

NcStudio V15 Laser Plane Cutting Medium and Low Power Control System User Manual (LS2000M)

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Modify Record

| Version | Data | Description |
|---------|------------|--------------------------|
| R1 | 2023.08.16 | 1st version established. |

1 Product Introduction

NcStudio V15 Laser Plane Cutting Control System (LS2000M) is referred to as **LS2000M**. Suitable for laser plane cutting of 6000W and below.

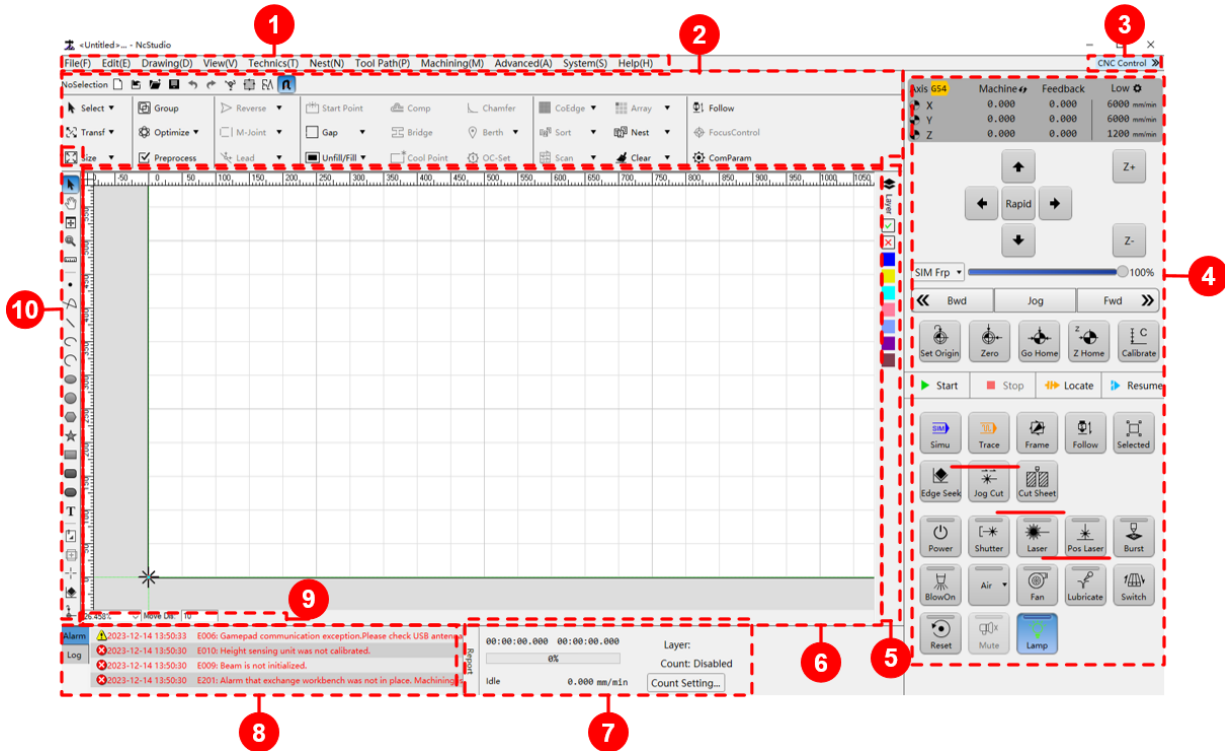
Product Feature:

- Support focus control.
- Support slow start/stop technic adjustment to ensure cutting effect at start/end point.
- Support multiple exchange workbench external device control.
- Support camera monitor.
- Support multiple automatic edge finding methods.
- Support bus torque anti-collision.
- Support quick one key cut sheet.

2 Software Main Interface

Through this part, you can quickly become familiar with the main software interface of LS2000M.




















LS2000M support horizontal and vertical screen adaptive switching. This article uses the horizontal screen as an example to introduce the software main interface. The main interface is as follows:












1. Menu bar
2. [Common Toolbar](#)
3. [Control Bar Display Button](#)
4. [Machine Tool Control Bar](#)
5. [Layer Toolbar](#)
6. [Drawing Area](#)
7. [Machining Information Statistics Column](#)
8. [Alarm/System Information Bar](#)
9. [Drawing Information Bar](#)
10. [Drawing Toolbar](#)

2.1 Common Toolbar

| Button | Description |
|---------------|----------------------------------------------------------------------------------------------|
| New | Create a new toolpath file. |
| Import | Import G, NC, DXF, DWG, PLT, LXD, CNC format files. |
| Open | Open NCEX format file. |
| Save | Save the tool path file. If save the new tool path file, click and save as NCEX format file. |
| Undo | Undo the last action. |
| Redo | Restore the undo operation. |

| Button | Description |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  Show Order | Show or hide the machining sequence. |
|  Show Direction | Show or hide the machining direction. |
|  Highlight Unclosed Objects | Display all unlocked graphics in special color (red) or not in special color. |
|  Catch Options | Set the features to be caught. Switch entry for catch function: In the menu bar click Drawing → Catch . |
|  Select ▼ | Select all, select invert, clear selected, and auto select unclosed, select tiny, inner, outer, select similar, etc. For details, please see Auto Select . |
|  Transf ▼ | Translate / rotate graphics and perform vertical and horizontal mirror of graphics. For details, please see Translate , Rotate and Mirror . |
|  Size ▼ | Scale the graphic proportionally and change the size of the graphic. For details, please see Size Scale . |
|  Group | Group selected objects into a group. For details, please see Group . |
|  Ungroup | When a single Group is selected, disband the group into multiple shapes. For details, please see Ungroup . |
|  Optimize ▼ | Perform pre-process operations on graphics, including Merge , Explode , Smooth , Curve Segmentation , Delete Overlap Line , Delete Tiny , Simplify Curve , Convert Polyline to Circle , Trim Self-intersection , Convert Text to Graphic . |
| <input checked="" type="checkbox"/> Preprocess | When single or multiple objects are selected, open the Instant Pre-process dialog box to make setting. For details, please see Preprocess . |
|  Reverse ▼ | Set the machining direction. For details, please see Machining Direction . |
| <input type="checkbox"/> M-Joint ▼ | Reserve a small distance without cutting (reserve gap) to connect the workpiece and the plate together. For details, please see M-joint . |
|  Lead ▼ | Set machining lead-in and lead-out lines. For details, please see Lead . |
|  Start Point | If there is a lead line, set the start point/end point of the lead line; if there is no lead line, set the start point of machining, and start machining the graphic from the selected current point. For details, please see Start Point . |
| <input type="checkbox"/> Gap ▼ | A seal is formed between the cutting start and end point of the part, and the seal method is divided into gap and overcut. For details, please see Gap . |
|  Unfill/Fill ▼ | Set unfill and fill. For details, please see Unfill/Fill . |
|  Comp | Compensate actual machining kerf error. For details, please see Kerf Compensation . |
|  Bridge | Connect two shapes like a bridge. For details, please see Bridge . |
|  Chamfer | Remove burrs from parts caused by machining. For details, please see Chamfer . |
|  Berth ▼ | Move the graphic berth to the workpiece origin. For details, please see Berth Point . |
|  OC-Set | Set unfill/fill, lead line, machining direction, machining sequence and kerf compensation at one time. For details, please see OC-Set . |

| Button | Description |
|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  CoEdge ▼ | Process the co-edge between graphics so that share a boundary. For details, please see CoEdge . |
|  Sort ▼ | Specify the machining order of graphic in the tool path file. For details, please see Sort . |
|  Scan ▼ | Find the most efficient path for machining, eliminating lift and cut steps. For details, please see Scan . |
|  Array ▼ | Copy and arrange the machining graphic in order. For details, please see Array . |
|  Nest ▼ | Arrange machining parts to improve material utilization and machining efficiency. For details, please see Nest . |
|  Clear ▼ | Clear part machining technic that has been set. For details, please see Clear . |
|  Follow | Calibrate the cutting head. For details, please see Calibrate Cutting Head . |
|  FocusControl | Focus Control function is used to automatically adjust the focus during machining. For details, please see Focus Control . |
|  ComParam | Set commonly used machine tool control parameter, follow-up control parameter, and unit switching. For details, please see Common Parameter . |

2.2 Control Bar Display Button

Show or hide the [Machine Tool Control Bar](#).






2.3 Machine Tool Control Bar

The machine tool control bar includes:

- [Coordinate Display Area](#)
- [Manual Axis Control Area](#)
- [Machine Tool Control Button](#)



2.3.1 Coordinate Display Area

Display the workpiece coordinates, machine coordinate, feedback coordinate, low speed, rapid speed and step distance of each axis:

| Axis | G54 | Machine  | Feedback | Low  |
|---------------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------------------------|----------|-----------------------------------------------------------------------------------------|
|  X | | 0.000 | 0.000 | 6000 mm/min |
|  Y | | 0.000 | 0.000 | 6000 mm/min |
|  Z | | 0.000 | 0.000 | 1200 mm/min |

After the return to machine origin is successful,  mark will appear in front of each axis.

In this area, can perform the following operations:

- Click  to switch between workpiece and machine coordinates.
- Click  to set the low speed, rapid speed and step distance of the X/Y-axis and Z-axis separately:

Manual Speed Setting ×

| | Low | Rapid | | Step |
|---------------|------|-------|--------|------|
| X/Y: | 6000 | 18000 | mm/min | 5 mm |
| Z: | 1200 | 1800 | mm/min | 5 mm |
| Forward/Back: | 3000 | | mm/min | 5 mm |

Close

2.3.2 Manual Axis Control Area

Axis description:

- X/Y-axis: The X/Y-axis is the axis that control the forward and back/left and right motion of the cutting head (the control mode use position loop control). Generally, the Y-axis is used to control the gantry axis and is divided into two drives, Y1 and Y2. The X-axis is generally used to control the cutting head to move left and right. There are also situations where the X-axis is used to control the gantry axis, such as the "Bond" machine tool. At this time, the gantry axis is divided into two axes: X1 and X2.
- Z-axis: Z-axis is the follow-up axis (the control mode is speed loop control), which is used to control the cutting head up and down motion.

Manual motion is divided into two types: jog and step mode. The switches for the two modes are as follows:

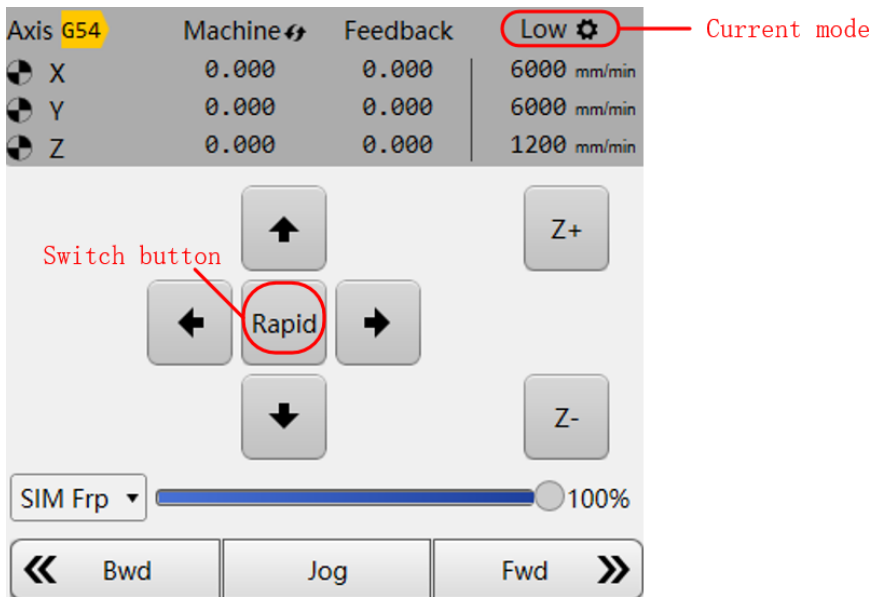


Jog/step switching switch

When using the handle to switch manual jog/step, press the **Step** button to switch.

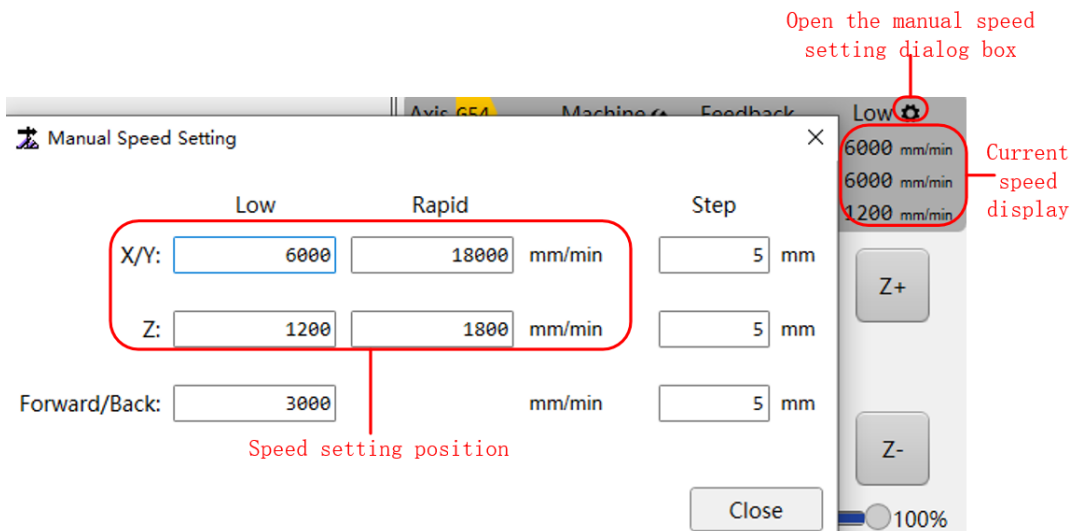
2.3.2.1 Jog Mode

There are two modes: **Rapid** and **Low** in manual jog mode. The switching path is as follows:



Note: When using the handle to switch manual rapid / low, need to keep pressing the rapid button on the handle. After releasing it, the current mode will change to the mode set on the software interface.

The corresponding rapid/low motion speed can be set according to different speed needs:



It can be set in the system parameters. The specific setting position is: **System Parameters** → **Speed Accuracy** → **2.0 Jog Speed** → **2.0.0 Jog Speed**.

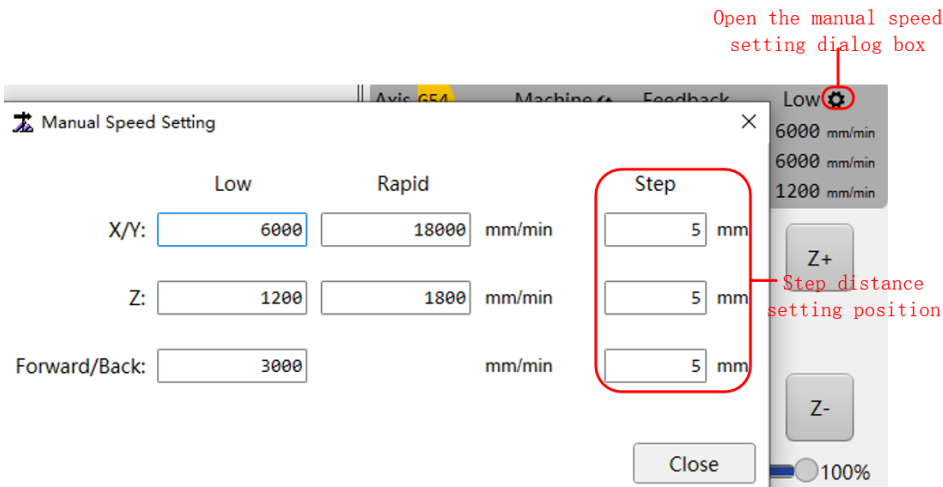
System Parameters

| Name | Value | Unit | Effective |
|----------------------------|-------|--------|-------------|
| 2.0.0 Jog Speed | | | |
| Manual Feedrate(X/Y) | 6000 | mm/min | Immediately |
| Rapid Manual Feedrate(X/Y) | 18000 | mm/min | Immediately |
| Stepping speed(X/Y) | 6000 | mm/min | Immediately |
| Manual Feedrate(Z) | 1200 | mm/min | Immediately |
| Rapid Manual Feedrate(Z) | 1800 | mm/min | Immediately |
| Stepping Speed(Z) | 1200 | mm/min | Immediately |
| Manual Feedrate(W) | 120 | mm/min | Immediately |

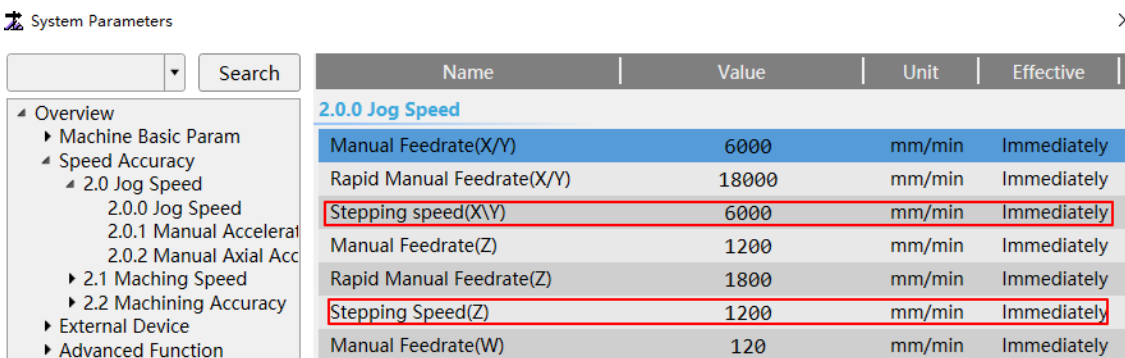
After setting the motion mode and speed, click the direction keys to move the corresponding axis for movement.

2.3.2.2 Manual Step

Manual step mode can set the corresponding step distance to move the target axis to the desired position.



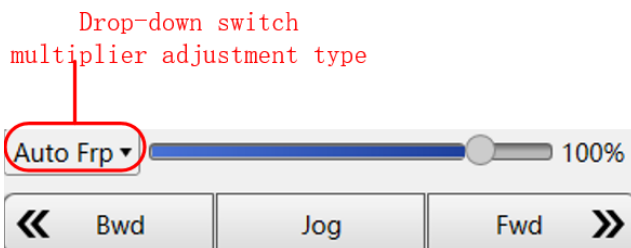
The speed of manual step is set in the system parameters. The specific setting position is: **System** → **System Parameters** → **Speed Accuracy** → **2.0 Jog Speed** → **2.0.0 Jog Speed**.



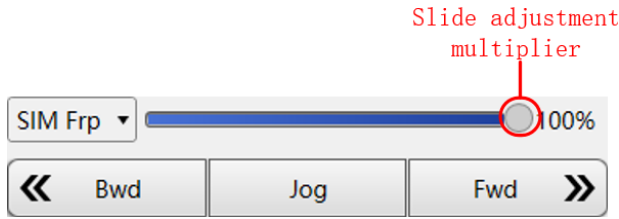
After setting the manual step distance and speed, click the direction key corresponding axis will move to a step distance position. It cannot be executed when manual movement is executed again during the movement. Only after step into the arrival target position, the system enter idle state can execute the next action.

2.3.2.3 Override Adjust

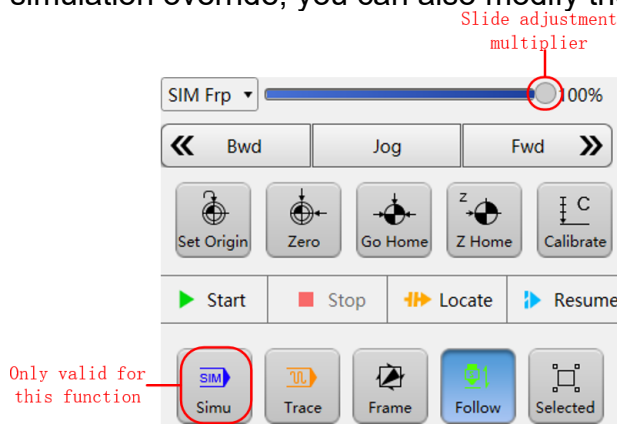
There is an override adjust function in the operation bar, which can adjust **Auto Frp** and **SIM Frp**.



- **Auto Frp**
Auto Frp adjust the speed of non-simulation motion. The adjusted machining override not only affect the speed during machining but also affect the speed of manual motion.
Actual movement speed = set speed × machining override

















- SIM Frp**
 SIM override is only effective for simulation machining and has no effect on other motion forms.
 $\text{Actual SIM speed} = \text{SIM speed} \times \text{SIM override}$
 When simulating motion, the machine tool is not controlled to execute corresponding machine electrical actions, and only the machining trajectory is displayed in the object edit area. The trajectory running speed is the simulation speed. If you want to accelerate simulation speed, in addition to modifying the simulation override, you can also modify the cutting speed in the layer.











2.3.3 Machine Tool Control Button

Start and stop machining and execute and laser cutting related operations:

| Button | Description |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Set Origin | Set the workpiece coordinate of the current coordinate system to zero. |
| Zero | Return to workpiece origin. |
| Go Home | Execute all axes to return to machine origin. |
| Z Home | Execute the Z-axis return to machine origin. |
| Calibrate | Calibration refer to capacitance calibration. Its main function is to collect capacitance data and match the relationship between the distance between the cutting head and the cutting plate and the capacitance feedback of the cutting head. |
| Start | Start the machining task from the beginning. |
| Stop | Stop this machining task. |





| Button | Description |
|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  Locate | After machining stop, if the machine coordinates are ensured to be accurate, machining will resume from where the last machining stopped. If set system parameter Break Distance When Breakpoint Continues , then resume machining from (last machining stop + breakpoint resume back distance). |
|  Resume | When machining stop, click this button to position the last machining stop point. If set system parameter Break Distance When Breakpoint Continues , then resume machining after positioning to (last machining stop point+ breakpoint resume back distance). |
|  Simu | Enter simulation mode. The system does not drive the machine tool to perform corresponding machine electrical action and only high speed simulate the machining path in the drawing area. |
|  Trace | Enter track mode. Run the machine tool without open the laser and machining related ports to check whether the machining action is correct. |
|  Frame | The laser head walk around the outer frame of the graphic to be machined and create a rectangle, which is used to determine the machining range and position of the plate. The speed of cut frame is set in System → Common Parameters → Machine Param → Frame Check Speed . |
|  Selected | During machining, only the selected graphics are machined, including machining, track, simu, frame and resume. |
|  Follow | Control the Z-axis to float up and down in real time to ensure that the relative distance between the cutting head and the plate remain unchanged. |
|  Edge Seek | Calculate the rotation angle of the current plate relative to the machine coordinate system, rotate the workpiece coordinate system in the tool path by the corresponding angle, and establish a new workpiece coordinate system. |
|  Jog Cut | Manually control the cutting head jog light once. |
|  Cut Sheet | Manually cut off the plate, distinguish between thin and thick plate, and can set the operation direction, cutting technic and cutting speed. |
|  Power | Before start machining, click to turn on the laser power. |
|  Shutter | Click to open the shutter, and then click to close. The shutter must be manually clicked open. First open the shutter and then open the laser valve to release the laser. |
|  Laser | Press and hold the laser valve until it is released to close. When machining start, the system automatically open the laser valve. |
|  Pos Laser | Click to turn on the red light, and then click to turn off, it must be turned on manually. A red light is used to indicate where the laser is released on the sheet. |

| Button | Description |
|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  Burst | Click to open the laser valve regularly. The system open the laser valve at the same time, and automatically close after continue the set jog parameter. |
|  BlowOn | Click to open the blow valve, click again to close, the blown gas is selected by  . When machining starts, the button is highlighted, and the system automatically opens the blow valve. |
|  Air | Click to select the type of blowing gas, you can choose air, oxygen, nitrogen. |
|  Fan | Click to open the fan power, and then click to close. The manufacturer parameters under the set External Device Control - Exhaust category control whether to auto turn on or off the fan at the begin and end of machining. |
|  Lubricate | Turn on lubrication. |
|  Switch | Click to perform automatic exchange worktables to improve machining efficiency. |
|  Lamp | By default, after open the software, the lamp button auto press and after OFF the software, the lamp button auto OFF. Also can manually control the lamp switch through the lamp button. |

2.4 Layer Toolbar

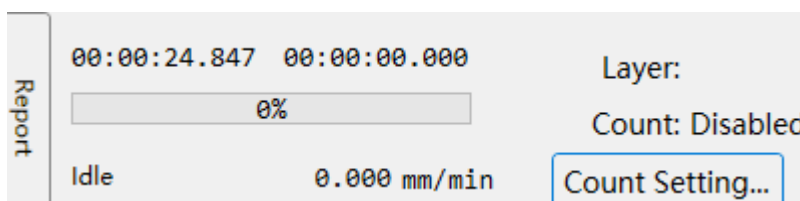
Perform layer related operation.

Include the following parts:

- : Set the layer. For details, please see [Layer Technic](#).
- : Set the selected graphic machining.
- : Set the selected graphic not to be machined, and the graphic will be white at this time.
- : Change the color of the selected object to the color of the corresponding layer.

2.5 Machining Information Statistics Column

The machining information statistics column is as follows:



The image shows a 'Report' panel with the following information:

- Time: 00:00:24.847 00:00:00.000
- Layer: (dropdown menu)
- Count: Disabled
- Progress bar: 0%
- Status: Idle
- Speed: 0.000 mm/min
- Count Setting... (button)

Can do the following:

- Click **Report** to view the [Report](#).
- Click **Count Setting** to set [Count Setting](#).

- View the current total machining time, remaining time for re-machining (when cycle machining is enabled), system status, machining speed, current layer and machining count.

2.6 Alarm/System Information Bar

The alarm/system information bar is as follows:

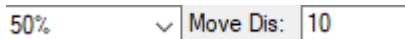
| | | |
|-------|------------------------|-----------------------------------------------------------------|
| Alarm | ⚠️ 2023-12-15 09:12:38 | E006: Gamepad communication exception. Please check USB antenna |
| Log | ❌ 2023-12-15 09:12:35 | E010: Height sensing unit was not calibrated. |
| | ❌ 2023-12-15 09:12:35 | E009: Beam is not initialized. |

Can do the following:

- Double click **Alarm/System**, [Log](#).
- Double click corresponding to the alarm item or system information item, and view the time, cause and solution of the alarm or log details in the pop-up dialog box.

2.7 Drawing Information Bar

The drawing information bar is as follows:



Can do the following:

- View and set the scale factor of the drawing area.
- View and set the single movement distance of the graphic in the drawing area.
Example: Set the jiggle distance to 10mm, select the graphic and press the → key on the keyboard, and the graphic will move 10 mm to the right.
- View related steps and prompt information for drawing graphic and perform machining operation.

2.8 Drawing Area

Used to preview and draw graphic in this area.

The type of graphic type drawn include:



Closed Graphic

Unclosed Graphic

2.9 Drawing Toolbar

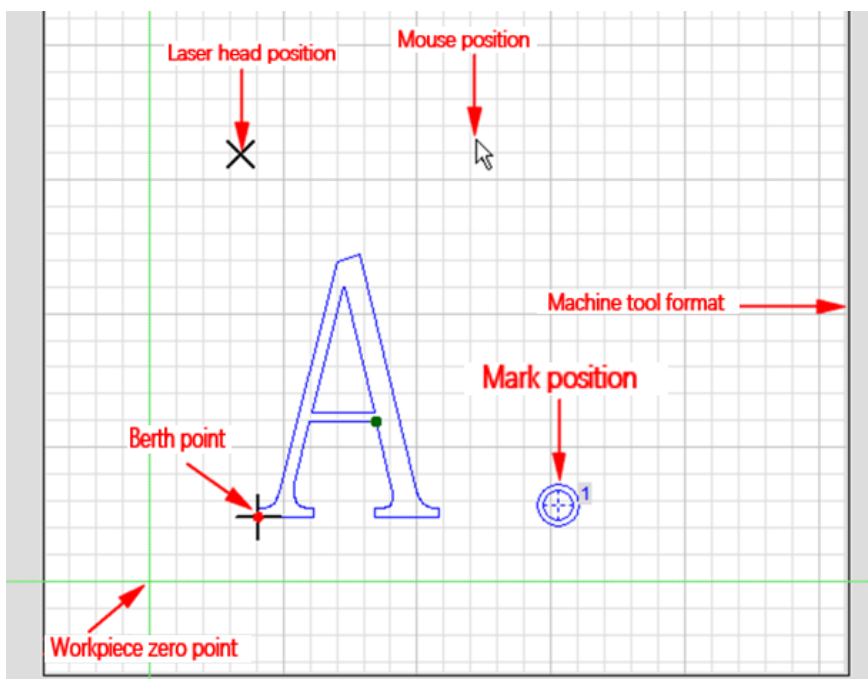
Can do the following:

- [Graphic Drawing](#)
- Support [Auxiliary Tool](#)

3 Coordinate System

The machine origin, also known as the machine tool origin, is the origin of the machine coordinate system. Its position is generally set at the lower left/lower right position of the machine tool. It is a physical position set by the machine tool manufacturer on the machine tool. Its function is to keep the actual machine coordinate origin of the machine tool consistent with the machine coordinate origin read on the software, and establish the start point for measuring the machine tool motion coordinate. Every time the CNC machine tool is started, the machine origin zero return operation must first be performed so that the CNC machine tool and the control system can establish a coordinate relationship and the control system can activate the soft limit function of each axis.

In the cutting software, taking the lower right corner as an example, the figure below shows the machine origin position displayed on the software.

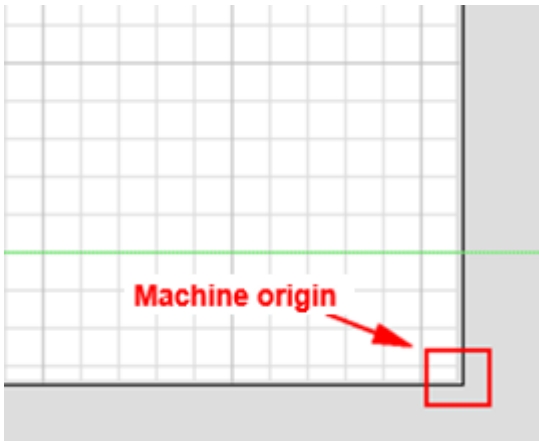



3.1 Machine Origin





3.1.1 Definition

The machine origin, also known as the machine tool origin, is the origin of the machine coordinate system. Its position is generally set at the lower left/lower right position of the machine tool. It is a physical position set by the machine tool manufacturer on the machine tool. Its function is to synchronize the CNC machine tool with the control system and establish the start point for measuring the motion coordinate of the machine tool. Every time the CNC machine tool is started, the machine origin zero return operation must first be performed so that the CNC machine tool and the control system can establish a coordinate relationship and the control system can activate the soft limit function of each axis.

In the cutting software, taking the lower right corner as an example, the figure below shows the machine origin position displayed on the software.



After the software successfully execute the machine origin zero return action, there will be an origin  mark (BMW mark) in the coordinate display column.

| Axis | G54 | Machine | Feedback | Low |
|-----------------------------------------------------------------------------------|-----|---------|----------|-------------|
|  | X | 0.000 | 0.000 | 6000 mm/min |
|  | Y | 0.000 | 0.000 | 6000 mm/min |
|  | Z | 0.000 | 0.000 | 1200 mm/min |
|  | W | 0.000 | 0.000 | |

There are two ways to set the machine origin return:

- Datum setting
- Machine zero return

3.1.2 Datum Setting

It is only applicable to absolute encoder machine tool. Using this method, there is no need to install a fixed origin signal on the machine tool.

Prerequisite:

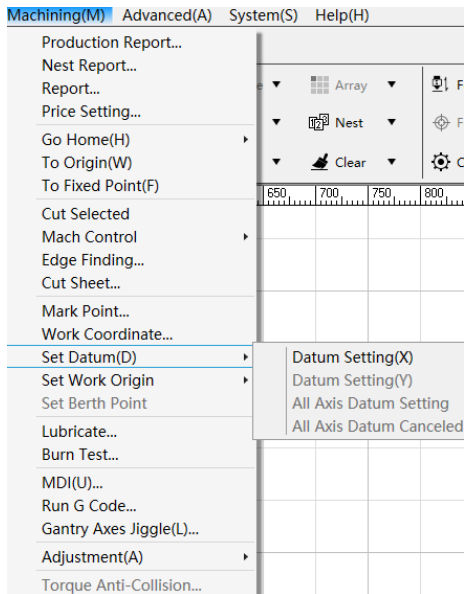
Before use, make sure the parameter **Absolute Encoder Back Home(X)** is set to 1.

System Parameters

| Name | Value | Unit | Effective |
|--------------------------------|-------|------|-------------|
| 1.1.1 Origin Setting(X) | | | |
| Absolute Encoder Back Home(X) | 1 | | Immediately |
| 1.1.2 Origin Setting(Y) | | | |
| Absolute Encoder Back Home(Y) | 1 | | Immediately |
| 1.1.3 Origin Setting(Z) | | | |
| Absolute Encoder Back Home(Z) | 0 | | Immediately |

Operation Steps:

1. Move cutting head to desired origin position.
2. In the menu bar, click **Machining** → **Set Datum** and select the corresponding sub-menu to perform datum setting to set the current position as the machine origin position (datum point).



3.1.3 Machine Zero Return

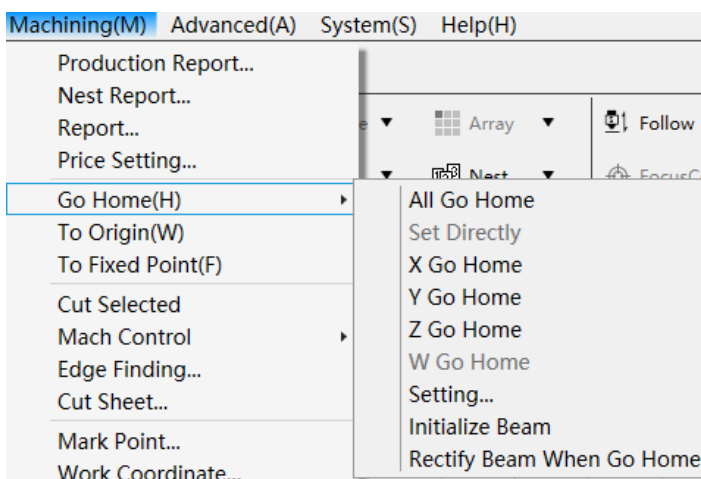
It is suitable for incremental encoder machine tool and absolute encoder machine tool. When using this method to return to the mechanical origin, the machine tool must be equipped with a mechanical origin signal.

Prerequisite:

If it is an absolute encoder machine tool, before using this zero return method, the parameter **Absolute Encoder Back Home(X)** need to be set to 0.

Operation Steps:

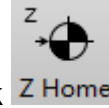
If there is no BMW logo after opening the software, you can click **Machining** → **Set Datum** on the menu bar to select the corresponding axis to perform the return to machine origin operation.



Or operate on the machine tool control bar:



- **All Return to Machine Origin:** Click **Go Home** **Go Home** to automatically return to the machine origin in the order of the Z-axis first, and then the X, Y, and W axes.

