recycle Mark

☐ Repeat

Delay(ms): 0

Trigger Mark

☐ Trigger

Delay(ms): 0

Same Space Mark

☐ Same Space

Space(mm) 10

Coding Wheel

Get Speed

0.0 (m/min)

Mark

Stop

➤ Operation introduction

Manually switch marking documents

Manually switch the current document to be marked, the document is the opened document.

Speed setting

The speed of the current flying marking can be set, which can be divided into two aspects: constant speed marking and variable speed marking, as shown in the figure below:

Working mode setting: The speed mode setting has two options of constant speed flight and speed measurement flight for users to choose.

Constant speed setting: When the mode selects constant speed flight, the speed value will be filled in, and its speed value is the running speed of the conveyor belt.

Encoder setting: When the mode is selected for speed measurement flight, the diameter and the number of lines of the encoder will be filled in.

Mode settings

According to the targeted flight marking methods, it is divided into general flight marking, segmented ranging marking, ultra-long content marking, communication flight marking (tobacco), and communication flight marking (tobacco piece marking).

Real-time refresh interface

The real-time refresh is mainly used for the refresh on the jump number, that is, the number can be automatically incremented. Encoder test

After clicking the "Encoder Test" button, the conveyor speed will be displayed in real time.

Distance between two markings

Set the spacing between two marks.

Pipeline speed

The speed of the current pipeline carousel.

Encoder position

The current running position of the encoder.

Manual marking

After clicking this button, marking will start.

Abort marking

Aborting marking will directly abort the current marking state.

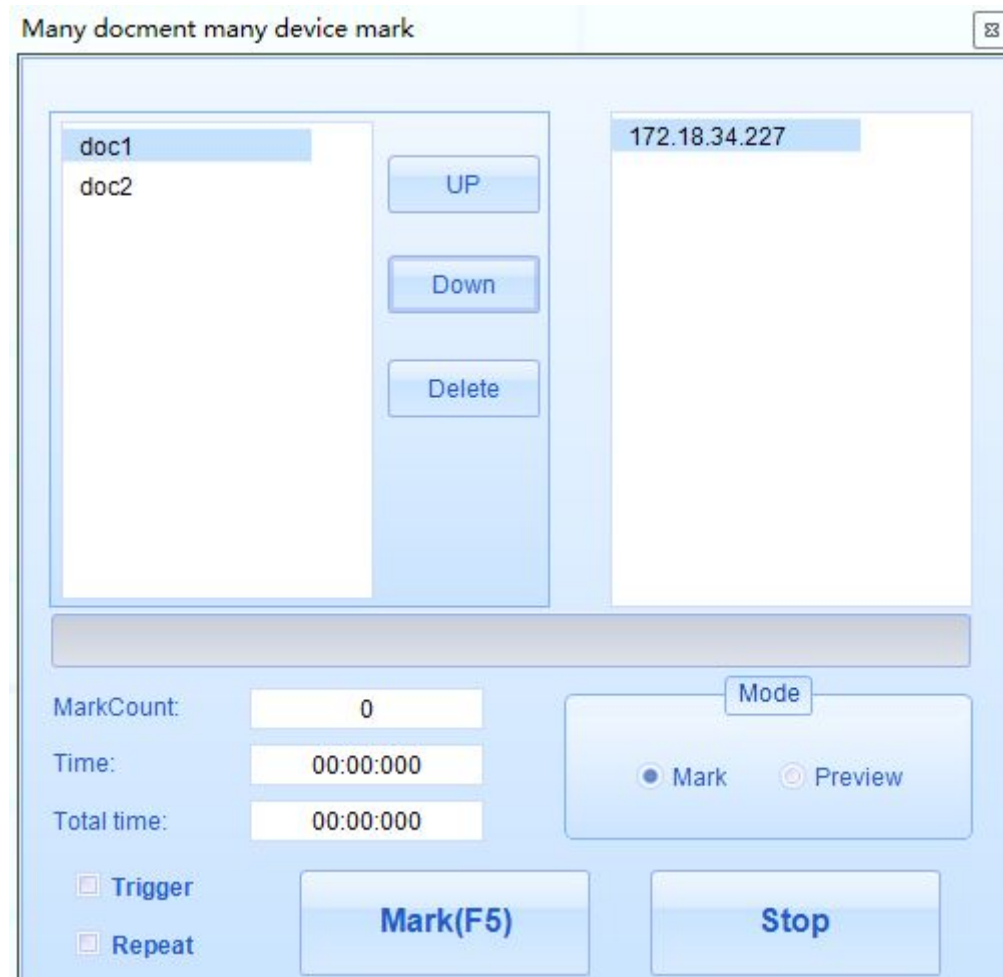
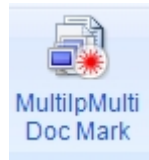
Clear the counter

Clear the counted marking times.

4.5 Multi-card marking

Multiple marking control cards can be connected through a switch, so that different cards can be marked with different graphics, and the documents and marking cards correspond one-to-one.

The operation is shown in the following figure:



4.6 Signal marking

Users can select the files to be marked by triggering external IO signals. The operation is shown in the following figure:



Figure 4.6.1

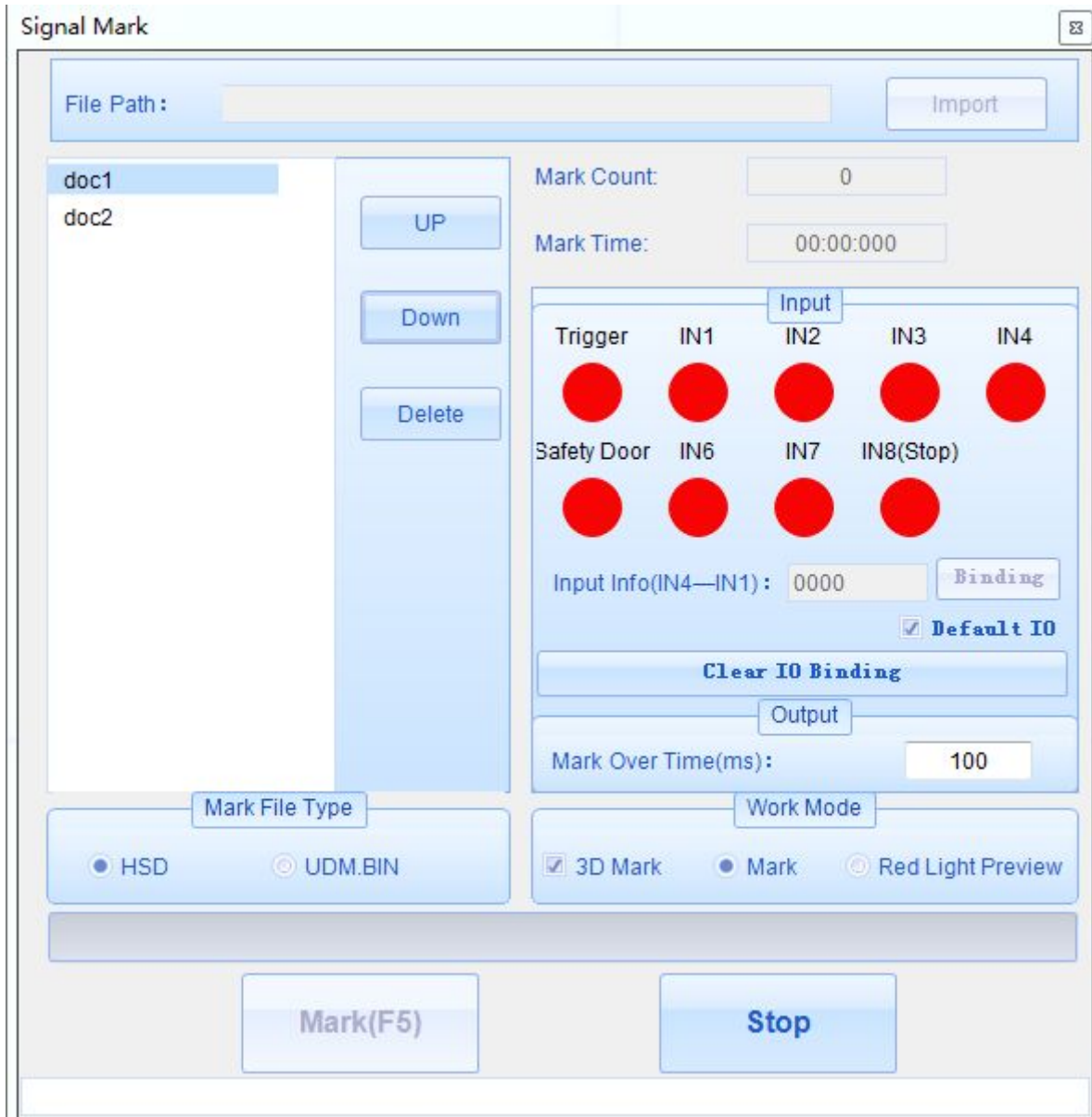


Figure 4.6.2

Marking file format

Select a different marking file format, when select **HSD文件** Loads a document created by the current marking software;

when selecting **Bin文件** **导入** The button is available, click to import the existing command file in the local directory. As shown in Figure 4.6.3 below: You can select multiple files to be marked at the same time, and then click the "Open" button to load the selected files, and the result is shown in Figure 4.6.4

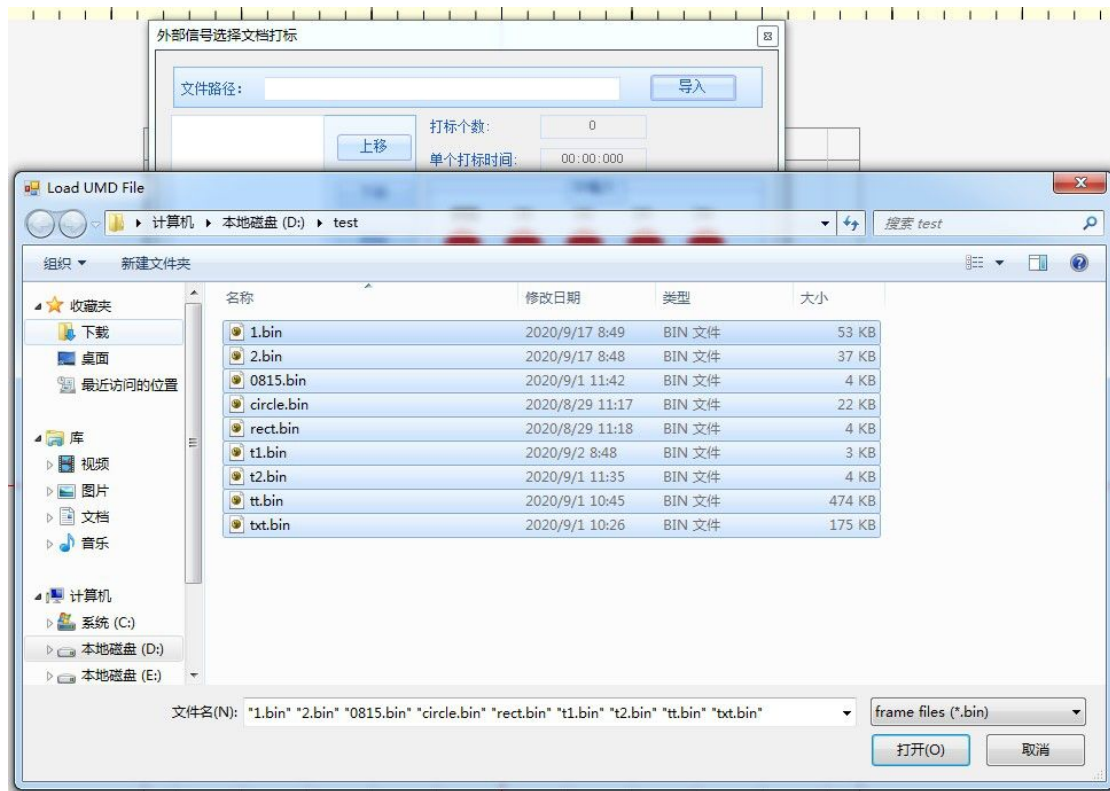


Figure 4.6.3

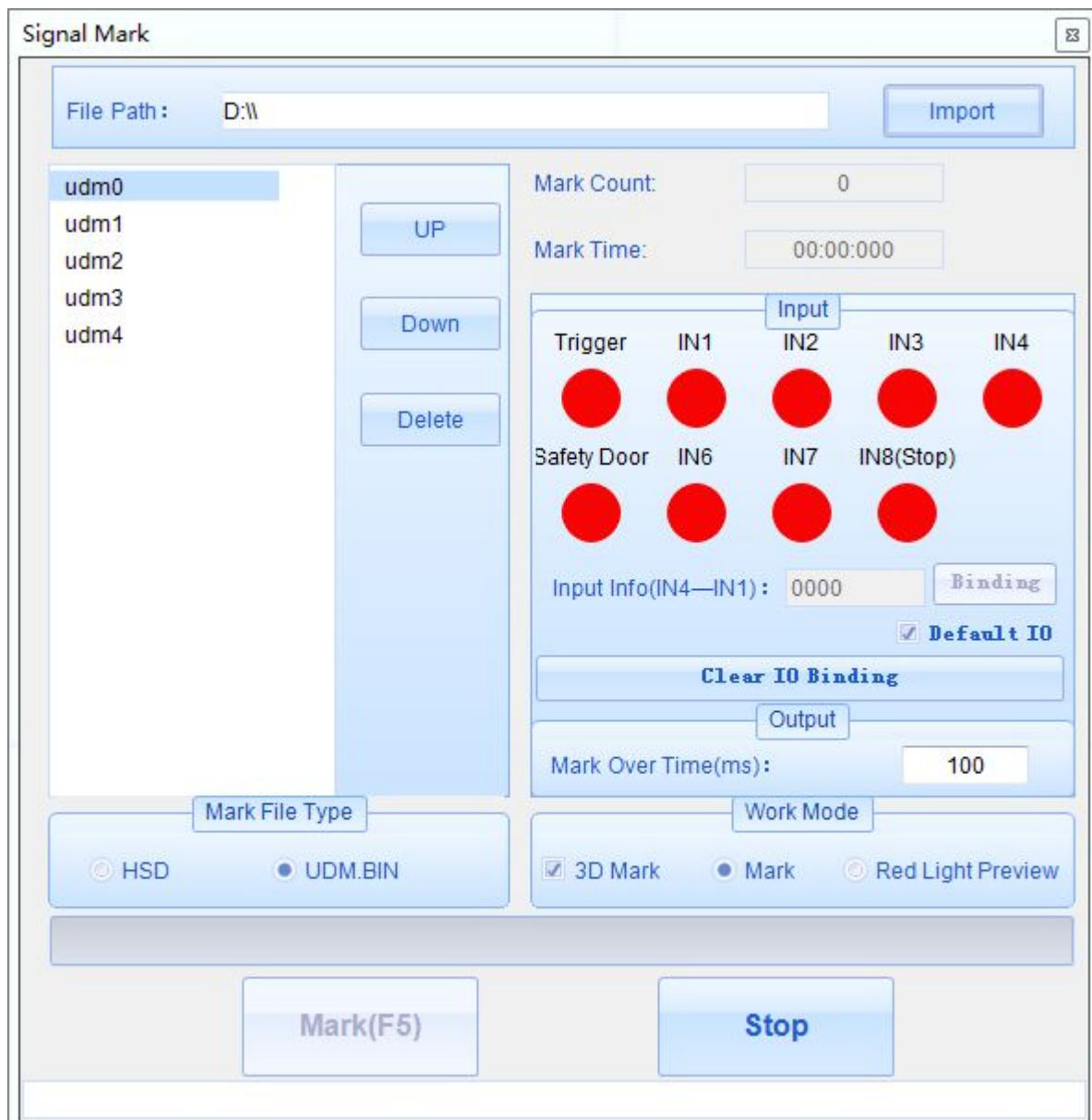


图 4.6.4

Complete signal duration

After the marking is completed, the time that the out1 signal on the marking card continues to be at a high level

- IO bound operations

User can customize IO signal, or choose. ☒ **Default IO**

The IO signal can be set through IN4-IN1, only 0 or 1 can be set (0 is low level, 1 is high level), A total of $2^4 = 16$ different IO signals can be set.