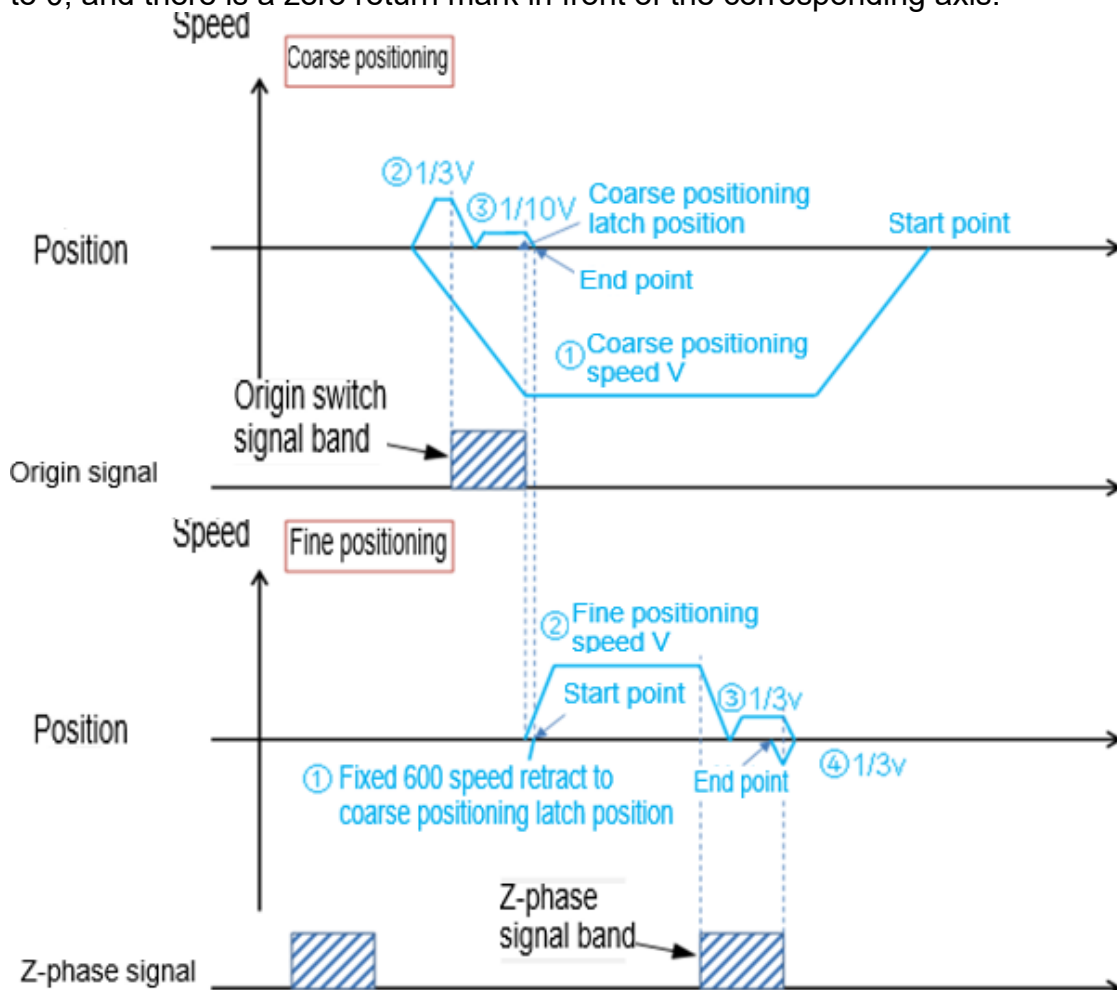


- **Only Z-axis Return to Machine Origin:** Click **Z Home**.

Related Instructions:

The machine zero return method is divided into three steps: coarse positioning stage, fine positioning stage, and retract stage.

- **Coarse Positioning Stage:** Find the origin switch according to the parameter coarse positioning stage direction and coarse positioning stage speed. After finding the origin switch, latch the coarse positioning stage axis feedback position;
- **Fine Positioning Stage:** After the coarse positioning stage end, the fine positioning stage enter. Reversely search for the Z-phase signal according to the parameter fine positioning stage speed. After searching for the Z-phase signal, latch fine positioning stage axis feedback position;
If the Z-phase signal is not enabled for the corresponding axis, the signal detected by the fine positioning stage is still the machine origin signal.
- **Retract Stage:** After the fine positioning stage is completed, retract to the target position according to the set retract distance and retract speed. It should be noted that when the retract distance parameter is positive, the retract direction is consistent with the coarse positioning direction. When the retract direction is negative, the retract direction and the coarse positioning direction are opposite. After retract is completed, the machine coordinate and feedback coordinate are set to 0, and there is a zero return mark in front of the corresponding axis.

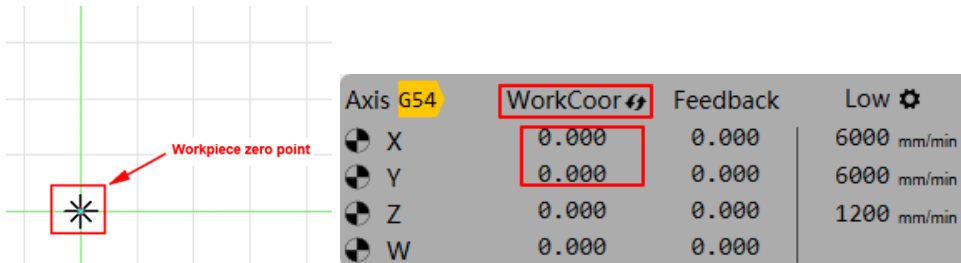


3.2 Workpiece Zero Point

3.2.1 Definition

The workpiece zero point refer to the reference point used to determine the workpiece position and coordinate in machining. It is the start point during the machining process.

In the cutting software, the intersection point of the two green coordinate lines in the coordinate system is the workpiece zero point, and the workpiece coordinate of the XY axis corresponding to the workpiece zero point is 0.



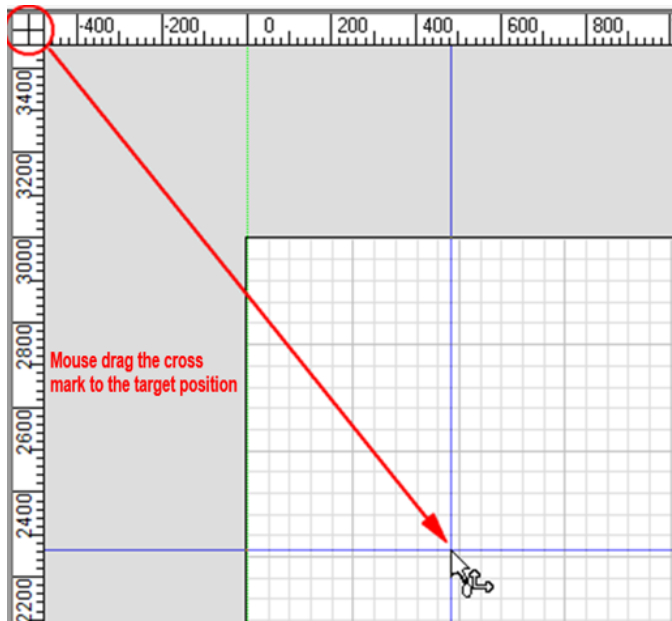
3.2.2 Set Workpiece Origin

The zero point of each axis in the tool path is the workpiece origin. Before machining, confirm the actual position of the workpiece origin on the plate.

Operation Steps:

Choose any of the following methods to execute:

- In the **Drawing** interface, drag the mouse to the cross mark at the intersection of the horizontal ruler and the vertical ruler to the target position.



- In the machine tool control bar, specify the laser head position as the workpiece origin:
 - Manually jog or step to move the cutting head to the target position.

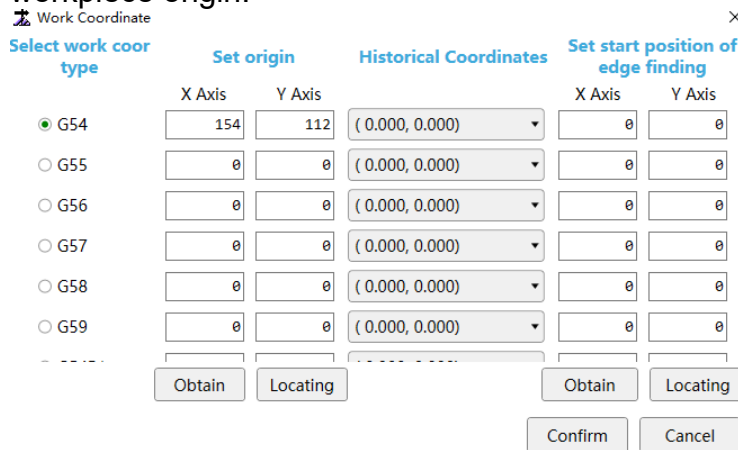


- Click **Set Origin** to set the current position as the workpiece origin.

- Manually set the workpiece origin:

- In the function menu bar, click , and the cursor changes to .

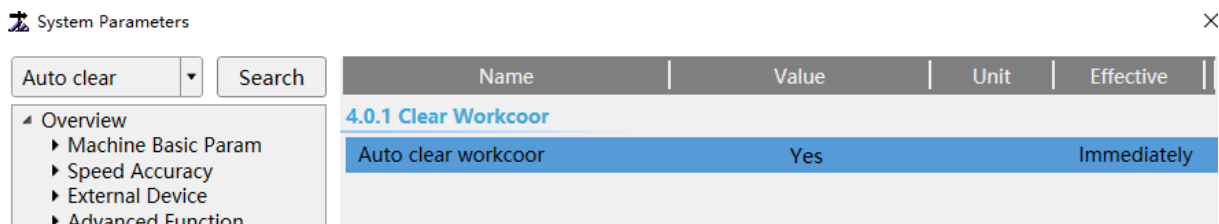
- b. Left click to select the workpiece origin position.
- c. Right click to exit the picking tool.
- Specify the coordinate of the laser head X-axis/Y-axis as the workpiece origin:
 - a. In the menu bar, click **Machining** → **Work Coordinate**.
 - b. Select coordinate system, set X/Y axis coordinate, or select historical workpiece origin.



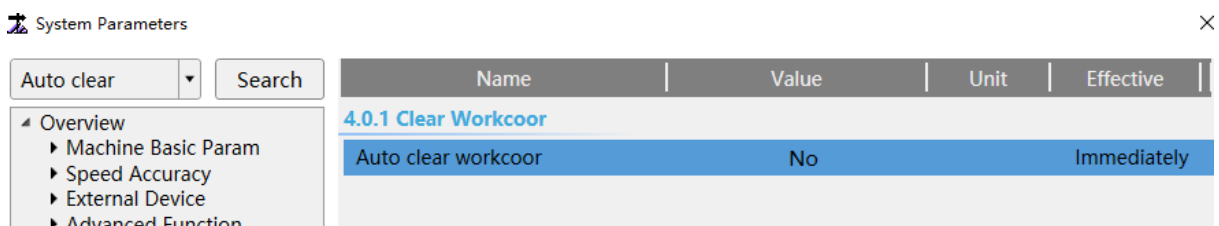
c. Click **Confirm**. That is, the selected workpiece zero point is applied.

3.2.3 Auto Clear Workpiece Coordinate

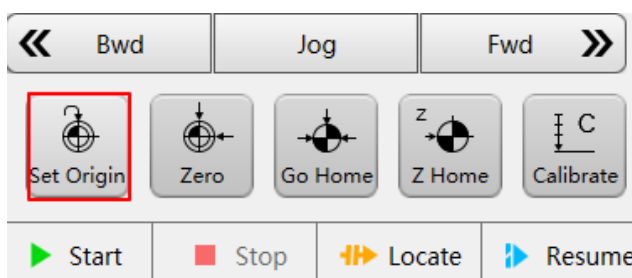
To facilitate machining, you can set **Auto Clear Workcoor** to **Yes** in the system parameters. In this way, before machining start, directly move the cutting head to the desired workpiece zero point position, click **Frame** or **Machining** directly, and the current position will auto set to the workpiece zero point.



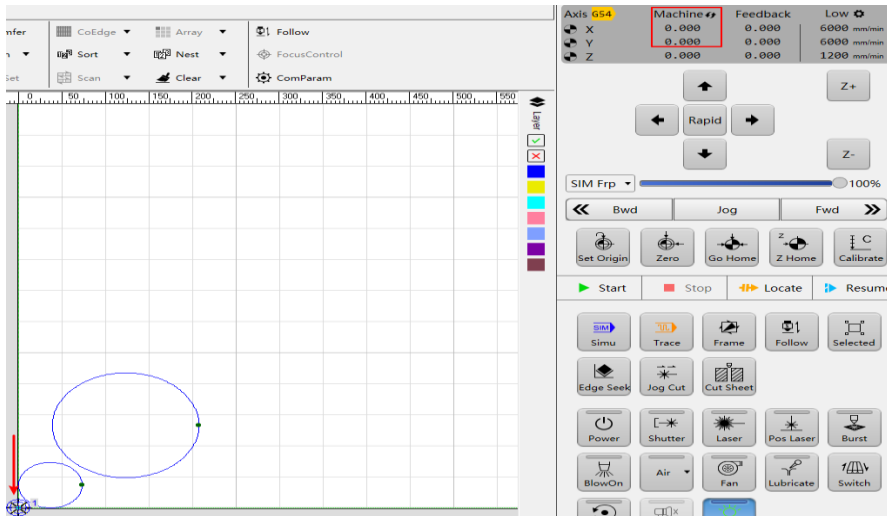
When the system parameter **Auto Clear Workcoor** is set to **No**, manual workpiece to zero is needed.



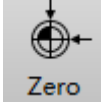
Manual workpiece to zero method: First move the cutting head to a suitable position on the plate (generally recommended in the lower left corner), and then click the **Set Origin** button.



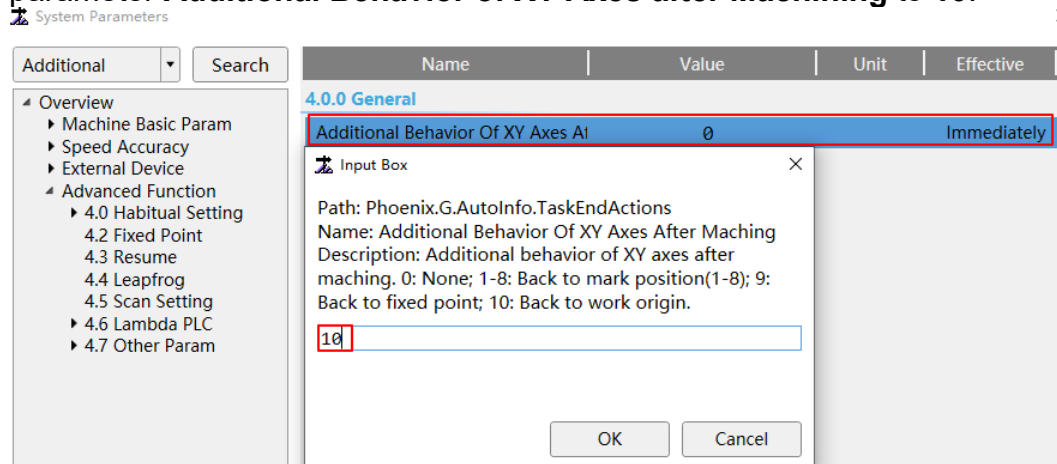
At this time, the workpiece coordinate of the XY axis return to 0, and the workpiece zero coordinate datum on the software will move to the cross cursor position.



3.2.4 Workpiece Zero Return Operation Steps:

- Manual control: In the machine tool control bar, click  and the cutting head will move to the workpiece zero position.
- After machining, auto return to the workpiece origin:

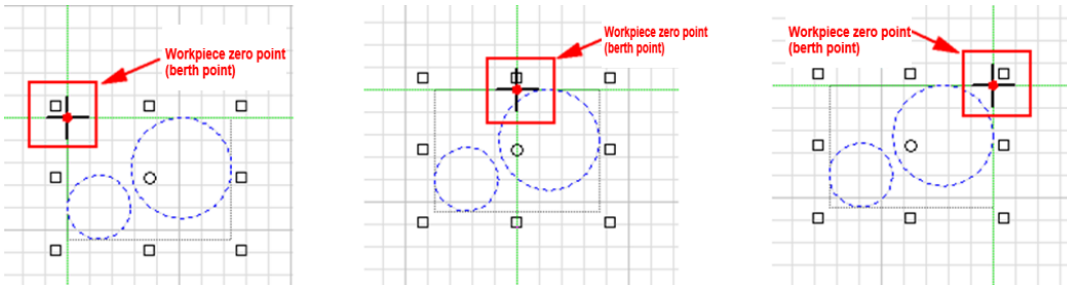
Click **System** → **System Parameters** in the menu bar and set the value of the parameter **Additional Behavior of XY Axes after Machining** to **10**.



3.3 Berth Point

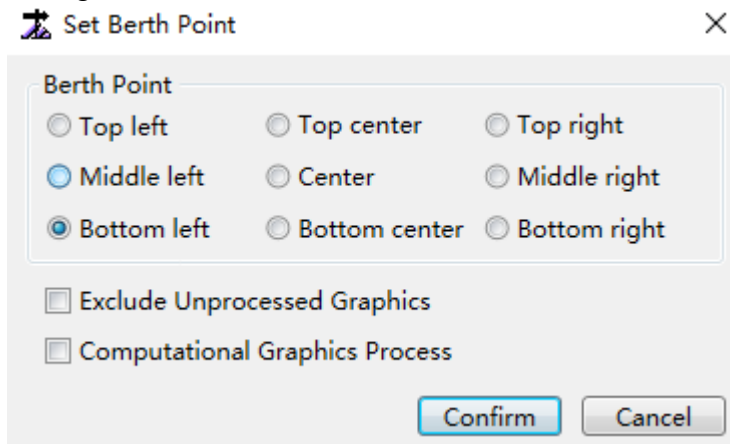
3.3.1 Definition

The berth point is the position of the cutting figure berth at the origin of the workpiece with the outer frame of the cutting figure set as datum. As shown below, the lower left corner of the outer frame of the graphic is set as the workpiece zero point, and the berth point is the workpiece zero point position when the berth point is the upper left/middle left/lower left:

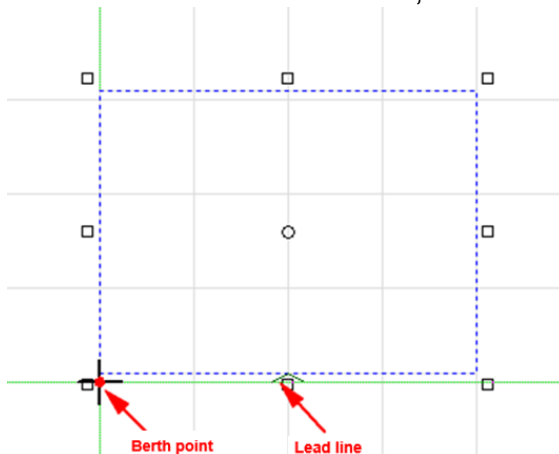


3.3.2 Set Berth Point Operation Steps:

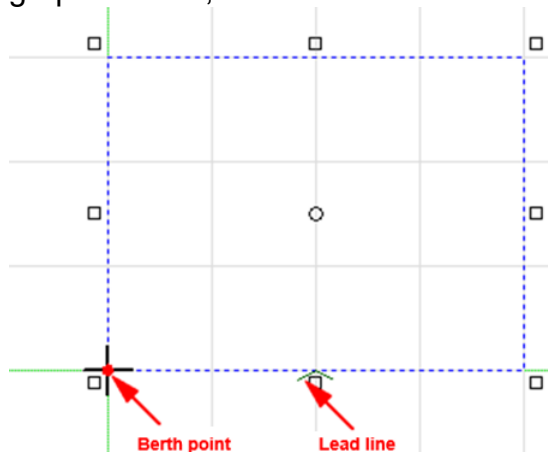
1. In the common toolbar, click **Berth**, and pop-up the **Set Berth Point** dialog box:



2. Select berth position.
3. Check **Exclude Unprocessed Graphics** as needed.
 - If checked, when performing workpiece to zero on a tool path with not machining primitive, the outer frame of the machining primitive will be used to perform workpiece to zero.
 - If not checked, then when performing workpiece to zero on a tool path with not machining primitive, the outer frame of the whole tool path will be used to perform workpiece to zero.
4. Check **Computational Graphics Process** as needed.
This function is mainly targeted at lead line technic.
 - If checked, the estimated graphic outer frame when the workpiece is set to zero will include the lead line, as shown below:



- If not checked, the workpiece to zero will recognize the lead line outside the graphic frame, as shown below:




Note: When using not checked apply layer technic, there is a risk of cutting out the plate during cutting machining.

5. Click **Confirm**.

3.3.3 Auto Apply Berth Point

Auto apply berth point, when the workpiece to zero, the cutting graphic auto berth at the set berth point position.

In the common toolbar, click the  **Berth** drop-down key and check **Auto Apply Berth Point**.

3.4 Mark Point

3.4.1 Definition


Mark point is a representative fixed point on the machine tool that is set according to the customer's habits (based on machine coordinate). When using mark point, multiple fixed points can be marked on the machine tool. Customers can use it as a safe position for XY return after machining, different workpiece origin positions in multiple workpiece coordinate systems, etc.

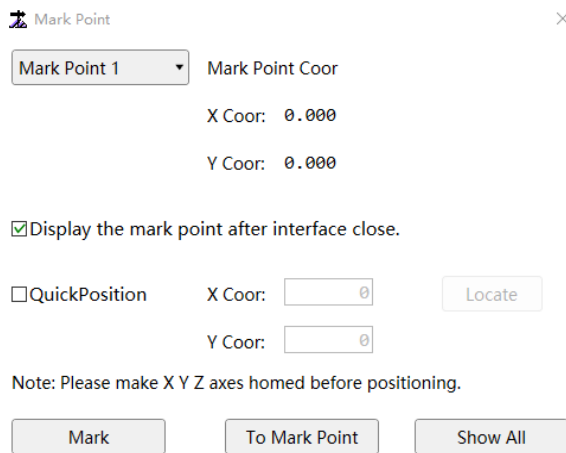
In the cutting software, 8 mark points are provided, and different colors are used to distinguish different mark points.



3.4.2 Set Mark Point

Operation Steps:

1. Select any of the following methods to open the **Mark Point** dialog box:
 - In the drawing toolbar, click  **Mark Point**.
 - In the menu bar, click **Machining** → **Mark Point**.




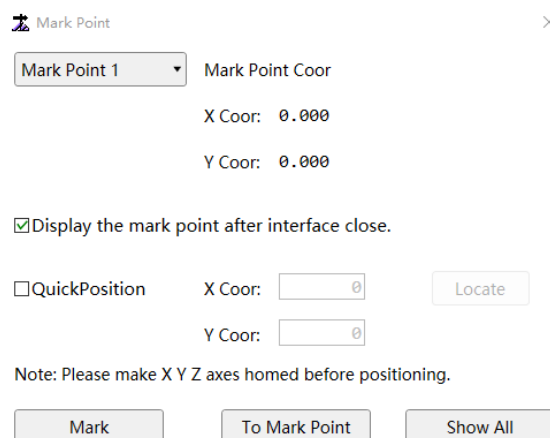
2. Select mark point n in the **Mark Point n** drop-down box. The value range of n is: 1~8.
3. Select any of the following methods to set the X and Y coordinate value.
 - In the machine tool control bar, click the X-axis and Y-axis direction buttons, move the cutting head to the target position, and click **Mark**.
 - If the target position is not a marked point and need quick positioning to the specified machine coordinate position, check **Quick Position**, enter the X coordinate value and Y coordinate value, click **Locate**, move the cutting head to the specified position, and click **Mark**.
4. **Optional:** In the **Mark Point** dialog box, you can also do the following:
 - Click **To Mark Point**, and the cutting head auto return to the mark point position.
 - If you need all marked points to be displayed in the drawing area, click **Show All**.

3.4.3 To Mark Point

Return the cutting head to the corresponding mark position.

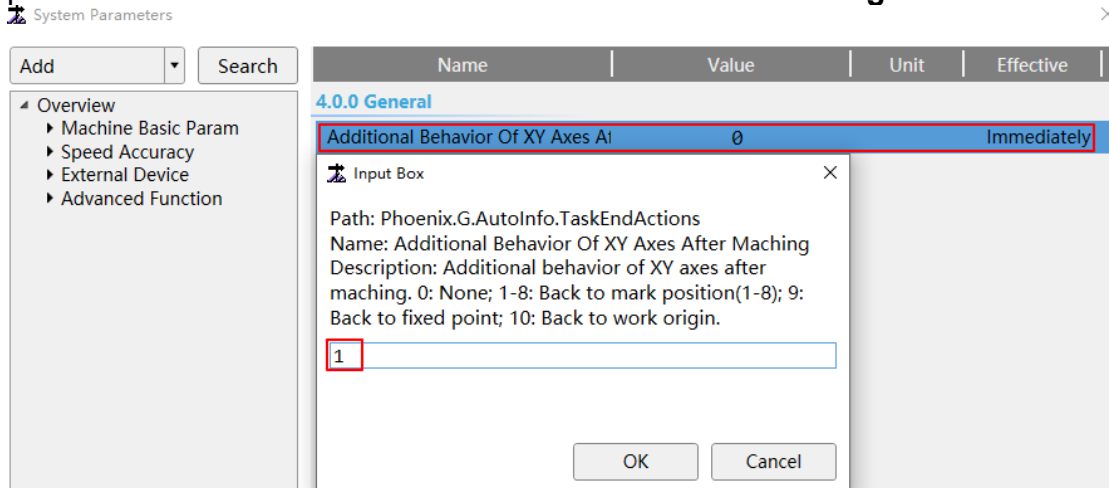
Operation Steps:

- Manual control:
 - a. Select any of the following methods to open the **Mark Point** dialog box:
 - In the drawing toolbar, click  **Mark Point**.
 - In the menu bar, click **Machining** → **Mark Point**.



- b. Select mark point n in the **Mark Point n** drop-down box. The value range of n is: 1~8.

- c. Click **To Mark Point**, and the cutting head will auto return to the **Mark Point** position.
- Auto return to fixed point after machining:
Click **System** → **System Parameters** in the menu bar and set the value of the parameter **Additional Behavior of XY Axes after Machining** to **1 - 8**.



3.5 Fixed Point

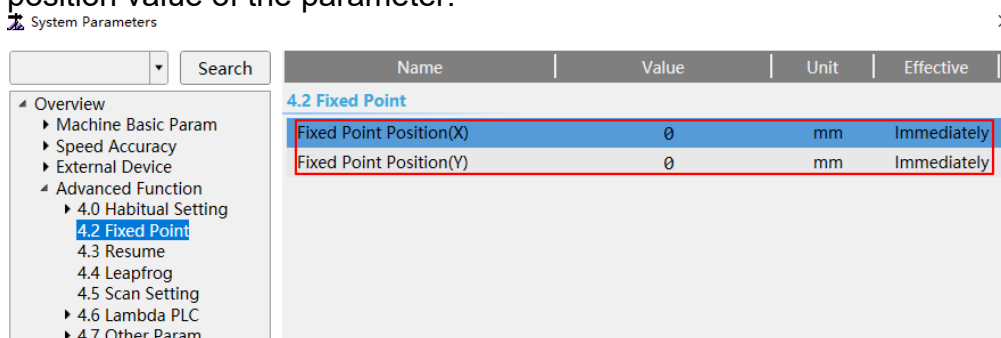
3.5.1 Definition

The fixed point is a fixed point set on the software based on the machine coordinate. After machining, you can choose to move the cutting head return to the fixed point position.

3.5.2 Set Fixed Point

Operation Steps:

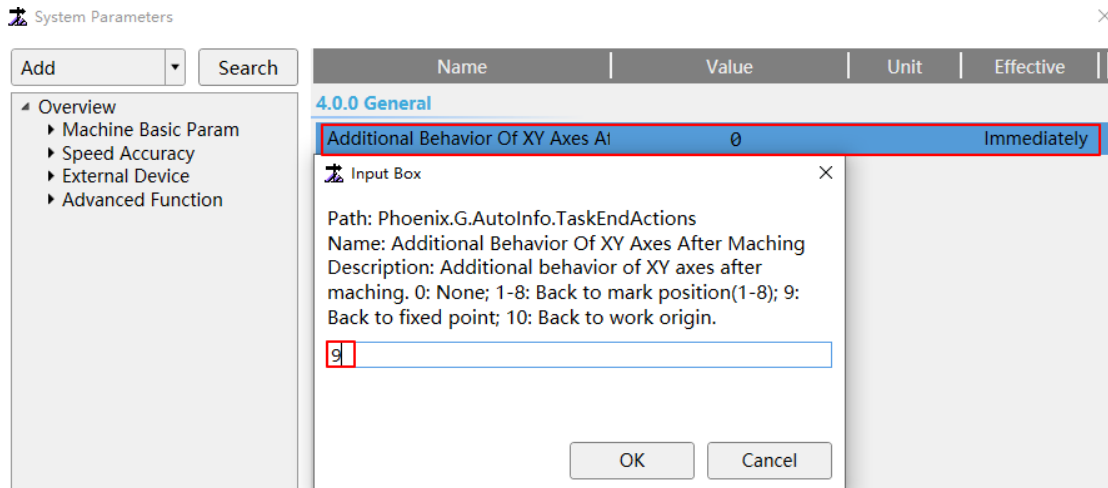
1. In the menu bar, click **System** → **System Parameters**, select the node **Overview** → **Advanced Function** → **4.2 Fixed Point**, right display the parameter and parameter information of the fixed point.
2. Double click **Fixed Point Position (X)** or **Fixed Point Position (Y)** to set the target position value of the parameter.



3.5.3 To Fixed Point

Operation Steps:

- Manual control:
In the menu bar, click **Machining** → **To Fixed Point**, and the cutting head auto return to the fixed point position.
- Auto return to fixed point after machining:
Click **System** → **System Parameters** in the menu bar and set the parameter **Additional Behavior of XY Axes after Machining** to **9**.



3.6 FAQ

3.6.1 Why "Return to Machine Origin before Machining"?

Answer: It is recommended that the parameter "return to machine origin before machining" is set to "Yes". Not returning to the machine origin is not allowed for machine tool auto running.

Since the servo system use an incremental encoder, the system can only know its current position relative to its previous position. In order to make any position on the machine tool as a fixed coordinate, need select a reference point, which is the machine origin. The reason for return to machine origin before machining is:

1. To prevent deviation, combine it with breakpoint resume. Because the machine tool is powered off during machining or E-stop occur, the motor enter the free status after power off. When restarting the machine tool to resume machining, it will be offset. After returning to the machine origin, the offset machine coordinate system can be corrected back to more accurately retrieve the original workpiece zero point, and then perform breakpoint resume to ensure the accuracy of resume machining;
2. Establish the coordinate system of the machine origin. Especially for machine tool with automated nozzle function, because the mechanical coordinate position of each nozzle base in the nozzle library is fixed.

3.6.2 What are "Coarse Positioning" and "Fine Positioning"?

Answer: These two parameters are the parameters for returning to the machine origin, and they are effective when returning to the machine origin.

"Coarse positioning" refer to the process in which the machine tool spindle return to the machine origin from any position, and the spindle travel from this point to the time when the origin switch receive a signal.

"Fine positioning" means that after the machine tool get the origin signal, it slowly move in the "fine positioning direction" at the "fine positioning stage speed". After getting the encoder zero signal (if the Z-phase signal of the corresponding axis is not enabled, the fine positioning stage also get the machine origin signal), the return to the machine origin is completed, and then the machine tool retract a "retract distance".

3.6.3 What is the Use of "Retract Distance"?

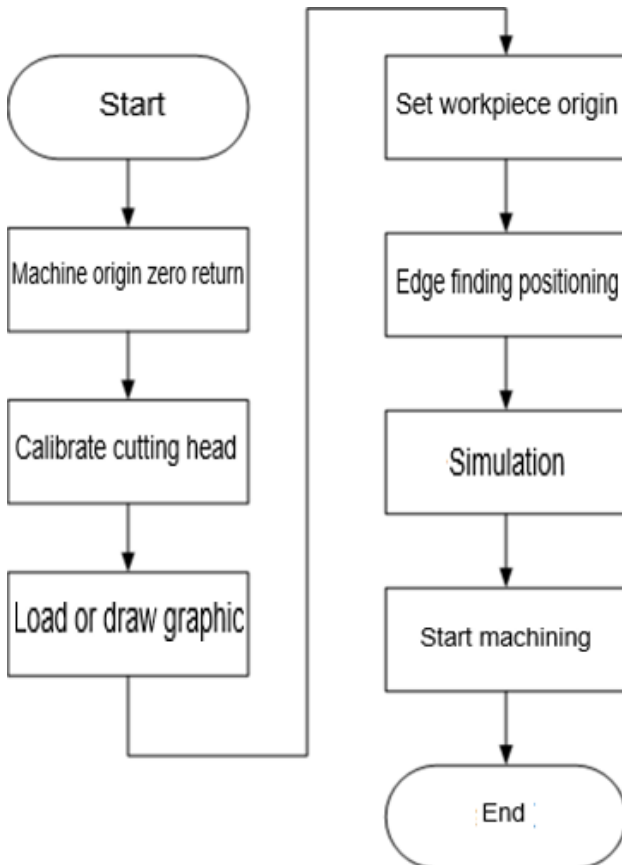
Answer: "Retract" means that after returning to the machine origin, the machine tool will retract a certain distance and leave the signal sensitive area of the origin switch.

4 Quick Start

4.1 Overview

Through this part, you can quickly know the sheet machining process of **NcStudio-V15 Laser Cutting Control System** and control the machine tool to perform laser cutting on the sheet metal.

The process is as follows:



4.2 Machine Origin Zero Return


There are two ways to set the machine origin zero return:

- Datum setting: Only applicable to absolute encoder machine tool. Using this method, there is no need to install a fixed origin signal on the machine tool. For details, please see [Datum Setting](#).
- Machine zero return: Suitable for incremental and absolute encoder machine tool. When using this method to return to the machine origin, the machine tool must be equipped with machine origin signal. For details, please see [Machine Zero Return](#).

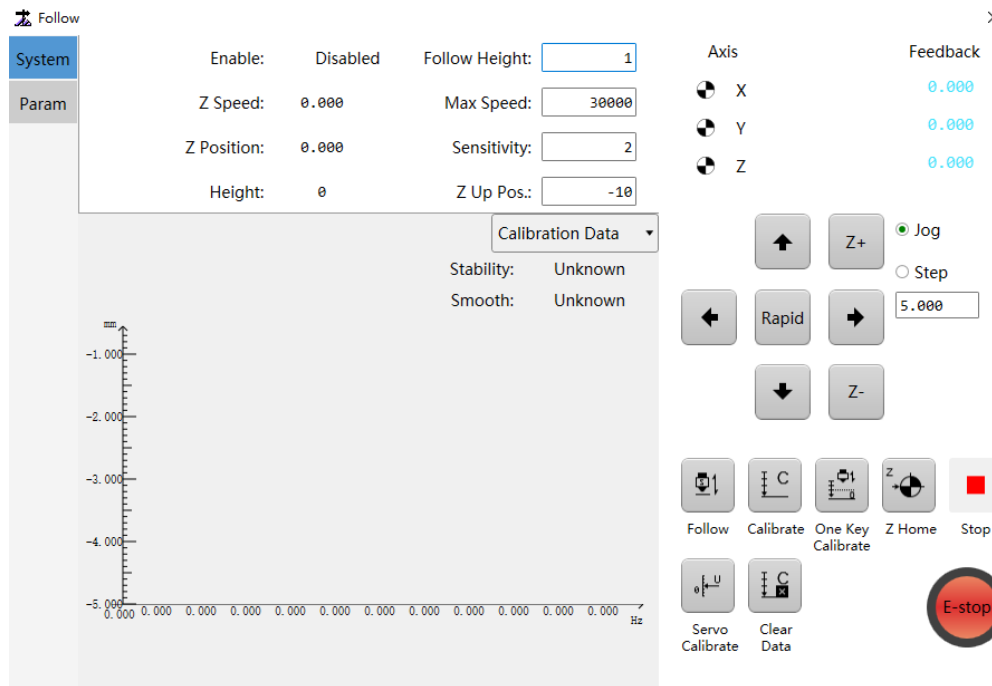
4.3 Calibrate Cutting Head




Measure the corresponding relationship of the capacitance with position between the cutting head and the plate to control the Z-axis floating up and down in real time to ensure that the relative distance between the cutting head and the plate remains unchanged in the follow-up state.

Operation Steps:

1. Select the following methods to open the **Follow** dialog box:
 - In the common toolbar, click  **Follow** .

- In the menu bar, click **Advanced** → **Follow Control**.





- Click  **Servo Calibration** to perform servo calibration to solve the servo motor zero point drift problem caused by speed loop control. At this time, the cutting head move back and forth in a small amount for servo compensation.
- Select the following methods to calibrate the cutting head:
 - If the cutting head has not been calibrated, click the Z-axis direction button, move the cutting head to about 5mm close to the board surface, and keep the board surface still. Click  **Calibrate** to calibrate the cutting head.
 - If the cutting head has been calibrated, click  **One Key Calibrate**. The system auto execute calibrate, which take about 20 seconds to complete.

After the cutting head is calibrated, in the **Calibration Data** area, check whether the **Stability** and **Smooth** are higher than **Good**. If they are lower than **Good**, recalibrate.

4.4 Load or Draw Graphic

Before machining, it is necessary to load the tool path or draw graphic.

Select the following methods to load or draw graphic:

- Select the following method to load graphic:
 - Drag the G, NC DXF, DWG, PLT, NCEX, LXD, and CNC format files to be loaded into the software drawing area.
 - Open NCEX format file:
 - In the common toolbar, click  **Open**.
 - In the menu bar, click **File** → **Open**.
 - Select the following methods to import files:
 - If need to import G, NC, DXF, DWG, PLT, LXD, CNC format files, click  **Import** on the common toolbar.

If need to import G, NC format files, please note:

- **Import Standard G Code:** Before importing, it need to be modified according to the G code specifications provided by our company. Please contact our company for details.
After importing, if need to adjust or switch view, right click.
- **Only Import CAD Information in G Code:** Import the CAD information of the tool path file.

After importing and running, the tool path auto generate an NCEX format file and store it in the NceFiles folder on the desktop. If there is no this folder, the system will create it by itself.

If need to insert G, NC DXF, DWG, PLT, NCEX, LXD, CNC format files based on the original tool path file without overwrite the original tool path, click **File** → **Insert** in the menu bar.

- Select the following method to draw graphic:
 - Manual [Drawing](#).
 - Use graphics [Gallery](#).


After loading or drawing the graphic, do the following:

- [Edit Graphic](#)

After editing the graphic, you can click **File** → **Export File** to export the current graphic as DXF or DWG file so that the tool path can be used multiple times.

- [Graphics Pre-process](#).
- Set [Machining Technic](#).
- Set [Layer Technic](#).

After performing the above operations, select the following method to save the file:

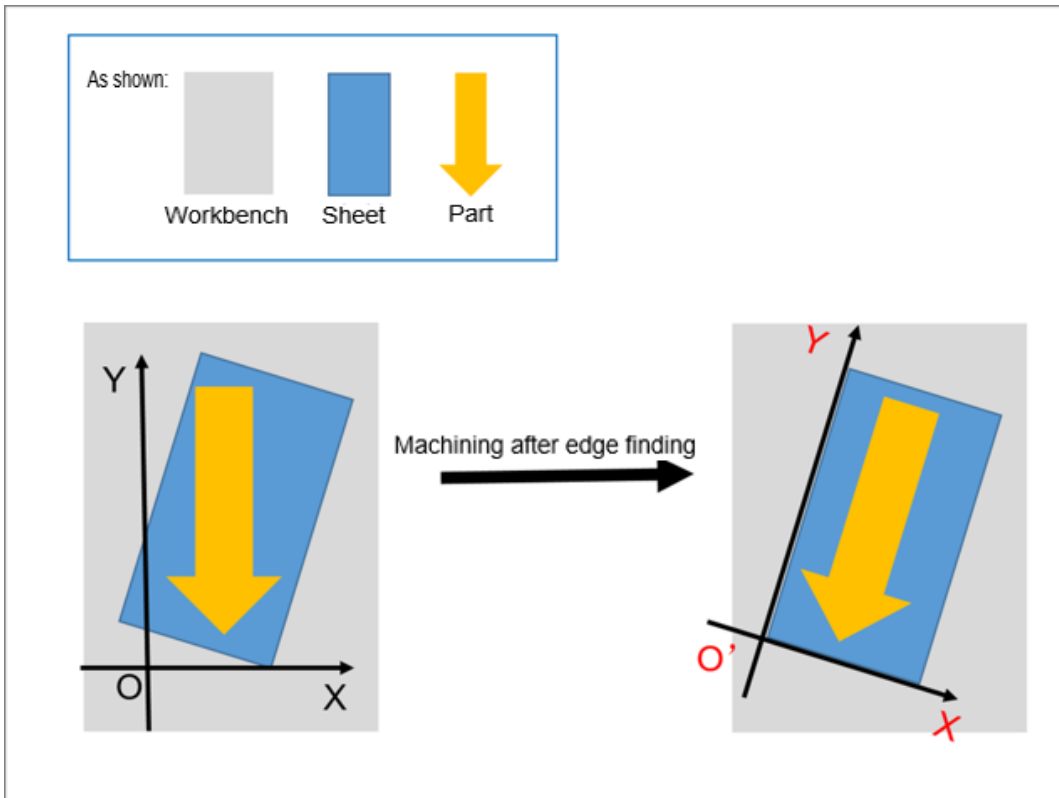
- If need to save the whole tool path, click **File** → **Save / Save As** in the menu bar, or click  **Save** in the common toolbar.
- If need to save the selected graphics in the tool path, click **File** → **Save Selected As** in the menu bar, select the save path and click **Save**.

4.5 Set Workpiece Origin



The zero point of each axis in the tool path is the workpiece origin. Before machining, confirm the actual position of the workpiece origin on the plate. For details, please see [Workpiece Zero Point](#).

4.6 Edge Finding Positioning

If the plate is placed arbitrarily on the workbench, the long and wide edges of the plate will not be parallel to the X and Y axis of the machine tool. If machined directly, excess residual material will appear and the plate will be wasted. The purpose of edge finding is to obtain the angle between the long or wide edge of the plate relative to the machine tool axis. During machining, the machined workpiece coordinate system is rotated to the same angle as the edge finding, so that the machined workpiece coordinate system is parallel to the plate long or wide edge. This avoid plate cutting waste caused by the plate place and the machine tool axis not being parallel.



Function entry:

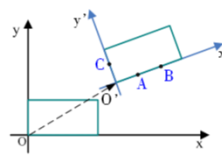
- In the machine tool control bar, click  to open the **Edge Finding** dialog box.
- In the drawing tool control bar, click  to open the **Edge Finding** dialog box.

Edge Finding
×

Edge Find Type Auto Manual

Locating Type 3-Point Sheet

Parameters Setting



Automatic identify plate size

Sheet Size X: mm Offset X: mm

Sheet Size Y: mm Offset Y: mm

Finding Speed: mm/min

Follow Height: mm

Edge Flatness: mm

Clear edge finding data after machining

Return to O' after edge finding

Always use custom angle

Find Edge Before Start

Enable Edge Finding

Machine Motion

Jog Step

Note: please ensure the cutting head is above the sheet, suggest starting edge search from the middle of the sheet.

Current point Fixed point

Locating Start point

Finding Result

O' Mach CoordX: X: Y:

Rotation: deg

Custom angle deg

4.6.1 Edge Finding Method

The software support the following edge finding methods. Need to confirm the plate size and select the correct edge finding method:

- Auto edge finding
Use the follow-up mode auto find the plate edge position, and obtain the plate edge finding data according to the movement sequence planned by the software.
- Manual edge finding
Manually move the cutting head, use red light to find the edge position and record it, and then calculate the edge finding result.

4.6.2 Auto Edge Finding

The auto edge finding function usage step mainly include:

1. Set auto edge finding parameter.
2. Apply auto edge finding.

According to different sheets, the software provide the following auto edge finding positioning methods:

- 3-Point: Applicable to normal sheet.
- Sheet: It is suitable for thin plate with thickness of less than 10mm. The three-point edge finding is expanded to six-point edge finding to improve the problem of inaccurate edge finding result caused by uneven plates.

4.6.2.1 Set Auto Edge Finding Parameter

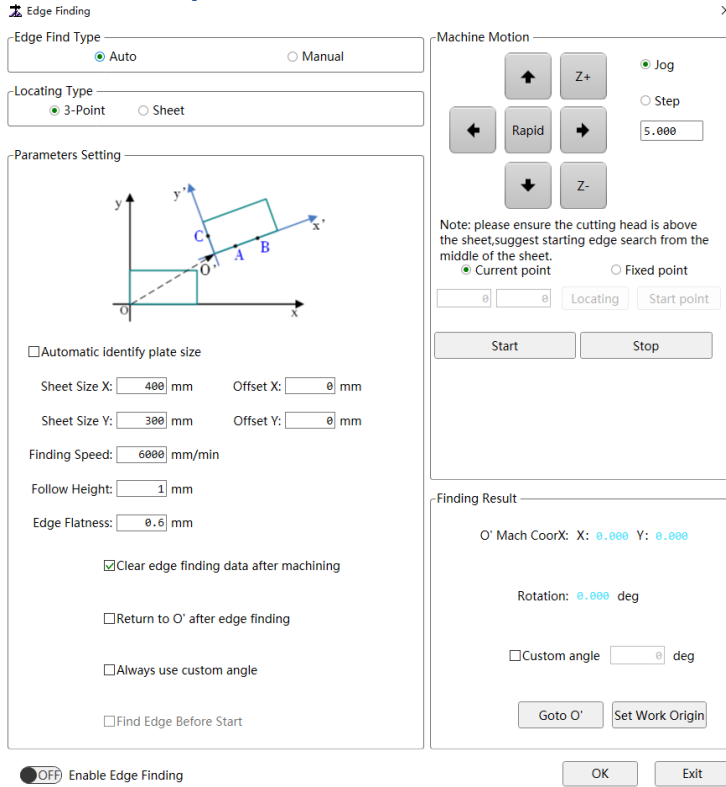
The origin O' of the new workpiece coordinate system is the berth point position, and the out margin direction of the auto edge finding is the adjacent two sides of the berth position.

The corresponding relationship between the berth position and the out margin direction is as follows:

| Berth Position | X Direction | Y Direction |
|----------------|-------------|-------------|
| Lower right | Positive | Negative |
| Upper right | Positive | Positive |
| Lower left | Negative | Negative |
| Upper left | Negative | Positive |

Before setting auto edge finding, make sure the berth point is at the upper right / lower right / upper left / lower left.

4.6.2.1.1 Auto Three-point



Operation Steps:

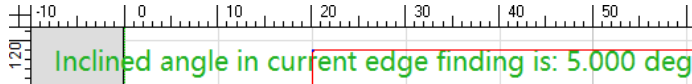
1. Set the auto three-point edge finding parameter.
 - a. In the **Edge Finding** dialog box, set the edge finding method to **Auto** and the positioning method to **Three-point**.
 - b. Set sheet size, offset parameter, finding speed and follow height.
 - c. According to the usage habits, set the zero return after edge search and clear the edge finding data.
2. Edge finding test.
 - a. Click **Start** in the machine motion area in the **Edge Finding** dialog box to check whether the edge finding action will out margin in advance and whether the follow-up motion is normal. Check the test edge finding result in the finding result area.
 Finding Result _____

O' Mach Coord: X: 0.000 Y: 0.000

Rotation: 0.000 deg

Custom angle deg

- b. After the edge finding test is completed, click **OK** to save the setting. The edge finding result will appear in the drawing area.



- c. At this time, click **Frame** to check whether the drawing boundary exceed the sheet.

4.6.2.1.2 Auto Sheet

The auto sheet edge finding setting operation is the same as the auto three-point edge finding, with additional need to set the **Rack Clearance** and **Back Distance**.


- **Rack Clearance:** Set according to the distance between machine tool racks.
- **Back Distance:** In order to return the distance within the sheet after edge finding, if the sheet tilt is serious during edge finding, the retract distance can be appropriately increased to avoid start edge finding from outside the sheet when the same edge is found multiple times.

4.6.2.2 Apply Auto Edge Finding

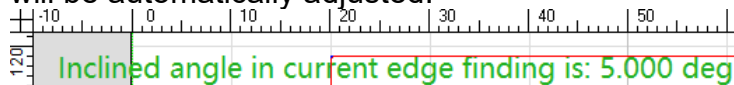
4.6.2.2.1 Auto Edge Finding before Machining

Operation Steps:

1. In the **Edge Finding** dialog box, click in the lower left corner **Enable Edge Finding**

function to the **ON** status. At this time, the in the machine tool control bar  become light, and click **OK**.

After the enable edge finding function takes effect, the tilt degree will be displayed in the upper left corner of the software and the zero point position of the workpiece will be automatically adjusted.



2. In the **Edge Finding** dialog box, check **Find Edge Before Start**.

- (Optional:)** If need to set a fixed start point for edge finding, in the **Edge Finding** dialog box, click **Fixed Point** to set the XY coordinates of the edge finding start point.

Note: please ensure the cutting head is above the sheet, suggest starting edge search from the middle of the sheet.

Current point **Fixed point**

 Locating Start point

- Set zero return after edge finding according to usage habits. This is also common with the **Return to O' after Edge Finding** parameter in the **Edge Finding** dialog box.
- In the **Edge Finding** dialog box, click **OK**.


Before actual machining, you can first turn on the red light and press the **Edge Seek** button on the handle to check whether the machining tool path will exceed the machining range and check whether the red light will exceed the sheet edge.

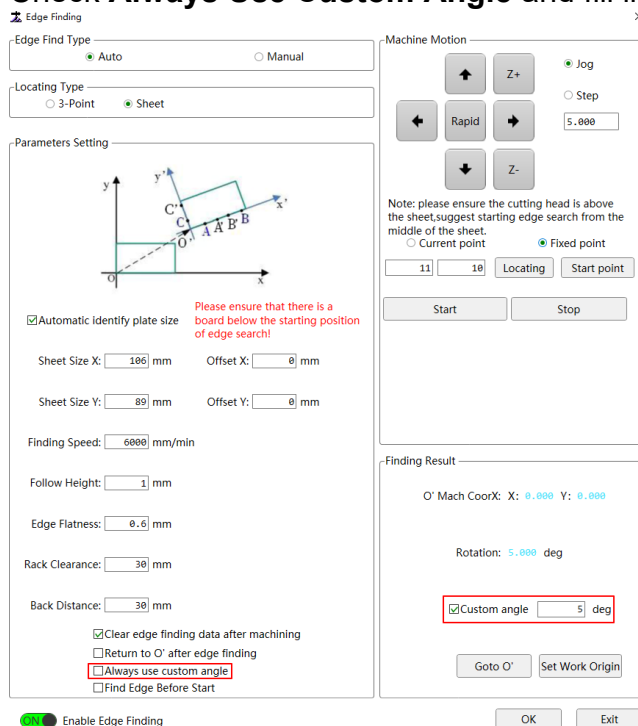
Also can directly click **Start** to start machining, and auto edge finding will be performed before machining.

4.6.2.2.2 Use Custom Angle

There is an option **Always Use Custom Angle** in auto three-point and sheet edge finding. In special cases, such as a fixed deviation of the sheet, you can enable the custom angle without using the auto edge finding function to improve machining efficiency.

Operation Steps:

- In the **Edge Finding** dialog box, click in the lower left corner **Enable Edge Finding** function to the **ON** status. At this time, the in the machine tool control bar  become light, and click **OK**.
- Check **Always Use Custom Angle** and fill in the custom angle in the finding result.



Edge Find Type: Auto Manual

Locating Type: 3-Point Sheet

Parameters Setting

Automatic identify plate size Please ensure that there is a board below the starting position of edge search!

Sheet Size X: mm Offset X: mm
 Sheet Size Y: mm Offset Y: mm

Finding Speed: mm/min
 Follow Height: mm
 Edge Flatness: mm
 Rack Clearance: mm
 Back Distance: mm

Clear edge finding data after machining
 Return to O' after edge finding
 Always use custom angle
 Find Edge Before Start

Machine Motion

Jog Step
 5.000

Note: please ensure the cutting head is above the sheet, suggest starting edge search from the middle of the sheet.

Current point Fixed point

 Locating Start point

Finding Result

O' Mach Coord: X: 0.000 Y: 0.000

Rotation: 5.000 deg

Custom angle deg

- Click **OK** to save the settings. During actual machining, the software will not perform edge finding, but will directly offset according to the custom angle.

4.6.2.3 Parameter Meaning

Auto edge finding parameter description:

| Name | Description |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Offset distance | <p>It is used to leave enough allowance for the sheet edge. After edge finding is completed, when the workpiece zero point is determined, an offset will be generated based on the offset distance. When set to positive value, the zero point is offset toward the inside of the sheet, and when it is set to negative value, the zero point is offset toward the outside of the sheet.</p> <p>The origin obtained by edge finding is exactly at the sheet edge. Offset 0 will cause machining to the sheet edge position, and the sheet will be seriously warped, so generally it is necessary to leave a certain space for the sheet edge.</p> <p>Setting it to positive value can leave a certain allowance for the sheet edge, and negative value is used for specially shape sheet.</p> <p>Range: -100mm-100mm</p> |
| Finding speed | <p>The cutting head move speed when perform edge finding action. Too fast speed may affect the edge finding accuracy. The recommended value is around 6000mm/min.</p> <p>Range: 3000 mm/min -15000mm/min</p> |
| Follow height | <p>Follow-up height during edge finding. Too high may affect edge finding accuracy. The recommended value is 1mm.</p> <p>Range: 0.1mm-16mm</p> |
| Clear edge finding data after machining | <p>It is mainly used for a single edge finding in flexible machining. After enable, the current edge finding data will auto cleared when the machining is completed.</p> |
| Return to O' after edge finding | <p>After the edge finding is completed, it return to the new workpiece zero point, which is convenient for the workpiece to zero and start machining directly.</p> |
| Always use custom angle | <p>After enable, the original edge finding function will be invalid and the custom angle will always be used for machining.</p> <p>Set the custom angle by checking custom angle on the right.</p> |
| Rack clearance | <p>It is used during auto sheet edge finding. In order to avoid the influence of the rack, on the basis of the original 3-point edge finding, edge finding will be performed again at interval of one rack clearance length. It need to be set according to the actual rack clearance of the machine tool.</p> <p>Range: 1mm-200mm</p> |
| Back distance | <p>The distance within the back sheet after edge finding during auto sheet edge finding.</p> <p>Range: 30mm-40mm</p> |

4.6.3 Manual Edge Finding

According to different sheets, the software provide the following manual edge finding positioning methods:

- 2-point: Suitable for coil material, only perform edge finding on one edge. Only provide in software that support coil material cutting.
- 3-point: Suitable for general sheet.

Prerequisite:



Before using manual edge finding, make sure you have clicked on **Pos Laser** pos laser to turn on the pos laser guide position.

4.6.3.1 Manual 2-point

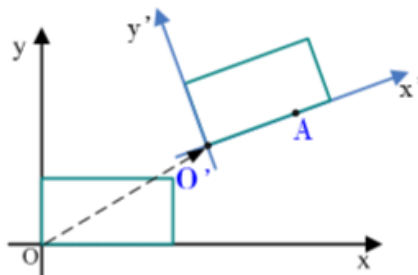
Manual 2-point edge finding needs to obtain the 2-point position on one edge and then calculate the sharp corner position and tilt degree of the sheet.

Operation Steps:

1. In the **Edge Finding** dialog box, set the edge finding method to **Manual** and the positioning method to **2-point**.
2. Set the edge finding direction. 2-point edge finding only perform edge finding on one edge, and you can select the edge finding direction:
 - X direction
 - Y direction

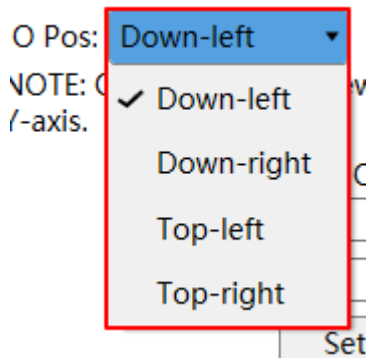
Parameters Setting

Direction X
 Direction Y



O Pos: **Down-left**

- Set the O point position. The workpiece zero point position, a new workpiece zero point O' will be automatically generated after edge finding.



- Set A point and O' point. According to the prompt in the schematic diagram, manually move the cutting head to the corresponding position of the sheet, click to **Set A** to take the A point, and click to **Set O'** to take the O' point.

| | | |
|-------------------------------------------|-------------------------------------------|------------------------------------------|
| | O' | A |
| X | <input type="text" value="0"/> | <input type="text" value="10"/> |
| Y | <input type="text" value="0"/> | <input type="text" value="1"/> |
| | <input type="button" value="Set O'"/> | <input type="button" value="Set A"/> |
| | <input type="button" value="Back To O'"/> | <input type="button" value="Back To A"/> |
| <input type="button" value="Reset O' A"/> | | <input type="button" value="Calculate"/> |

The software automatically connects the two points A and O' to determine the new X-axis. Draw a straight line perpendicular to O'A through point O' to determine the new Y-axis to form a new workpiece coordinate system.

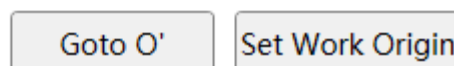
If need to restore the current coordinate to the software default value, click **Reset O'A** to re-select.

- Click **Calculate** and check the automatically calculated positioning results in the finding result area.

Finding Result _____

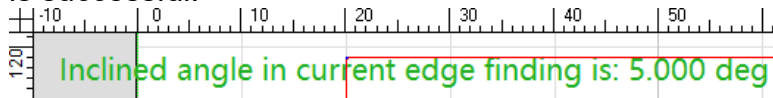
O' Mach Coord: X: 0.000 Y: 0.000

Rotation: 5.000 deg



If the rotation angle is greater than 15°, it indicate that the sheet is too offset and the sheet need to be replaced and edge finding positioning need to be performed.

- Click in the lower left corner **Enable Edge Finding** function to the **ON** status. Click **OK**. If you can see the tilt angle in the upper left corner of the software, the setting is successful.



4.6.3.2 Manual 3-point

Manual 3-point edge finding need to obtain two points in the X direction, and then obtain a point in the Y direction to calculate the sharp corner position and tilt degree of the sheet.

Operation Steps:

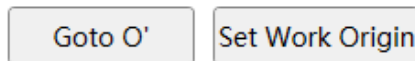
- In the **Edge Finding** dialog box, set the edge finding method to **Manual** and the positioning method to **3-point**.
- Set the O point position. The workpiece zero point position, a new workpiece zero point O' will be automatically generated after edge finding.

- Follow the following step to manually find A, B, and C points to determine the new workpiece coordinate system:
According to the schematic prompt, manually move the cutting head to the position corresponding to the sheet, taking the O point position as the lower left as an example:

- a. Manually move the cutting head to the boundary in the positive direction of the X-axis of the sheet, click **Set A** and **Set B** to take A and B two points. When taking the point, A point X-axis coordinate need smaller than point B. The software auto connect the A and B two points to determine the new X-axis.
 - b. Manually move the cutting head to the boundary of the Y-axis positive direction of the sheet, click **Set C** to take C point. The software auto determine the straight line pass through C point and perpendicular to AB as the new Y-axis.
- If need to restore the current coordinate to the software default value, click **Reset ABC** and select again.
4. Click **Calculate** and check the auto calculated positioning result in the finding result area.
Finding Result _____

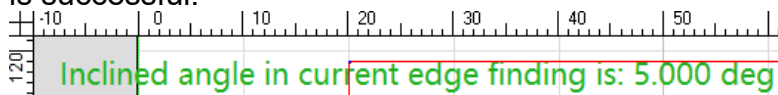
O' Mach Coord: X: 0.000 Y: 0.000

Rotation: 5.000 deg



If the rotation angle is greater than 15°, it indicate that the sheet is offset too much and the sheet need to be repositioned before edge finding positioning.

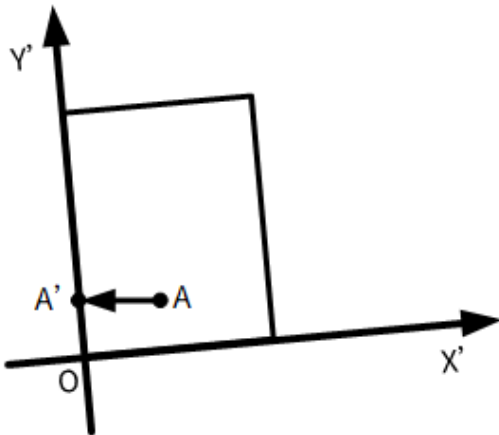
5. Click in the lower left corner **Enable Edge Finding** function to the **ON** status. Click **OK**. If you can see the tilt angle in the upper left corner of the software, the setting is successful.



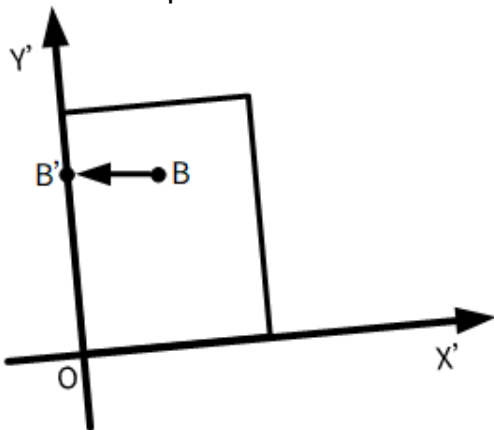
4.6.4 Edge Finding Action Process

4.6.4.1 2-point

1. Positioning A' point:
 - a. Enable follow-up at position A.
 - b. Move in the X negative direction at **Finding Speed**, and set the out margin as A' point.



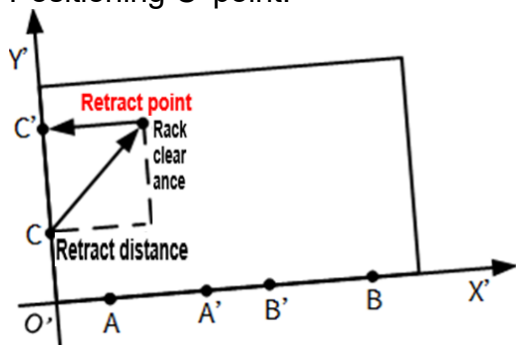
2. Positioning B' point:
 - a. Move to B position and enable follow-up.
 - b. Move in the X negative direction at **Finding Speed**, and set the out margin as B' point.



4.6.4.2 3-point and Sheet

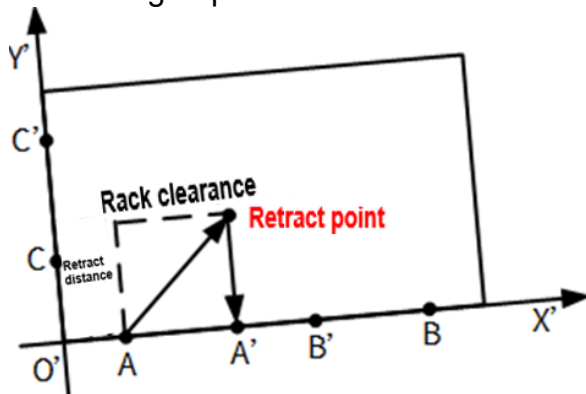
The sheet action process is steps 1 ~ 6, and the normal sheet action process is steps 1, 3, 5.

1. Positioning C point:
 - a. Enable follow-up at the current position.
 - b. Move to the short side at **Finding Speed**, and set the out margin as C point.
2. Positioning C' point:

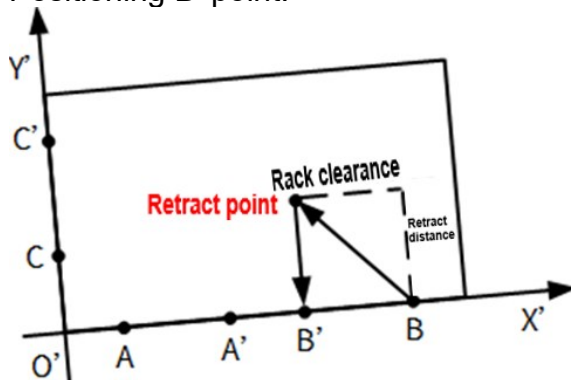


- a. From C point, according to the value of **Retract Distance** and **Rack Clearance**, the X-axis and Y-axis linked retract into the sheet to the retract point.
 - b. Move to the short side at **Finding Speed**, and set the out margin as C'.
3. Positioning A point:
 - a. Position it 20% from the short side boundary and enable follow-up.

- b. Move in the long side direction, and the out margin is designated as A point.
4. Positioning A' point:



- a. From A point, according to the value of **Retract Distance** and **Rack Clearance**, the X-axis and Y-axis linked retract into the sheet to the retract point.
- b. Move to the long side at **Finding Speed**, and set the out margin as A' point.
5. Positioning B point:
- a. Position it 20% from the other edge of the short side and enable follow-up.
- b. Move in the long side direction at **Finding Speed**, and set the out margin as B point.
6. Positioning B' point:



- a. From B point, according to the value of **Retract Distance** and **Rack Clearance**, the X-axis and Y-axis linked retract into the sheet to the retract point.
- b. Move to the long side at **Finding Speed**, and set the out margin as B' point.

4.6.5 Historical Edge Finding Angle

Through historical information, you can find the historical workpiece origin, historical edge finding angle and historical calibration result. This function is often used in the auto clear workpiece coordinate mode. When the user perform certain specific operations (cutting frame, dry run, restart machining), the original workpiece origin will auto clear, resulting in original origin position loss.

Operation Steps:

1. In the menu bar, click **System** → **History Information** to pop-up the **History Information** dialog box:

| History Information | | |
|-----------------------|------------------------|------------------------------|
| Work Coordinate | Historical Coordinates | Historical Edge Find |
| G54 | No Records | Manual2-Point O': (0,0) Angl |
| G55 | No Records | No Records |
| G56 | No Records | No Records |
| G57 | No Records | No Records |
| G58 | No Records | No Records |
| G59 | No Records | No Records |
| G54P1 | No Records | No Records |
| Historical Calibrated | No Records | |

4.6.6 FAQ

4.6.6.1 Find Cutting Position not on the Tool Path after Pause during Machining

Answer: What is shown in machining is the drawing compared to the workpiece zero point offset. It is convenient to observe the machining trajectory. After pausing during machining, the machine coordinate without offset will be displayed. It seem that they are not on the machining trajectory and will not affect machining.

4.6.6.2 Whether to use Edge Finding Angle for One Key Cutting Sheet?

Answer: Yes, but it must be enabled in the system setting. After enable it, you can manually execute it once when you need to edge finding angle for single cutting sheet. When used in batch machining, the data obtained by auto use auto edge finding.

4.7 Simulation

Before machining, you can use simulation to check whether the machining range and tool path travel range are reasonable, and check the machining path.

Simulation is divided into:


- **Simulation:** It does not control the machine tool to perform corresponding machine electrical action. It only display the machining path at high-speed in the object edit area, which is used to directly observe the problem encountered during the machining process and make adjustment. It does not actually occupy and consume resources such as machine tools and workpieces.
- **Cutting Frame:** Control the machine tool to travel along the rectangular frame outside the machining file, which is used to determine the machining range.
- **Dry Run:** Control the machine tool to run the program with disable the laser and machining related port, and check whether the machining trajectory is correct.

Select the following methods to perform simulation:

- **Simulation**

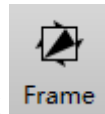
Note: Before simulation, ensure that the current system status is **Idle**.



- In the machine tool control bar, click .
- In the menu bar, click **Machining** → **Mach Control** → **Simu**.

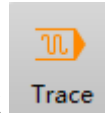
- In keyboard, press **F8**.
The machine tool auto start high-speed simulation machining from the first stage of the simulation program.

- **Cut Frame**



- In the machine tool control bar, click **Frame**.
- In the menu bar, click **Machining** → **Mach Control** → **Cut Frame**.

- **Dry Run**



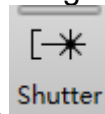
- In the machine tool control bar, click **Trace**.
- In the menu bar, click **Machining** → **Mach Control** → **Dry Run**.

4.8 Start Machining

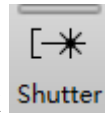
The formal machining link controls the start of machining.

Before start machining, make sure there are no E-stop or other alarms.

- Start machining
After determining the workpiece zero point and drawing technic, select any of the following methods to start machining. ①Open **Shutter**,②Press **Start** and the cutting machine will follow light cutting according to the cutting path.



- In the machine tool control bar, click **Shutter**, then click **Start**.




- In the machine tool control bar, click **Shutter**, and then in the menu bar, click **Machining** → **Mach Control** → **Start**.

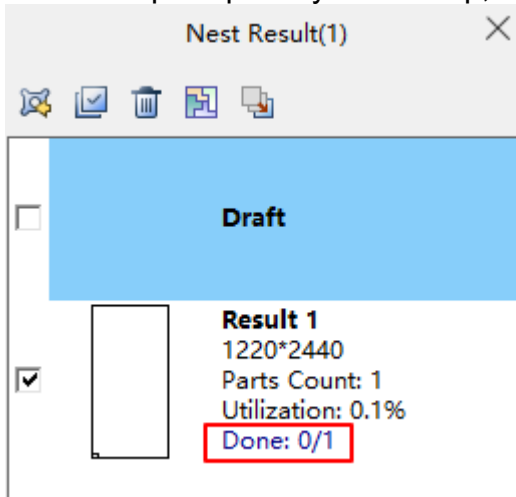
After start machining, the following operations can be performed:

- Stop machining
Make the machine tool stop machining and stop the whole machining task, and the system enters **Idle** status:
 - In the machine tool control bar, click **Stop**.
 - In the menu bar, click **Machining** → **Mach Control** → **Stop**.
- Breakpoint resume
If there is stop during the cutting process, you can directly click **Resume**. After clicking, the cutting machine will retreat from the stopped position one **Back Distance when Breakpoint Continues** to continue cutting. (Parameter position: **System** → **System Parameters** → **Advanced Function** → 4.3 **Resume**)
 - In the machine tool control bar, click **Resume**.
 - In the menu bar, click **Machining** → **Mach Control** → **Resume**.
- Breakpoint location
Before breakpoint resume, you can execute **Locate** first. After executing breakpoint locate, it will return to the resume cutting position according to **Back Distance**

when Breakpoint Continues. You can observe whether the retract distance is as expected. If it is not as expected, you can use the **Fwd** and **Bwd** buttons to move the position of the cutting head to adjust the breakpoint start position. After executing any one or several actions in **Locate / Fwd / Bwd**, and then execute **Resume**, the cutting head will no longer execute retreat, but resume cutting directly from the current position.

Note: Machining flay cutting/high-speed micro-joint tool path. When breakpoint resume, it will auto retract to the previous micro-joint point or fly cutting intersection point.

- In the machine tool control bar, click  **Locate**.
- In the menu bar, click **Machining** → **Mach Control** → **Locate**.
- Machining nest tool path
After loading the tool path or using the cutting software nest, the nest result may have multiple nest result tool paths. The corresponding machining quantity can be set in the nest result, and the machining quantity can be changed in the nest result. When the part quantity is used up, the quantity cannot be increased.



When machining the nest tool path, only the currently selected shape will be machined, and it will not jump even if the nest quantity is machined. If need jump, you can set parameter **Auto Step to Next Zone** in **System** → **System Parameters** → **Advanced Function** → **Habitual Setting** → **General** to Yes. Prevent the inconsistency between machined nest quantity and setting.

System Parameters ×















| Name | Value | Unit | Effective |
|-------------------------------------|------------|------|-------------|
| 4.0.0 General | | | |
| Tips for reordering before workin | Yes | | Immediately |
| Auto step to next zone | Yes | | Immediately |
| Additional Behavior Of XY Axes Al | 0 | | Immediately |
| Positioning cutting safty tips enat | Yes | | Immediately |

5 Graphic Operation

5.1 Drawing

The drawing tools and operations that can be used in the drawing area, and the drawn graphics are used for machining.

Drawing tools include:

| Tool | Name | Tool | Name |
|------------------------------------------------------------------------------------|-----------------------------------|------------------------------------------------------------------------------------|---------------------------------|
|  | Dot |  | Polyline |
|  | Line |  | Elliptic Arc |
|  | Arc |  | Ellipse |
|  | Circle |  | Polygon |
|  | Star |  | Rectangle |
|  | Rounded Rectangle |  | Runway Graphics |
|  | Text |  | Gallery |

After using the drawing tool, right click or press the **Esc** key to exit the tool.


If you need to adjust the drawn graphic later, select the object and the following methods to modify:

- In the common toolbar, to modify the size and position parameter.
- Press **Shift** key and drag the rectangle points around the graphic to manually adjust the size.

5.1.1 Polyline

A polyline is a chain of lines and arcs that are joined together into one object. This system supports switching drawing of line and arc.

Operation Steps:


1. Select from the following methods to use **Polyline**:
 - In the drawing toolbar, click  **Polyline**.
 - In the menu bar, click **Drawing** → **Polyline**.
2. Left click to select two points to draw a line.
3. **Optional:** To switch to the arc mode, right click on the drawing window and select **Tangent Arc**.
 The arc is tangent to the last line/arc.
 If you need to switch back to line drawing mode, right click to call the shortcut menu and click **Line**.
4. Left click to select another point.
5. Right click and do one of the following:
 - Click **Confirm** to confirm that the current point is the end point of the polyline, and this polyline is an unclosed shape.
 - Click **Close** to connect the current point and the start point with a line, and this polyline is a closed shape.

- Click **Cancel** to cancel all previous point selection operations and exit polyline drawing.

After drawing a polyline, to change an unclosed polyline into a closed one, select it and check **Close** in the common toolbar. This operation is irreversible.