1. Default IO

Among them is IN0, which is equivalent to the start signal. Only when this signal is triggered, can marking start.

The following is the default IO binding information (in binary order), set from the 1st document to the 16th document. It can also be viewed by clicking on the document, as shown in Figure 4.6.5

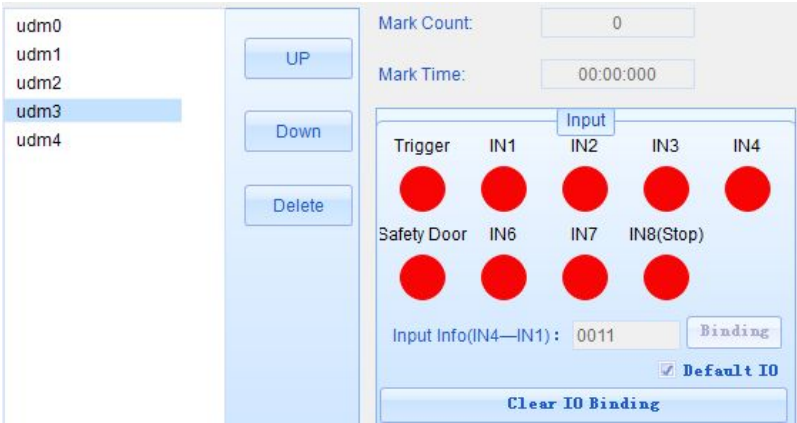


Figure 4.6.5

<div>IO</div> <div>文档号</div>	IN4	IN3	IN2	IN1
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
⋮				
14	1	1	1	0
15	1	1	1	1

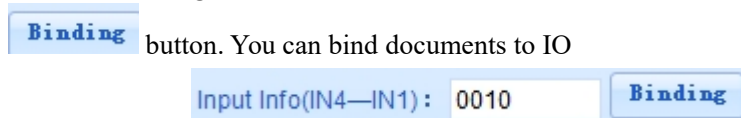
2. Custom IO operation

- Uncheck "Default Apps"

☐ Default IO
- Select a document in the document list on the left side of the interface



- Set the IO information, assuming that the document IO selected in the above figure is bound to 0010, the settings are as follows, and then click



3. Marking operation

After the IO binding is completed, the marking can be triggered through the external IO.

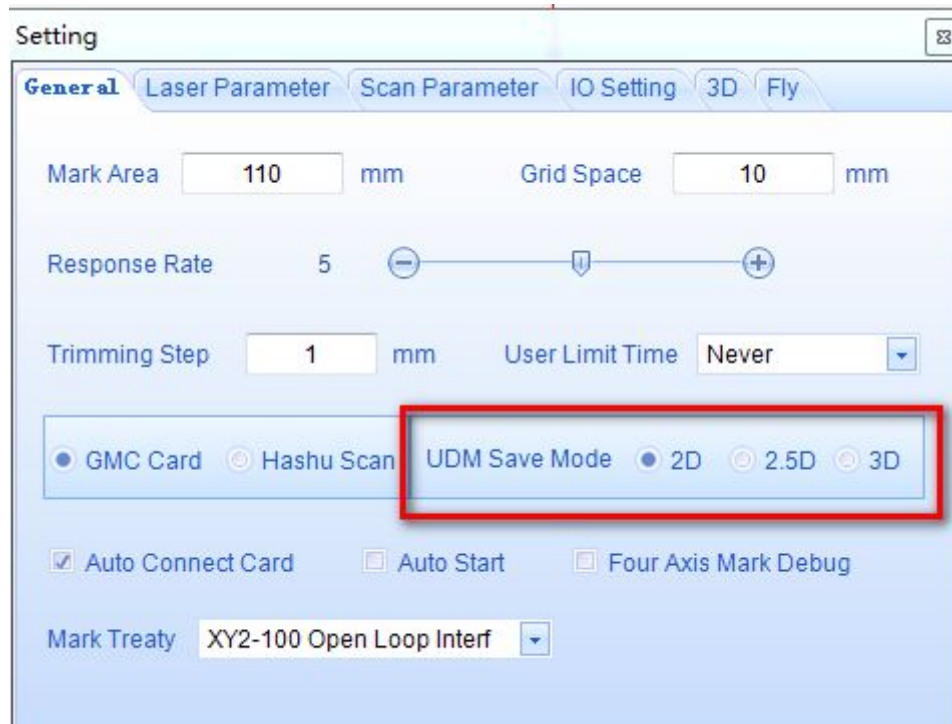
If the IO is bound according to step 2, mark

1 document, **Need to trigger IN2, then trigger the foot pedal (IN0)**, This triggers the marking of the document. When the IN signal is high, the signal light on the interface turns green.

Note: IN0 is the signal to start marking, only when this signal is triggered, can marking start

4.7 Offline marking

Users can choose offline ".hsd" file or ".bin" file according to their needs. After the offline is completed, they can leave the host computer software, and only need to trigger the IO signal to mark. **(Note: When you select ".hsd" offline, you need to choose to save the UDM mode according to the actual marking requirements, as shown in the figure below, and you need to switch to the 3D interface when you select 2.5D or 3D)**



Up to 16 documents can be offline, and SD card needs to be inserted on the marking card when the number of documents ≥ 2 .

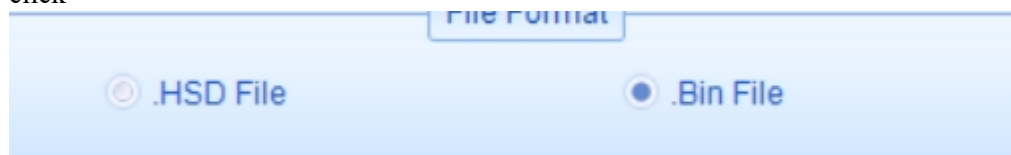
The IO control is the same as the default IO information of signal marking, please refer to the default IO information in 4.6 Signal marking.





➤ Offline Operation Instructions

- Click the "Multiple Document Offline Marking" button
- Select the offline file format, if it is a Bin file, you need to click the **"Import"** button to import the offline file
- click



➤ Clear offline

If there is offline data in the marking card, but it is no longer needed, you can click **"Clear offline data"** to clear the existing offline data. As shown below:



Chapter 5 System Settings

Open the upper left menu button, as shown below:



Figure 5.1 Settings Button Dialog Box

Then click the "Select" button, the system settings dialog box will pop up, as shown below:

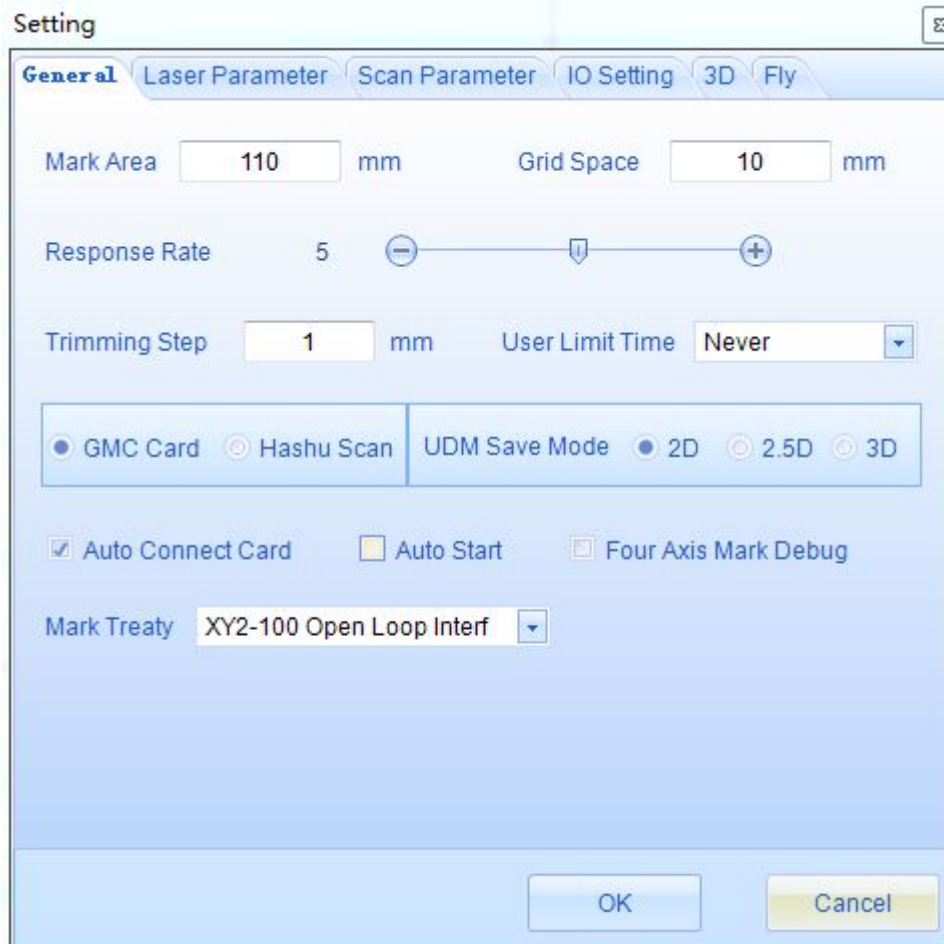


Figure 5.2 Marking parameter setting dialog

5.1 Lasers

Considering that the user can customize the laser, in the "Laser" option, click the "Edit" button to define the name of the laser and the parameters used, as shown below:

The screenshot shows a 'Setting' dialog box with the 'Laser Parameter' tab selected. The dialog contains two columns of parameters, each with a label and a corresponding input field or dropdown menu. The parameters are as follows:

Parameter	Value	Parameter	Value
Laser Type	IPG	LaserOnLevel	High
Power(%)	50	Pulse Width(ns)	
Laser On Delay(us)	110	Bump	1150
Laser Off Delay(us)	110	SPI Waveform	0
Q Delay(us)	0	Maintain Current(A)	0
Q Frequency(KHZ)	100	Idle Power(A)	0
Duty Cycle	0.5	FPS Current	0
Standby Q(KHZ)	100	FPK Length(us)	0
Standby Duty Cycle	0.5	FPK Delay(us)	0
<input type="checkbox"/> Power Depend On Analog		<input type="checkbox"/> PWM Control	

At the bottom of the dialog are 'OK' and 'Cancel' buttons.

Figure 5.3 Laser Library Settings Dialog Box

In the figure above, you can see the newly created laser type and optional parameters.

5.2 Marking parameters

The marking parameters are mainly displayed in the option "Laser Parameters", as shown in the figure below:

Setting - ScanParameter			
Repeat Mark Count	1	<input type="checkbox"/> SkyWriting Enable	
Mark Speed(mm/s)	1000	Umax	2.5
Jump Speed(mm/s)	2000	X Turning Speed(mm/s)	10000
Mark Delay(us)	0	Y Turning Speed(mm/s)	10000
Jump Delay(us)	0	Z Turning Speed(mm/s)	10000
Poly Delay(us)	0	Max Speed Limit(mm/s)	100000
Lead Time(us)	0		
Extend Time(us)	0		

OK Cancel

The marking parameters will be different depending on the control method of each laser. This article will introduce the parameters used by this software, please use them according to the actual situation.

On laser delay (us)

Definition: the adjustment time for combining the starting point of the laser with the starting point of the galvanometer movement, the advance or delay time of the galvanometer before the laser is turned on ($-\infty, 0, +\infty$);

Function: how long to start outputting laser after the effective vector is executed. This value can be positive or negative. When it is positive, it does not respond to the marking time.

Too large: The galvanometer goes too far before the laser turns on, and the strokes start not long enough.

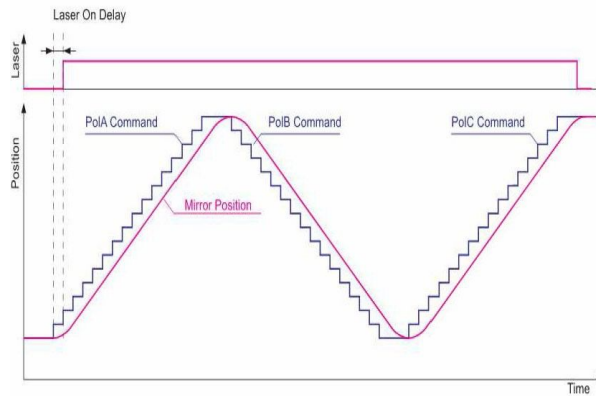


Figure 5.6 Turn on the laser delay time

Too small: If the galvanometer moves too little, the laser will be turned on, and the focus will appear at the beginning of the stroke.

Off laser delay (us)

Definition: The adjustment time for combining the laser tail point and the galvanometer movement tail point, the advance or delay time of the galvanometer before the laser is turned off $(0, +\infty)$;

Function: how long to turn off the laser output after the effective vector is executed. This value is not negative and does not affect the marking time; after the last command of the stroke is given, it will take a period of time to reach the specified position due to the lag of the galvanometer.

Too large: The galvanometer has been fully rotated, and the laser will be turned off after staying for a period of time. The end point of the stroke will form a key point and increase the marking time.

Too small: The galvanometer is not fully turned, the laser is turned off, and the end of the stroke will not be long enough.

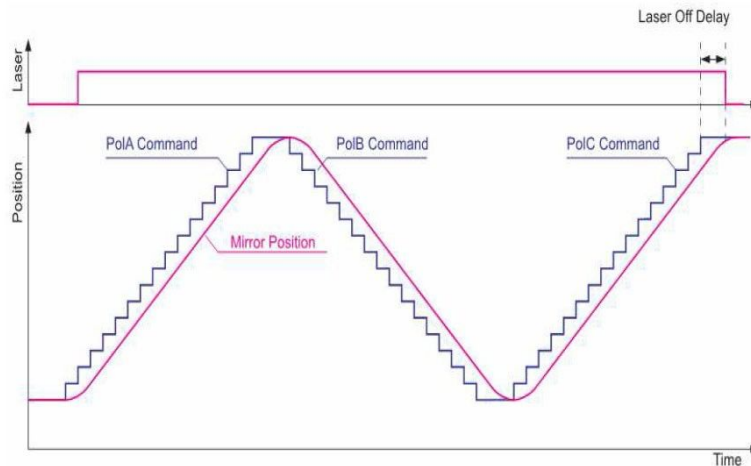


Figure 5.7 Laser Off Delay

Q period (us) / Q frequency (KHz)

Definition: The number of pulses output by the laser per second (Q cycle and Q frequency are inverse relationship), such as 20KHz means 20000 pulses output per second.

Function: Changing the Q frequency/Q period can increase the laser output frequency, reduce the single point energy and peak power, and improve the marking speed to a certain extent.

Too large: the energy gathering time is short, the energy is weak, and the marked points are dense.

Too small: The energy gathering time is long, the energy is strong, and the marked points are sparse.

Laser energy (%)

Definition: The output power of the laser, the setting value is the percentage of full power.

Function: used to set the laser power percentage or laser current of the laser when marking the current layer.

Marking speed (mm/s)

Definition: The speed at which the galvanometer runs during marking.

Too big: The marked strokes are not fine enough, sparse, without depth, and the marking speed is fast.

Too small: The marked strokes are fine, dense and deep, and the marking speed is slow.

Note: The marking speed is generally matched with Q frequency and power debugging, the recommended value: 1000mm/s.

Marking delay (us)

Definition: The delay time of the galvanometer after the laser is turned off (150, + ∞).

Function: To ensure the accuracy and precision of the galvanometer trajectory at the end point position, and to a certain extent, it can reduce the tailing phenomenon of the IPG laser. Too small: In the case of high speed, the end segment of the effective vector trajectory is incomplete and prone to deformation.

Too large: it has no effect on the marking effect, the corners are focused, and the marking time is increased.

Turnover delay (us)

Definition: At the corners, the adjustment time to bring the galvanometer motion curve into place, in the range (0, + ∞).

Function: After the last command of the line segment is given, due to the hysteresis of the galvanometer, it will take a period of time to reach the specified position.

Too large: The galvanometer has been fully rotated, and the next line segment of the stroke will be processed after a period of time. The turning point will form a key point and increase the marking time.

Too small: The galvanometer has not been fully rotated, and the next line segment of the stroke will be processed, and an arc will appear at the corner.

106

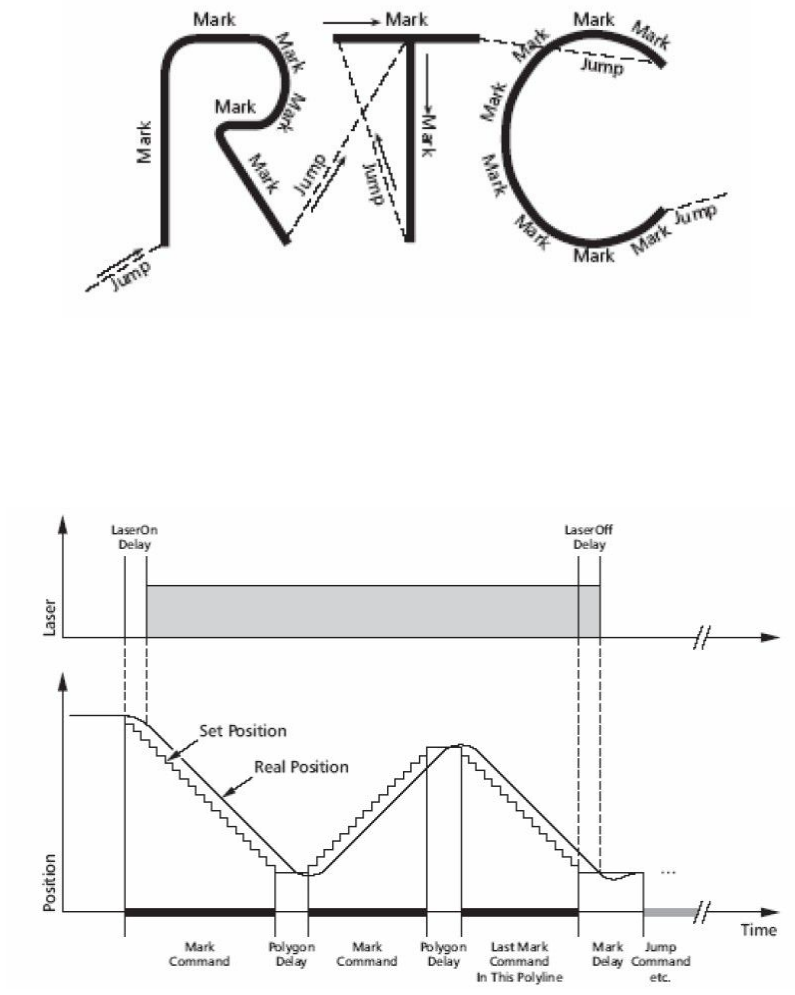


Figure 5.8 Turnover Delay

Jump delay (us)

Definition: After the air jump, the adjustment time to make the galvanometer motion still in place, in the range $(0, +\infty)$.

Function: Continue to execute the next vector command after the galvanometer jumps to the target point.

Too large: The galvanometer has been fully rotated, and the next stroke will be processed after staying for a period of time, which increases the marking time.

Too small: The next stroke will be processed before the galvanometer is fully rotated. Scatter points will appear at the beginning of the stroke, and there will be jitter when starting the stroke.

107

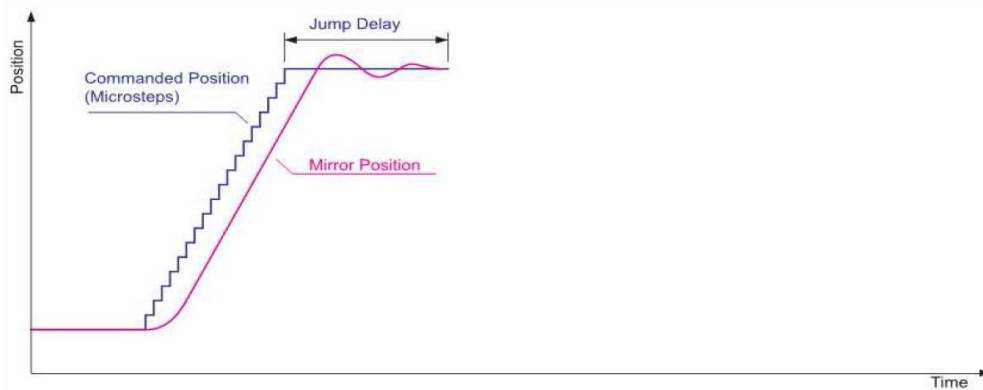


Figure 5.9 Jump Delay

Marking times

Definition: The continuous marking times of a single object after triggering.

Witt Current (%)

Definition: control parameters for end-pump laser turn-on.

Function: If the holding current is too small, the first point will lack light; if it is too large, light will leak during the air jump.

Q pulse width (us)

Definition: Under a certain Q frequency, the light-emitting time of the laser in one cycle;

Function: It is used to adjust the emission energy and peak power of the laser. This parameter has little effect on the fiber laser.

First pulse suppression power (V)

Definition: The energy released under suppression control when simulating Q-drive head pulse compression.

Function: Suppress the head pulse.

First pulse compression length (us)

Definition: Digital/analog Q-drive head pulse compression time.

Function: Compress the first pulse.

First pulse compression delay (us)

Definition: The position where the first pulse signal appears is relative to the position of the on-laser signal.

Function: Compress the first pulse.

Q delay (us)

Definition: The delay of the Q signal relative to the ON laser signal.

Function: Control the laser light output.

No light Q frequency (us)

Definition: Q signal period when no light is emitted.

Function: Q signal period when the laser is turned off.

No light Q width (us)

Definition: Q signal width when no light is emitted.

Function: Q signal width when the laser is turned off.

Notice: CO₂, ultraviolet, green light and other lasers only need a Q frequency and Q pulse width signal, so **the frequency of the no-light Q and the pulse width of the no-light Q must be set to 0**, otherwise the laser cannot be turned off. Of course, in addition to this signal, the lasers of some manufacturers may also need the Laser on signal. At this time, it does not matter whether it is set to 0 or not.

Boot time (us)

Definition: The time when the galvanometer enters the marking direction and reaches the marking speed before the starting point of marking.

Function: Ensure that the galvanometer enters a uniform speed state at the beginning of marking, and ensures that the marking effect at the starting point of marking is uniform.

Extension time (us)

Definition: After marking the end point, the galvanometer still maintains the marking direction and marking speed.

Function: to keep the galvanometer in a constant speed state after the marking is terminated, to avoid the offset of the marking tail point due to the lag of the galvanometer in the subsequent jump instructions; and to ensure the tail when the marking delay parameter is zero Point evenly.

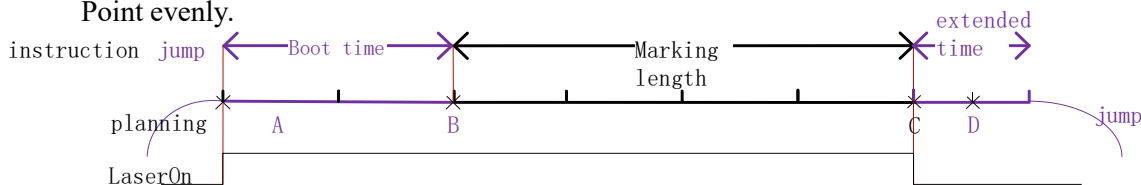


Figure 5.10 Jump Delay

Note: When the jump delay setting is greater than 0, the lead time parameter is invalid; when the marking delay is greater than 0, the extension time parameter is invalid.

Increasing the lead time will increase the laser on delay; increasing the lead time and extension time will increase the overall marking completion time.

Adaptive turning speed

Adaptive turning speed: When this option is checked, the input of the XYZ turning speed value below is invalid, and the system will automatically adjust the turning speed according to the marking speed at this moment. This turning speed is obtained through actual measurement and is more representative sex. When this item is not checked, the turning speed is the user input speed.

X/Y/Z axis turning speed (mm/s)

Definition: When marking a polyline, the change of the X/Y galvanometer movement speed at the corner.

Function: When marking a broken line, once the speed change of the X and Y galvanometers is greater than the set X, Y axis turning speed, a jump command will be automatically added to the corner, so that the marking effect of the turning is obviously sharp.

5.3 Visual Settings

➤ Connect the galvanometer

After the device is connected correctly, the IP address of the device will appear in the device management interface, as shown in Figure 1.1, right-click the IP to connect the device.

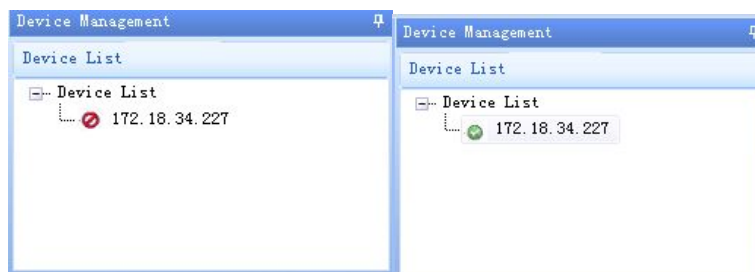


Figure 1.1 Device Connection

➤ Select the "Settings" button on the main menu bar, as shown in Figure 1.2



图 1.2

- Click the "Visual Settings" button, Figure 1.3 will appear, then click "Connect Camera", the camera parameter setting interface will pop up, as shown in Figure 1.4, click the "Connect" button to complete the camera settings, and the real-time image will be displayed in the working area. As shown in Figure 1.5, if you click the "Disconnect" button, the camera is not connected.