5.1.2 Elliptic Arc

Operation Steps:

1. Select the following methods to call **Elliptic Arc**:
 - In the drawing toolbar, click  **Elliptic Arc**.
 - In the menu bar, click **Drawing** → **Elliptic Arc**.
2. Draw an ellipse. Check [Ellipse](#).
3. Left click to select the start and end point of the elliptic arc.
System CCW generates an elliptic arc tool path.


5.1.3 Arc

Operation Steps:

1. Select the following methods to call **Arc**:
 - In the drawing toolbar, click  **Arc**.
 - In the menu bar, click **Drawing** → **Arc**.
2. Left click to select the center point.
3. Left click to select a point.
This point is the start point of the arc, and the distance from the center is the radius.
4. Left click to select the end point of the arc.
System CCW generates an arc tool path.

5.1.4 Ellipse


Operation Steps:

1. Select the following methods to call **Ellipse**:
 - In the drawing toolbar, click  **Ellipse**.
 - In the menu bar, click **Drawing** → **Ellipse**.
2. Left click to select the center point.
3. Left click to select two points respectively.
The distances between the two points and the center point are the major and minor axes of the ellipse, respectively.

5.1.5 Circle

5.1.5.1 Draw Circle by Radius

Operation Steps:

1. Select the following methods to call **Draw Circle by Radius**:
 - In the drawing toolbar, click  **Circle**.
 - In the menu bar, click **Drawing** → **Circle** → **Draw Circle by Radius**.
2. Left click to select the center point.
3. Left click to select a point. The distance between this point and the center point is the radius.


5.1.5.2 Draw Circle by 3Point

1. In the menu bar, click **Drawing** → **Circle** → **Draw Circle by 3Point**.
2. Left click three times continuously to select three points to form a circle.

Note: The selected three points are not on a straight line and do not overlap, then the three points can form a triangle. Draw any two vertical centerlines will get the intersection point, which is the center of the circle.


5.1.6 Polygon

Operation Steps:

1. Select the following methods to call **Polygon**:
 - In the drawing toolbar, click  **Polygon**.
 - In the menu bar, click **Drawing** → **Polygon**.
2. Set parameter **Edges** in the common toolbar and press **Enter**.
3. Left click to select the center point.
4. Left click to select the vertex position.

5.1.7 Star


Operation Steps:

1. Select the following methods to call **Star**:
 - In the drawing toolbar, click  **Star**.
 - In the menu bar, click **Drawing** → **Star**.
2. Set parameter **Vertexes** in the common toolbar and press **Enter**.
3. Left click to select the center point.
4. Left click to select the vertex position.

5.1.8 Rectangle

Rectangular.


Operation Steps:

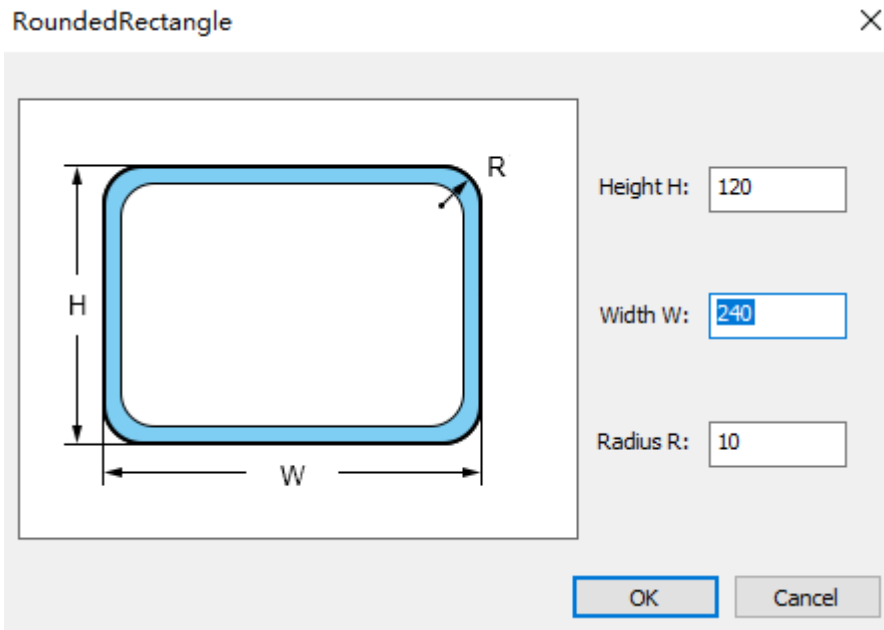
1. Select the following methods to call **Rectangle**:
 - In the drawing toolbar, click  **Rectangle**.
 - In the menu bar, click **Drawing** → **Rectangle**.
2. Left click to select the start point.
3. Set parameter **Rotation** in the common toolbar. Enter the angle to rotate around the start point and press **Enter**.
4. Left click to select the end position.

5.1.9 Rounded Rectangle

A rectangle with rounded corners.

Operation Steps:

1. Select the following methods to call **Rounded Rectangle** and open **Rounded Rectangle** dialog box:
 - In the drawing toolbar, click  **Rounded Rectangle**.
 - In the menu bar, click **Drawing** → **Rounded Rectangle**.



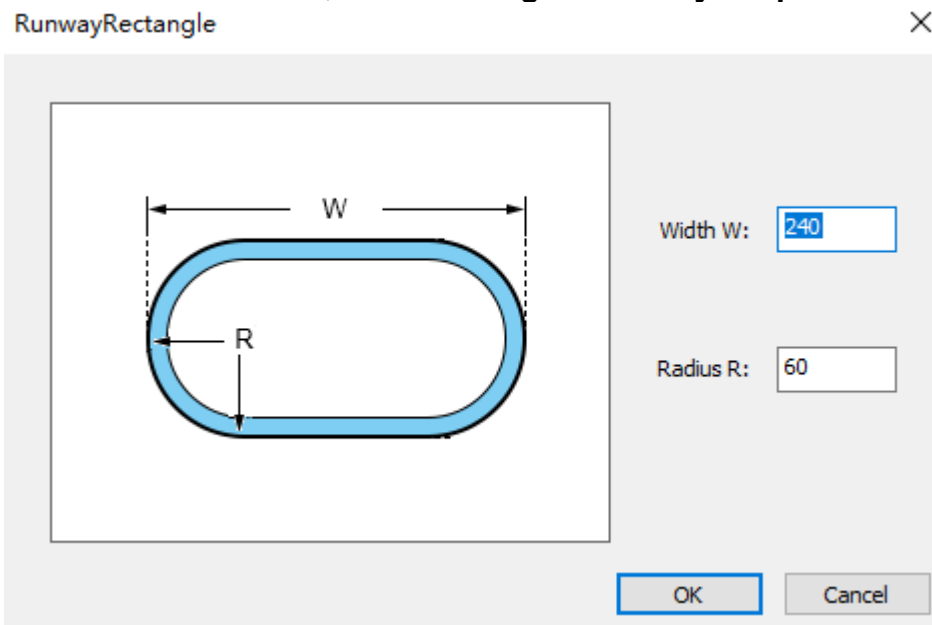
2. Enter parameter, click **OK**.
3. Left click to select the position.

5.1.10 Runway Graphics

Operation Steps:

1. Select the following methods to call **Runway Graphics** and open **Runway Graphics** dialog box:

- In the drawing toolbar, click  **Runway Graphics**.
- In the menu bar, click **Drawing** → **Runway Graphics**.




2. Enter parameter, click **OK**.
3. Left click to select the position.

5.1.11 Text

It is mainly used to draw text in an advertisement board.

Operation Steps:


1. Select the following methods to call **Text**:

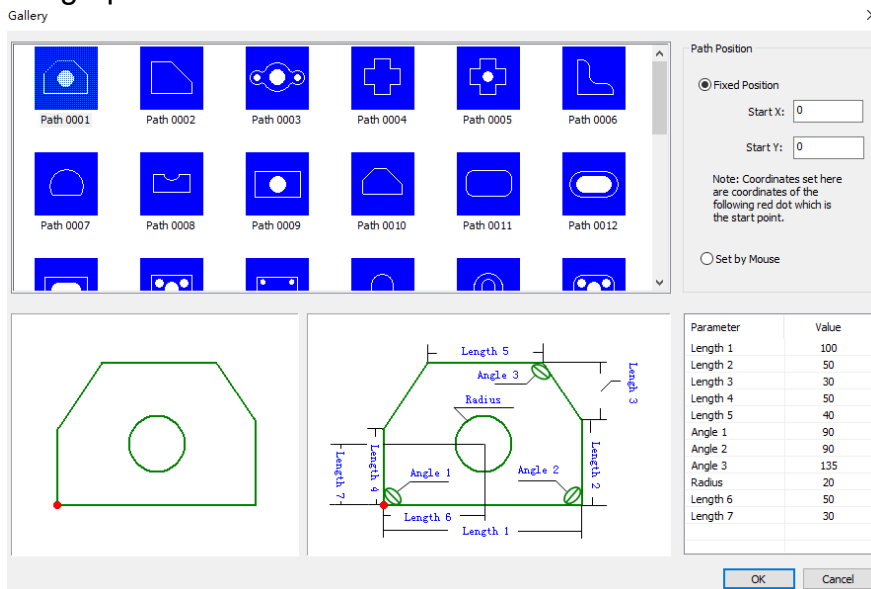
- In the drawing toolbar, click  **Text**.
 - In the menu bar, click **Drawing** → **Text**.
2. Drag the cursor to define a rectangular text box.
 3. Enter text in the input box.
Need switching when enter, press the **Ctrl+Enter** combination key.
 4. Press the **Enter** key to complete text drawing.

5.1.12 Gallery

The software come with commonly used standard graphic parts, and support users to call and modify graphic parameters.

Operation Steps:

1. Select the following methods to call **Gallery**:
 - In the drawing toolbar, click  **Gallery**.
 - In the menu bar, click **Drawing** → **Gallery**.
2. In the **Gallery** dialog box, select the target graphic. Follow as the preview effect of the graphic.



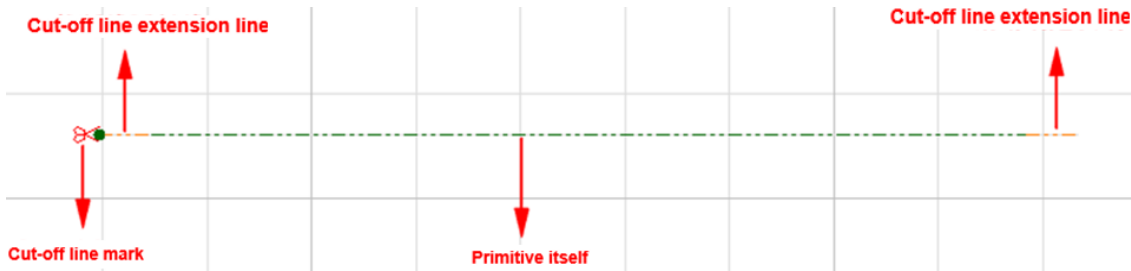
3. Double click the corresponding parameter in the parameter bar to set the parameter value.
4. In the **Path Position** area, select one of the following methods to set the position of the graphic.
 - Check **Fixed Position**, set the value of X coordinate and Y coordinate, click **OK**.
The values of the X and Y coordinates set are the red dot positions on the preview effect.
 - Check **Set by Mouse**, click **OK** to close the **Gallery** dialog box. In the **Drawing Area**, select a position and click the mouse.

5.1.13 Cut-off Line

Manually draw the cut-off line to achieve quick cut-off of the plate.

Schematic diagram of cut-off line composition:

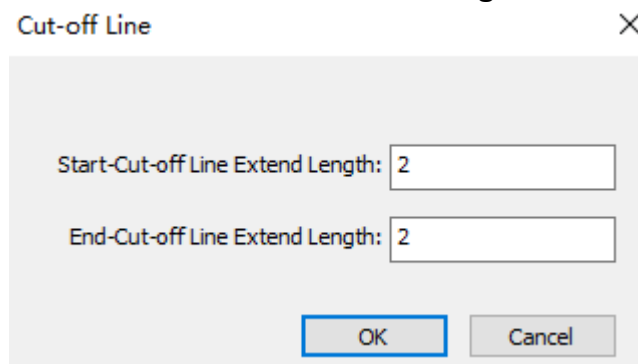
The length of cut-ff line both ends extension line can be set separately.



Operation Steps:

1. In the software main interface, draw the line that needs to be cut-off in the drawing area, and select the primitive.
You can also draw multiple lines, select them all, and set them in batch.
2. Set the length of the cut-off line extension line.

Click **Drawing** → **Cutoff Line Setting** on the menu bar, or right click and select **Cutoff Line** → **Cutoff Line Setting**.



3. Create cut-off line.

In the menu bar, click **Drawing** → **Create Cutoff Line**, or right click to select **Cutoff Line** → **Create Cutoff Line**.

If need to clear cut-off line, select **Clear Cutoff Line**.

5.2 Select and View Operation

View function is used for a better view of objects without changing the actual sizes and coordinates.


5.2.1 Select Object

The software provide many graphic select methods.

- [Manual Select](#): Select any object by yourself.
- [Auto Select](#): Auto select object that meet the conditions.

5.2.1.1 Manual Select

Operation Steps:

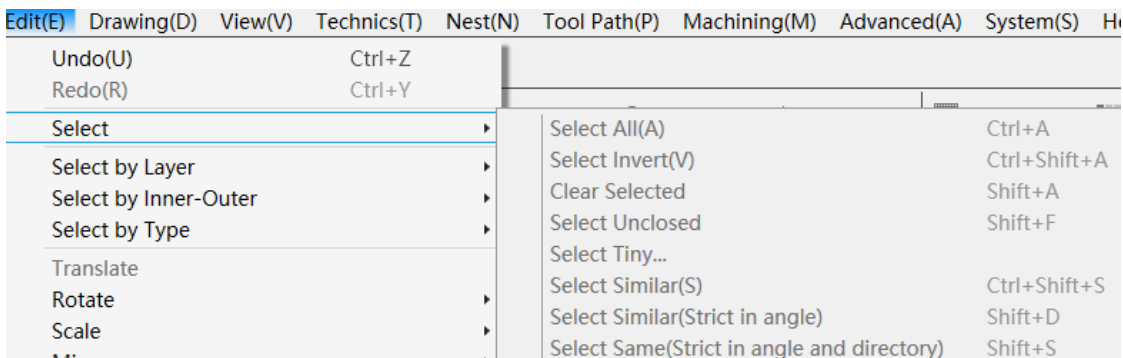
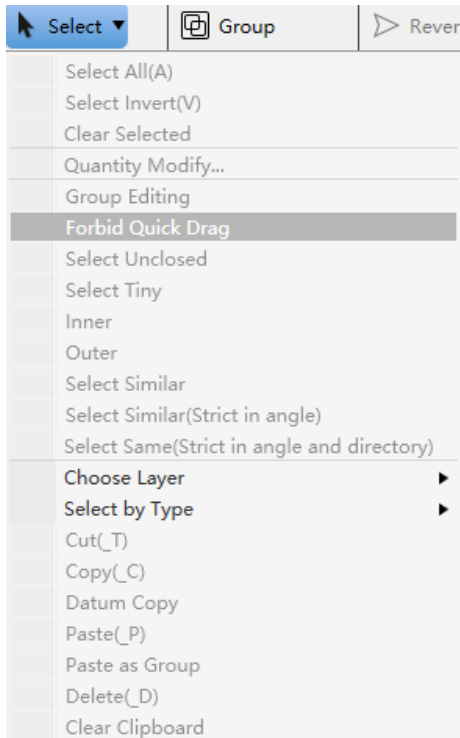
1. In the drawing toolbar, click  **Select Graph** to call the manual select function.
2. Select the following methods to select objects:
 - Left click to select a single object.
 - Press **Ctrl** key, then left click to select multiple objects.
 - Press and drag the left mouse button to frame the object from the upper left to the lower right, and select all graphics contained in the frame.

- Press and drag the left mouse button to frame the object from the lower right to the upper left, and select all graphics that intersect with the frame and included in the frame.

5.2.1.2 Auto Select

Operation Steps:

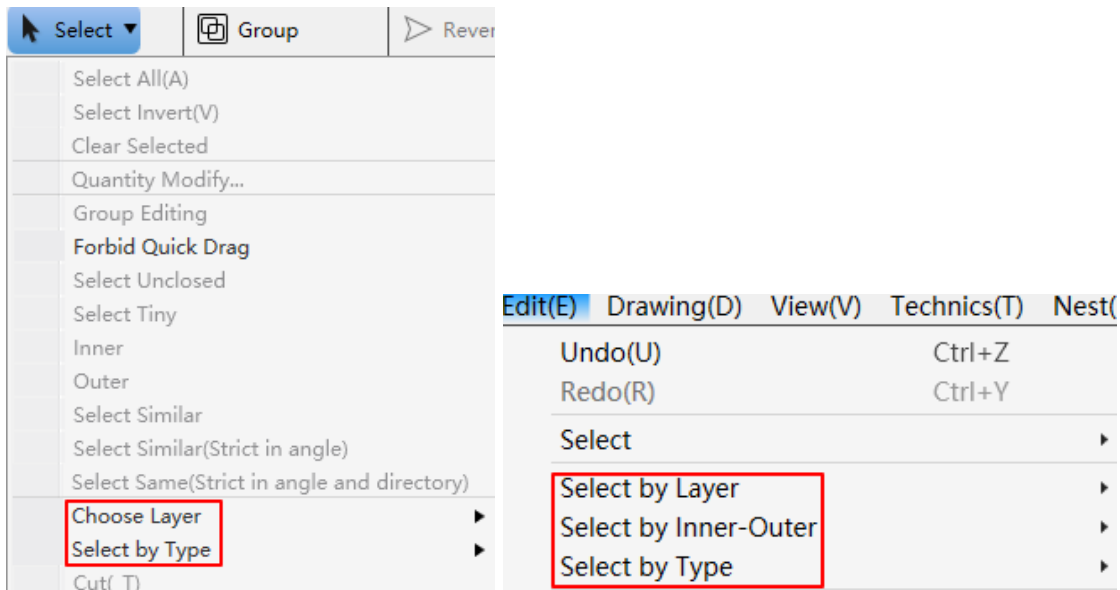
In the drawing toolbar, click  **Select Graph** drop-down key or click **Edit** → **Select** in the menu bar to select the auto select method:



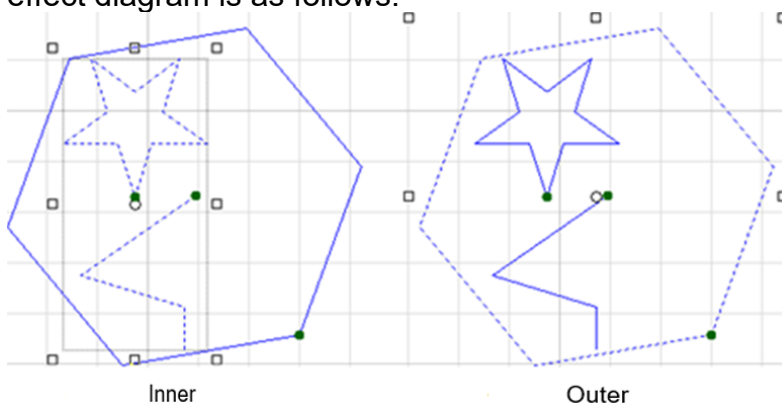
- **Select All:** Select all graphics.
- **Select Invert:** Select unselected graphics.
- **Clear Selected:** No selection at all.
- **Select Unclosed:** Select all unclosed graphics in the tool path file.
- **Select Tiny:** In the pop-up dialog box, input the X, Y size range of the graphics to be selected, and the system will automatically select the graphics within the size range.
- **Select by Inner:** Select the included graphics.
- **Select by Outer:** Select the not included graphics.

- **Select Similar:** After manually selecting a graphic, click **Select Similar**, and the system will automatically select the graphic with the same type and size as the selected graphic.
Note: This operation does not distinguish angles.
- **Select Similar (Strict in Angle):** After manual select a graphic, click **Select Similar(Strict in Angle)**, and the system will auto select the graphic with the same type and size as the selected graphic.
Note: This operation distinguish angles.

More advanced select operations:



- **Select by Layer:** Select the corresponding layer in the submenu, and the system will auto select the graphics in this layer.
- **Select by Inner-outer:** In the submenu, select the corresponding inner layer graphics (included graphics) or outer layer graphics (not included graphics). The system auto select the graphics corresponding to the nesting relationship, and the effect diagram is as follows:



- **Select by Type:** Select the corresponding graphic type in the submenu, and the system will auto select the same type of graphic.

5.2.2 Basic Operation

Commonly used basic operations include:

- Cut (Ctrl+X)
- Copy (Ctrl+C)


- Datum copy (Shift+Ctrl+C): Select a point. The relationship between the graphics and the mouse position is the same as that of the datum and the original graphics when pasting.
- Paste (Ctrl+V)
- Paste as group: Copy two or more objects, select to paste as a group, then the selected objects will be combined into a group when pasted.
- Delete
- Clear clipboard
- Clear selected: It can also be realized by click the blank area.
- Forbid quick drag: After checking, it will not allow drag, copy, and rotate graphics to avoid misalignment of graphics due to misoperation.

5.2.3 Pan View

Repositioning the graphic in the window is convenient for observing different parts of the current graphic.

Operation Steps:

Select any of the following methods to pan view:

- Press the mouse wheel and drag the mouse to the target position.
- Call view pan function:
 - a. Select from the following methods to call the view pan tool:
 - In the drawing toolbar, click  **Pan**.
 - In the menu bar, click **View** → **Pan**.
 - b. Select a datum point, press the left mouse button, drag to the target position and release the mouse.
 - c. Right click or press **Esc** to exit view pan.

5.2.4 Zoom

Zoom in and out of view in real time. Through changing the size of the shown area and objects, you can draw objects more precisely.


Operation Steps:

1. In the menu bar, click **View** → **Zoom** to call real time zoom.
2. Select from the following methods to perform real time zoom:
 - Scroll up the mouse wheel to zoom in the view and scroll down the mouse wheel to zoom out the view.
 - Press and drag up the left mouse button to zoom in the view, and press and drag down the left mouse button to zoom out the view.
 - In the numeric keypad, press **+** to zoom in the view, and press **-** to zoom out the view.
3. Right click or press **Esc** to stop.

5.2.5 Zoom by Rect

Zoom in the part of the graphic to the view window size.


Operation Steps:

1. Select the following methods to call zoom by rect function:
 - In the drawing toolbar, click  **Zoom by Rect**.
 - In the menu bar, click **View** → **Zoom by Rect**.
2. Left click on the drawing window, drag the mouse to form a rectangle and left click again. The area formed by the rectangle zoom in.

5.2.6 Best View

Display all graphics in the window with adaptive size.

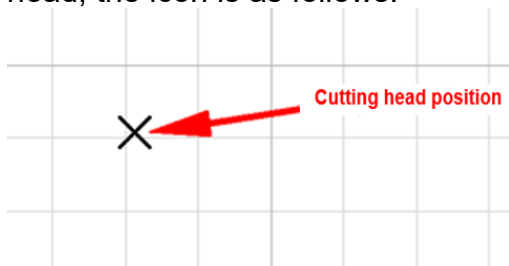
Operation Steps:

- In the drawing toolbar, click  **Best View**.
- In the menu bar, click **View** → **Best View**.
- In the numeric keypad, press *.

5.2.7 Show/Center Current Point

In the menu bar, under the drop-down key of **View**, the view setting of the current point:

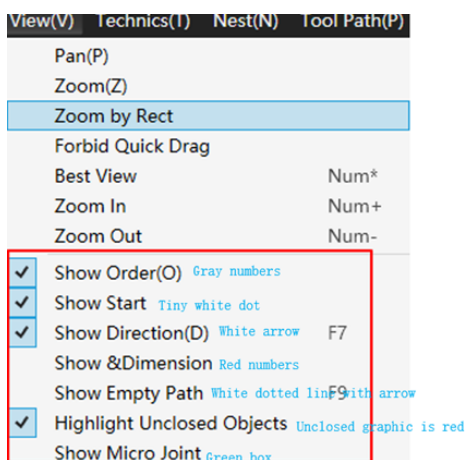
- Show current point: The current point refer to the current position of the cutting head, the icon is as follows:



- Center current point: Show the layout of the current drawing area with the current point as the center.

5.2.8 Show Setting

In the menu bar, under the drop-down key of **View**, buttons are provided to control the display effect.



Check the button in the red box, the show effect will take effect immediately, and you can see the change of the show effect in the drawing area. If the button is checked, it means that the corresponding effect is turned on, otherwise, it means that the effect is not turned on.

5.2.9 Show Track

Show the machining track with a red line. During simulation, the simulated machining track is displayed in real time.

In the menu bar, select from the drop-down key of **View** → **Show Track**:

- Hide track
- Show machining track
- Show feedback track

Note: Three options, only one can be chosen.

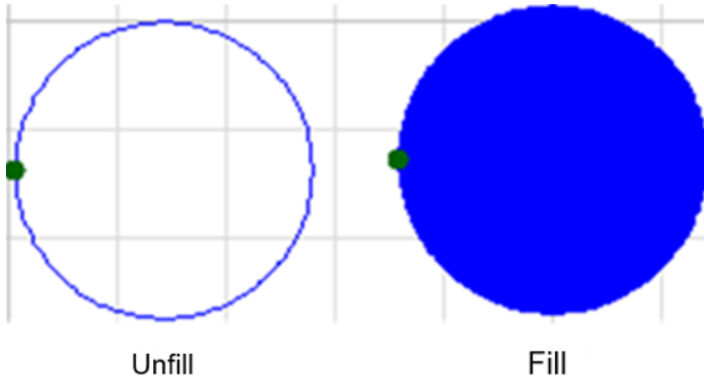
If you want to clear the machining track, select any of the following methods:

- In the menu bar, click **View** → **Clear Track**.
- In the common toolbar, click **Clear** → **Trajectory**.

5.2.10 Fill Mode

View the closed graphics set to **Fill**. In this mode, the closed graphics of **Fill** are filled and displayed, and the other graphics are displayed in wireframe.



In the menu bar, click **View** → **Fill Mode** to switch to fill mode:

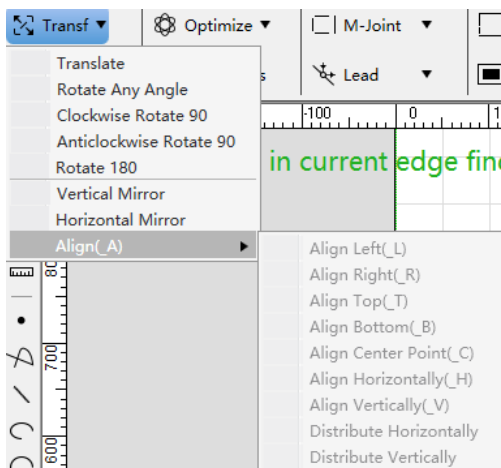


To switch back to the system default wireframe mode, in the menu bar, click **View** → **Wireframe Mode**, all graphics will be displayed in wireframe mode.

5.3 Edit Graphic

5.3.1 Transform Graphic

In the common toolbar,  **Transf** drop-down key provides many geometric transformation functions. Most of the commonly used geometric transformations only need to click  **Transf** drop-down key. Select the target and it can be completed.

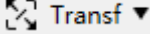


5.3.1.1 Translate

Move the graphic in a certain line direction and change the coordinate position of the graphic without changing the size of the graphic.

Operation Steps:

1. Select the object.
2. Select any of the following methods to perform translate:
 - Press the left mouse button and drag the graphic.
 - In the keyboard, press \uparrow , \downarrow , \leftarrow , \rightarrow .
 - Call translate function:

- a. In the common toolbar click  **Transf** → **Pan** or in the menu bar, click **Edit** → **Pan**.
- b. Left click to select the reference point position.
- c. Left click to select the target position.

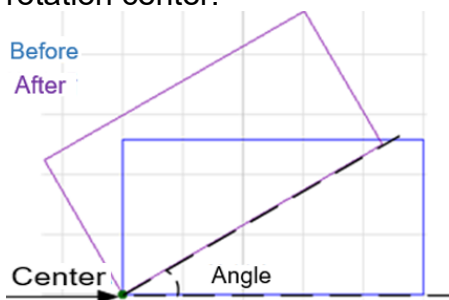
5.3.1.2 Rotate

Rotate the graphic at a certain angle around a point in a certain direction.

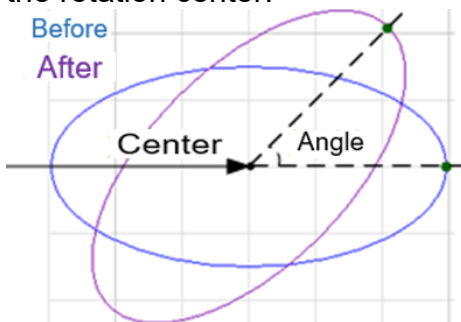
Operation Steps:

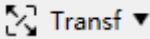
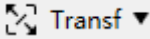
1. Select the object.
2. Select any of the following methods to perform rotate:
 - After entering the rotation angle in the **Rotation** input box in the common toolbar, press **Enter** to confirm.

- When the object is a rectangle or text, the lower left point of the object is the rotation center:



- When the object is star, polygon or ellipse, the center point of the object is the rotation center:



- Rotate any angle:
 - a. In the common toolbar click  **Transf** → **Rotate any Angle** or click **Edit** → **Rotate any Angle** in the menu bar.
 - b. Left click to select the rotation center.
 - c. Move the cursor to adjust the rotation angle, left click to confirm. Or enter the angle in the input box of the rotation center and press **Enter** to confirm.
- 90° or 180° rotation:
 - a. In the common toolbar click  **Transf** → **Clockwise Rotate 90 / Anticlockwise Rotate 90 / Rotate 180** or click **Edit** → **Clockwise Rotate 90 / Anticlockwise Rotate 90 / Rotate 180** in the menu bar.


5.3.1.3 Mirror

Including vertical and horizontal mirror:

- **Vertical Mirror:** Flip up and down with the graphic center point as the rotation center.

- **Horizontal Mirror:** Flip left and right with the graphic center point as the rotation center.



After selecting the target object, select the following methods to perform mirror:

- In the common toolbar, click  **Transf** → **Horizontal Mirror / Vertical Mirror**.
- In the menu bar, click **Edit** → **Mirror** → **Horizontal Mirror / Vertical Mirror**.

5.3.1.4 Align

Change the relative position between graphics to align them.

Operation Steps:

1. Select multiple objects.
2. Select any of the following methods to perform align:
 - In the drawing toolbar, click  **Center Point Alignment**.
 - In the menu bar, click **Edit** → **Align**, select the alignment method in the submenu.
 - In the common toolbar, click  **Transf** → **Align**, select the alignment method in the submenu:
 - **Align Left**
 - **Align Right**
 - **Align Top**
 - **Align Bottom**
 - **Align Center Point**
 - **Align Horizontally**
 - **Align Vertically**
 - **Distribute Horizontally**
 - **Distribute Vertically**

System auto perform alignment.

5.3.2 Size Scale

Scale the graphic proportionally and change the size of the graphic. The software provides 7 rapid size scale.



Note: After modifying the size, the lead out line and kerf compensation will not be transformed at the same time, that is, the value remain unchanged.


5.3.2.1 Multiple Quick Scale

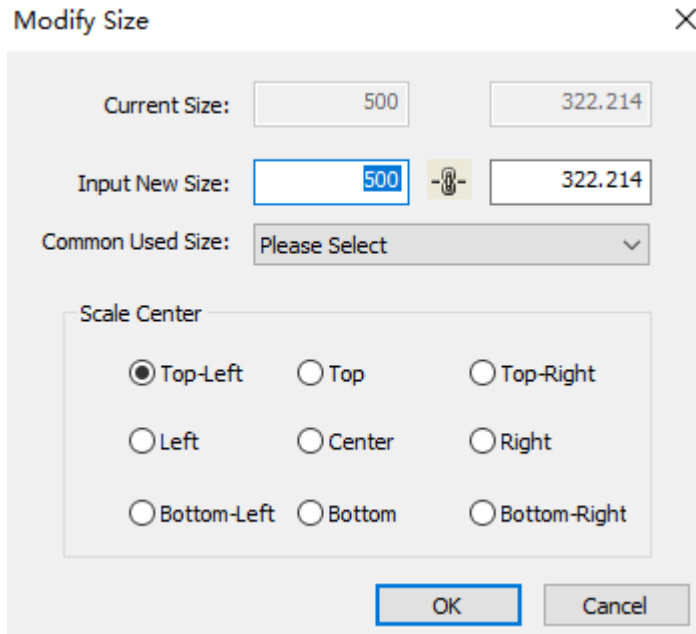
Operation Steps:



Select the object. In the common toolbar, click  **Size** → select the scale method from the drop-down menu.

5.3.2.2 Accurate Size Scale

Operation Steps:


1. Select the object.
2. In the common toolbar, click  Size → **Fixed Scaling**, or in the menu bar, click **Edit** → **Scale** → **Fixed Scaling**.



3. Input size.
 - When the lock state in the dialog box is , you can select the **Command Used Size**, and when entering a new size, the length and width will be modified according to the size ratio of the original image.
 - When the lock state in the dialog box is , the **Command Used Size** cannot be selected. When entering a new size, the length and width can be entered separately.
4. Select scale center.
The scale center can specify the positional relationship between the new graphics and the original graphics after scaling. For example, if you select "top left", it means that after scaling, the new graphics and the original graphics are aligned according to the top left corner, and other parts are scaled based on the top left corner.

5.3.2.3 Interactive Scaling

Operation Steps:

1. Select the object.
2. In the common toolbar, click  Size → **Interactive Scaling**, or click **Edit** → **Scale** → **Interactive Scaling** in the menu bar.
3. Left click to select the scale center point.
4. After left click, move the cursor to adjust the scale ratio.
5. Left click to confirm.

5.3.3 Group

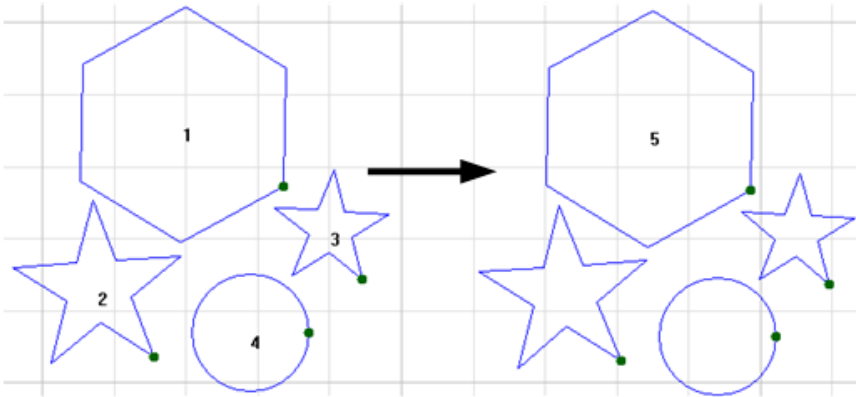
Used to form multiple selected objects into a group.

Operation Steps:

1. Select multiple objects.
2. Select any of the following methods to perform group:

- In the common toolbar, click  **Group**.
- Right click to call the shortcut menu, click **Group**.
- In the menu bar, click **Edit** → **Group/Disband** → **Group**.


The group effect diagram is as follows:



5.3.4 Ungroup

It is used to disband the combined group into multiple graphics.

Operation Steps:

1. Select the target group.
2. Select any of the following methods to perform ungroup:
 - In the common toolbar, click  **Ungroup**.
 - Right click to call the shortcut menu, click **Break Group**.
 - In the menu bar, click **Edit** → **Group/Disband** → **Ungroup**.

5.3.5 Merge


Merge multiple path objects into a single path object to connect disconnected graphics.

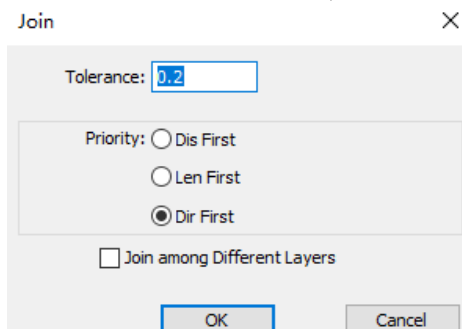
Merged objects must meet the following conditions:

- Non-closed object
- Non-dot
- Non-text
- Non-group

Before merging objects, it is suggested to enable catch.