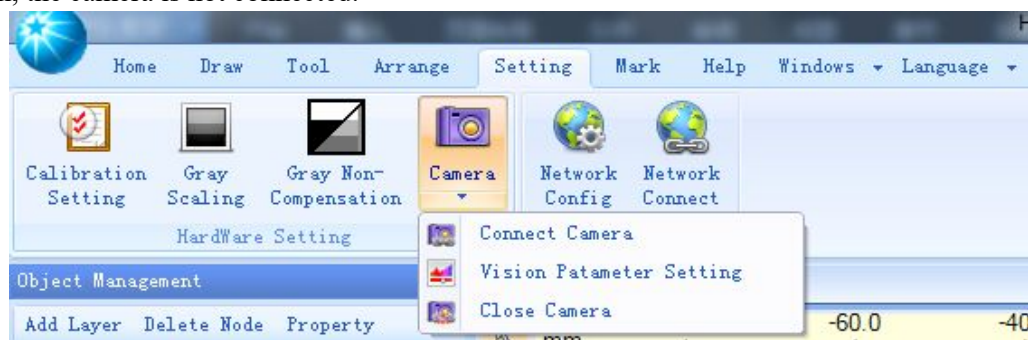


图 1.3

CameraDevice

Device Name

DMK 23G445

Frame Format

Y800 (1280x960)

Frame Rate

30.00003

Serial Number

20314028

Connect

DisConnect

Figure 1.4 Camera parameter settings

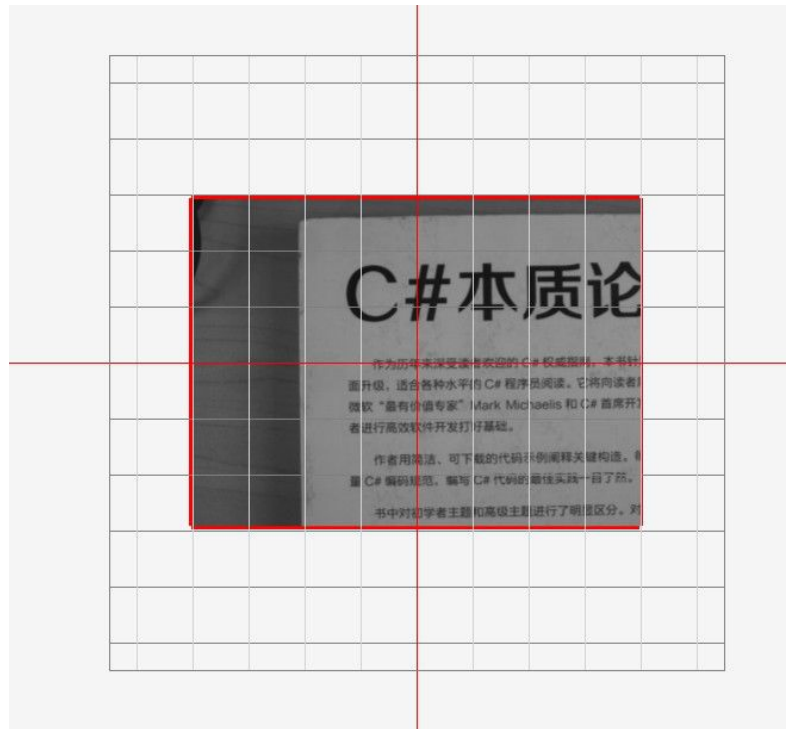



Figure 1.5 Live image captured by the camerav

- After the camera and the galvanometer are connected, you can start some visual operations. First click the last button  in the left toolbar of the main interface, the template can be selected, as shown in Figure 1.6, select "C" as the template. After the template selection is completed, the visual parameter setting interface will pop up, as shown in Figure 1.7. At this time, the outline of the template will be displayed in the work area according to the parameter settings. If the parameters are appropriate, the outline of the template will be displayed, as shown in Figure 1.8 (a), otherwise a prompt message will appear, as shown in Figure 1.8(b). Template selection is complete.

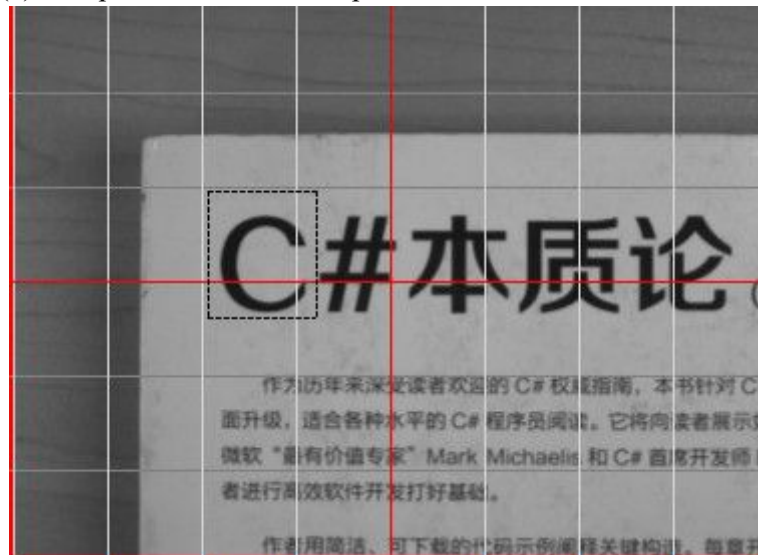


Figure 1.6 Select Template

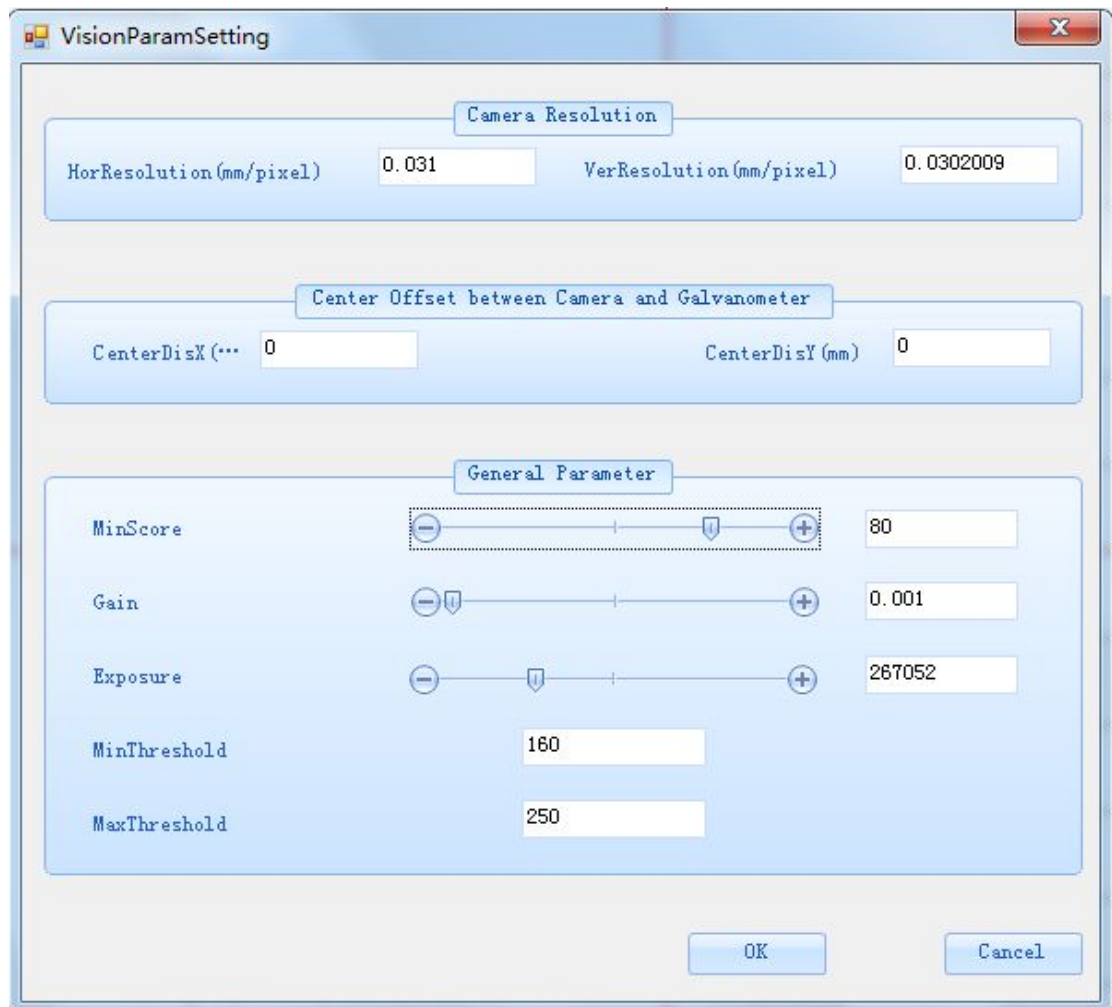


Figure 1.7 Vision parameter settings

"Horizontal Resolution" and "Vertical Resolution" represent the horizontal and vertical ratio of each pixel of the image to the display in the workspace;

"Minimum match rate" indicates the lowest score of the searched matching images. When the matching score (between 0 and 100) is greater than this value, it indicates that a matching image is found, otherwise it is not found. Different minimum matching rates can be set for different requirements.

"Exposure time" means the exposure time of the camera, and the brightness of the image can be changed by adjusting this parameter.

"Threshold Minimum Gray Value" and "Threshold Maximum Gray Value" can adjust the acquired contour according to the pixel value of the image.

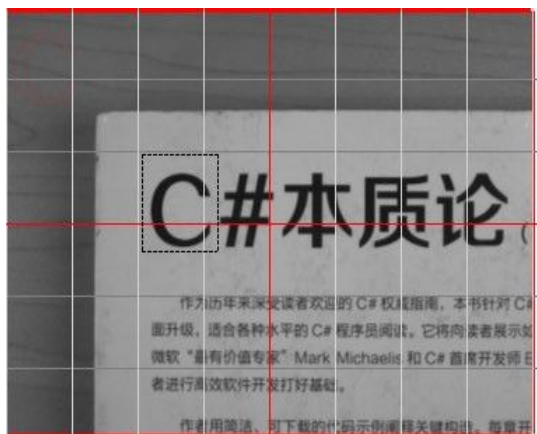


Figure 1.8(a)

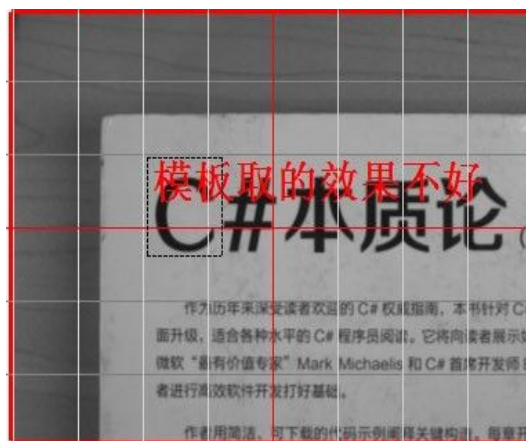


Figure 1.8(b)

- After the template is set, you can start editing the logo that needs to be marked. No matter how the position of the template changes, as long as the template can be found correctly, the logo can be marked on the same position of the object.

Chapter 6 Calibration Settings

6.1 2D square box correction

After the device is connected, select the calibration setting button in Figure 6.1.1 below:



The window shown in Figure 6.2.2 will pop up:

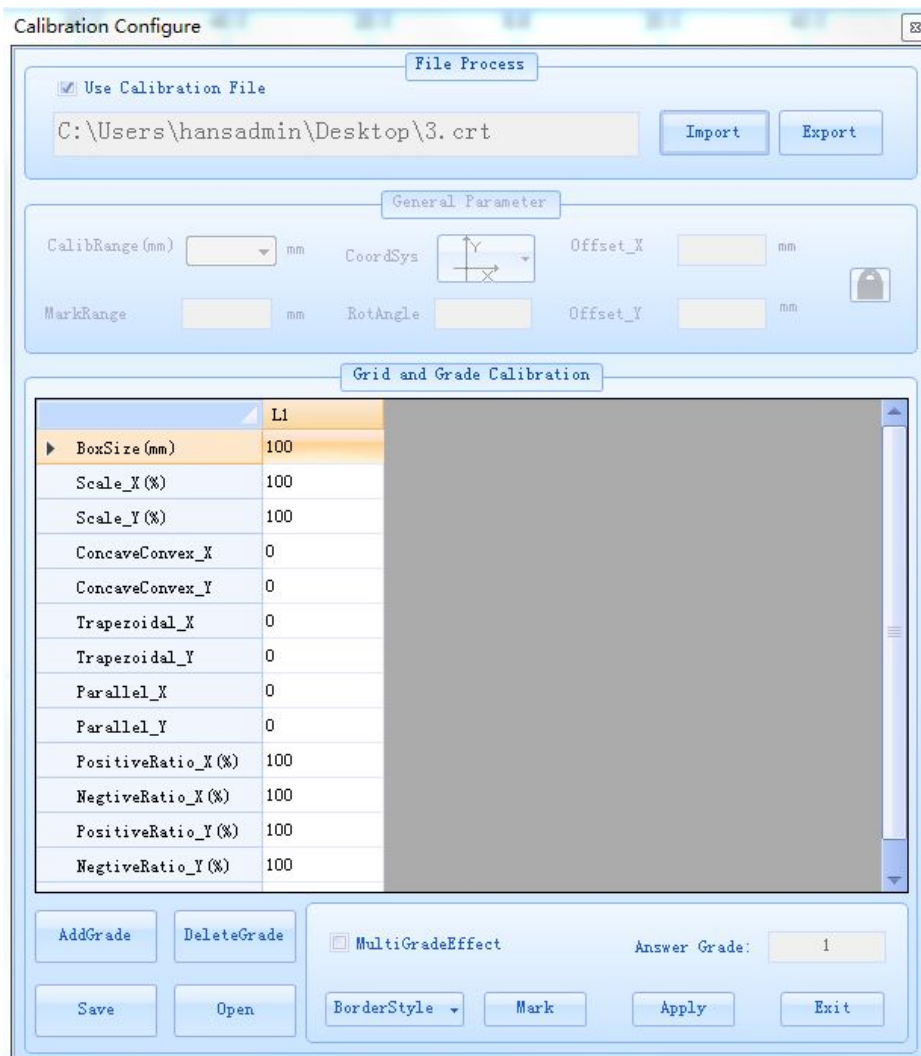


Figure 6.2.2 Calibration setting interface

➤ Manual Calibration Operation Introduction

There are two ways for users to choose, the first is to use the correction file, which was saved before,

The calibrated file can be imported directly, and then click Apply to burn the calibration data into the square head, and then click Mark to see the actual marking effect. The second is userdefined calibration. A calibration file will be generated during user-defined calibration. In this way, the user can select the calibration range, etc., and this calibration should be selected when large-scale marking is required. Way. After the user has set the parameters, they need to click Apply first. At this time, a calibration file will be generated, and the calibration file will be written to the square header. After changing the parameters, click Apply, otherwise the parameter modification will be invalid and will not be written to the square header.

Import

Import an existing calibration file from a local directory

Export

Export the calibration file to the specified directory

Correction range

Set correction box size

Marking range

Set the maximum marking range (1.06 times its range must be less than the calibration range)

Coordinate System

Set the marking XY coordinate system

Rotation angle

Rotate the angle of the BOX;

X offset

Offset to X-axis Y

Offset

Offset to Y-axis

Add level

Add correction parameter level

Delete level

Delete calibration parameter level

Border type

Select the graphic to be marked

Application

Apply Correction Parameters to Square Heads

Marking

Mark according to the selected frame type and the set calibration parameters

Quit

Exit the calibration interface

➤ Introduction of calibration parameters

Box
size

Corrected Box side length, that is, the side length of the square when marking

X scaling

X-axis side length scaling

Y scaling









Y-axis side length scaling

X Bump

When debugging BOX, the bump length of X axis

Y bump

When debugging BOX, the bump length of Y axis

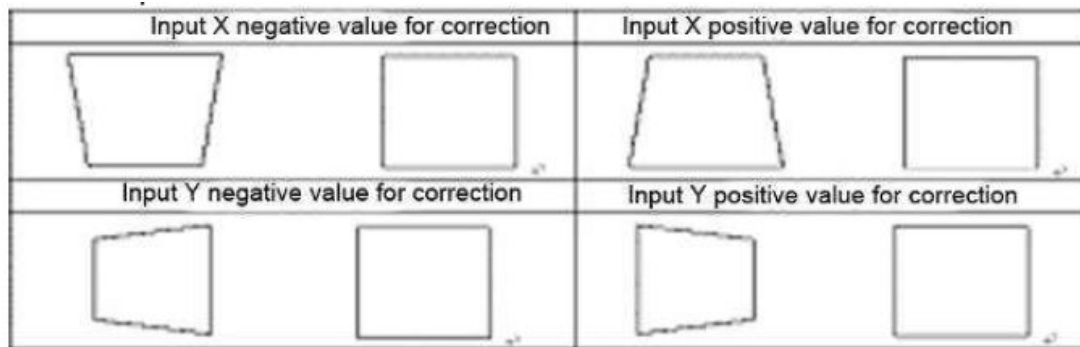
Input X positive value for correction		Input X negative value for correction	
			
Input Y positive value for correction		Input Y negative value for correction	
			

X trapezoid

X-axis trapezoidal deformation length

~~Y trapezoid~~

Y-axis trapezoidal deformation length

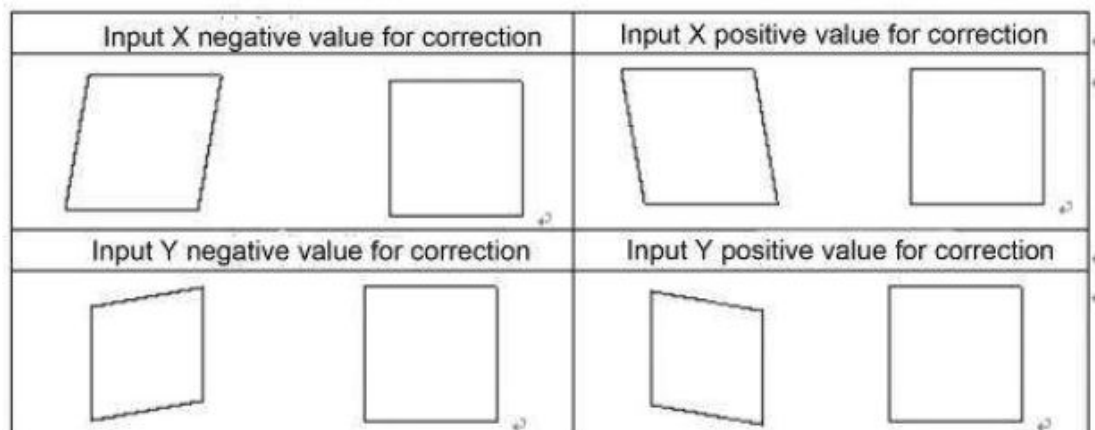


X
parallel

Movement parallel length of X axis

Y parallel

Movement parallel length of Y axis



~~X positive scale~~

Extend the scale in the positive direction of the X axis; **X**

~~negative scale~~

Extend the scale in the negative direction of the X axis;

~~Y positive scale~~

Extend the scale in the positive direction of the Y axis;

~~Y negative scale~~

Extend the scale in the negative direction of the Y axis;

6.2 3D Correction

After the device is connected, select the calibration setting button in Figure 6.2.1 below:

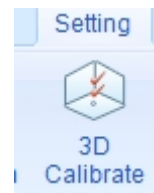
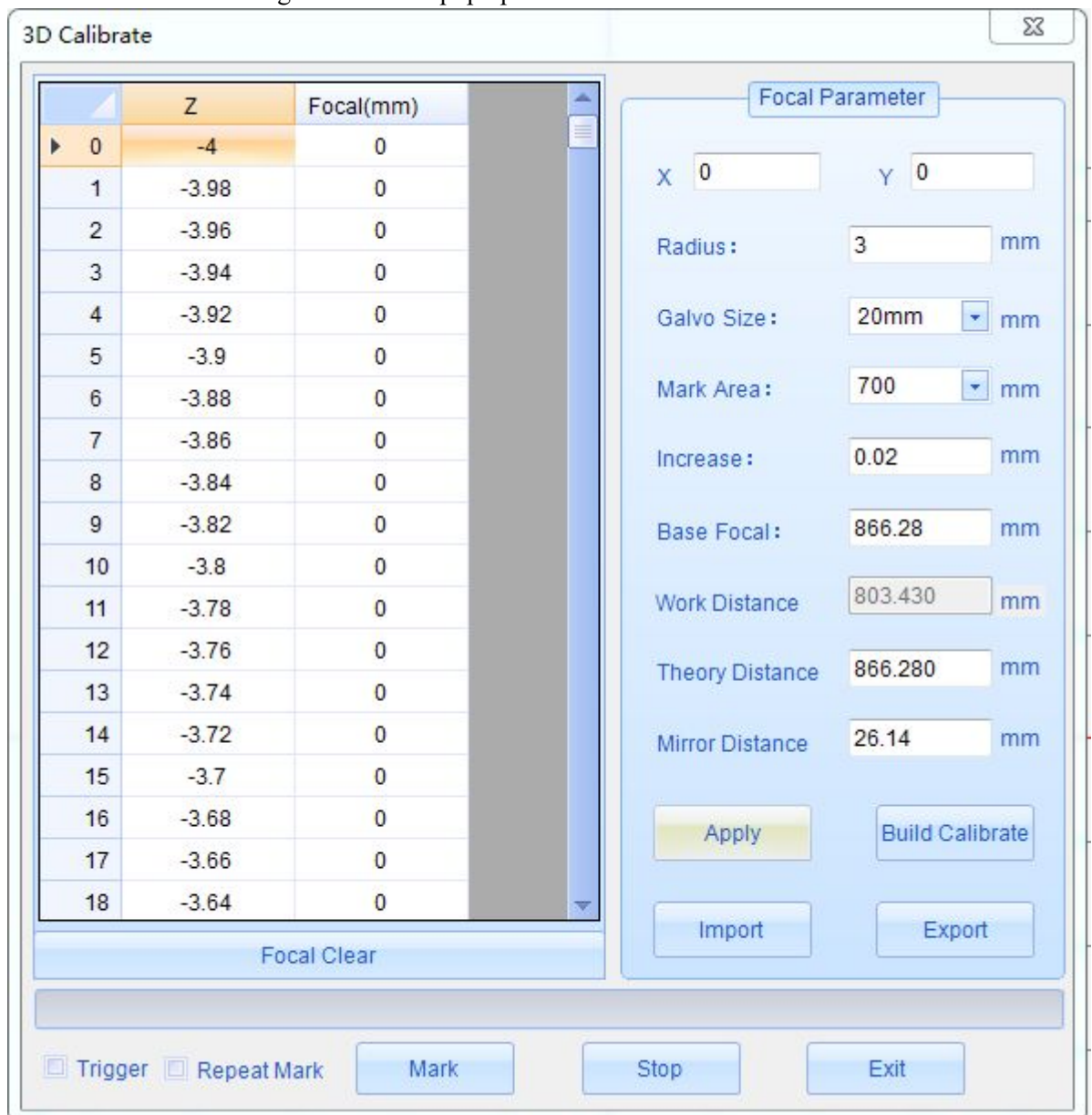


Figure 6.2.1

The window shown in Figure 6.2.2 will pop up:



	Z	Focal(mm)
▶ 0	-4	0
1	-3.98	0
2	-3.96	0
3	-3.94	0
4	-3.92	0
5	-3.9	0
6	-3.88	0
7	-3.86	0
8	-3.84	0
9	-3.82	0
10	-3.8	0
11	-3.78	0
12	-3.76	0
13	-3.74	0
14	-3.72	0
15	-3.7	0
16	-3.68	0
17	-3.66	0
18	-3.64	0

Focal Parameter

X: 0 Y: 0

Radius: 3 mm

Galvo Size: 20mm mm

Mark Area: 700 mm

Increase: 0.02 mm

Base Focal: 866.28 mm

Work Distance: 803.430 mm

Theory Distance: 866.280 mm

Mirror Distance: 26.14 mm

Buttons: Apply, Build Calibrate, Import, Export

Buttons: Focal Clear

Buttons: ☐ Trigger ☐ Repeat Mark Mark Stop Exit

Figure 6.2.2

➤ Operation introduction

Rough calibration of focus: Rough calibration of focus should be done first during 3D calibration, otherwise the dynamic axis may not be in focus during marking, and normal marking operation cannot be performed;

Box correction: After the rough focus correction is completed, the box of the 3D square head can be corrected;

Focus fine calibration: Due to the large distortion of the marking pattern during rough calibration, there is a deviation between the calculated theoretical focal length and the actual focal length, so it is necessary to fine-tune the focal length after the box calibration is completed. Details are given below.

➤ Correction parameter description

➤ Motor selection

Select the corresponding model according to the hardware device of the system. After the system is installed, the value will remain unchanged.

Correction format

Set according to the actual markable format of the system. After the system is installed, the value will remain unchanged.

Correction increment

Set the data interval of the first column of the calibration table on the left, which can be set according to the actual situation. If the focal depth is relatively small, the value can be set to a smaller value. focus position

Base plane focal length

The distance from the Y lens to the working surface. After the system is installed, the value will remain unchanged.

Working distance

The distance from the bottom surface of the marking square head to the working surface. After the system is installed, the value will remain unchanged. Theoretical focal length

The software can mark different positions according to the settings, automatically calculated theoretical focal length.



The image shows a software interface with two input fields. The first field is labeled 'X' and contains the value '0'. The second field is labeled 'Y' and also contains the value '0'. The fields are light blue with a thin border.

XY lens spacing

The distance between the XY lenses of the system. After the system is installed, the value will remain unchanged.

➤ Button description

【Parametric application】

After modifying the parameters on the interface, you need to click this button

【Generate correction table】

After clicking this button, a calibration table will be generated based on the data in the current table. You can also click every time the focus is found, in case an abnormal situation occurs and data is lost.

【Import calibration table】

Load an existing correction table in the format ".crt3"

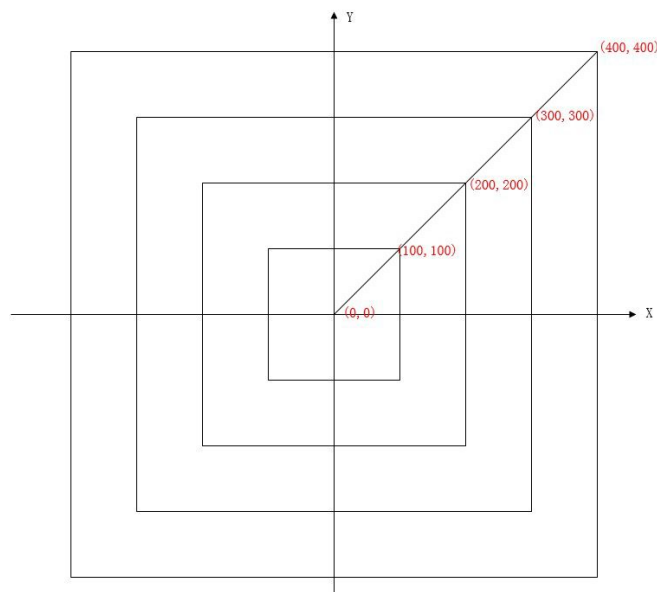
【Export correction table】

Store the correction table in a user-specified directory.

➤ Focus correction, take 800 format as an example

A. Focus Rough Calibration

When the box is not corrected, the graphics distortion is relatively large. The purpose of this correction is to allow the box to be corrected at the focal length. Subsequent corrections are required after the box correction is completed. The following points can be selected when focal length is roughly calibrated, that is, the points on the diagonal, or other points can be set by yourself, but it must be ensured that the maximum range of the corrected points is not less than the required range.



The steps to find focus are as follows:

Set the marking parameters on the marking interface, it is best to set multiple markings, such as 10 times, to ensure that the Z axis is in place, the focal length found will be more accurate, and the focal length found will be more accurate;

- Click on the calibration interface **Focal Clear** button to clear the existing calibration data, then click **Build Calibrate**, an uncorrected focus correction table is generated.

- Set the marking position during calibration, such as (100,100), and fill it in

X	100	Y	100
---	-----	---	-----

Select a value in the Voice Coil Z value field, then click **Mark**, observe the marking situation, The most suitable focus position is found by continuously adjusting the Z value of the voice coil, which is generally the position of the voice coil when the marking energy is the strongest.

- Fill in the theoretical focal length to the corresponding Z value position, assuming that the (100,100) ring has the strongest energy when the voice coil Z value is 0.12,

fill **理论焦距:** 1000.085 mm in

音圈Z值	当前焦距
0.04	0
0.06	0
0.08	0
0.1	0
0.12	1000.085

- After the focus correction of all points is completed, click **生成校正表**, that is, the focus correction operation is completed.