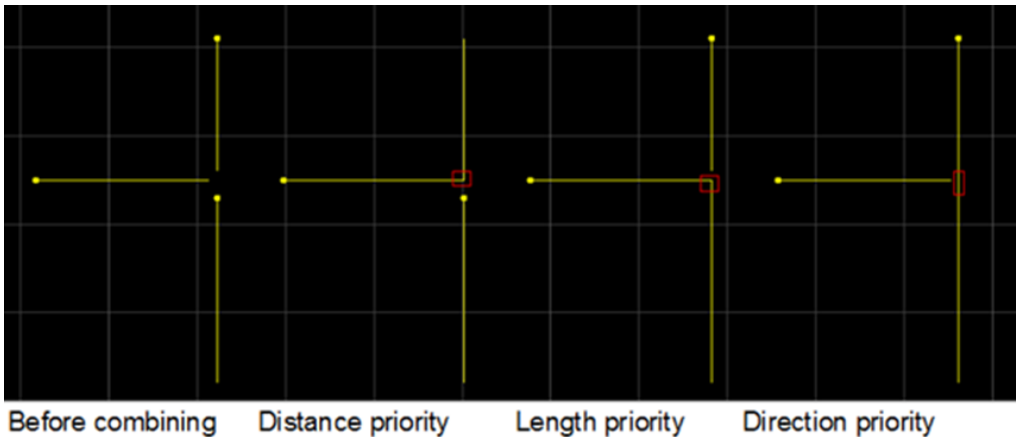
Operation Steps:

1. Select multiple objects.
2. Select any of the following methods to open the **Join** dialog:
 - In the common toolbar, click  **Optimize** ▾ → **Merge**.
 - Right click to call the shortcut menu, click **Join**.
 - In the menu bar, click **Edit** → **Merge**.



3. Set the parameters **Tolerance** and **Priority**.
 - **Tolerance**: The maximum distance between objects that needs to be merged.
 - **Priority**: When there are more than three end points satisfying the merge tolerance at the same merge position, the objects with the closest distance, the longest length, and the same direction are preferentially merged.
4. **Optional**: Check **Join among Different Layers**. The system merges objects of different layers into the layer with a higher layer order.

The merge effect diagram of different priority is as follows:



5.3.6 Explode


Delete extra lines to trim the toolpath. It usually applies to polylines.

Use it together with **Merge** function, to correct mistakes by drawing and make sure machining quality.

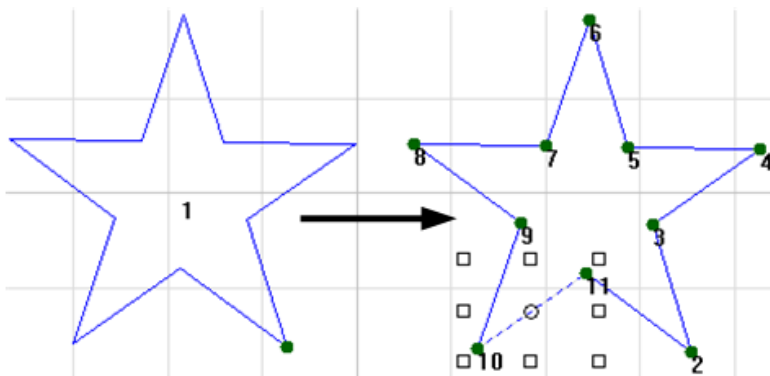
According to different machining objects, it can be divided into:

- If the object is a group: Explode objects is equal to [Ungroup](#).
- If the object is text: Explode objects is equal to [Convert Text to Graphic](#).

Operation Steps:

1. Select the object.
2. Select any of the following methods to perform explode:
 - In the common toolbar, click  **Optimize** ▾ → **Explode**.
 - In the menu bar, click **Edit** → **Explode**.

The explode effect diagram is as follows:



5.3.7 Break

Used to cut-off graphics into multiple polylines.

It is usually used in the following situations:

- Through brake processing, connect the cutting part to its surrounding material. It equal to micro joint.
- Cut extra objects during drawing objects. Easily cut out ideal shapes.

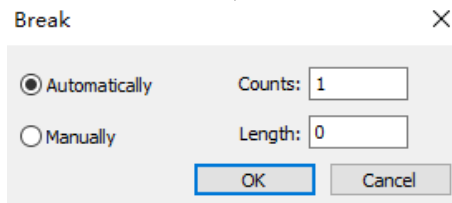
Select any of the following methods to perform break:

- **Automatically:** Auto execute break on all selected objects according to the set value.
- **Manually:** Select break position by yourself, only perform break on one object at a time.

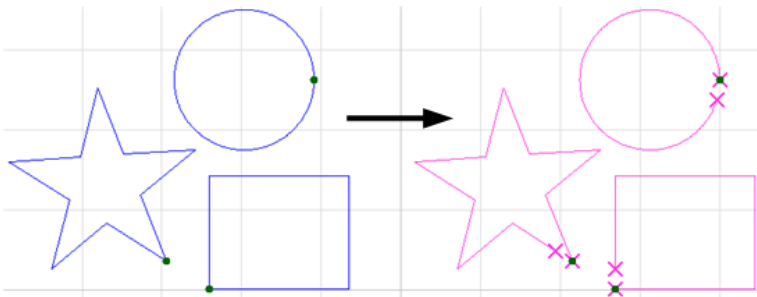
5.3.7.1 Automatically

Operation Steps:

1. Select the object.
2. In the menu bar, click **Edit** → **Break** to open the **Break** dialog box:



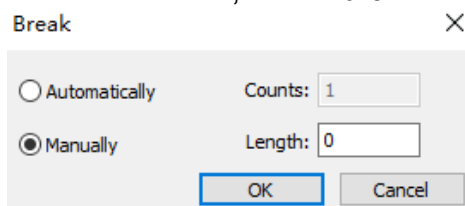
3. After selecting **Automatically**, enter the **Counts** and **Length** of the break line. The automatic break effect diagram is as follows:



5.3.7.2 Manually

Operation Steps:

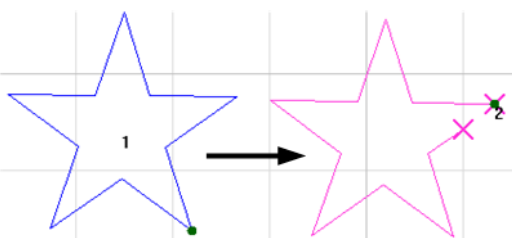
1. In the menu bar, click **Edit** → **Break** to open the **Break** dialog box:



2. After selecting **Manually**, enter the **Length** of the break line.

3. Click **OK**, the cursor change to \pm .
4. Left click to select the position for breaking.
5. Right click to finish breaking.


The manually break effect diagram is as follows:

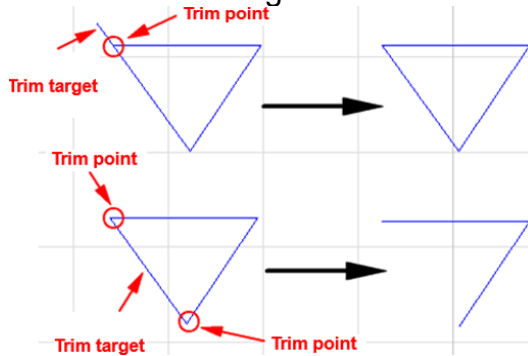


5.3.8 Trim

The trim function use the intersection point as the trim point to delete the selected part.

Operation Steps:


1. In the menu bar, click **Edit** → **Trim**, the cursor change to .
2. After selecting the target to be trimmed, left click, the graphic will use the intersection point as the trim point, and the selected target will be deleted. The trim effect diagram is as follows:



5.3.9 Extend

The extend function is to extend a line to another line to form an intersection, making the line closed. Extend is often applied to unclosed graphics, and does not support line segments without intersection after extend.

Operation Steps:

1. In the menu bar, click **Edit** → **Extend**, .
2. Move the cursor to the line segment that needs to be extended, and the graphic will display the effect of extend.
3. Left click to confirm extend.

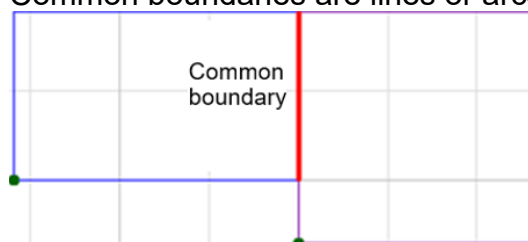


5.3.10 Common Edge

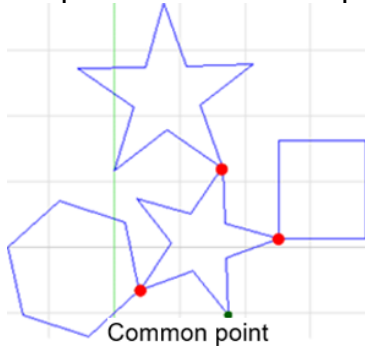
Common edge is used for overlap edges between graphics, so that they share a boundary, which avoid repeated cutting of the same boundary during machining.

The following conditions must be met before common edge:

- Closed graphics
- Common boundaries are lines or arcs

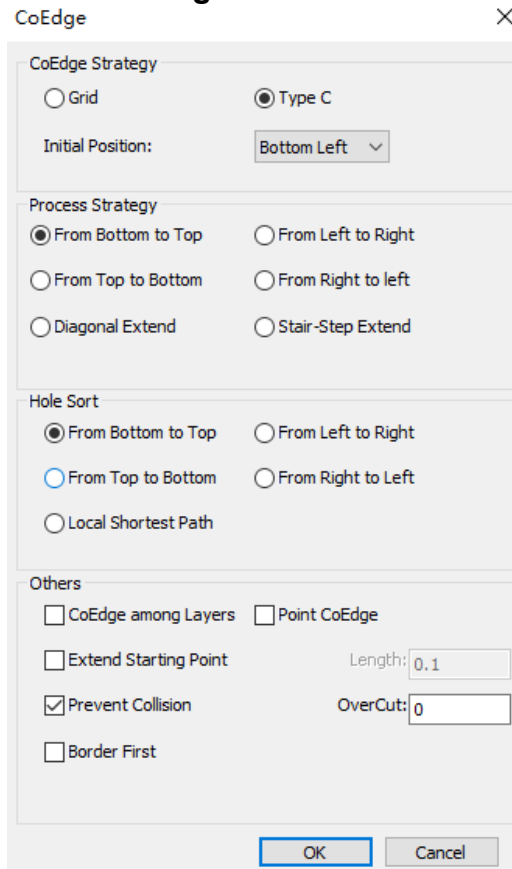


- Graphics with common points



Operation Steps:

1. Select multiple objects.
2. Follow any of the following steps to perform common edge:
3. Select any of the following methods to open the **CoEdge** dialog box:
 - Right click to call the shortcut menu, click **CoEdge**.
 - In the menu bar, click **Tool Path** → **Common Edge**.
 - In the common toolbar, click  **CoEdge** ▾ drop-down key → **Advanced Settings**.



4. Select CoEdge strategy:
 - **Grid**: Cut internal graphics first.
 - **Type C**: The tool path is type C cutting graphics.
5. **Optional**: If the co-edge strategy is selected as **C Type**, set the machining order:
 - **From Bottom to Top**: According to the order of the center point of each area from bottom to top.
 - **From Left to Right**: According to the order of the center point of each area from left to right.

- **Diagonal Extend:** Select the closed area in the lower left corner to start processing. The extend direction is from the lower left corner to the upper right corner.
 - **Stair-Step Extend:** Suitable for regular matrix graphics. The machining tool path is stepped, and the extend direction is from the lower left corner to the upper right corner.
6. **Optional:** If the CoEdge strategy is selected as **C Type**, single part has inner hole can specify the sorting strategy of the inner hole graphics, that is, set the inner hole sorting:
- **From Bottom to Top:** Machining in the order of the center points of each area from bottom to top.
 - **From Left to Right:** Machining in the order of the center points of each area from left to right.
 - **From Top to Bottom:** Machining in the order of the center points of each area from top to bottom.
 - **From Right to Left:** Machining in the order of the center points of each area from right to left.
 - **Local Shortest Path:** The shortest empty path between the cutting of one graphic and the start of cutting of another graphic is the "local shortest path".
7. **Optional:** If you need to perform other operations, in the **Other** area, check the following options:
- **CoEdge among Layers:** Graphics CoEdge between different layers.
 - **Point CoEdge:** The graphics contain common points are converted into groups.
 - **Extend Starting Point:** to extend the tool path in the opposite machining direction through the start point and turn on the laser in advance, helping completely cut the start point and avoid over-burning. It is applicable to rectangular objects.
 - **Prevent Collision:** to avoid colliding with the cutting head after cutting parts in the first region of shared objects. the CoEdge will be cut in the second region.
- Note:** Only valid for C type CoEdge. Otherwise, maintain the original common edge path, and cut the common edge part when machining the first area.
- **Over Cut:** Over cut strategy.
 - **Border First:** The outer frame of the part is preferentially CoEdge.
8. After the setting is complete, click **OK**, and the graphics will become a group after CoEdge.

5.3.11 Array

It is used to copy the machining objects and arrange them in order, so as to improve machining efficiency.



Array include the following:

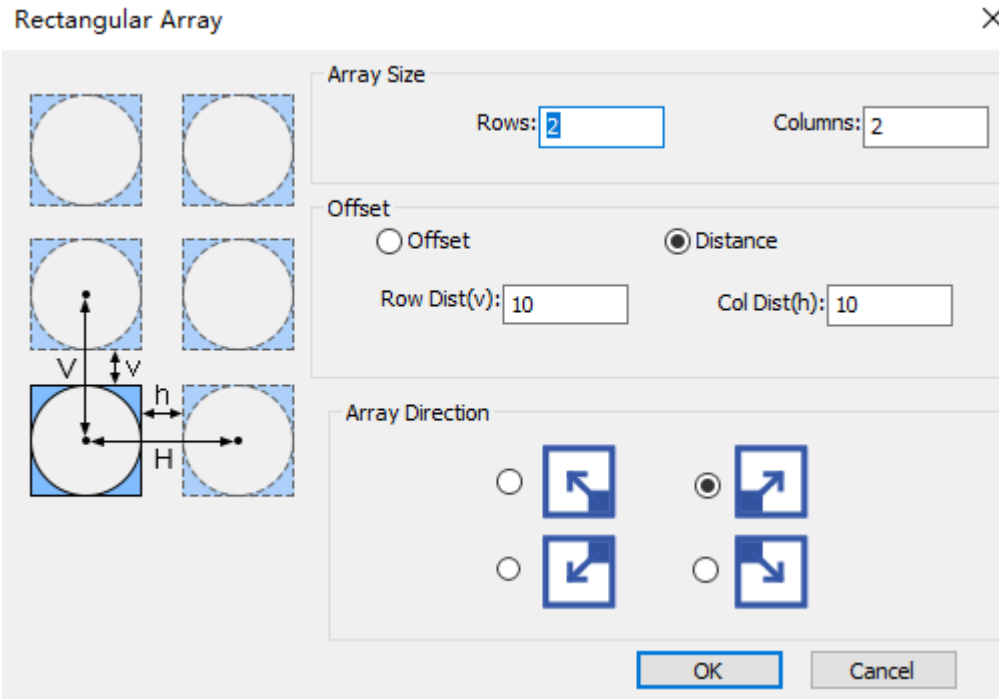
- [Rectangular Array](#)
- [Circular Array](#)
- [Manual Array](#)

5.3.11.1 Rectangular Array

Copy the graphic along the rectangular array.

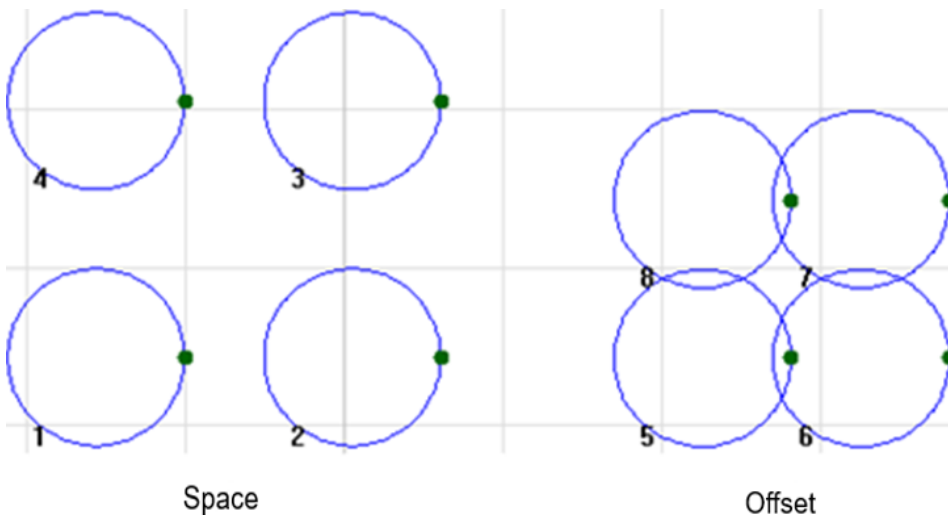
Operation Steps:

1. Select the object.
2. Select one of the following to open the **Rectangular Array** dialog box:
 - In the common toolbar, click  Array.
 - In the common toolbar, click  Array ▾ drop-down key → **Rectangular Array**.
 - In the common toolbar, click **Drawing** → **Array** → **Rect Array**.



3. Set the rows and columns for rectangular array.
4. In the **Offset** area, set the offset method:
 - **Offset**: Translate based on the center of the graphic.
 - **Distance**: Translate based on the graphic frame.
5. Select the row and column directions for rectangular arrays.

The result is as follows:




5.3.11.2 Circular Array

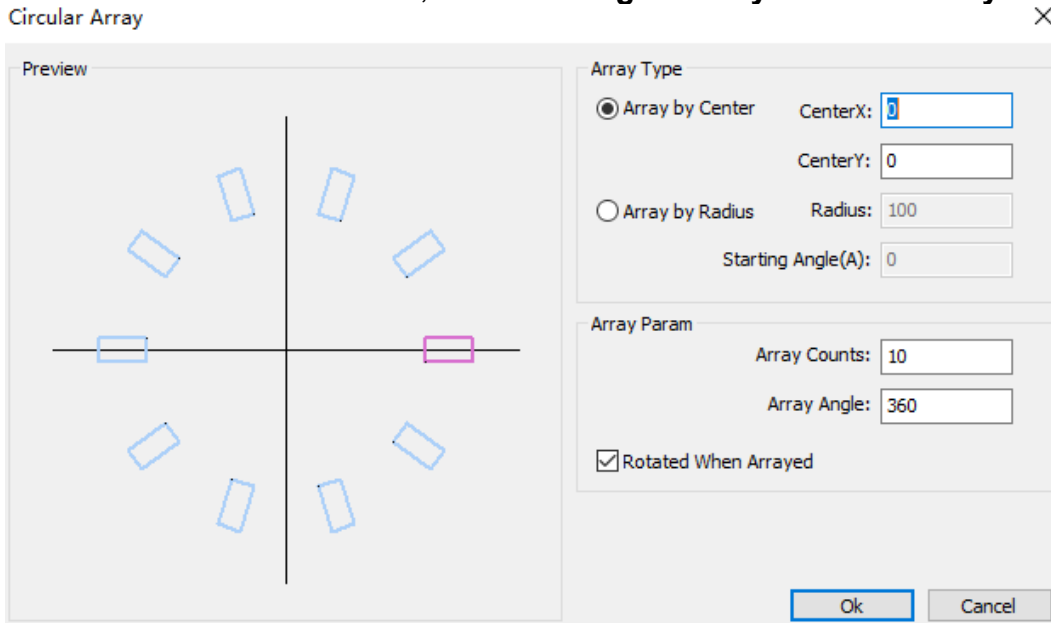
There are two modes for circular array:

- Array by center: Make an array based on the specified circle center coordinates.

- Array by radius: Make a circle array around the currently selected graphic as the datum (circle center).

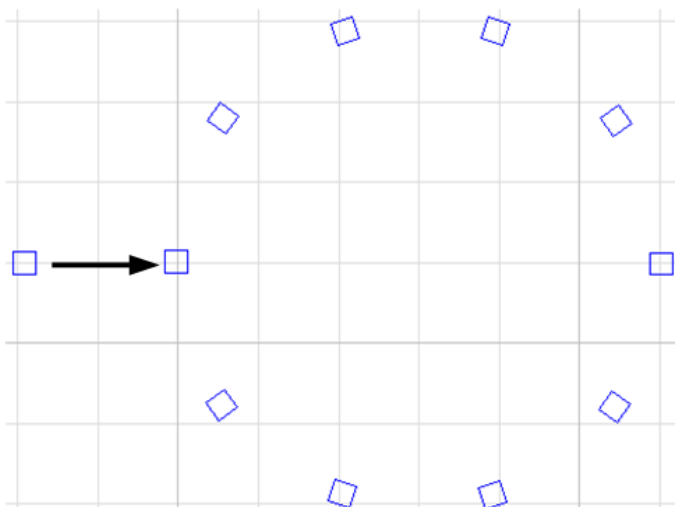
Operation Steps:

1. Select the object.
2. Select one of the following to open the **Circular Array** dialog box:
 - In the common toolbar, click  **Array** drop-down key → **Circular Array**.
 - In the common toolbar, click **Drawing** → **Array** → **Circle Array**.



3. Set the array method.
 - Array by center: Check **Array by Center** to set the coordinates of the rotation center point of the circular array.
 - Array by radius: Check **Array by Radius**, set **Radius** and **Starting Angle(A)** parameters.
4. Sets the parameters for the **Array Param** area.
 - **Array Counts**: Total number of circles to copy.
 - **Array Angle**: Total column offset angle.
5. Check or uncheck **Rotated when Arrayed** as required.


The result is as follows:

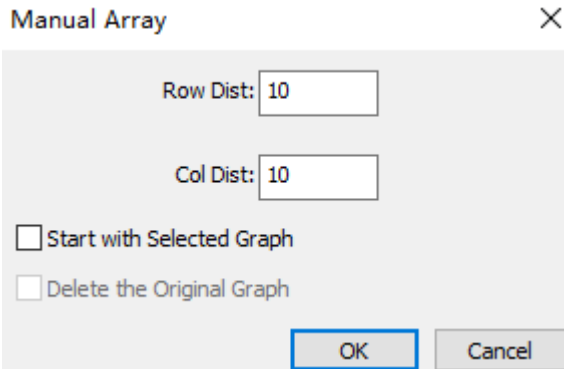




5.3.11.3 Manual Array

Set the row distance and column distance, delineate the planning area by dragging the mouse, and quickly copy the selected graphics in an array.

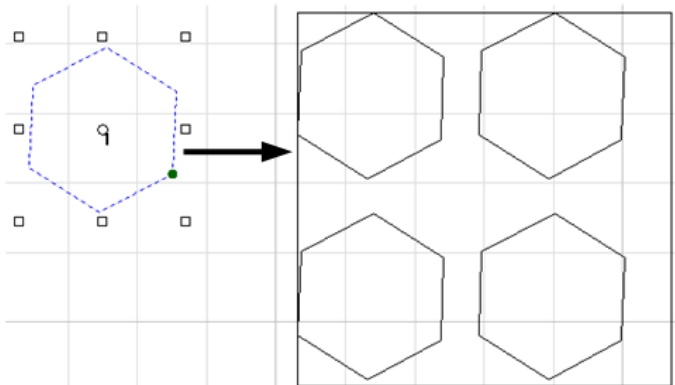
Operation Steps:

1. Select the object.
2. Select one of the following to open the **Manual Array** dialog box:
 - In the common toolbar, click  **Array** drop-down key → **Manual Array**.
 - In the common toolbar, click **Drawing** → **Array** → **Manual Array**.




3. Set **Row Dist** and **Col Dist** for manual array.
 - **Row Dist**: Translate left and right based on the graphic frame.
 - **Col Dist**: Translate up and down based on the graphic frame.
4. Select the start point for the array.
 - Take the selected object as the start point:
 - i. Click **OK**. The cursor turns into .
 - ii. Drag the mouse to delineate the planning area, select the end point, and left click.
 - Manual select the start point:
 - i. Check **Start with Selected Graph**.
 - ii. If you need to delete the original graph, check **Delete the Original Graph**.
 - iii. Click **OK**, left click to select the start position. If need to re-select the start position, right click.
 - iv. Drag the mouse to delineate the planning area and the cursor turn into . Select the end point, left click.

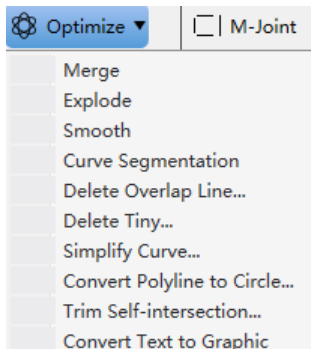
The result is as follows:



5.4 Graphic Preprocessing

When importing external graphics, the software can be set to automatically optimize the graphics to achieve better machining results. For details, please see [Preprocess](#).

If you need to manually optimize the graphics, you can use  **Optimize** ▾ button function in the common toolbar. Select the graphics to be processed, click the corresponding button, and operate according to the prompts.

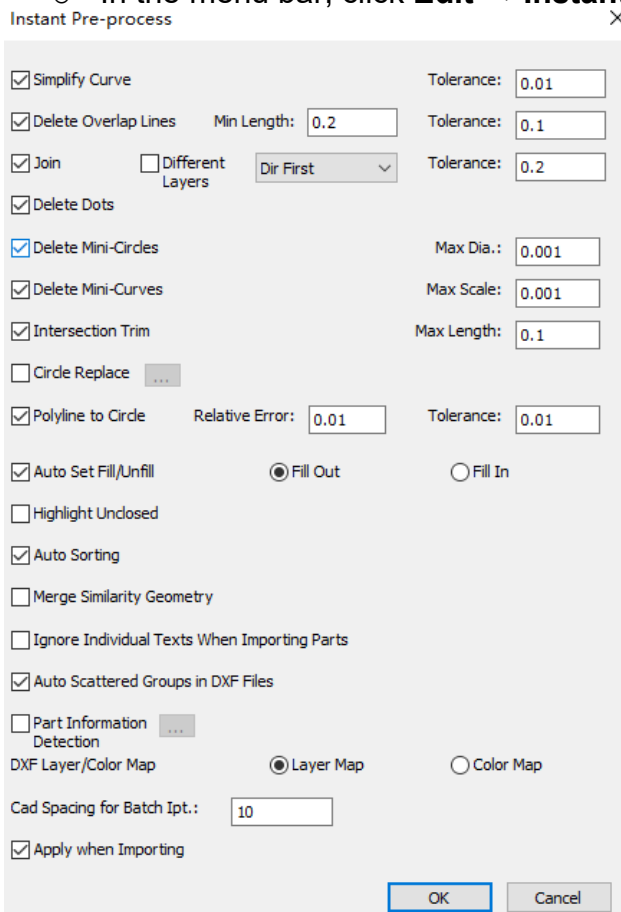


5.4.1 Preprocess

Automatically process of graphics at once.

Operation Steps:

1. Select the object.
2. Select any of the following methods to open the **Preprocessing** dialog box:
 - In the common toolbar, click **Preprocess**.
 - Right click to call the shortcut menu, click **Preprocessing**.
 - In the menu bar, click **Edit** → **Instant Pre-process**.




3. Check the preprocessing item and set the parameter range.
 - [Simplify Curves](#)
 - [Delete Overlap Line](#)
 - [Join](#)
 - If you need to delete dots, check **Delete Dots**, and the system will automatically delete dots.
 - If you need to delete small circles within the diameter range, check **Delete Mini-circles**, and set **Max Dia.**, the system will automatically delete small circles within the diameter range.
 - If you need to delete small curves within the size range, check **Delete Mini-curves**, and set **Max Scale**, the system will automatically delete small curves within the size range.
 - [Intersection Trim](#)
 - [Polyline to Circle](#)
 - Auto set fill/unfill
 - Highlight unclosed
 - Auto sorting
 - Part information: After checking, set the identifier and quantity of the part name. When drawing CAD drawings, you can use the set identifier to set the part information. After importing to the system software, you can quickly obtain the part name and number.
 - DXF layer/Color map: Set the corresponding relationship between the layer color of the system software and the CAD drawing.
4. **Optional:** Check **Merge Similarity Geometry**, in the menu of imported parts, the same parts will only be displayed once in the parts list, and the number will be superimposed, and not all will be expanded.
5. **Optional:** Check **Apply when Importing**. The system processes the objects automatically according to the selections above after importing a toolpath file.

5.4.2 Smooth

Smooth processing is performed on multi-segment polyline graphics, and the processed graphics are smoother to ensure smooth machining.

Operation Steps:

1. Select the object.
2. Select any of the following methods to perform smooth curves:
 - In the common toolbar, click  **Optimize** ▾ → **Smooth**.
 - Right click to call shortcut menu, click **Smooth**.
 - In the menu bar, click **Edit** → **Smooth**.

After smoothing curves, the prompt **Curve Smoothing Successful** shows.

5.4.3 Curve Segmentation

It is used to cut-off the graphics and break the lines of the graphics.



Common usage scenarios are as follows:

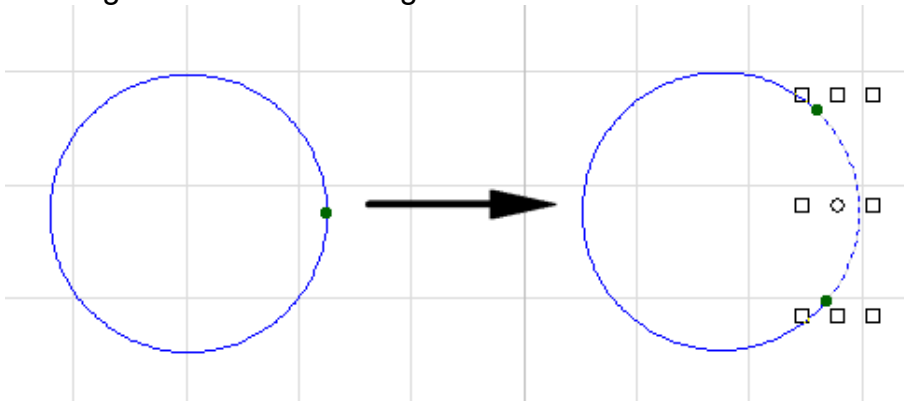
- Through break processing, the cut parts are connected with the surrounding materials, which is the same as micro joint.
- Cut redundant graphics in the graphics drawing stage, which is convenient for cutting out ideal shapes.

The difference between curve split and [Break](#):

- The difference in the method: Split can only select the break point manually, and the break support automatic and manual selection of the break point.
- The length of the break point: Split cannot be set, and the break support setting the length of the break point.

Operation Steps:

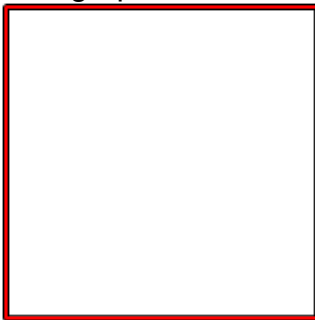
1. Select any of the following methods to enable curve segmentation:
 - In the common toolbar, click  **Optimize** ▾ → **Curve Segmentation**.
 - Right click to call shortcut menu, click **Curve Segmentation**.
 - In the menu bar, click **Edit** → **Curve Segmentation**.
2. At this point the cursor change to . At the position of the break point, left click. The segmentation effect diagram is as follows:



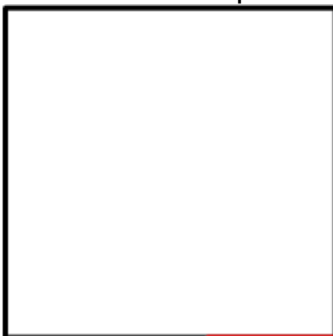
5.4.4 Delete Overlap Line

To delete overlap lines need to meet the following conditions:

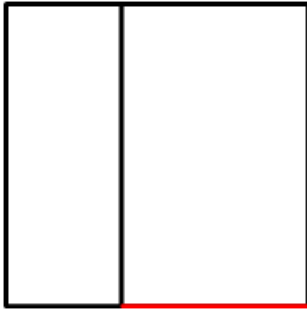
- Two graphics that coincide exactly:




- Lines that overlap between lines and graphics:

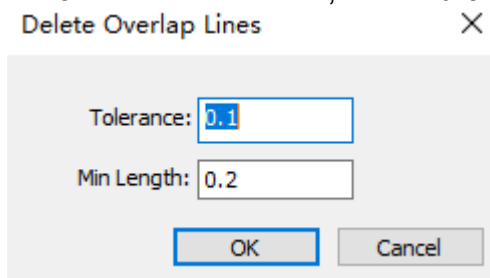


- Lines where the graphic overlaps itself:



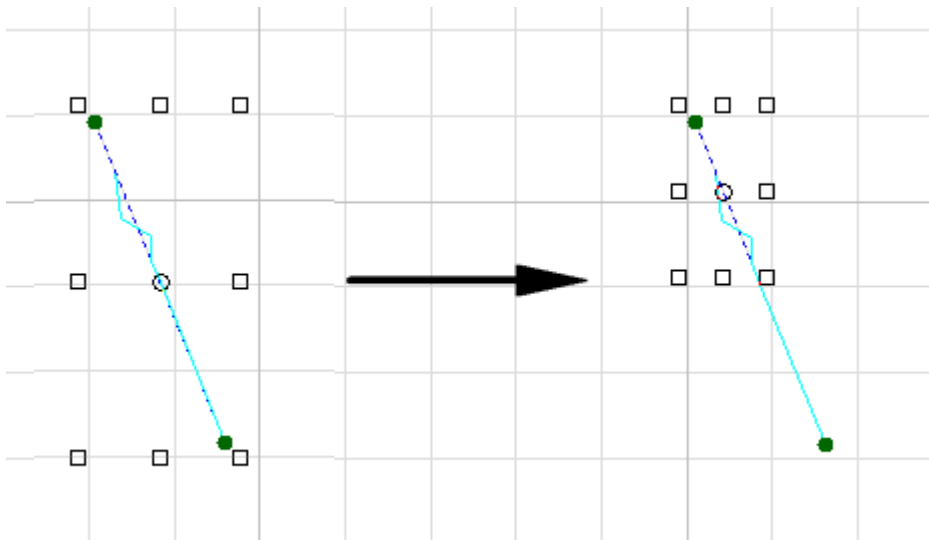
Operation Steps:

1. Select multiple objects.
2. Select any of the following methods to open the **Delete Overlap Lines** dialog box:
 - In the common toolbar, click  **Optimize** ▾ → **Delete Overlap Lines**.
 - Right click to call shortcut menu, click **Delete Overlap Lines**.
 - In the menu bar, click **Edit** → **Delete Overlap Lines**.



3. Set the following parameters:
 - **Tolerance**: To delete overlap lines, the distance between two lines must be within the maximum tolerance range.
 - **Min Length**: To delete overlap lines, the overlap length of the two lines must be greater than the minimum length.

The effect of delete overlap lines is as follows:



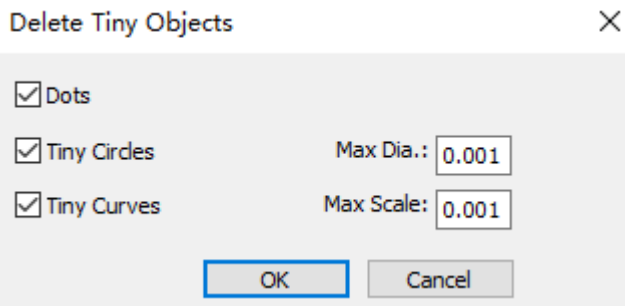
5.4.5 Delete Tiny

It can automatically delete dots, tiny circles and tiny curves according to the set conditions. The size of the tiny circles and tiny curves to be deleted can be set.

Operation Steps:

1. Select the object.
2. Select any of the following methods to open the **Delete Tiny Objects** dialog box:

- In the common toolbar, click  **Optimize** ▾ → **Delete Tiny**.
- In the menu bar, click **Edit** → **Delete Tiny**.



3. Select the item to be deleted and set the size.
4. Click **OK**, and a prompt box will pop up indicating the number of tiny graphics to be deleted.

The effect diagram of deleting tiny graphics is as follows:




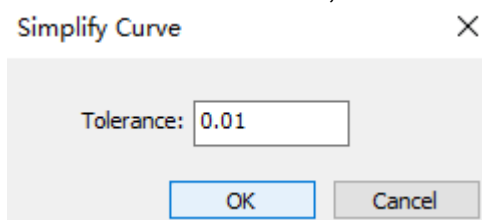
5.4.6 Simplify Curve

It is used to reduce the number of control points for polylines, so as to speed up the response time to object operations.

Control points are special points that control and adjust the shape of a curve.

Operation Steps:

1. Select the object.
2. Select any of the following methods to open the **Simplify Curve** dialog box:
 - In the common toolbar, click  **Optimize** ▾ → **Simplify Curve**.
 - In the menu bar, click **Edit** → **Simplify Curve**.



3. Set the tolerance and click **OK**.

The system automatically reduces the number of control points for polylines within the set tolerance.

5.4.7 Convert Polyline to Circle

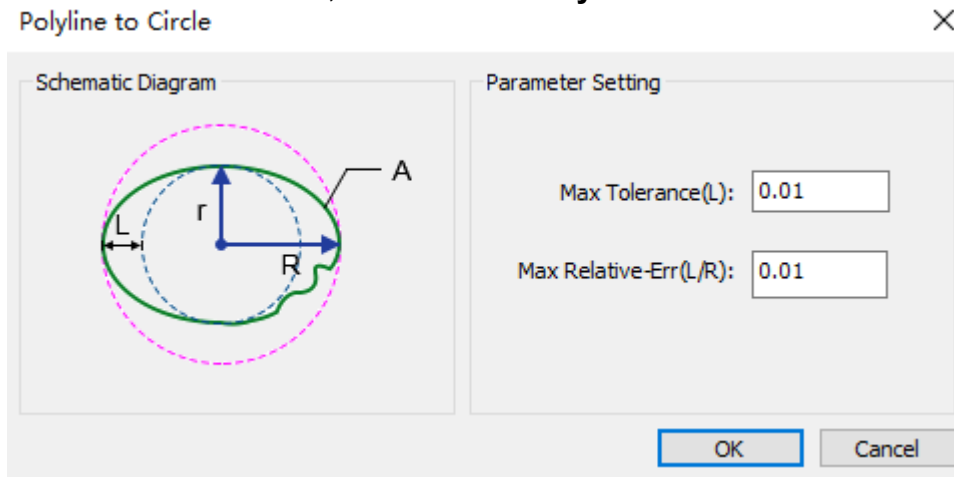
It is used to turn closed polylines shaped like circles into circles.

Operation Steps:

1. Select the object.

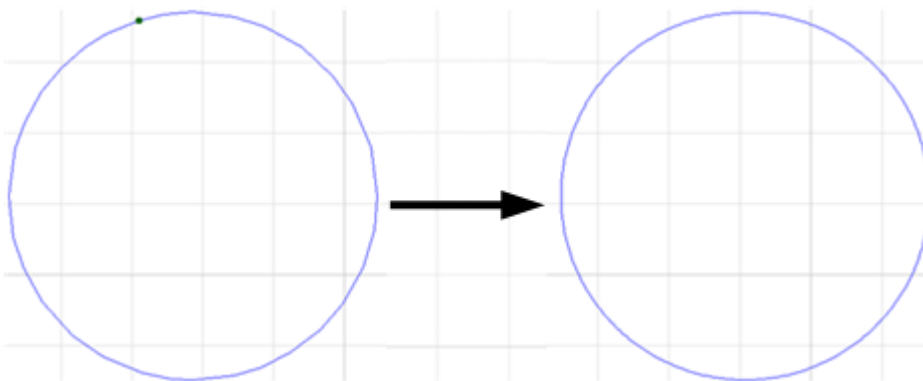
2. Select any of the following methods to open the **Convert Polyline to Circle** dialog box:

- In the common toolbar, click **Optimize** ▾ → **Convert Polyline to Circle**.
- Right click to call shortcut menu, click **Convert Polyline to Circle**.
- In the menu bar, click **Edit** → **Polyline to Circle**.



3. According to the schematic diagram, set parameters max tolerance and max relative error.

After successfully turning polylines into circles, the following dialog box pop-up. The result is as follows:

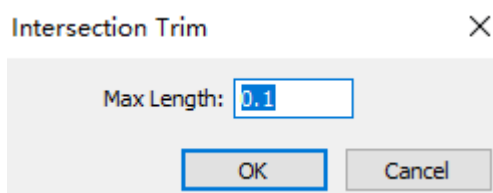


5.4.8 Trim Self-intersection

Separate the self-intersecting polyline graphics and cut-off redundant lines.

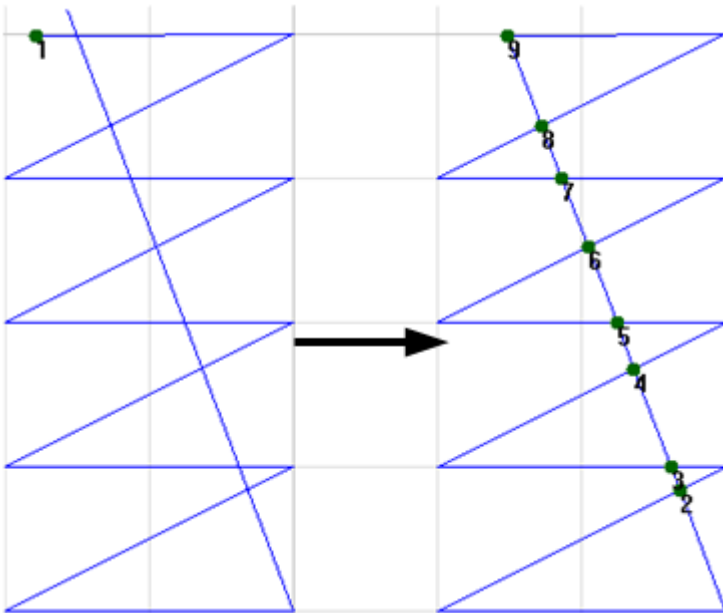
Operation Steps:

1. Select the object.
2. Select any of the following methods to open the **Intersection Trim** dialog box:
 - In the common toolbar, click **Optimize** ▾ → **Trim Self-intersection**.
 - In the menu bar, click **Edit** → **Trim Self-intersection**.



3. Set the length, click **OK**, the software will automatically cut-off the lines within the length range.


The self-intersecting trim effect diagram is as follows:



5.4.9 Convert Text to Graphic

Convert text to polylines to ensure that technic can be added later.

Operation Steps:

1. Select the object.
2. Select any of the following methods to perform convert text to graphic:
 - In the common toolbar, click  **Optimize** ▾ → **Convert Text to Graphic**.
 - Right click to call shortcut menu, click **Text to Polylines**.
 - In the menu bar, click **Edit** → **Convert Text to Graphic**.

5.5 Auxiliary Tool



5.5.1 Catch

More precise positioning of feature points for some graphics when drawing objects.

When the mouse is close to a feature point, the system can easily catch it, facilitating accurate connection between graphics.

5.5.1.1 Turn On/Off the Catch Function

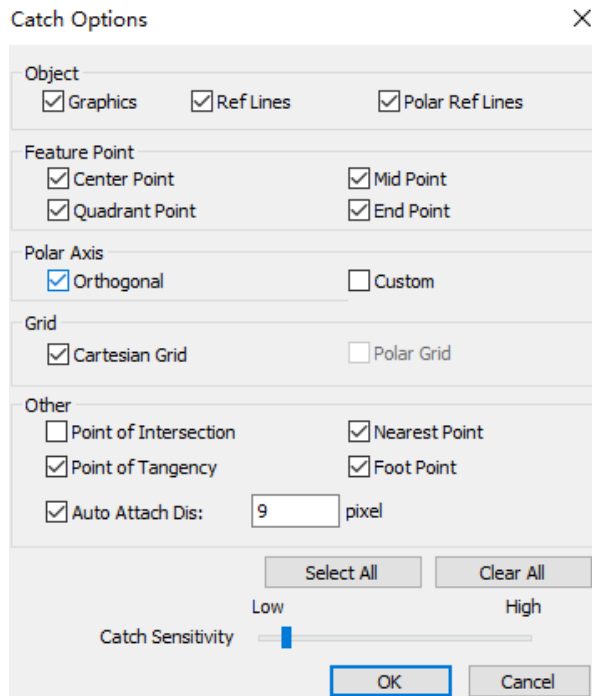
In the menu bar, click **Drawing** → **Catch**. If the **Catch** option is checked, it is turned on, and if it is not checked, it is turned off. In the corresponding common toolbar, the **Catch**

Options button will change,  indicating that the catch function is off,  and that indicators catch function is turned on.

5.5.1.2 Set Catch Options

Operation Steps:

1. Select the following method to open the **Catch Options** dialog box:
 - In the common toolbar, click  **Catch Options**.
 - In the menu bar, click **Drawing** → **Catch Options**.



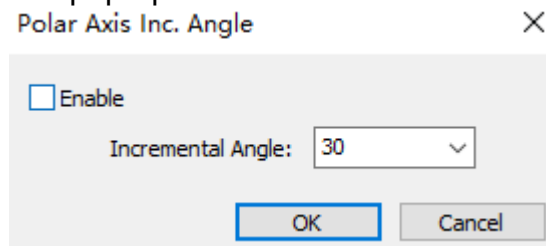
2. Check the feature items that you need to catch, and adjust **Catch Sensitivity**. It is easier to get the feature points with higher catch sensitivity.
3. If **Custom** is checked in **Polar Axis** area, to set the incremental angle. For details, please see [Polar Axis Inc. Angle](#).

5.5.1.3 Polar Axis Incremental Angle

Set the incremental angle, catch at the set **Incremental Angle**, every time **Incremental Angle** is rotated, the system will give blue polar axis prompts in the horizontal and vertical directions.

Operation Steps:

1. In the menu bar, click **Drawing** → **Polar IncAngle. Polar Axis Inc. Angle** dialog box pop-up.




2. Set incremental angle and check **Enable**.

5.5.2 Measure Distance

It is used to measure distance, X-axis / Y-axis offset and the vector angle between two points and the angle with the positive X-axis.

Operation Steps:

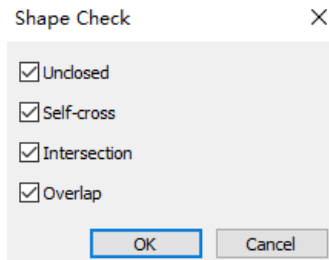
1. Select any of the following methods to call the function of measure distance:
 - In the drawing toolbar, click  **Measure**.
 - In the menu bar, click **View** → **Measure**.
2. Left click to select the start point for measuring.
3. Move the cursor to select the end point. The measurement result shows near the end point.

5.5.3 Graphic Detection

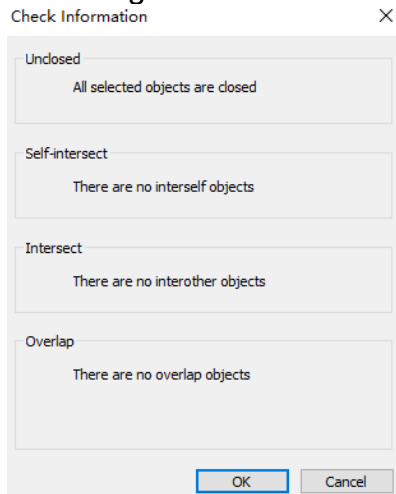
After importing or drawing graphic, check whether the current graphic has unclosed, self-cross, intersection and overlap, quickly lock the graphic.

Operation Steps:

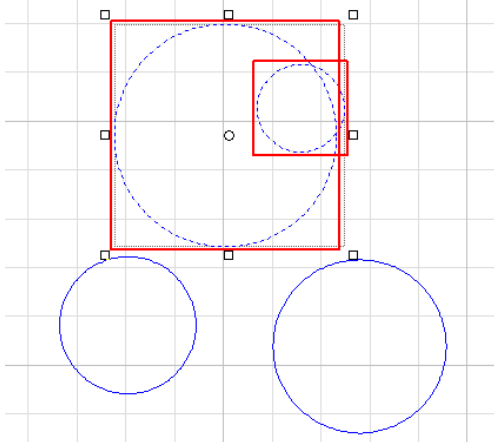
1. Select the object.
2. In the menu bar, click **View** → **Graphic Detection**, and the **Shape Check** dialog box will pop-up:



3. Check the items that need to be detected, click **OK**, after the detection is completed, the dialog box of **Check Information** will pop-up:



4. Check whether to select unclosed objects according to the needs.
5. Click **OK**, in the **Drawing Area** the graphs that meet the conditions will be displayed with dotted lines and selected by red boxes:



5.5.4 Quantity Modify

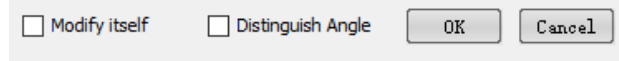
Batch process the selected graphics and the graphics that are exactly the same as them.

Operation Steps:

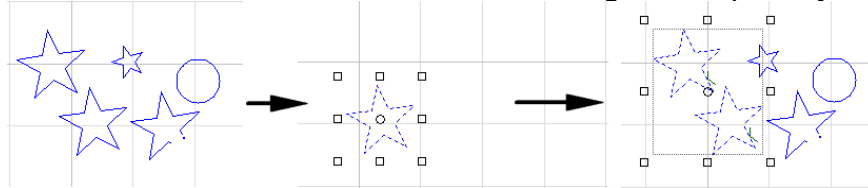
1. Select a single object.
2. Select any of the following methods to enable quantity modify:
 - In the menu bar, click **Edit** → **Quantity Modify**.
 - Right click in the drawing area and select **Quantity Modify**.

After the quantity modify function is enabled, the drawing interface only display the selected objects.

3. **Optional:** Check any of the following options:



- To modify only the selected graphics, check **Modify Itself**. Otherwise, quantity modify the selected graphic and its identical graphic.
 - If not modify graphics with similar rotation angles to the selected graphics, check **Distinguish Angle**.
4. Modify according to actual needs, the gray button means that it cannot be operated.
 5. After modification, click **OK**. The effect diagram of quantity adding lead line:



5.5.5 Group Editing

A group is to combine multiple graphics, or even multiple [Group](#) together to form a group, and the whole group will be treated as a whole.

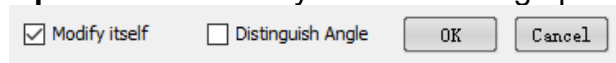
Quantity modify is to modify the graphics in the group in quantity, and at the same time, you can choose whether to modify the same group in quantity.

Operation Steps:

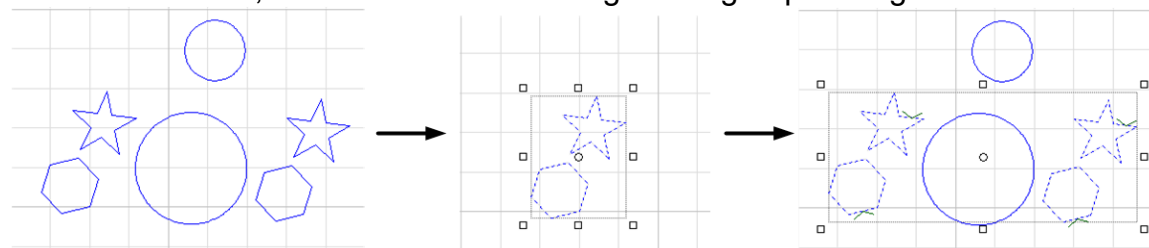
1. Select a single group.
2. Select any of the following methods to enable group editing:
 - In the menu bar, click **Edit** → **Group Editing**.
 - Right click in the drawing area, select **Group Editing**.

After the group editing function is enabled, only the selected group will be displayed on the drawing interface.

3. **Optional:** Check any of the following options:



- If only modify the selected group, check **Modify Itself**. Otherwise, quantity modify the selected group and its identical group.
 - If not modify graphics with similar rotation angles to the selected graphics, check **Distinguish Angle**.
4. Modify according to actual needs, the gray button means that it cannot be operated.
 5. After modification, click **OK**. The effect diagram of group adding lead line:



6 Machining Technic

6.1 Overview


This chapter introduces the setting of technic related functions. Since most of the technic parameters are directly related to the material being cut, the laser and the gas pressure used, they need to be set according to the actual technic requirements. The parameters in this chapter, including those in the picture, are only example and cannot be considered as guidance parameters.

Warning: Please set parameters carefully. Inappropriate or wrong parameters may cause poor cutting results or even damage the machine tool.

6.2 Machining Direction

Display and change the machining track direction in the tool path. Before changing the machining direction, to show the machining direction.

Select any of the following methods to display the machining direction:

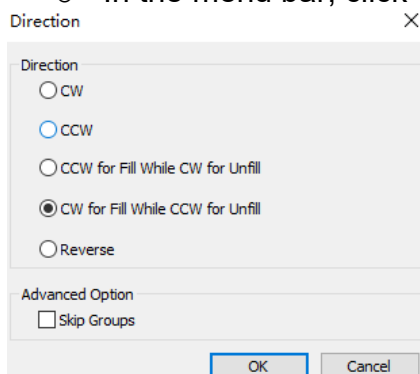
- In the common toolbar, click  **Show Direction**.
- In the menu bar, click **View** → **Show Direction**.

6.2.1 Auto Set Machining Direction

Auto set the machining direction for the selected and satisfied objects according to the set value.

Operation Steps:

1. Select one or more graphics.
2. Select any of the following methods to open the **Direction** dialog box:
 - In the common toolbar, click  **Reverse** drop-down key → **Advanced Settings**.
 - In the menu bar, click **Technics** → **Mach DIR** → **Set**.



3. Select the machining direction.

Note: If the selected object is an unlocked graphic, it cannot be selected:




 - CCW for fill while CW for unfill
 - CW for fill while CCW for unfill
4. **(Optional:)** If need to set the machining direction, the machining direction of the primitives in the group will not change, check **Skip Groups**.
5. Click **OK** to automatically generate the machining direction.

6.2.2 Manual Set the Machining Direction

Auto select the machining direction.

Operation Steps:

1. Select one or more graphics.
2. According to different needs, select to perform the following operations:

| If... | So... |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reverse the machining direction of the selected graphics | Select any of the following methods to perform the reverse: <ul style="list-style-type: none"> ▪ In the menu bar, click Technics → Mach DIR → Reverse. ▪ In the common toolbar, click  Reverse ▼ drop-down key → Reverse. ▪ Right click to call the shortcut menu, click Reverse. |
| Unify the machining direction of the selected graphics into CW | In the common toolbar, click  Reverse ▼ drop-down key → CW . |
| Unify the machining direction of the selected graphics into CCW | In the common toolbar, click  Reverse ▼ drop-down key → CCW . |


6.3 Micro Joint

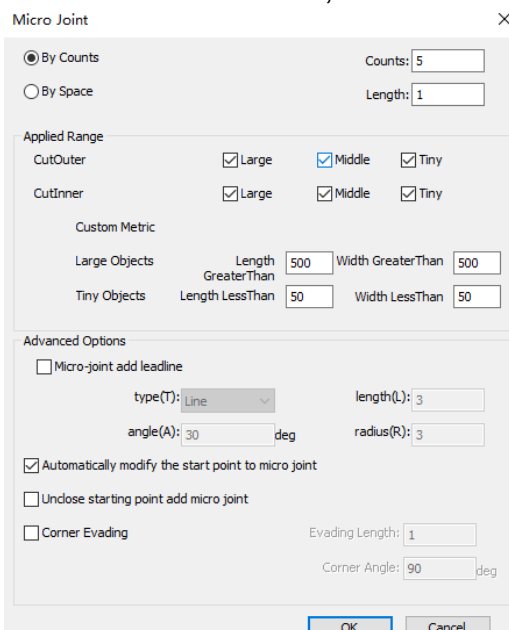
During laser cutting, the cut parts cannot fall from the gap in the support bars or be lifted up when held by the support bars, and the high-speed moving cutting head may collide with them. Use **Micro Joint** to connect parts with surrounding materials so that the materials do not fall and the work of sorting is eliminated.

6.3.1 Automatic Micro Joint

Automatically add micro joint to the selected objects according to the set value.

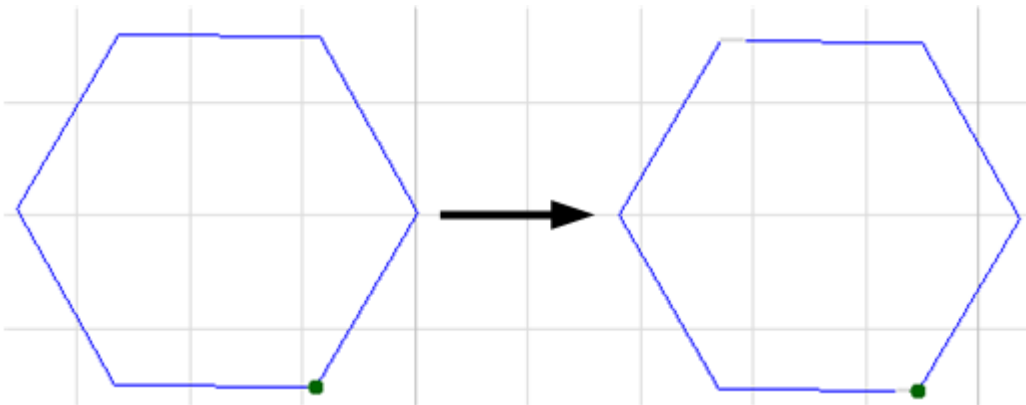
Operation Steps:

1. Select the object.
2. Select any of the following methods to open the **Micro Joint** dialog box:
 - In the common toolbar, click  **M-Joint** ▼ drop-down key → **Automatic Micro Joint**.
 - In the menu bar, click **Technics** → **Micro Joint** → **Micro Joint**.

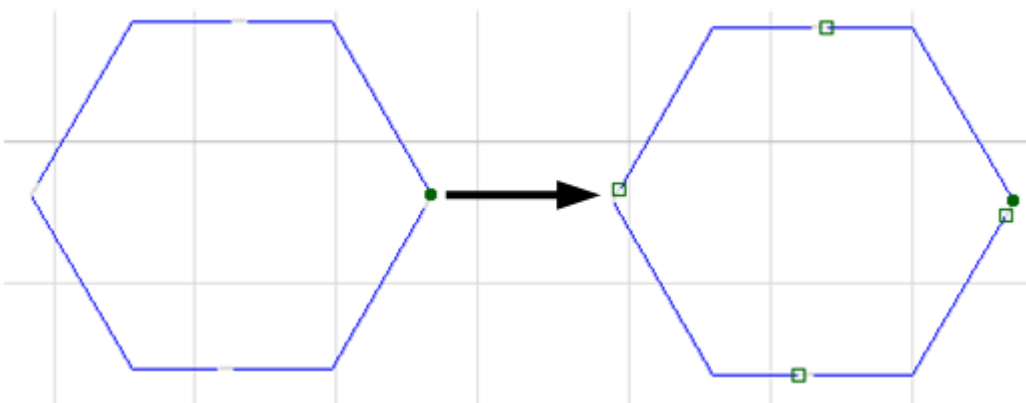


3. Select by counts or by space micro joint. The system automatically performs micro joint on the selected objects according to the set value.
4. In the **Applied Range** area, set the size of the large and small graphics. Check the graphic range of the micro joint.
5. In the **Advanced Options** area, check the options as required:
 - Micro joint add lead line, set the lead line parameters after checking
 - Automatically modify the start point to micro joint
 - Unclose start point add micro joint
 - Corner evading, set the following parameters after checking, otherwise all points support micro joint.
 - **Evading Length**: Range: 0.001mm~10mm
 - **Corner Angle**: Range: 90°~180°
6. After setting, click **OK**, the system will automatically add micro joint according to the set value.

When **By Counts** is selected and the number is set to 2. The before and after effect of automatic micro joint are as follows:




If need to view the position of the added micro joint more clearly, in the menu bar, click **View** → **Show Micro Joint**, the effect picture is as follows:

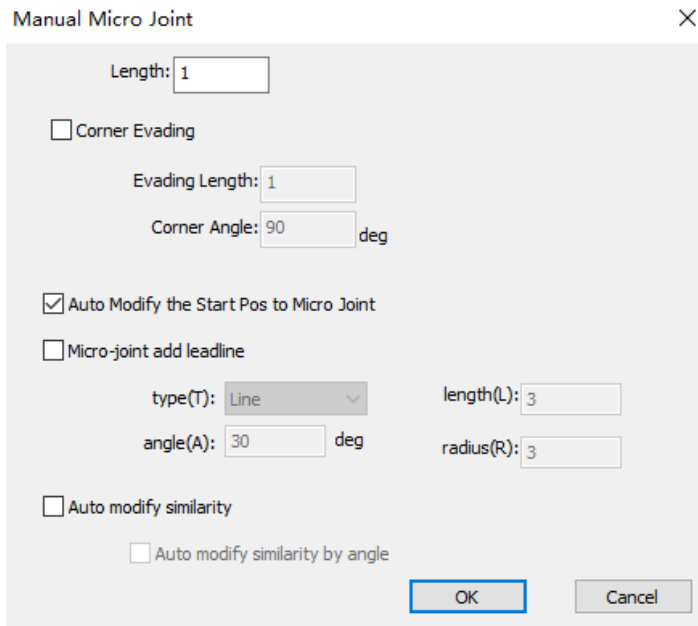


6.3.2 Manual Micro Joint

Select the micro joint position. When setting manually, it is recommended to enable the catch function.

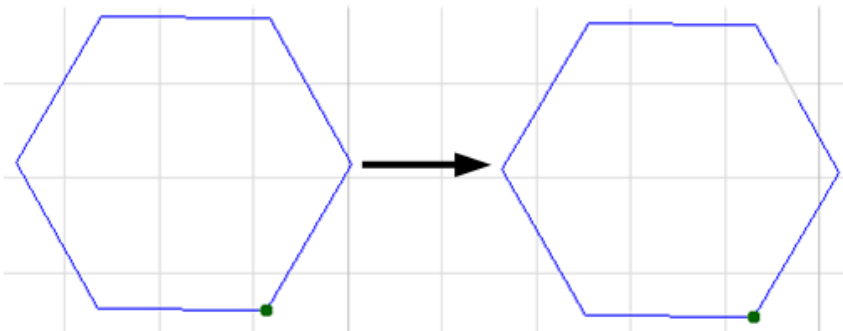
Operation Steps:

1. Do not need to select the object, select any of the following methods to open the **Manual Micro Joint** dialog box:
 - In the common toolbar, click  | **M-Joint Micro Joint**.
 - In the menu bar, click **Technics** → **Micro Joint** → **Manual Joint**.

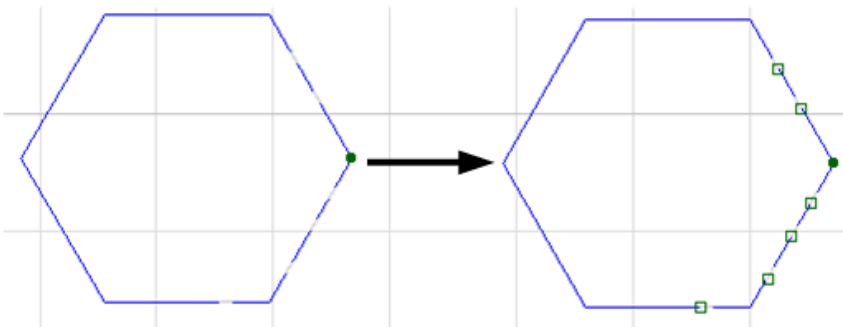


2. Set the line length.
3. Check **Corner Evading**, and set the following parameters, otherwise all points support micro joint.
 - **Evading Length**: Range: 0.001mm~10mm
 - **Corner Angle**: Range:90°~180°
4. Check options as needed:
 - Auto modify the start point to micro joint
 - Micro joint add lead line, and set the lead line parameters after checking it
5. Click **OK**. The cursor turn to **+ _ _**.
6. Left click to select the micro joint position.
7. Right click to exit the manual micro joint function.

The effect diagram of manual micro joint is as follows:



If need to view the position of the added micro joint more clearly, in the menu bar, click **View** → **Show Micro Joint**, the effect picture is as follows:




6.3.3 Explode Micro Joint

If you want to separately modify the part after the micro joint is separated, you can use the **Explode Micro Joint** function. Through **Explode Micro Joint** the unclosed graphics after the separation will be regarded as a separate individual to modify.

For example, if you want to add leads to the micro-connection part, you need to **Explode Micro Joint** first, and then add the leads.

Operation Steps:

1. Select the object.
2. Select any of the following methods to perform the explode micro joint operation:
 - In the common toolbar, click  **M-Joint** drop-down key → **Explode Micro Joint**.
 - In the menu bar, click **Technics** → **Micro Joint** → **Explode Micro Joint**.

6.4 Lead Line

Set the lead line in the waste area to avoid machining error or workpiece damage caused by the laser stay at the start point for a long time at the beginning of machining. Make machining more precise.

The types of lead line:


- **Lead-in:** Including line, arc and hook type, the hook type is formed by connecting arc and line.
- **Lead-out:** Including line and arc type.

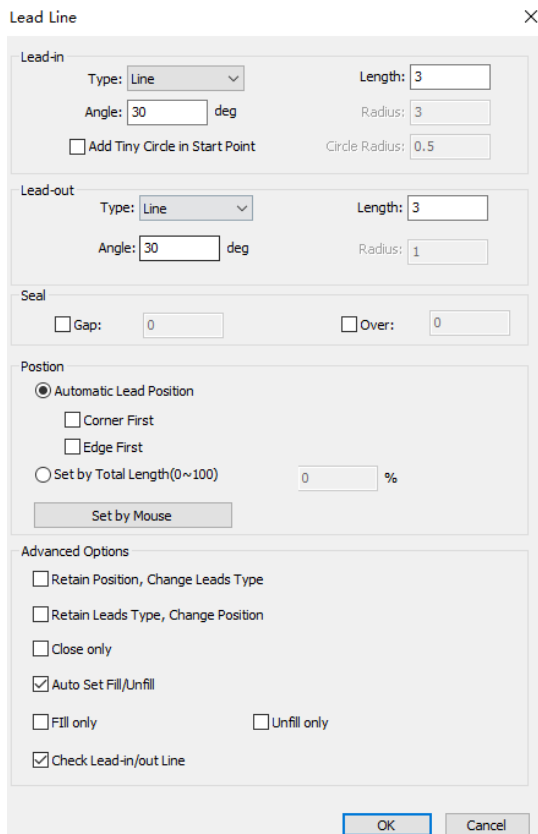
The selection of the lead line type is determined by the cutting technic. According to the actual situation, set relevant parameters such as **Speed**, **Lead Line Height** on the **Lead Line Technics** page of **Layer**.

6.4.1 Automatically Set Lead Line

Automatically add lead line to the selected object according to the set value.

Operation Steps:

1. Select one or more objects.
2. Select any of the following methods to open the **Lead Line** dialog box:
 - In the common toolbar, click  **Lead Line**.
 - Right click to call the shortcut menu, click **Lead Line** → **Set**.
 - In the menu bar, click **Technics** → **Lead Line** → **Set**.



3. In the **Lead-in** and **Lead-out** areas, set relevant parameters. The parameter descriptions are as follows:

| Parameter | Description |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type | Including line, arc and hook type, where the hook type is composed of arc and line. |
| Angle | <ul style="list-style-type: none"> ▪ The angle of line type lead line refers to the angle between the lead line and the tangent line at the intersection point of the primitive. ▪ The angle of the arc type lead line refers to the central angle. |
| Length | <ul style="list-style-type: none"> ▪ The length of line and arc type lead line refers to the length of line and arc. ▪ The length of the hook type lead line refers to the sum of the radius of the arc part and the length of the line part. |
| Radius | The radius of the hook type lead line is the radius of the arc part of the lead line. |
| Add tiny circle in start point | In order to solve the problem that the accumulation of slag affect the cutting effect when piercing thick plates. Adding a suitable small round hole at the start point of the lead line can cut off the slag at the same time, so as to ensure the cutting quality. |
| Circle radius | The radius of the tiny circle at the start point of the lead line. |

4. **Optional:** If it is a closed graphic, set the following parameters in the **Seal** area:

- **Gap:** Unclosed lead line means not cutting.
- **Over:** Seal lead line.

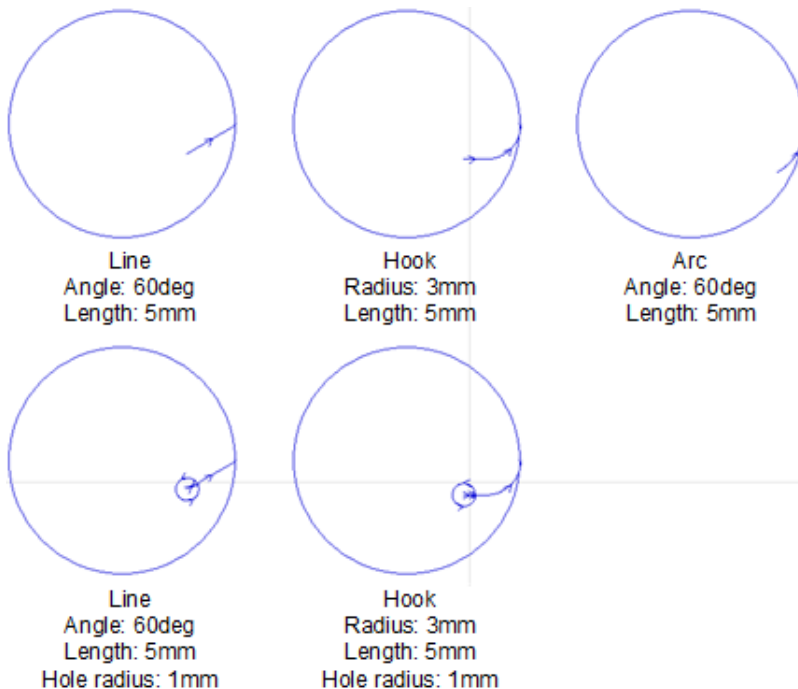
In the menu bar, click **Technics** → **Lead Line** → **Seal** → **Gap/Over** to edit or delete the gap and overcut separately.

5. Select any of the following methods to set the lead line position:

- If select **Automatic Lead Position**, select as needed:
 - **Corner First:** Prioritize adding lead lines at corners.
 - **Edge First:** Add lead lines on the longest edge first.

- If select **Set by Total Length (0~100)**, set the percentage of the total side length of the graphic from the start point of machining to the position of the lead line.
Only apply to closed graphics.
- 6. In the **Advanced Options** area, select as desired:
 - **Retain Position, Change Leads Type**
 - **Retain Leads Type, Change Position**
 - **Close only**
 - **Auto Set Fill/Unfill**
 - **Fill only**
 - **Unfill only**
 - **Check Lead-in/out Line:** If **Check Lead-in/out Line** is checked, the software will automatically check whether the lead line is reasonable, and if it is reasonable, a dialog box will pop-up and display "check lead line passed".
- 7. Click **OK**.



The effect diagram of the lead line is as follows:



6.4.2 Manually Set Lead Line

Use the mouse to specify the position of the lead line, and add the lead line according to the set value.

Operation Steps:


1. Select one or more objects.
2. Select any of the following methods to open the **Leader Line** dialog box:
 - In the common toolbar, click  **Lead Line**.
 - Right click to call the shortcut menu, click **Lead Line** → **Set**.
 - In the menu bar, click **Technics** → **Lead Line** → **Set**.
3. In **Lead-in**, **Lead-out** and **Seal** areas, set relevant parameters. For details, please see [Automatically Set Lead Line](#).
4. In the **Position** area, click **Set by Mouse** to return to the drawing area, and the cursor changes to .

5. Click the graphic boundary to manually specify the position of the lead line.
6. After setting, right click or press **Esc** key to exit the tool.

6.4.3 Modify Lead Line

Manually modify the position of the lead line.

Operation Steps:

1. Select any of the following methods to call the function of manually set the start point:
 - In the common toolbar, click  **Start Point**.
 - Select any object, right click to call the shortcut menu, click **Lead Line** → **Start Point**.
 - In the menu bar, click **Technics** → **Lead Line** → **Set Start Point**.
2. As needed, do the following:
 - Left click on the graphic boundary.
Only modify the position of the lead line, not modify the angle and length.
 - After left clicking outside the graphic, left click on the graphic boundary.
Draw a line type lead line from outside the graphic to the graphic.
3. Right click or press the **ESC** key to exit the start point function.

6.4.4 Check Lead Line

Check whether the lead line is reasonable, if not, give a modification suggestion and modify it automatically.