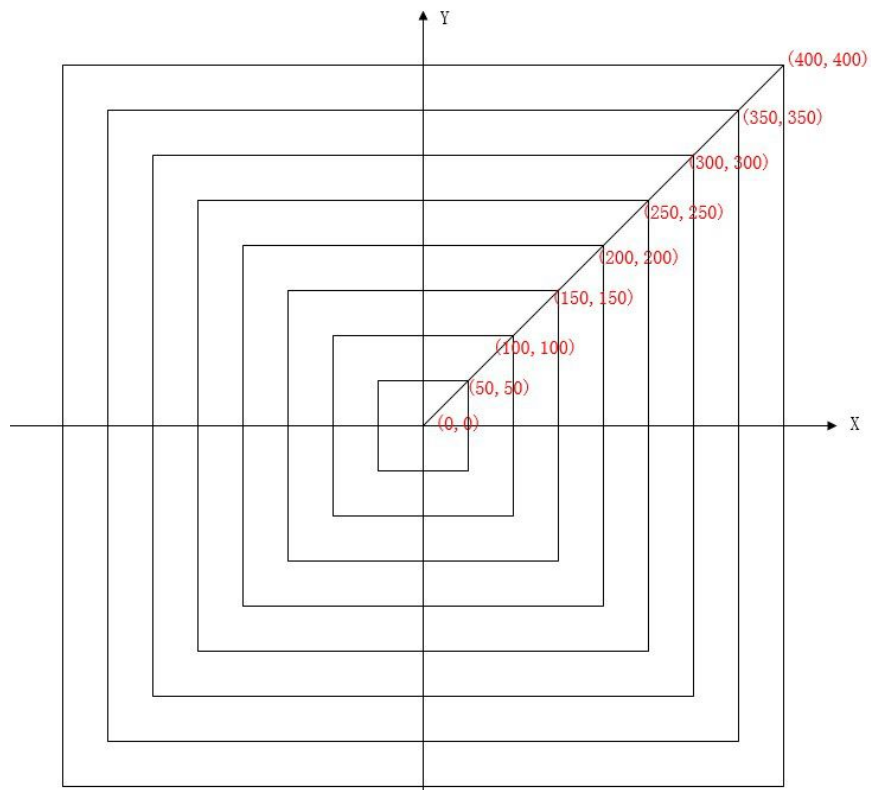
B. 3D Box Correction

Refer to 2D box correction.

When the accuracy requirement is not high, the user can manually correct it. If the accuracy requirement is high, the CCD can be used to capture the point data, and then the correction software can be used for correction.

C. Focus Refinement

After the box calibration is completed, the actual focal length is different from the rough calibration, and the focus point needs to be re-calibrated. At this time, the number of calibration points can be appropriately increased for higher calibration accuracy, as shown in the following figure:



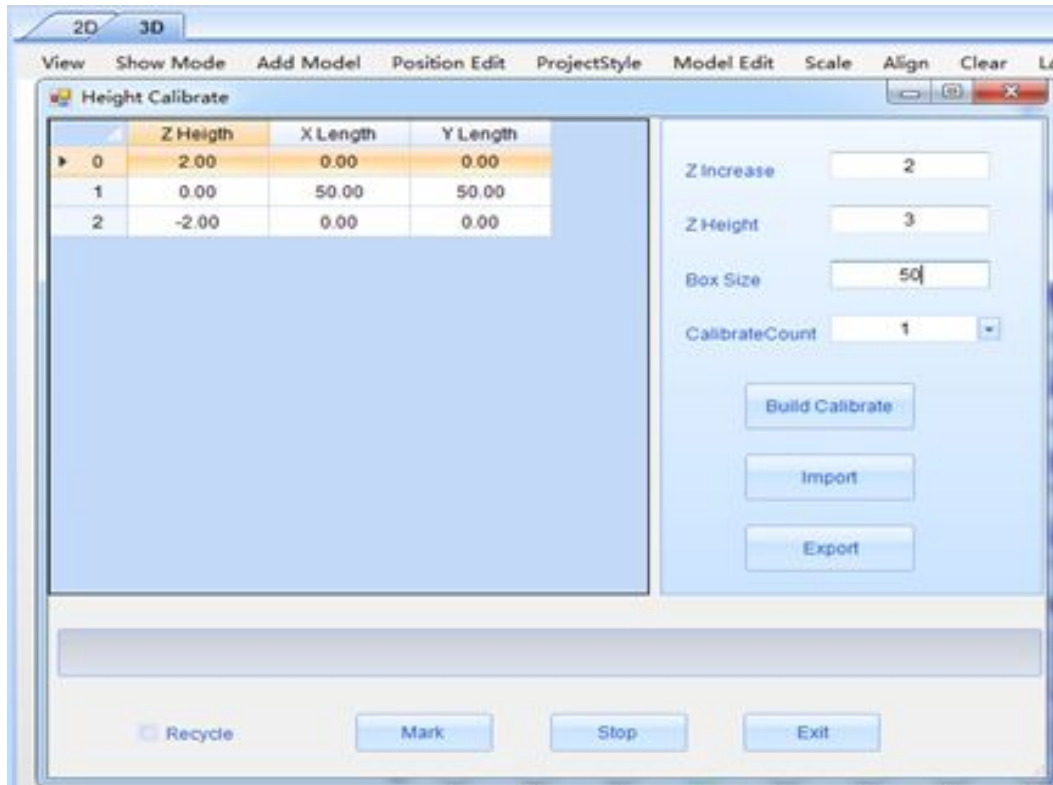
Refer to A Rough Calibration of Focus for the calibration steps.

➤ Box height correction

If the accuracy of boxes with different heights is high, the box height correction can be performed, otherwise the correction can be omitted.

Click the "**box height correction**" button in the figure below to open the calibration interface, as shown in the figure:





➤ Parameter Description:

➤ Z-plane increments

Correct spacing between planes

Z plane height

The height range that needs to be marked, that is, the total height

Box size

Marking range of each plane

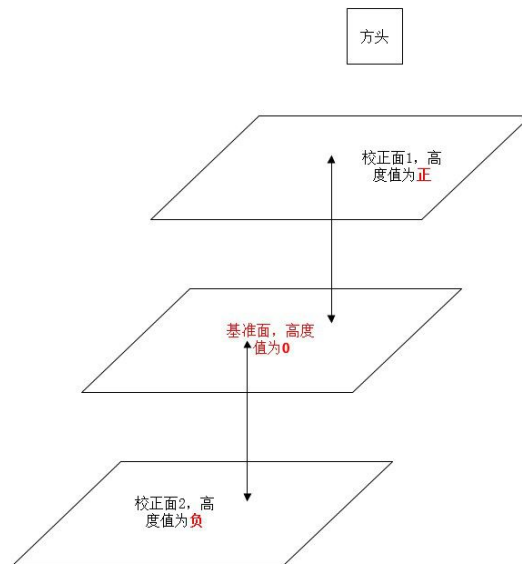
Correction order

The number of fitting measurements, the first order is a linear fit, and the higher the order, the more dependent on the measurement accuracy. Generally, level 1 can be selected.

➤ Operation introduction

A. Set calibration parameters

B. Select a height value in the table on the left. At this time, you need to adjust the height of the working surface so that the height is the difference between the actual working surface and the reference surface. The positive and negative directions of height are as shown in the figure below. Above the reference plane is positive, and below the reference plane is negative.



打标

- C. Click , measure the actual length of the frame in the X and Y directions, respectively, and fill it in the corresponding form. Assuming that the height of the working surface relative to the reference surface is 3mm, the actual measured length is 97mm in the X direction and 98mm in the Y direction, then fill in the measured values into the table, as shown in the figure below

	z平面高度	实际x长度	实际y长度
0	5.00	0.00	0.00
1	4.00	0.00	0.00
▶ 2	3.00	97.00	98.00
3	2.00	0.00	0.00
4	1.00	0.00	0.00
5	0.00	100.00	100.00

- D. Follow the steps above to correct boxes in other positions, **it is not necessary to correct the heights in all tables, but it is necessary to include the height range that the system needs to mark.**

- E. After calibration is complete, click **Build Calibrate** ,

You can generate box correction tables with different height corrections“**layerBoxZ.crtB**”

Chapter 7 3D Operations

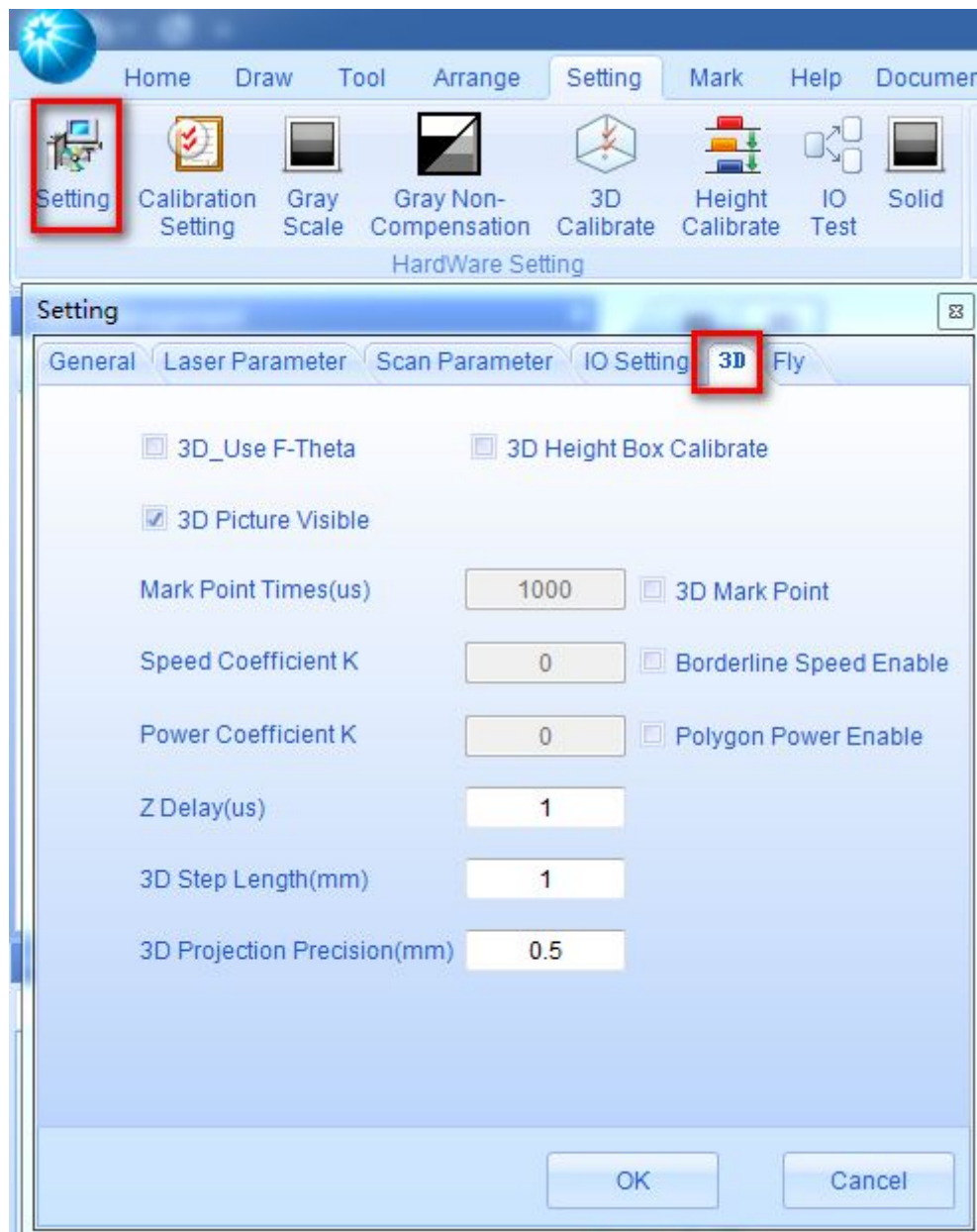
7.1 3D texture related operations

When using the 3D marking function, you need to set the relevant parameters of 3D marking in the system settings, and prepare the corresponding two-dimensional vector graphics (dxf, plt, etc.) and 3D models (STL format files, NC files), pay attention to Do not exceed the

format range. There is no hard requirement on the order of importing 2D and 3D drawings, an example is given below.

➤ 3D related parameter settings

Click "Settings" - "System Settings" - "3D Parameters"



3D Mounted F-Theta Field Lenses

Whether to use the field lens during 3D marking, if it is used, check it, otherwise do not check it

Box fine-tuning at different heights

Since only one plane is corrected during box calibration, there will be certain errors in installation. Therefore, if you want to make the size of plane boxes with different heights more accurate, you need to check this function and correct boxes with different heights. Please refer to Section 6. If you do not have high requirements for box sizes of different heights, you can uncheck it.

2D interface displays 3D graphics

The 3D model area is displayed on the 2D interface, which is convenient to adjust the position of the marking graphics on the 2D interface. It is checked by default.

Voice coil waiting time

The time the XY galvo waits for the voice coil to be in place during 3D marking

3D step size setting

Project the 2D marking graphics to the point spacing on the 3D model, that is, project each line segment according to the step size and generate corresponding marking points

3D texture accuracy

Projection of 2D marking graphics onto 3D model point spacing for display

➤ 3D model import and adjustment

- **Open the software**, click the 3D interface with the mouse, and switch to the 3D space.