Operation Steps:

1. Select one or more graphics.
2. In the common toolbar, click  **Lead** ▼ drop-down key → **Check the Lead Line**.

Result:


- If there is an unreasonable lead line, it will be modified automatically.
- If the system cannot automatically modify the unreasonable lead line, a prompt box will pop-up.

6.5 Start Point

The start point is the start point of cutting each part. Each independent graphics has one and only one start point. The setting of the start point can facilitate the planning of the path, or set the start position of the tool according to the actual situation on site.

If there is a lead line, set the start/end point of the lead line; if there is no lead line, set the start point of machining, and start machining the graphic from the selected current point.

Operation Steps:

1. Select any of the following methods to call the function of manually set the start point:
 - In the common toolbar, click  **Start Point**.
 - Select any object, right click to call the shortcut menu, click **Lead Line** → **Start Point**.
 - In the menu bar, click **Technics** → **Lead Line** → **Set Start Point**.
2. Move the mouse, left click to select the start point of the start line.
3. In the graphics, select the end point of the start line with the left click to form the start line.
4. **Optional:** Modify start point:

- Whole moving start line: Move the mouse along the graphic, and the start line will also move along with it. Left click the graphic to select another place as the start point.
 - Reset the start line: Repeat steps 2~3.
5. Right click or press **ESC** key to exit the start point function.

6.6 Seal

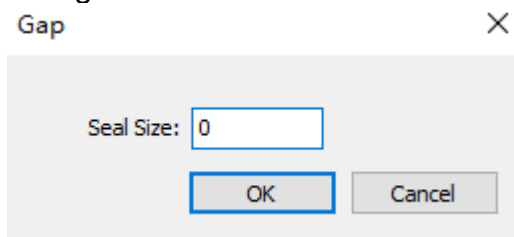
A seal is formed between the cutting start point and the end point of the part, and the seal method is divided into gap and overcut.

- **Gap**: It means to keep a certain distance between the start point and the end point, which is used for the adhesion of parts and plates, and can prevent parts from warping after cutting.
- **Overcut**: It means that the end point continues to cut forward for a certain distance after passing the start point, the purpose is to remove the possible start point slag.

6.6.1 Set Gap

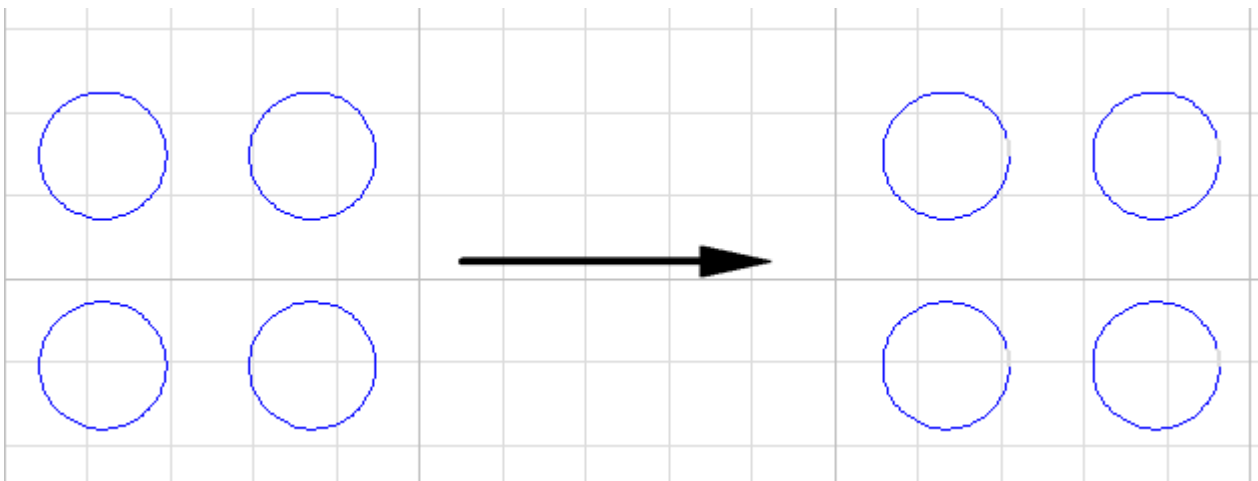
Operation Steps:

1. Select one or more graphics.
2. In the common toolbar, click Gap ▼ drop-down key → **Gap** to open the **Gap** dialog box:



3. Set the length of gap.
4. Click **OK**.

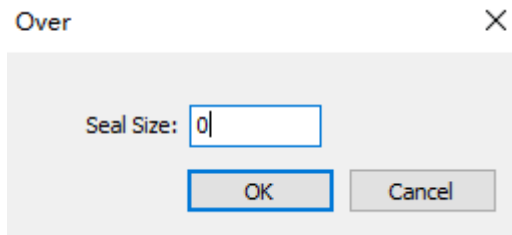
Add gap effect diagram:



6.6.2 Set Overcut

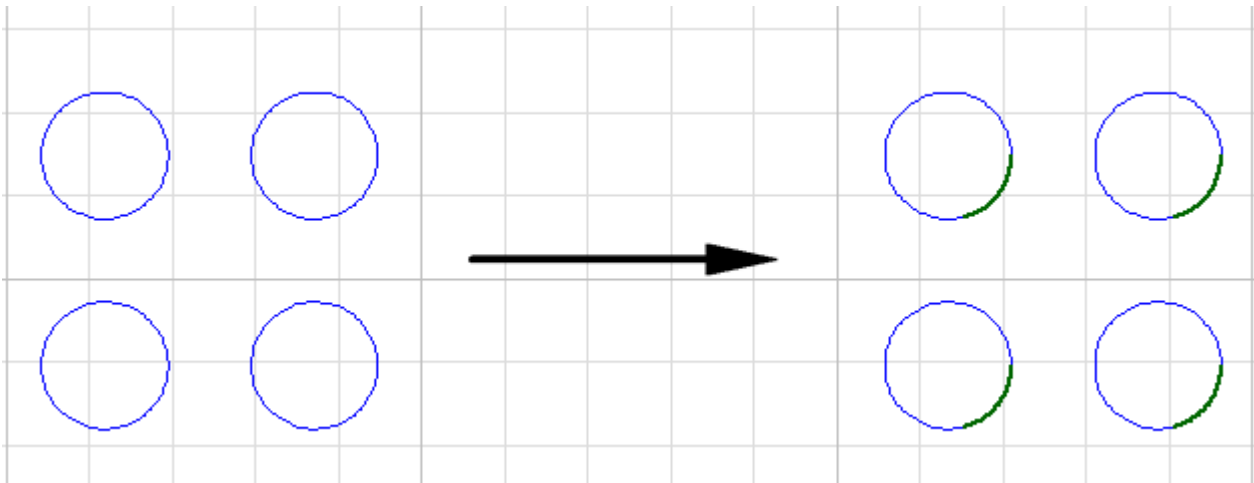
Operation Steps:

1. Select one or more graphics.
2. In the common toolbar, click Gap ▼ drop-down key → **Overcut** to open the **Over** dialog box:



3. Set the length of the overcut.
4. Click **OK**.


Add overcut effect diagram:



6.7 Unfill / Fill

Unfill is used to preserve the outer of the closed graphics during machining. **Fill** is used to preserve the inner of closed graphics during machining.

Operation Steps:

1. Select closed graphics.
2. Select any of the following methods to select the **Unfill/Fill** command:
 - In the common toolbar, click  **Unfill/Fill** ▼.
 - Right click to call the shortcut menu, click **Unfill/Fill**.
 - In the menu bar, click **Technics** → **Unfill/Fill**.
3. Select the setting method in the submenu:
 - Select **Unfill/Fill**, and manually set the selected graphic as unfill or fill.
 - Select **Auto Set**, according to the nesting relationship of the selected graphics, it will be automatically set as unfill or fill.

After setting, you can check the unfill and fill cut properties by switching [Fill Mode](#).

6.8 Kerf Compensation

Laser cutting has a kerf (the part that is lost during cutting), which makes the size of the actual cut part deviate from the theoretical size of the part. This operation enable geometric compensation for deviations.

Kerf compensation types are divided into:


- **All Shrink**: Shrink the cutting area for all selected parts.
- **All Expand**: Expand the cutting area for all selected parts.
- **Unfill: Shrink; Fill: Expand**: shrink the cutting area for parts with unfill attribute, and expand the cutting area for parts with fill attribute.

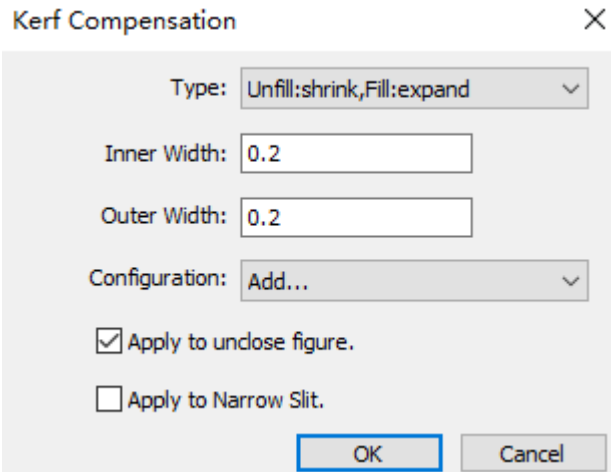
Prerequisite:

Before setting kerf compensation, make sure the following:

- The text has been [Convert Text to Graphic](#).
- Non-dot, scan, self-intersecting, CoEdge graphics.
- Closed graphic.

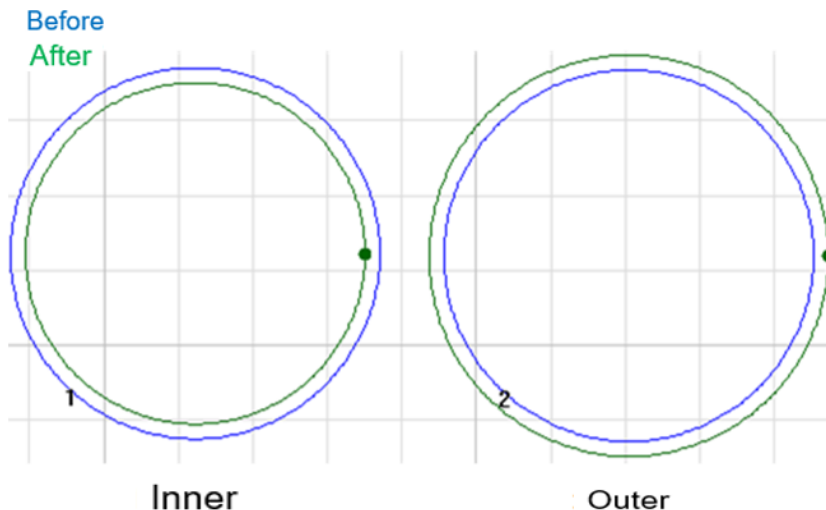
Operation Steps:

1. Select one or more graphics.
2. Select any of the following methods to open the **Kerf Compensation** dialog box:
 - In the common toolbar, click  **Comp**.
 - In the menu bar, click **Technics** → **Kerf Compensation**.



3. Set the compensation type.
4. Set the inner and outer width.
5. Check **Apply to Unclose Figure** as required.
6. Click **OK**.

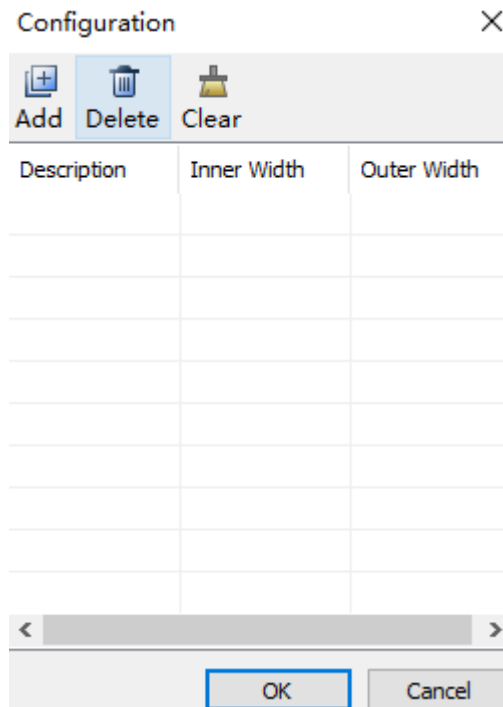
The result of kerf compensation is as follows:



Related Tasks:

If you need to save the commonly used inner/outer width for direct call next time:

1. Select **Add** in the **Configuration** drop down box, and the **Configuration** dialog box will pop-up:




2. Click **Add**, set the name in the **Description** column, and set the inner and outer widths in the **Inner Width** and **Outer Width** columns respectively.
3. When you need to use it, select the name set in the **Description** column in the **Configuration** drop down box, and the system will automatically fill in the inner width and outer width.

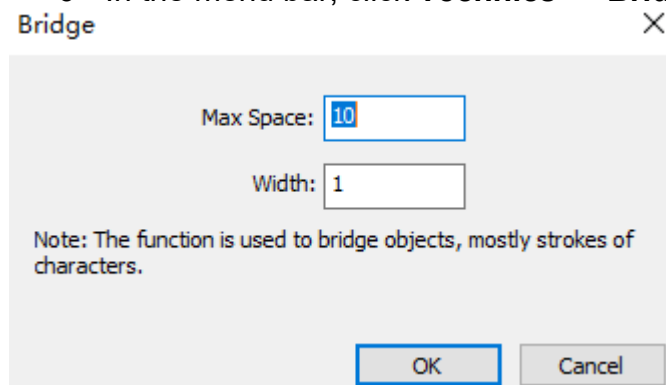
6.9 Bridge


When a workpiece is composed of multiple parts, using this function to connect these parts can prevent it from falling apart after cutting and reduce the number of pierces. Multiple use of the **Bridge** function can achieve the effect of one stroke for all graphics, and it is mostly used for the connection of text strokes.

Before setting the bridge, make sure the text has been [Convert Text to Graphic](#).

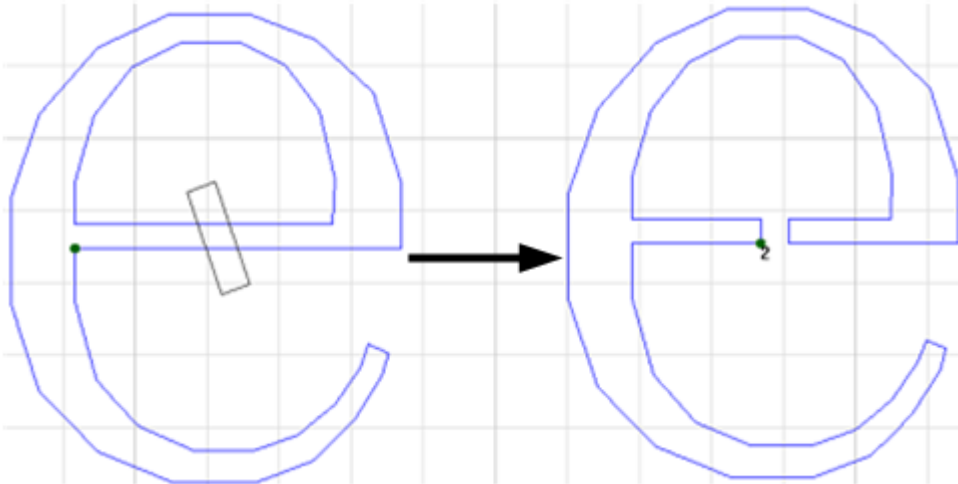
Operation Steps:

1. Select the following method to open the **Bridge** dialog box:
 - In the common toolbar, click  **Bridge**.
 - In the menu bar, click **Technics** → **Bridge**.



2. Set the maximum space and width of the bridge, and click **OK**, the cursor changes to .
3. Left click select both ends of the bridged part separately.
4. Right click or press **Esc** key to exit the bridge function.

The bridge effect diagram is as follows:




6.10 Chamfer

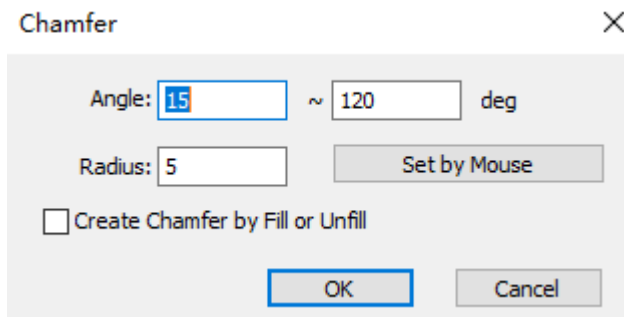
Perform arc chamfer on all corners smaller than 180° in the graphic to improve cutting effect on corners of thick material.

6.10.1 Automatically Add Chamfer

Automatically add chamfers to the selected objects that meet the conditions according to the set value.

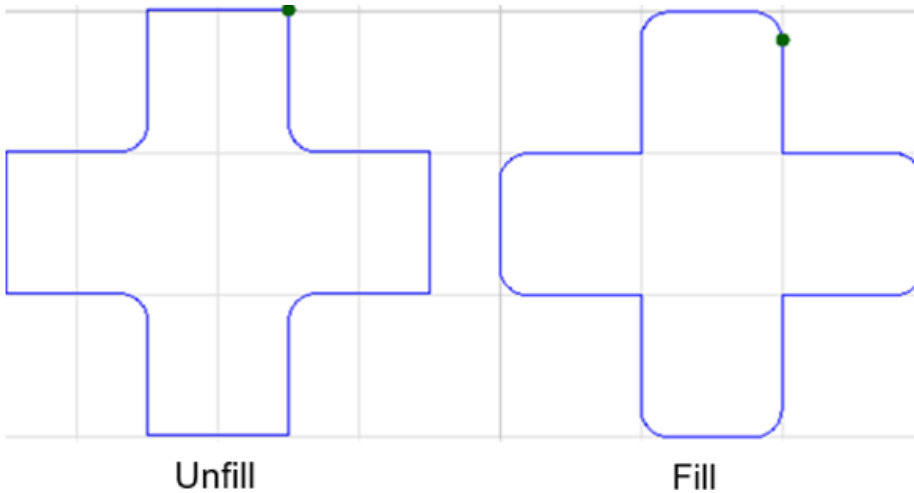
Operation Steps:

1. Select the object.
2. Select any of the following methods to open the **Chamfer** dialog box:
 - In the common toolbar, click  **Chamfer**.
 - Right click to call the shortcut menu, click **Chamfer**.
 - In the menu bar, click **Technics** → **Chamfer**.



3. Set the range and radius of the chamfer.
4. **Optional:** If the selected closed graphics will add chamfers according to the unfill and fill attributes, check **Create Chamfer by Fill or Unfill**.
5. After setting, click **OK**, and the system will automatically add chamfers to corners that meet the conditions.


The setting range is 45°~90°, and when **Create Chamfer by Fill or Unfill** is checked, the effect of automatically adding chamfers is as follows:

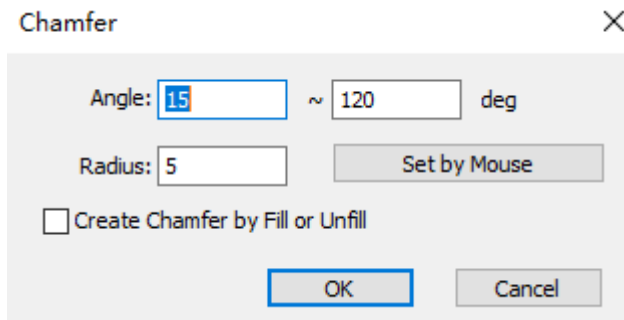



6.10.2 Manually Add Chamfer

The chamfer position can be selected by yourself. Corner range: 0°~180°.

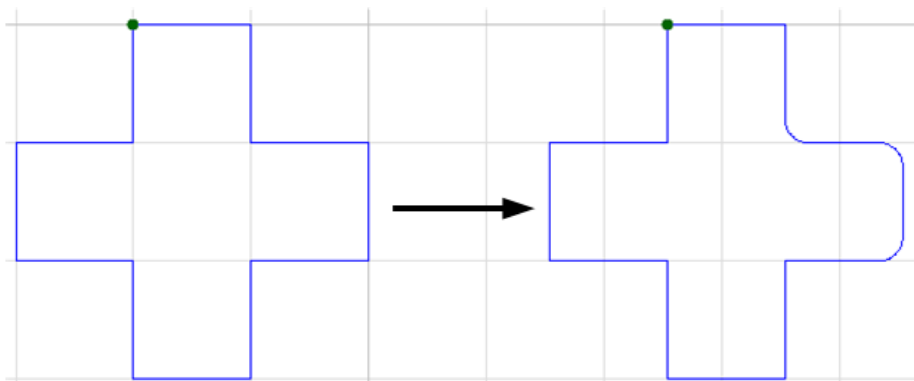
Operation Steps:

- Select any of the following methods to open the **Chamfer** dialog box:
 - In the common toolbar, click  **Chamfer**.
 - Right click to call the shortcut menu, click **Chamfer**.
 - In the menu bar, click **Technics** → **Chamfer**.



- Set the radius of the chamfer.
- Optional:** Check **Create Chamfer by Fill or Unfill**.
- Click **Set by Mouse**, the cursor changes to .
- Left click to select the position of the added point.
- Right click or press the **Esc** key to exit the function of manually add chamfers.

When **Create Chamfer by Fill or Unfill** is not checked, the effect of manually adding chamfers is as follows:



6.11 Chop

Divide the selected graphic into multiple blocks, that is, chop the machining waste to facilitate the waste to fall off.

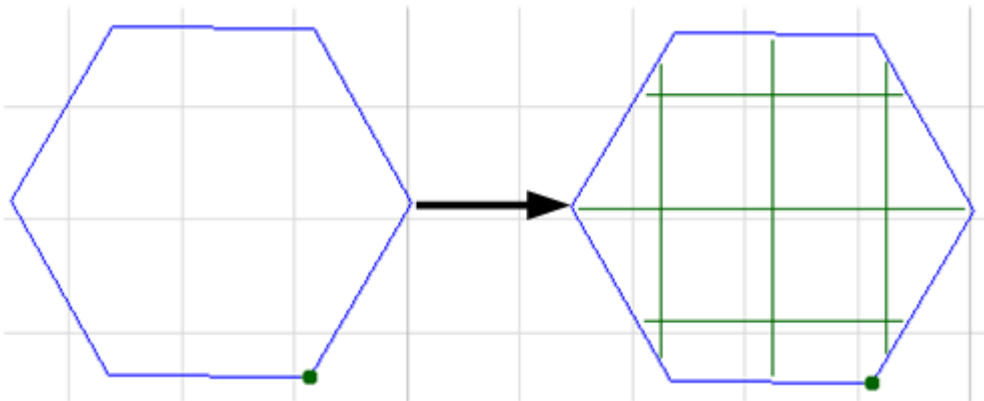
The object of chop needs to meet the following conditions:

- Non-fill closed graphics other than text.
- Large graphics, and the minimum distance between the chop line and the border of the primitive is 0.3mm, and the minimum length of the chop line is 1mm.
- No micro joint added.
- No other graphics are included.

Operation Steps:

1. Select the object.
2. In the menu bar, click **Technics** → **Chop** to pop-up the **Chop** dialog box.
3. Set the space and left side interval. The value range of left side interval: 0-1.

The chop effect picture is as follows:



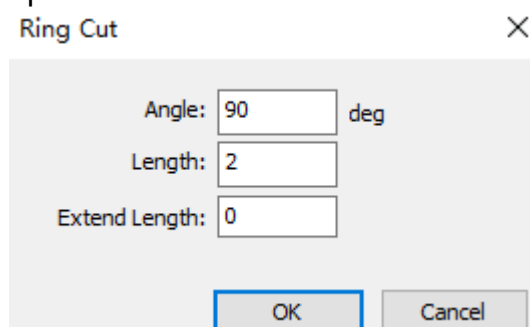
6.12 Ring Cut

Set the sharp corner of the overcut and rotate it to prevent overheating.

Before setting ring cut, according to the actual situation set [Unfill/Fill](#).

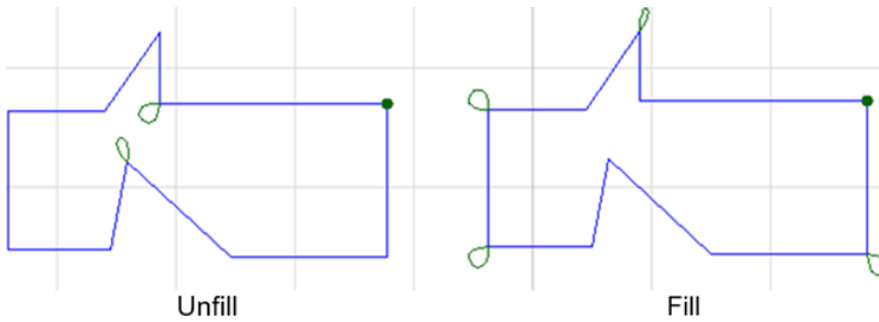
Operation Steps:

1. Select the object.
2. In the menu bar, click **Technics** → **Ring Cut**, and the **Ring Cut** dialog box will pop-up:



3. Set the following parameters:
 - **Angle:** Range: 0°~90°.
 - **Length:** Range: 0.1mm~100mm.
 - **Extend Length:** Range: 0mm~5mm.

The ring cut effect picture is as follows:

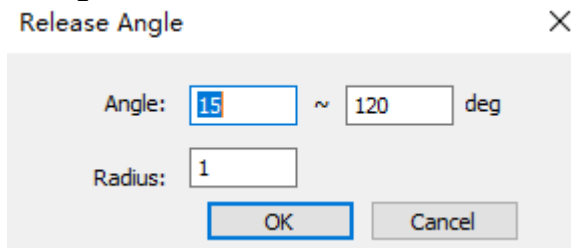



6.13 Release Angle

It is used to cut out a fan-shaped area at the bending corner of a bent workpiece during bending process after machining, so as to solve the uplift of workpiece at the bending corner.

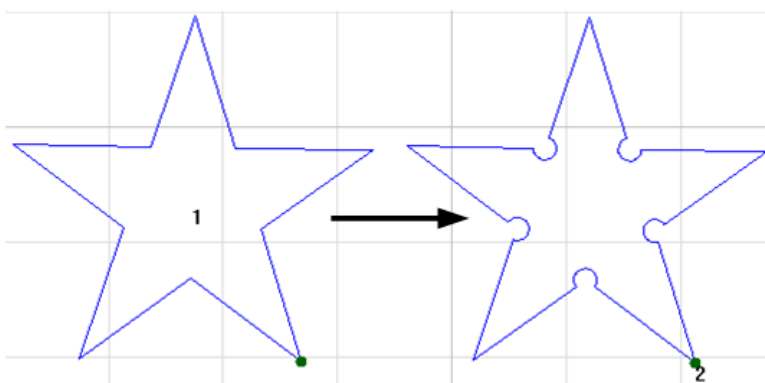
Operation Steps:

1. In the menu bar, click **Technics** → **Release Angle** to open the **Release Angle** dialog box:



2. Set the range and radius of the release angle and click **OK**. The cursor change to .
3. Left click to select where to add the point.
4. Right click or press **Esc** key to exit the function of adding release angle.

The effect diagram of adding release angle is as follows:



6.14 Counterbore

Counterbore technic, generate a set of counterbore auxiliary lines through parameter setting. Use the specific counterbore technic parameter machining auxiliary line to machine the counterbore on the primitive.

Through the counterbore technic function, the section effect of the precious metal can be guaranteed, and the counterbore can be directly machined to avoid drilling and chamfering.

Term:

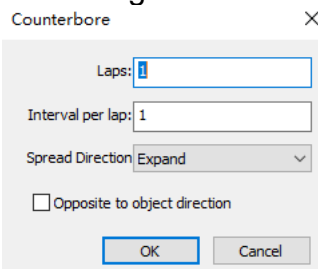
- Counterbore

Through hole with a chamfered slop, the counterbore accommodates the screw head when the screw is installed. Avoid screws protruding from the workpiece surface.

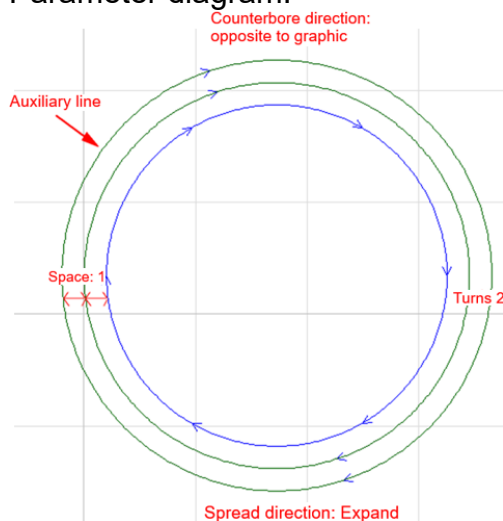
- Counterbore auxiliary line
In order to cut out the machining path of the counterbore, it cannot be directly selected for editing, but can only be adjusted by parameters.

Operation Steps:

1. Select the object.
2. Select any of the following methods to open the **Counterbore** dialog box:
 - In the menu bar, click **Technics** → **Counterbore**, and the dialog box of **Counterbore** will pop-up.
 - Right click to call the shortcut menu, click **Counterbore**.



3. Set parameters.
Parameter diagram:




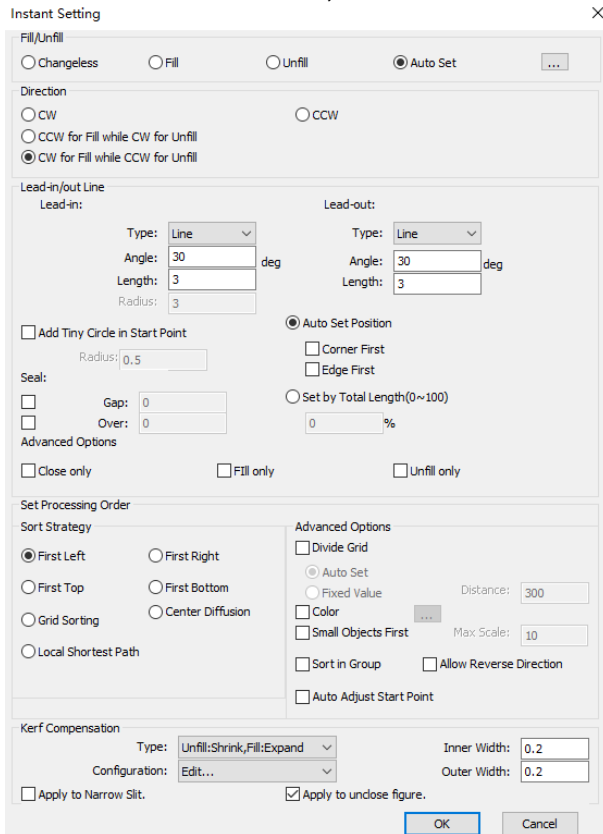
| Parameter | Range | Unit | Description |
|------------------------------|-------------------------|----------------------|------------------------------------------------------------------------------------------------|
| Turns | [0, 100] | - | Total number of counterbore auxiliary lines |
| Space | [0, 100] | Mm (metric: inch) | Distance between counterbore auxiliary lines |
| Spread direction | 1. Shrink, 2. Expand | - | The direction in which the counterbore auxiliary line expands compared to the original graphic |
| Opposite to object direction | - | - | The machining direction of the counterbore auxiliary line is opposite to the original graphic |

6.15 Instant Setting

For the selected objects, add the same technic in batches to improve technic efficiency.

Operation Steps:

1. Select the object.
2. Select any of the following methods to open the **Instant Setting** dialog box:
 - In the common toolbar, click  **OC-Set**.
 - Right click to call the shortcut menu, and click **Instant Setting**.
 - In the menu bar, click **Technics** → **Instant Setting**.




3. Set as needed.
4. Click **OK**.

6.16 Clear

Delete the technic and machining track of the selected object, the machining technic that can be cleared includes:

- Trajectory
- Lead line
- Kerf compensation
- Micro joint
- Chop
- Round cut
- Scan
- Counterbore

Operation Steps:

1. Select one or more objects.
2. Select any of the following methods to clear:
 - In the common toolbar, click  **Clear** drop-down key to select items to be cleared.
 - Right click to call the shortcut menu, click **Clear**, and select items to be cleared.
 - In the menu bar, click **Technics** → **Clear**, and select the item to be cleared.

7 Layer Technic

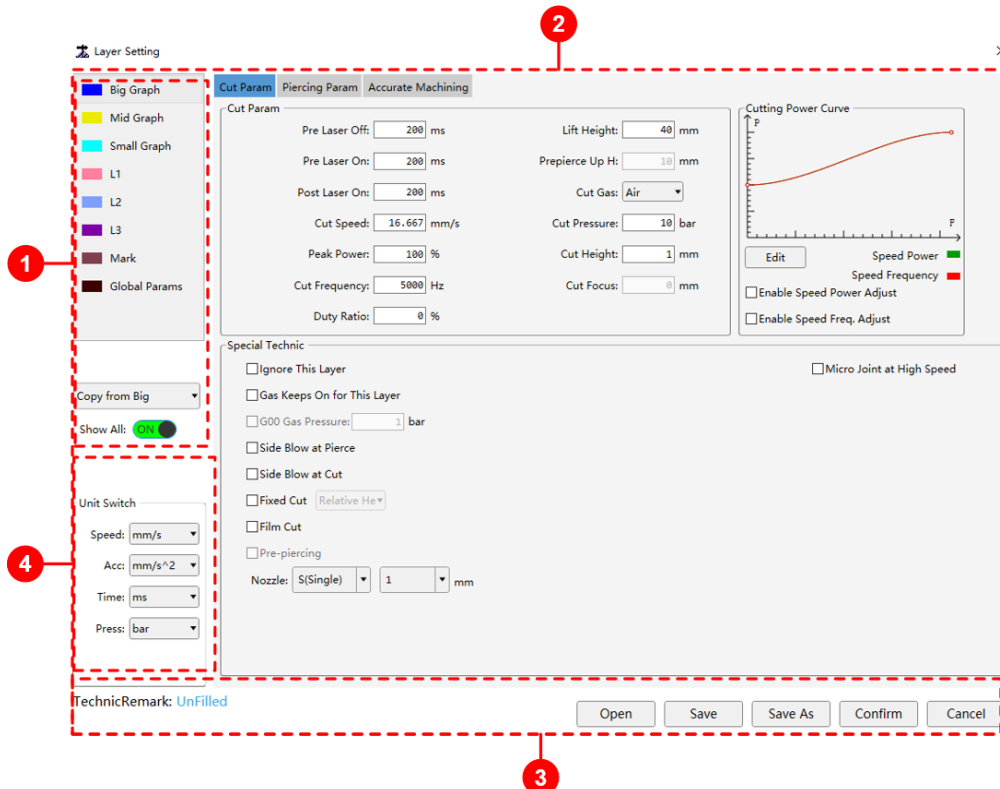
7.1 Overview

The layer function is mainly used to set layer technic, that is, parameters such as cutting and piercing, to ensure the cutting effect.

Select one of the following methods to open **Layer Setting** dialog box:

- In the layer toolbar, click **Layer Setting**.
- In the menu bar, click **Technics** → **Layer Setting**.

The **Layer Setting** dialog box is as follows:



1. Layer selection box

The system provides 7 color layers. Each layer can be set to different layer technic independently. By default, the layer technic of objects of the same color is the same. The following operations can be performed in the layer selection box:

- Click layer: Set the layer technic of the target layer.
- Select the target layer, select a layer in the **Copy from XX** drop-down box, copy and apply the layer parameters to the current layer.
- Set **Show All** to **ON** status: The system displays all layers; otherwise, the system only show layers in the current tool path file.

2. Parameter setting page

After clicking the page switching button above, switch to the corresponding parameter setting page, including:

- **Film Cutting Process** page
Set the film cutting process under the global parameter layer here. For details, please see [Set Film Cutting Param](#) and [Film Cutting Param](#).
- **Cut Param** page
Set the cutting and special technic under each layer here.

- For details, please see [Set Cutting Param](#) and [Cutting Param](#).
 - **Piercing Param** page
Set the piercing technic parameter here.
For details, please see [Set Piercing Param](#) and [Piercing Param](#).
 - **Accurate Machining** page
Set accurate machining technic parameter here.
For details, please see [Set Accurate Machining](#) and [Accurate Machining](#).
3. Technic operation bar
[Add Technic Remark](#), [Open/Save/Save As Technic](#).
 4. Unit setting bar
According to the appropriate display unit need to be switched here.