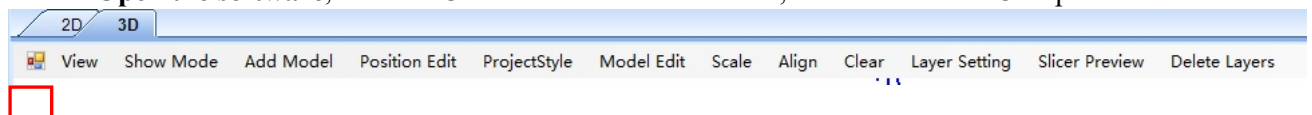
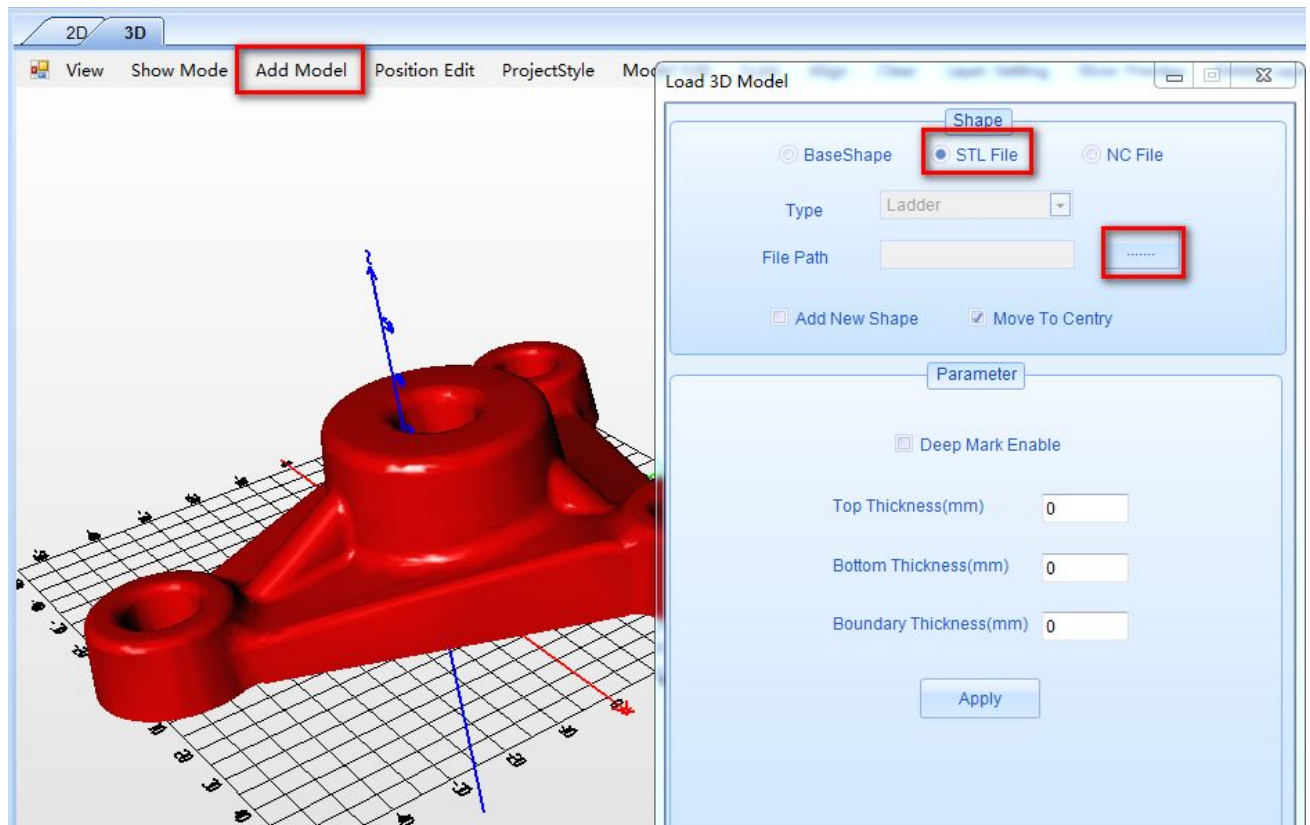


图 7. 1. 1

- **Model loading**
Click the model load, generally use the STL model, select the storage path, and load the 3D file. The 3D model will default to "Model Center" (common option), but some projects require the spatial coordinate relationship and 3D model after the 3D model is imported. When the software creates a 3D model, the spatial coordinates are the same. At this time, you need to remove the "Model Center" option.



- Model position adjustment

For general 3D files, the editing software has its corresponding spatial coordinates, angles, etc., but in the marking process, we generally adjust it to the coordinate center point of the marking software. As shown in the figure below, click on the model adjustment, and in the pop-up box, you can choose the coordinate adjustment and perform the corresponding inversion function. In this example, when we actually mark, the sample is placed horizontally on the fixture at the center of the galvanometer, so at this time, the angle needs to be adjusted to rotate -90 degrees along the z-axis, and the height of the z-axis is lowered by 10mm.

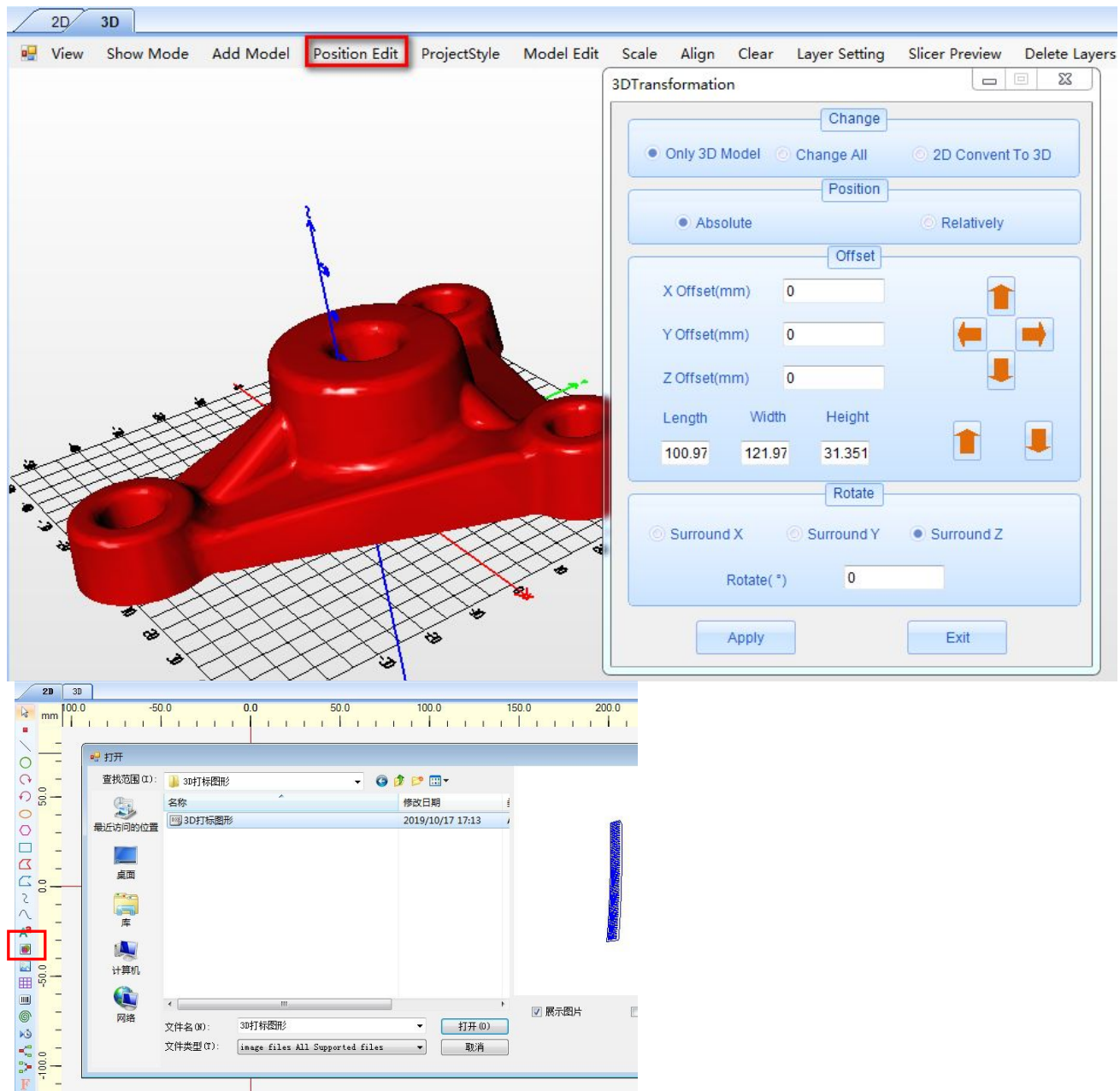


Figure 7.1.3

- Import a marking file
Switch back to the 2D interface, as shown in Figure 7.1.4, click the red box to import the vector diagram, and import it according to the storage path. After clicking to open, you need to use the mouse to click once in the interface, and a vector diagram will appear. After selecting, you can adjust the coordinates and angles, as shown in Figure 7.1.5.

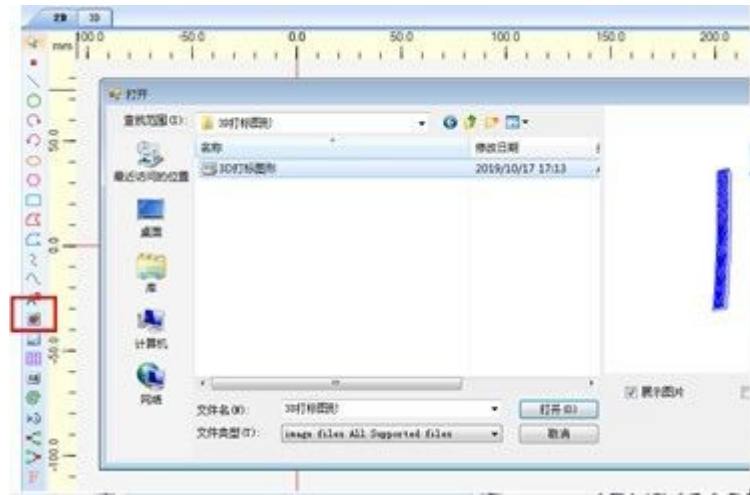


Figure 7.1.4

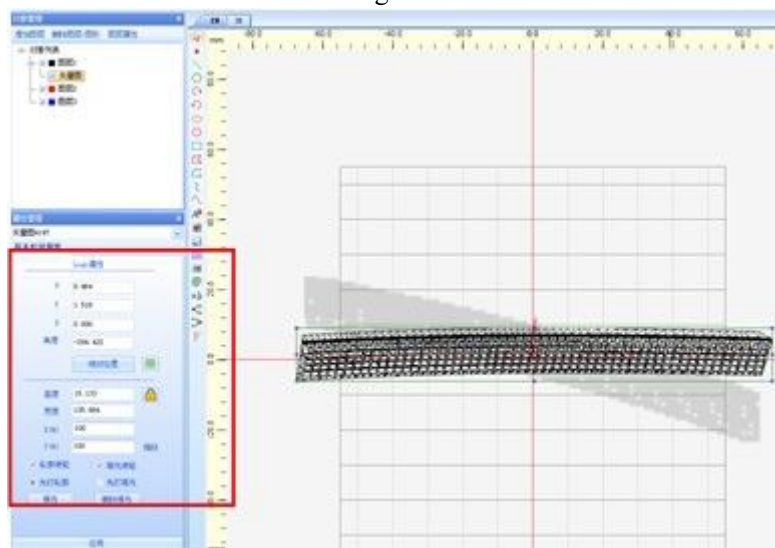


Figure 7.1.5

➤ Fitting adjustment of vector diagram and model

After importing the graphics, start to adjust the position of the vector diagram and the model to match the fit. Switch back to the 3D interface again, we found that at this time, there is a coordinate deviation between the vector image and the model (as shown in Figure 7.1.6). This software cannot display the actual space coordinates of the 3D model temporarily, and can only see the relative coordinates of the initial position when the model is imported in the model adjustment. So at this time, we generally choose to fine-tune the vector coordinates to achieve the purpose of perfect fit.

Note: Before this, be sure to make sure that the two space angles are the same.

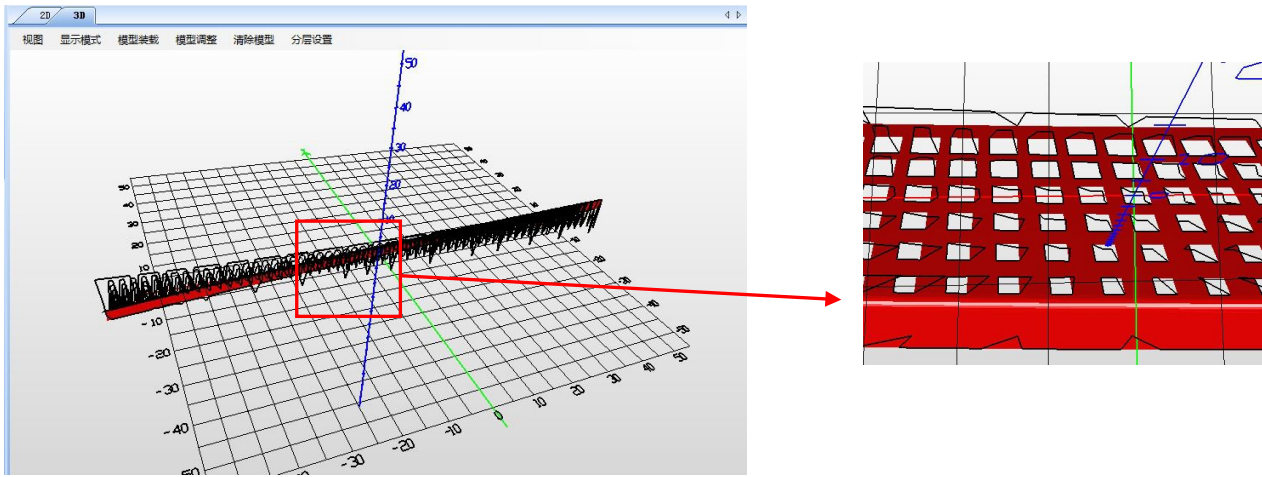


Figure 7.1.6

In the 3D interface, use the mouse wheel to zoom in on Figure 3, check which side is not aligned, switch back to the 2D interface, and fine-tune its xy coordinates in the lower left corner of the interface according to Figure 7.1.5 (the software displays the coordinates in the lower left corner of the overall graph). Switch the interface back and forth until the fit is good. If it is found that there is always an alignment deviation, the 2D vector graphics can be edited with the "inner shrink and outer expansion" command on the toolbar. Or zoom and enlarge with software such as CAD. Figure 7.1.7. Figure 7.1.8 is the effect after fitting.

Figure 7.1.7

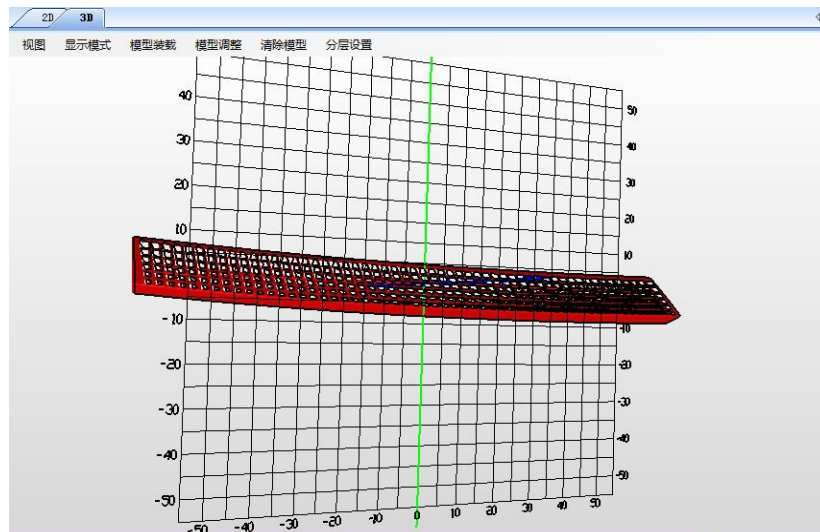


Figure 7.1.8

The standard of fit is: the vector diagram can be all on the surface of the model without leakage, and the deviation of the micron level is acceptable.

7.2 Marking test

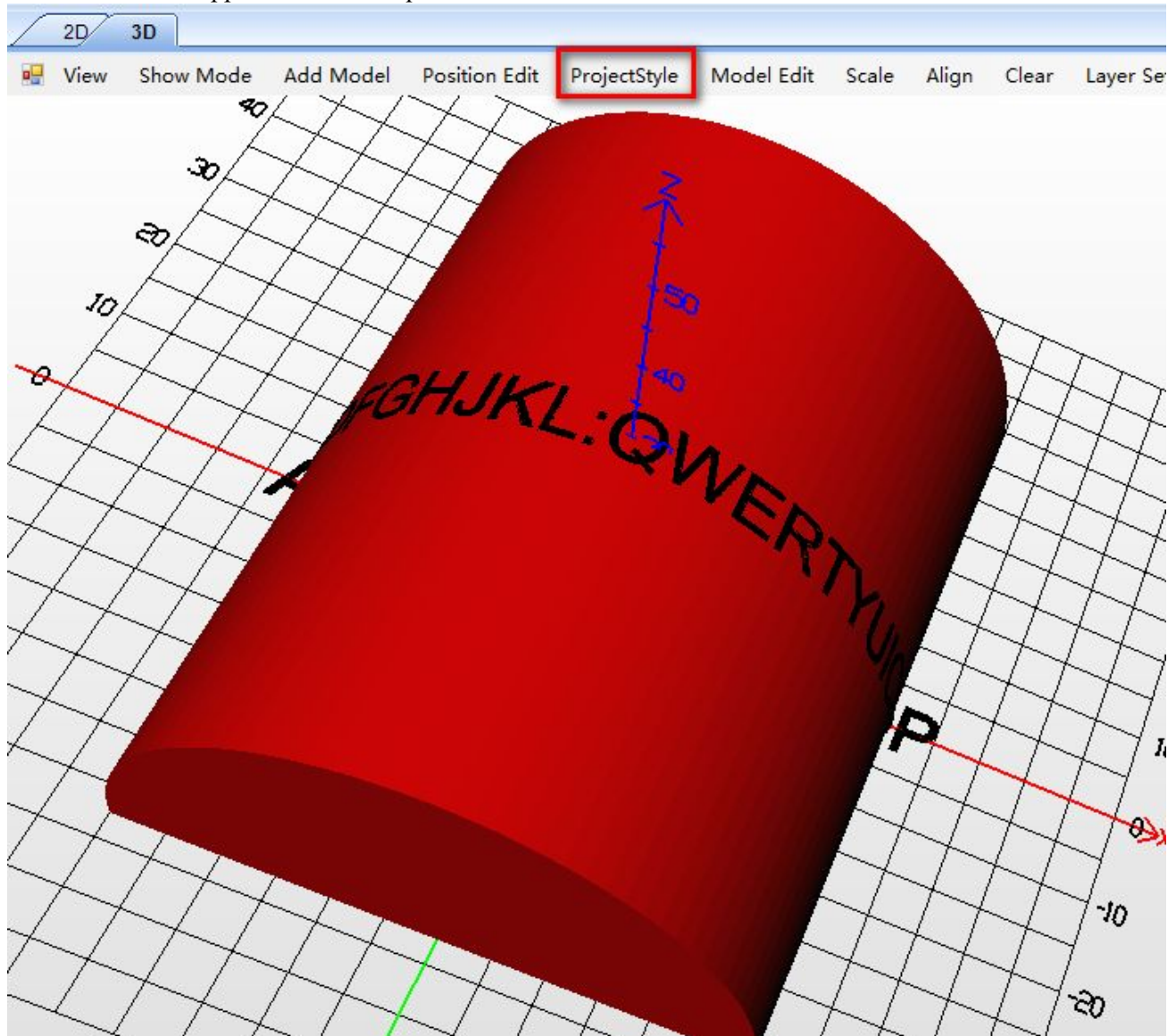
After the mapping is completed, in the 2D interface, give the vector graphics appropriate filling and marking parameters, place the fixture and sample, raise the galvanometer to the

corresponding working surface height, switch to the 3D interface, align the red light, and start marking, mark test.

7.3 Introduction of other functions of 3D interface

【Texture method】

Maps are divided into "projection maps" and "wrapped maps", and most of the 3D processing uses "projection maps". The "wrapped texture" is mainly used in "characters and LOGOs and other applications that require non-destructive textures"

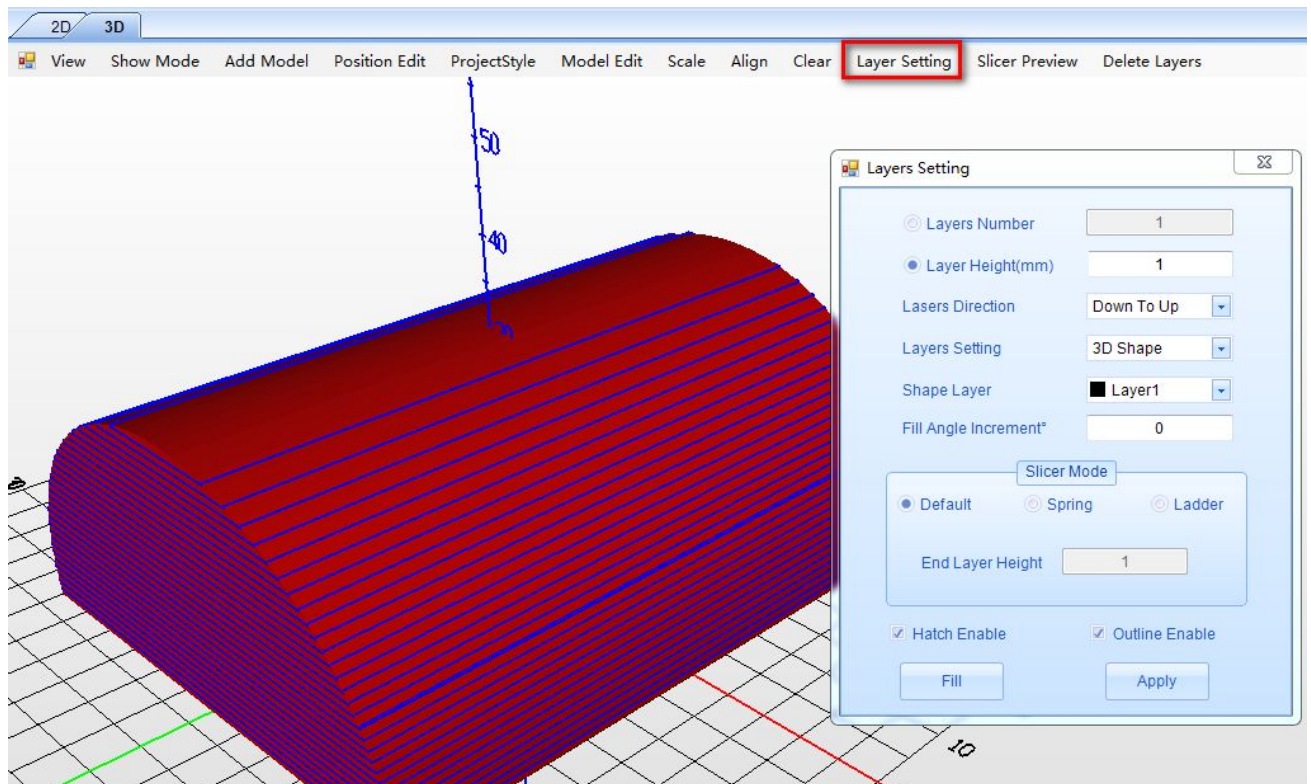


7.4 Layered marking

Layered marking is mainly used for drilling, deep engraving, relief and other processing.

Note that this kind of application can only be carried out with "Layered Marking" in the marking interface.

The layered settings are divided into "Normal Mode, Spring Mode, Staircase Mode". The common mode is the common mode of equidistant layering, and the spring mode and the step mode can be set unequally according to the actual effect of the processing technology.



Chapter 8 Network Configuration

Function: Configure the IP address, subnet mask, gateway of the device, and modify and test the network parameters of the device.

➤ Internet connection

Select the "Settings" option on the menu, as shown below:



Figure 8.1 Network Configuration Toolbar

Then select the "Network Connection" button, as shown in the figure:



Figure 8.2 Network Connection Button

The following "Network Connection" dialog box will pop up, as

shown in the figure:

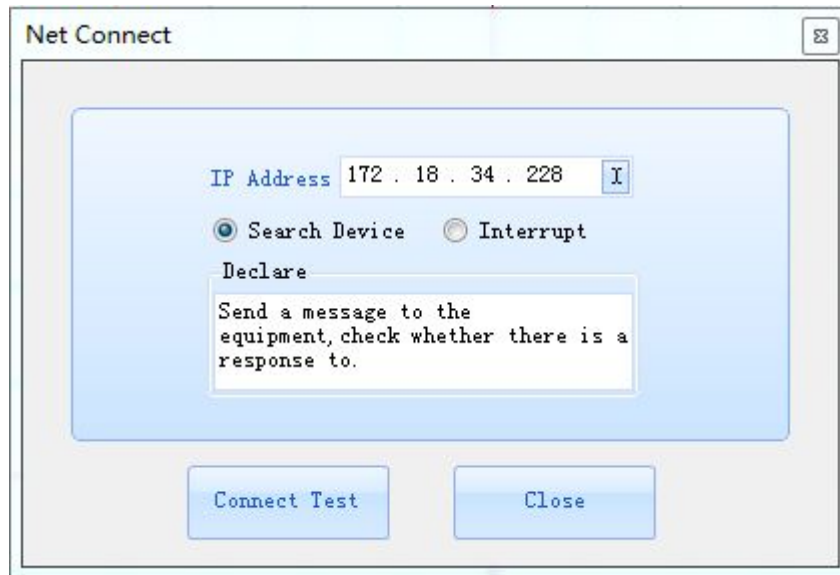


Figure 8.3 Network Connections Dialog

Search Device: Select the "Search Device" option, and then click "Communication Test", if the connection is normal, the unadded IP will be added to the IP list, and a dialog box that the device responds normally will pop up. If you cannot connect to the device, a dialog box will pop up that no response from the device was received. to notify the user that the device could not be found.

Interrupt device startup: Select the "Interrupt device startup" option, after the device is powered off, fill in the factory-set IP address (172.18.34.227) in the device IP address, then click "Communication Test", and then power on, a pop-up will pop up. Receive device interrupt response dialog:

Then you need to modify the parameters in "Network Settings", otherwise the parameters are still not modified.

Note: This function is mainly used when the user forgets the IP address or cannot connect to the device. PC network settings such as: IP address: 172.18.34.22; Subnet mask: 255.255.255.0; Gateway: 172.18.34.1. Since the gateway and subnet mask of switches or routers in different places are different, it is recommended to use a crossover cable to reset the IP address of the device. The IP address of the PC cannot be the same as the IP address of the device.

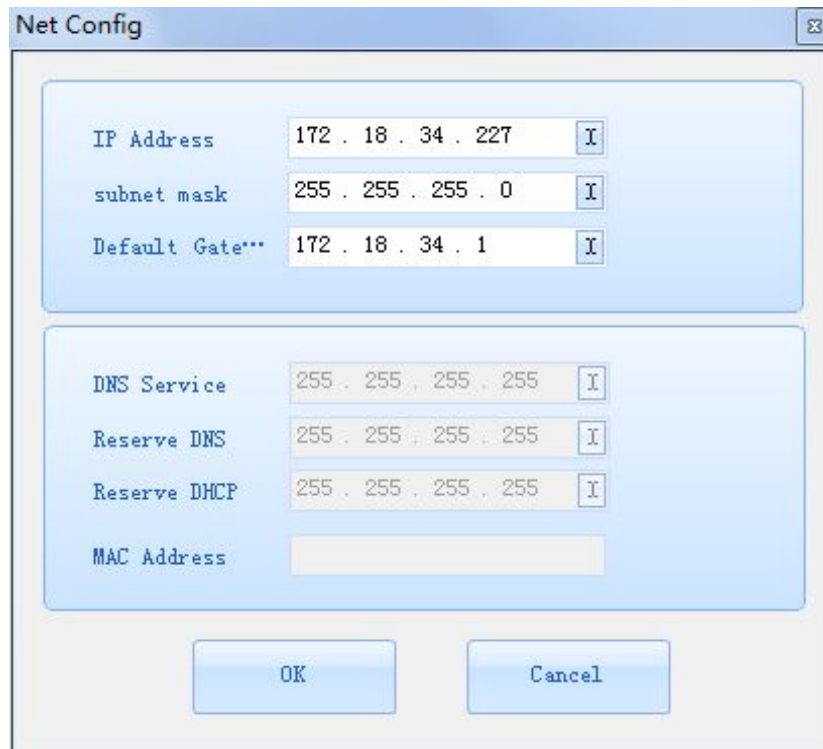
➤ Network settings

Then select the "Network Settings" button, as shown in the figure:



Figure 8.4 Network Configuration Button

The following "Network Settings" dialog box will pop up, as shown in the figure:



The image shows a "Net Config" dialog box with a title bar and a close button. It contains two main sections for network configuration. The first section has three rows: "IP Address" with the value "172 . 18 . 34 . 227", "subnet mask" with "255 . 255 . 255 . 0", and "Default Gate..." with "172 . 18 . 34 . 1". Each row has a text input field and a small "I" icon button. The second section has four rows: "DNS Service" with "255 . 255 . 255 . 255", "Reserve DNS" with "255 . 255 . 255 . 255", "Reserve DHCP" with "255 . 255 . 255 . 255", and "MAC Address" with an empty text field. Each of the first three rows in this section also has a small "I" icon button. At the bottom of the dialog are two buttons: "OK" and "Cancel".

Figure 8.5 Network Configuration Dialog

Write device: fill in the IP address, subnet mask, default gateway, click the "Write device" button, a dialog box will pop up whether to confirm the parameter curing:

Click "OK" to modify the IP address, subnet mask, and default gateway. Re-power on (make sure the PC and the device are in the same network segment), then click "Network Connection", write the modified IP, click "Communication Test", you can see the modified IP in the device management in the upper right corner. equipment.

Note: When modifying, please confirm whether the device is connected.