7.2 Operation

Including the operations of specify and set layers and set layer technics.

Follow these steps to perform layer operations:

1. [Set Film Cutting Param](#).
2. [Set Cutting Param](#).
3. [Set Piercing Param](#).
4. [Set Accurate Machining](#).

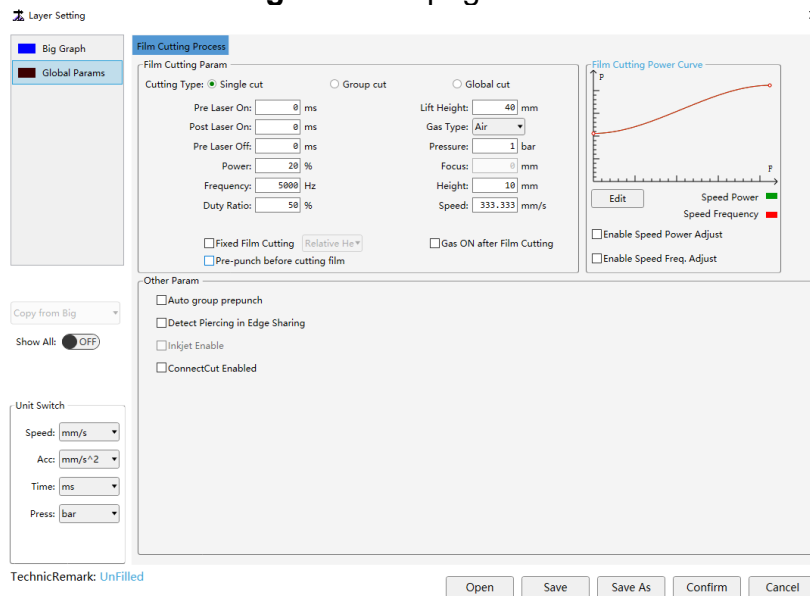
After the operation is completed, in the technic operation bar [Add Technic Remark](#), [Open/Save/Save As Technic](#).

7.2.1 Set Film Cutting Param

Select the film cutting method to remove the protective film on the surface of the plate.

Operation Steps:

1. In the layer selection box on the layer setting page, click **Global Params** to switch to the **Film Cutting Process** page:



2. Select the film cutting method.
For details, please see [Film Cutting Method](#).
3. Set the parameters of **Film Cutting Param**.
For details, please see [Parameter Description](#).
4. **Optional:** If need to maintain the common parameter **Fixed Position** for film cutting, check **Fixed Film Cutting**.

- Optional:** If need to keep the gas output port always ON during the film cutting process and film cutting to cutting process, check **Gas ON after Film Cutting**.

7.2.2 Set Cut Param

Set cut param, special technic and cutting power curve.

By editing the power curve, problem such as over-burning around the corner and inconsistent cutting effects with different thicknesses can be solved in laser cutting. The cutting power can be adjusted so that it change with the cutting speed to ensure that the heat power absorbed within the unit area is consistent and achieve the ideal cutting effect.

Operation Steps:

- In the layer setting page, click **Cut Param** of the non-global params layer to switch to the **Cut Param** page:

The screenshot shows the 'Layer Setting' dialog box with the 'Cut Param' tab selected. The 'Cut Param' section includes fields for Pre Laser Off (200 ms), Pre Laser On (200 ms), Post Laser On (200 ms), Cut Speed (16.667 mm/s), Peak Power (100 %), Cut Frequency (5000 Hz), Duty Ratio (0 %), Lift Height (40 mm), Preplece Up Ht (10 mm), Cut Gas (Air), Cut Pressure (10 bar), Cut Height (1 mm), and Cut Focus (0 mm). The 'Special Technic' section has checkboxes for 'Ignore This Layer', 'Gas Keeps On for This Layer', 'G00 Gas Pressure (1 bar)', 'Side Blow at Pierce', 'Side Blow at Cut', 'Fixed Cut (Relative He)', 'Film Cut', and 'Pre-piercing'. A 'Nozzle' dropdown is set to 'S(Single)'. On the right, a 'Cutting Power Curve' graph shows a curve of Power vs. Frequency, with 'Enable Speed Power Adjust' and 'Enable Speed Freq. Adjust' checkboxes. Buttons for 'Edit', 'Speed Power', and 'Speed Frequency' are visible. At the bottom, there are 'Open', 'Save', 'Save As', 'Confirm', and 'Cancel' buttons.

- Set the parameters of the **Cut Param** and **Special Technic** modules. For details, please see [Cut Param](#).
- Check **Enable Speed Power Adjust** and **Enable Speed Freq. Adjust**. When cutting, the cutting power and frequency change with the cutting speed. The specific values are determined by the speed power and frequency curve; otherwise, the power and frequency remain unchanged during cutting.
- Taking **Enable Speed Freq. Adjust** as an example, click **Edit** to pop-up the **Speed Power Curve Editing** dialog box:

The screenshot shows the 'Speed Power Curve Editing' dialog box. It has two tabs: 'Speed Power Adjustment' (selected) and 'Speed Frequency Adjustment'. The 'Speed Power Adjustment' tab features a graph with Power (%) on the y-axis (0 to 100) and Speed (%) on the x-axis (0 to 100). A green curve starts at (0, 50) and rises to (100, 100). To the right of the graph is a table with columns 'Speed' and 'Power':

| Speed | Power |
|-------|-------|
| 0 | 50 |
| 100 | 100 |

Buttons for 'Add', 'Delete', and 'Clear' are above the table. At the bottom, there are 'Smooth' and 'Copy to Frequency' buttons. 'Confirm' and 'Cancel' buttons are at the bottom right.

5. Select the following methods to edit the power curve:

- Edit in the curve box:
 - Double click the target position to add a curve node.
The more nodes to add, the more accurate the curve will be.
 - Double click the added node position to delete the curve node.

Right list synchronously add or delete the corresponding speed and power values.

- Edit in list:
 - Click **Add**. List auto add a set of speed and power values, double click to modify the value, and press **Enter** to confirm.

Note: The speed power curve is an incremental curve, and the added values need to increase in sequence and **0** and **100** cannot be modified.

- Select a set of speed and power values and click **Delete** to delete the set of values.

The curve box on the left add or delete corresponding nodes simultaneously.

To restore the curve to the default curve, click **Clear**.

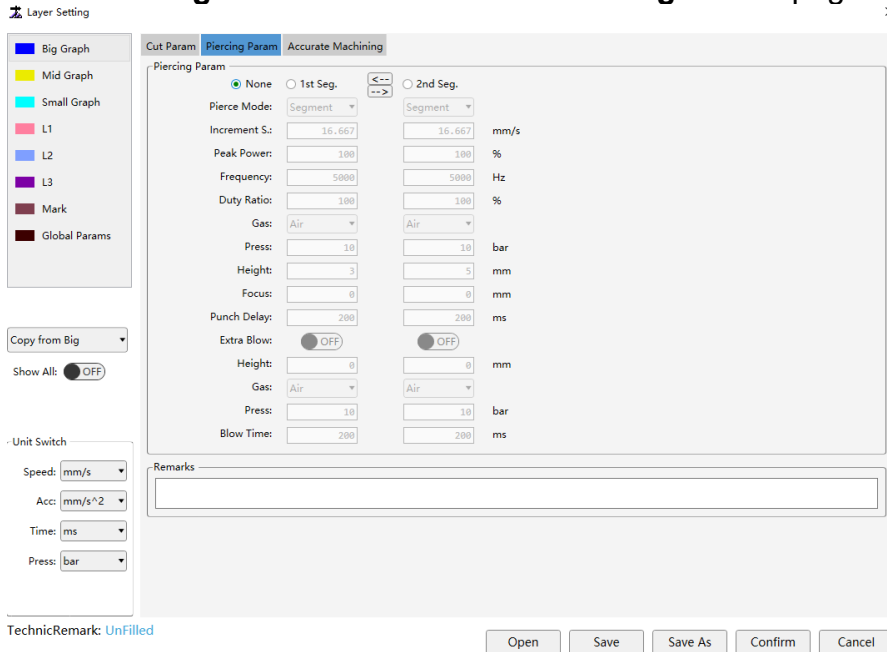
During the machining process, the system will automatically adjust the speed and power/frequency match relationship according to this curve, without the need for other manual operations.

7.2.3 Set Piercing Param

Select the piercing method and set the piercing parameters.

Operation Steps:

1. Click **Piercing Param** to switch to the **Piercing Param** page:



2. Select the piercing method.

For details, please see [Piercing Method](#).

3. Set piercing related parameters.

For details, please see [Piercing Parameter Description](#).

4. **Optional:** If the piercing method is set to **Gradual**, set the parameter **Increment S..**

The cutting head will descend to **Cutting Height** with **Increment S.**; otherwise the cutting head will follow to **Cutting Height**.

- Optional:** Set the **Extra Blow** switch button to **ON**, and set the parameters below **Extra Blow**.

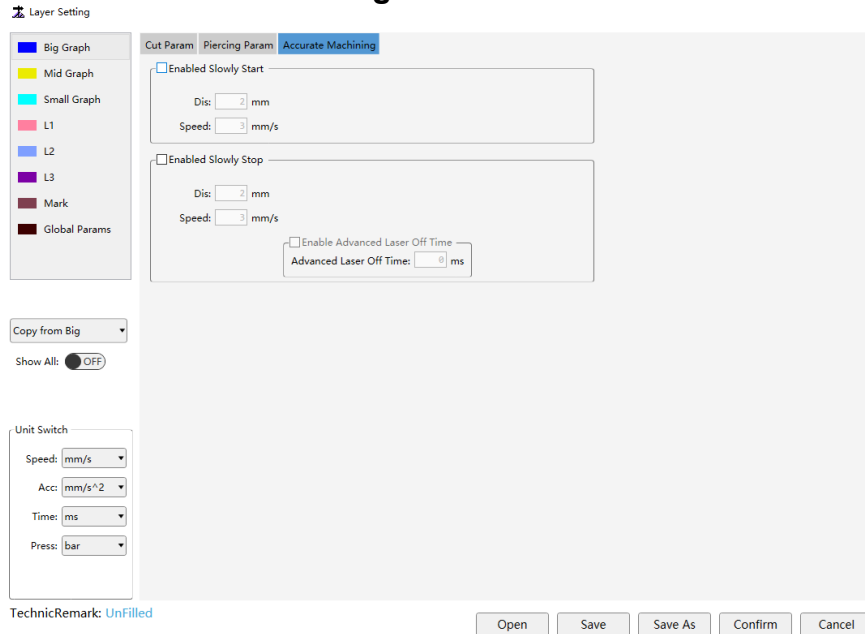
After the piercing is completed, turn off the laser and perform blowing, otherwise there will be no extra blow after the piercing is completed.

7.2.4 Set Accurate Machining

Slowly start, slowly stop cutting technic.

Operation Steps:

- Click **Accurate Machining** to switch to the **Accurate Machining** page:



- Check to enable the technic as needed and set the corresponding parameters. For details, please see [Accurate Machining](#).

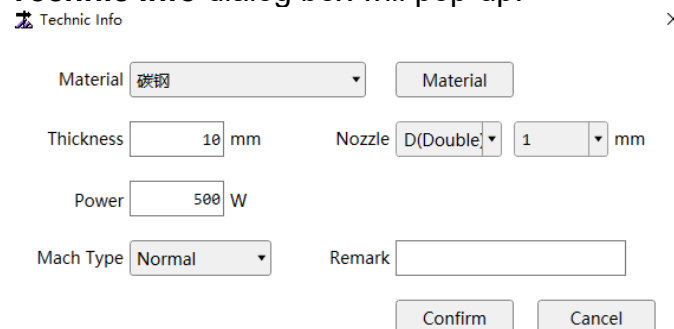
7.2.5 Add Technic Remark

Remark the machining information to facilitate the import/save as technic. The system automatically generate technic file name based on the remark information, thereby distinguishing technic files with different machining conditions.

Naming rule: Laser power-Material-Thickness-Mach type-Cutting gas-Nozzle type-Aperture

Operation Steps:

- In the **Layer Setting** dialog box, click the blue text after **Technic Remark**, and the **Technic Info** dialog box will pop-up:



- Set relevant parameters according to the actual situation and add notes.

7.2.6 Open/Save/Save As Technic

Open/save/save as technic files for each layer one by one.

Naming rule: Layer name-Material-Thickness-Laser power-Mach type-Nozzle type-Aperture-Cutting gas-Remarks

Select the following operations as needed to open/save/save as the technic:

- Click **Open** to open the technic folder, select the target LTPX format file, import and overwrite the technic of the current layer setting. The technic file name is displayed in the upper right corner of the layer setting interface.
- Click **Save** technic:
 - If it is a new technic file, the **Save Technic As** dialog box will pop-up. After setting the parameters, select the save path and click **Confirm**.
 - If this technic file is opened, update files in the technic file folder.
- Click **Save As**. After setting the parameters in the **Save Technic As** dialog box, select the save path and click **Confirm**.

7.3 Parameter

7.3.1 Film Cutting Param

Include:

- [Film Cutting Method](#)
- [Parameter Description](#)

7.3.1.1 Film Cutting Method

Include:

- **Single Cut:** Single graphic film cutting first, and the graphic is machined after film cutting.
- **Group Cut:** Taking the group as a unit, film cutting the graphics of the whole group first, and then machining the graphics of the group. Other groups of graphics are also done in this order.
- **Global Cut:** Check all graphics with film cutting layer according to film cutting parameter film cutting, and then normal machining.

7.3.1.2 Parameter Description

Include:

- **Pre Laser On:** Delay before turning on the laser.
- **Post Laser On:** After turning on the laser and continuing to set the time, go to the next step.
- **Pre Laser Off:** Delay before turning off the laser.
- **Power:** By adjusting the laser, set the laser intensity during film cutting.
- **Frequency:** When film cutting the carrier frequency of the PWM modulation signal is also the number of times the light is emitted within one second. The larger the value, the more continuous the light is emitted.
- **Duty Ratio:** Adjust the laser through PWM to set the duty ratio when film cutting.
- **Lift Height:** When switching film cutting, the height of the laser head lifting.
- **Gas Type:** The type of auxiliary gas used while film cutting.
- **Pressure:** The pressure of the auxiliary gas during film cutting needs to be used in conjunction with proportional valve.
- **Focus:** Take effect when focus control is enabled. The position of the focus point when film cutting.
- **Height:** The height of the nozzle from the plate when film cutting.

- **Speed:** Actual film cutting speed.
- **Fixed Film Cutting:** Maintain the parameter **Fixed Height Position** in the common parameter for film cutting.
- **Gas ON after Film Cutting:** The gas output port is always ON during the film cutting process and film cutting to cutting process.
- **Pre-punch before Cutting Film:** When using global film cutting, the default is to perform film cutting first and then prepiercing. If checked, perform prepiercing first and then film cutting. All other film cutting methods perform prepiercing first.
- **Auto Group Prepunch:** By default, prepiercing start cutting after completing the global holes. After auto group, start cutting the primitives of this part after the group is completed.
- **Detect Piercing in Edge Sharing:** When coedge primitives slowly start on the tool path that has been cut, auto detect will be performed and the piercing process will be omitted.
- **Inkjet Enable:** The inkjet code function will take effect after registration. If not checked, the inkjet code function will disabled.
- **Connect Cut Enabled:** After enabling it, when machining primitives connected end to end, piercing and other behaviors will no longer be performed at the start point of the second primitive.

7.3.2 Cut Param

Include:

- [Common Parameter](#)
- [Special Parameter](#)

7.3.2.1 Common Parameter

Include:

- **Pre Laser Off:** Delay before turning off the laser.
- **Pre Laser On:** Delay before turning on the laser.
- **Post Laser On:** After turning on the laser and continuing to set the time, go to the next step.
- **Cut Speed:** The actual cutting target speed when the feed rate is 100%.
- **Peak Power:** Adjust the laser through analog quantity to set the laser intensity during cutting.
- **Cut Frequency:** When cutting the carrier frequency of the PWM modulation signal is also the number of times the light is emitted within one second. The larger the value, the more continuous the light is emitted.
- **Duty Ratio:** Adjust the laser through PWM to set the duty ratio when cutting.
- **Lift Height:** When switching cutting graphics, the height of the laser head lifting.
- **Prepierce Up H:** During the prepiercing process, each time one hole is pierced, the cutting head is lifted up. If the total number of piercing in the tool path is 1, this parameter will not take effect.
- **Cut Pressure:** The pressure of auxiliary gas during cutting needs to be used in conjunction with the proportional valve.
- **Cut Gas:** The type of auxiliary gas used while cutting.
- **Cut Height:** The height of the nozzle from the plate when cutting.
- **Cut Focus:** Take effect when focus control is enabled. The position of the focus point when cutting.

7.3.2.2 Special Parameter

Include:

- **Ignore This Layer:** Not machining all graphics in the current layer.
- **Gas Keeps On for This Layer:** Not off the blowing port during machining the graphics in this layer.
- **G00 Gas Pressure:** Check this column to set the pressure at G00. When enabled, this layer G00 will not gas off.
- **Side Blow at Pierce:** When piercing, open the side blow port.
- **Side Blow at Cut:** When cutting, open the side blow port.
- **Fixed Cut:** Whether to enable fixed height cutting. That is, when cutting, whether to maintain the fixed Z-axis coordinates for cutting.
- **Film Cut:** Enabled when cutting metal materials with surface coatings.
- **Pre-piercing:** All machining objects in the current layer enable the prepiercing function, so that all tool paths are perforated in advance before actual machining.
- **Nozzle:** Type and size of nozzle.
- **Micro Joint at High Speed:** The laser is not turned on at the micro joint, and the cutting head continues to move without deceleration.

7.3.3 Piercing Param

Include:

- [Piercing Method](#)
- [Piercing Parameter Description](#)

7.3.3.1 Piercing Method

Include:

- None
The system automatically perform the following machining actions:
 - Enable the follow-up valve and blow valve.
 - After controlling the cutting head G00 to descend to **Cutting Height**, wait for the **Blow Delay** time set in **Common Parameter**.
 - Turn on the laser valve and start cutting.
- 1st Seg./2nd Seg.
The system automatically perform the following machining actions:
 - Enable the follow-up valve and blow valve.
 - After controlling the cutting head G00 to descend to **Pierce Height**, wait for **Blow Delay** time.
 - Turn on the laser valve and start piercing for **Pierce Delay**.
 - According to the piercing method, do the following:
 - **Gradual:** Do not turn off the laser valve, go down to **Cutting Height at Increment S.**, and start cutting.
 - **Segment:** Turn off the laser valve, control the cutting head G00 to descend to **Cutting Height**, turn on the laser valve, and start cutting.

7.3.3.2 Piercing Parameter Description

Include:

- **Increment S.:** Set the speed from pierce height fall to cutting height using increment piercing.
- **Peak Power:** Adjust the laser through analog quantity to set the laser intensity during piercing.
- **Frequency:** The carrier frequency of the PWM modulation signal is used for pierce, and a lower frequency is generally used for pierce, and pulse pierce is used to avoid blast hole.

- **Duty Ratio:** Adjust the laser through PWM to set the duty ratio during piercing.
- **Gas:** Auxiliary gas used during piercing.
- **Press:** The pressure of the auxiliary gas during piercing needs to be used in conjunction with the proportional valve.
- **Height:** The height of the piercing position from the plate.
- **Focus:** Effective after enabling focus control. The position of the focus point during piercing.
- **Punch Delay:** The time when laser is turned on at the piercing height during gradual piercing and segment piercing.
- **Extra Blow:** After each level of piercing, whether to turn off the laser and then perform blowing.
- **Extra Blow Height:** The height of the extra blow. If the height value set by the parameter is less than the maximum height followed directly, it will follow directly to that position. If the height value set by the parameter is greater than the maximum height followed directly, the Z-axis first follow to a position 1mm away from the plate surface, and then use this as a datum increment to move to the height value set by the parameter.
- **Extra Blow Gas:** Air, nitrogen, oxygen.
- **Press:** The pressure value during blowing.
- **Blow Time:** The interval time for blowing after turning off the laser.

7.3.4 Accurate Machining

- **Enabled Slowly Start:** Used when poor cutting occurs during the initial stage of thick plate cutting. If fine adjustment is not enabled, the effect is equivalent to the original slow start.
- **Enabled Slowly Stop:** Used when dragging the end stage of thick plate cutting elements. If fine adjustment is not enabled, the effect is equivalent to the original speed.


Fine adjustment technic at the start and end point of cutting can improve problems such as burn through, unable to cut through or over-burning slag.

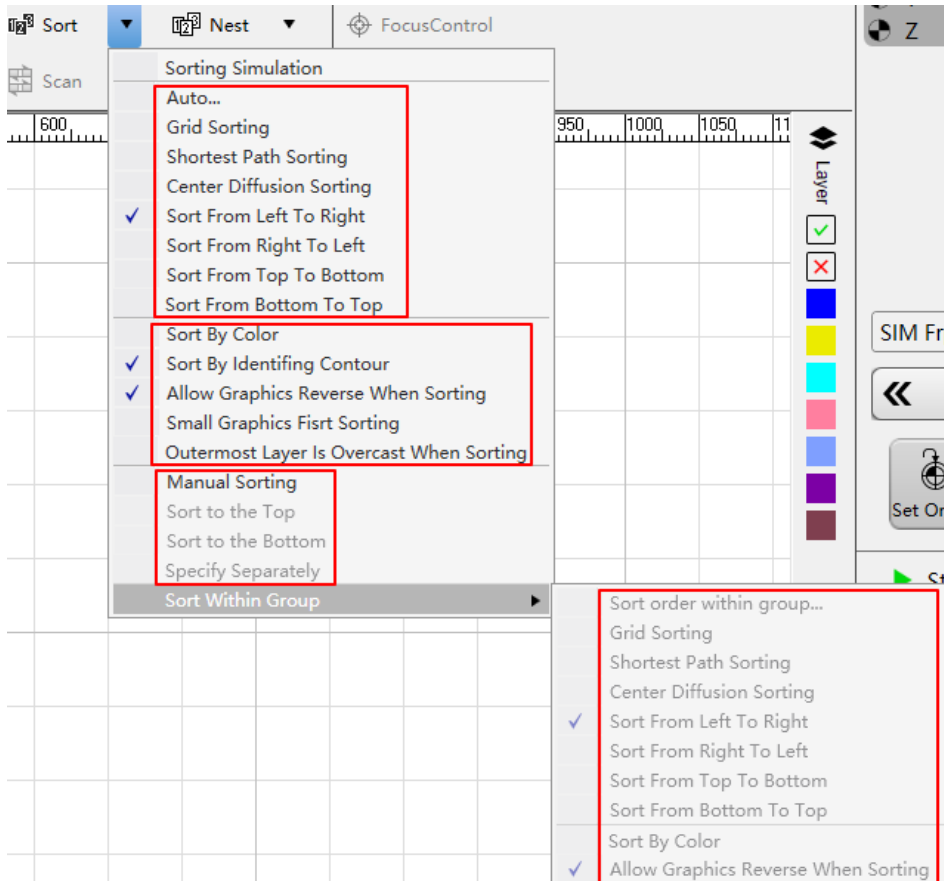
Note: Slowly start and slowly stop technic conflicts with the following three types of machining technic.

- During flay cutting and high-speed micro-joint, slowly start and slowly stop technic not take effect.
- When the lead line slowly drop to take effect, slowly start technic not take effect.
- When slowly start and slowly stop technic take effect, the speed power adjustment not take effect.

8 Tool Path Arrange

8.1 Sort


It is used to specify the machining order of each graphics in the tool path file. You can find  **Sort** in the common toolbar. All functions as shown in the picture.



Sort strategy description:

- **Sort by Color:** The graphics in the part are sorted again according to the sequence of layers, which is only applicable to parts with nesting relationship.
- **Allow Graphics Reverse when Sorting:** In order to make the cutting path more coherent, it is allowed to automatically reverse the cutting direction of some graphics.
- **Sort by Identifying Contour:** Distinguishes inner and outer membranes of graphics when sorting.
- **Small Graphics First Sorting:** The small graphics whose size is smaller than the set value is sorted first, only applicable to parts with nesting relationship.
- **Outermost Layer is Overcast when Sorting:** The default graphics outermost layer is unfill.
- **Sort within Group:** The sorting of graphics in multiple combinations changes according to the sort strategy.

If need displays the original machining sequence in the tool path, select any of the following methods to operate:

- In the common toolbar, click  **Show Order**.
- In the menu bar, click **View** → **Show Order**.

8.1.1 Auto Sort

The system automatically arrange the machining sequence according to the selected sort strategy.

8.1.1.1 Method 1

Operation Steps:

1. **Optional:** Selected objects if sorting only selected objects.
2. Select any of the following methods to open the **Sort** dialog:
 - In the common toolbar, click Sort .
 - In the common toolbar, click Sort ▼ drop-down box → **Auto**.
 - Right click to call the shortcut menu, click **Mach Order** → **Auto Sorting**.
 - In the menu bar, click **Tool Path** → **Auto**.



3. Select sort strategy.
4. Set advanced options, including:

| Option | Description |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Divide grid | Direction sort strategy. <ul style="list-style-type: none"> ▪ Select Auto Set to automatically divide the sort distance according to the distance and number of all graphic direction sorted. ▪ Select Fixed Value, input a fixed value interval, and when the interval between graphics is smaller than the set value, it will be divided into one area. |
| Color | The graphics in the part are sorted again according to the order of the layers, which is only applicable to the parts with nesting relationship. |

| Option | Description |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Small objects first | To sort objects whose sizes are less than the set value. It only applicable to part interior with nested relation. |
| Sort in group | To sort objects in groups according to the sort strategy. |
| Allow reverse direction | In order to make the cutting path more coherent, you can automatically reverse the cutting direction of some graphics. |
| Auto set fill/unfill before sort | After checking, the unfill/fill are automatically set when sorting. |
| The outmost in inner contour | After check the outermost layer of the graphics as unfill. |
| Auto adjust start point | After check to allow automatic modification of the start point. |
| Hole part first | After checking, the sort strategy acts on the inner membrane graphics first, and then on the outer membrane graphics. |

5. Click **OK**.


Related Tasks:

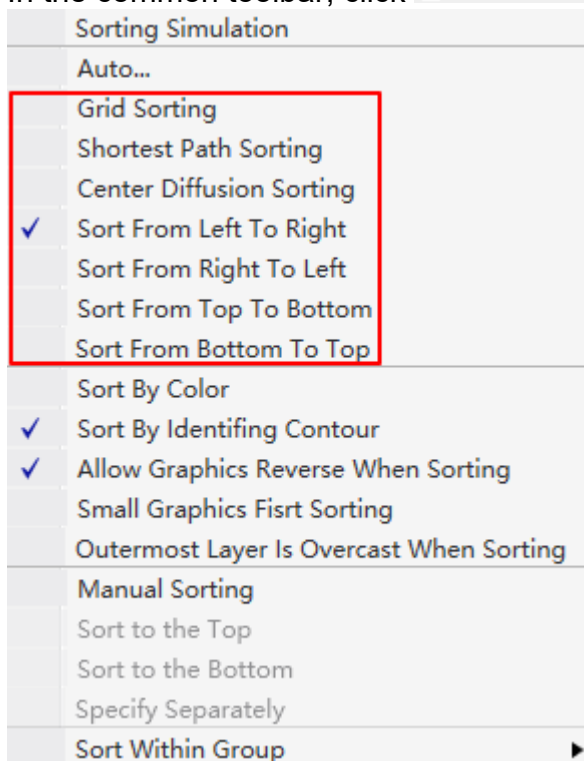
If need to individually set the sort of graphics within a single group, select any of the following methods to open the **Sort** dialog box and set the sort strategy and advanced options:

- In the common toolbar, click  **Sort** ▼ drop-down box → **Sort within Group**.
- Right click to call the shortcut menu, click **Sort within Group**.

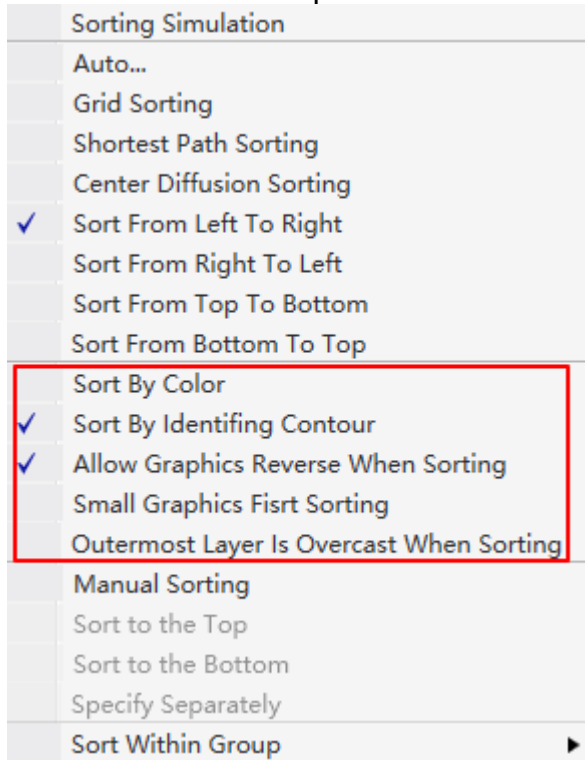
8.1.1.2 Method 2

Operation Steps:

1. **Optional:** Selected objects if sorting only selected objects.
2. In the common toolbar, click  **Sort** ▼ drop-down box → select sort method:




3. Click  Sort ▼ drop-down box → select sort strategy:




8.1.2 Manual Sort


Manually specify the machining sequence for single or multiple objects.

Operation Steps:

1. Select any of the following methods to call the manual setting function:
 - In the common toolbar, click  Sort ▼ drop-down box → **Manual Sorting**.
 - Right click to call the shortcut menu, click **Mach Order** → **Manual Sorting**.
 - In the menu bar, click **Tool Path** → **Manual Sorting**.

The cursor becomes  and automatically display the machining order.

2. Select the target graphic to be set as the first one.

The cursor becomes , the machining order on the object turns into 1, and the order of other objects turns into 2,3 ... in sequence on the basis of previous order. To reset the last order number, right click and select **Previous Order**.

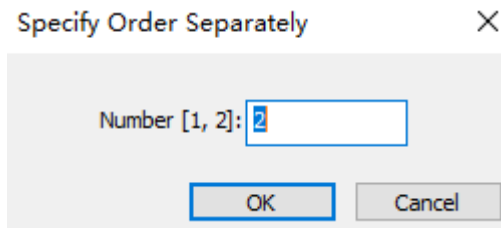
3. Repeat step 2 and click the objects in order.
4. After manually changing the machining order, to exit **Manual Sorting** command, right click and select **Exit**, or press **Esc**.

8.1.3 Specify the Single Workpiece Machining Order

Manually specify the machining order of an object.

Operation Steps:

1. Select an object.
2. In the common toolbar, click  Sort ▼ drop-down box → **Specify Separately** dialog box:




3. Enter the specified sequence in the **Number [1, n]** input box. n is automatically displayed as the maximum value of the machining sequence in the current tool path file.

8.1.4 Sort to the Top/Bottom

Change the machining order of the selected single object to the top or the bottom.

Operation Steps:

1. Select an object.
 - In the common toolbar, click  Sort ▼ drop-down box → **Sort to the Top / Sort to the Bottom.**
 - In the menu bar, click **Tool Path** → **Manual Sorting** → **Sort to the Top / Sort to the Bottom.**
 - Right click to call the shortcut menu, click **Manual Sorting** → **Sort to the Top / Sort to the Bottom.**

8.2 Scan Cutting



When the graphics to be cut are regular graphics and present a certain regular sort, the tool path is re-planned through scanning and cutting to find the most efficient path for machining. At the same time, it eliminate the lift and lower tool steps between graphics during ordinary laser cutting machining, and only control the on/off light during the movement.

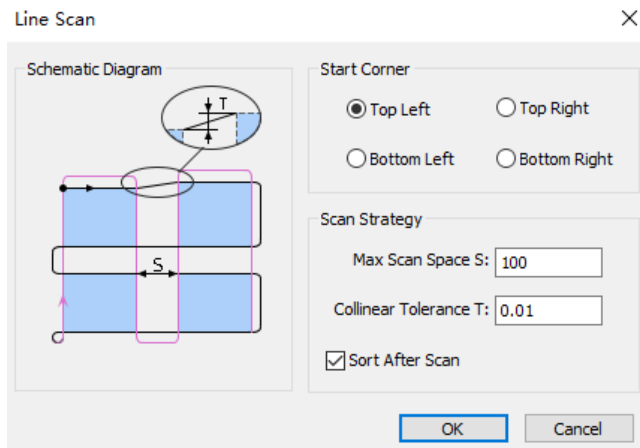
According to different cutting graphics, the scan cutting methods are divided into:

- [Line Scan](#): Identify objects as lines.
- [Arc Scan](#): Identify objects as arcs.
- [Runway Scan](#): Identify objects as a graphic similar to playground runway.
- [Ring Scan](#): Identify objects as nested ring graphic inner and outer.
- [Sector Scan](#): Identify objects as sector graphic.
- [LED Scan](#): Identify objects as graphic filled with small circles.

8.2.1 Line Scan

Operation Steps:

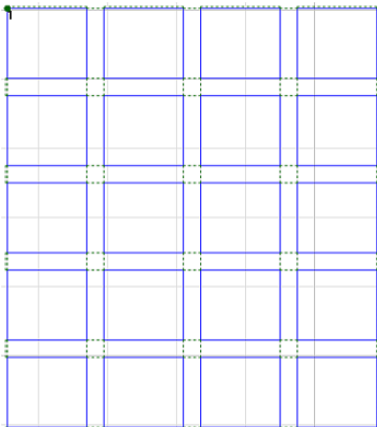
1. Select multiple objects.
2. Select the following method to open the **Line Scan** dialog box:
 - In the common toolbar, click  Scan .
 - In the common toolbar, click  Scan ▼ drop-down box → **Line Scan.**
 - In the menu bar, click **Tool Path** → **Scanning** → **Line Scan.**



3. Select the slowly start position and set the following parameters:
 - **Max Scan Space S**: The distance between the two collinear graphics is greater than the maximum scan space set, and they are divided into two groups for scanning.
 - **Collinear Tolerance T**: If the distance between two parallel lines in objects is less than the set value, the two lines are regarded as collinear.

4. Check **Sort after Scan** as needed.

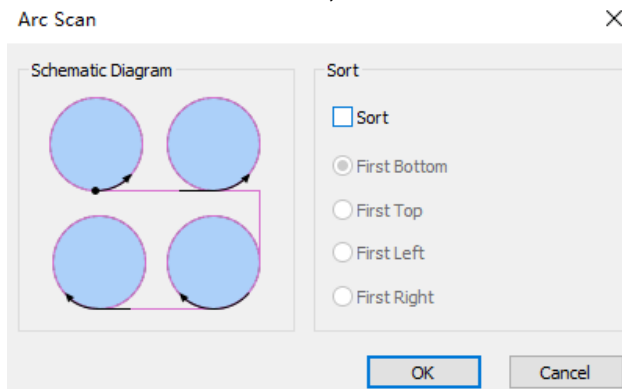
The effect diagram of line scan is as follows:



8.2.2 Arc Scan

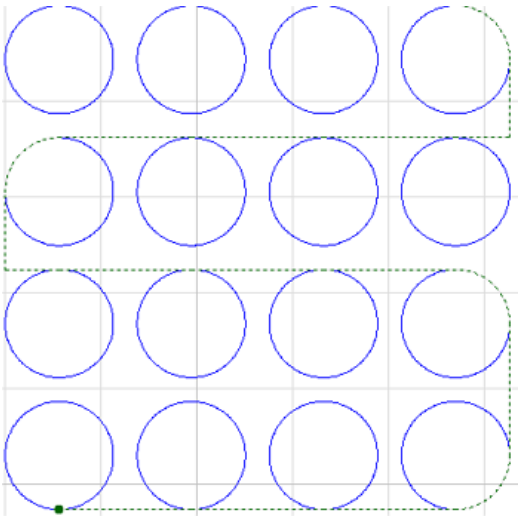
Operation Steps:

1. Select multiple objects.
2. Select the following method to open the **Arc Scan** dialog box:
 - In the common toolbar, click Scan drop-down box → **Arc Scan**.
 - In the menu bar, click **Tool Path** → **Scanning** → **Arc Scan**.



3. **Optional:** If need to scan the selected circle according to the sort strategy, check **Sort** and select the sort strategy.

The effect diagram of arc scan is as follows:

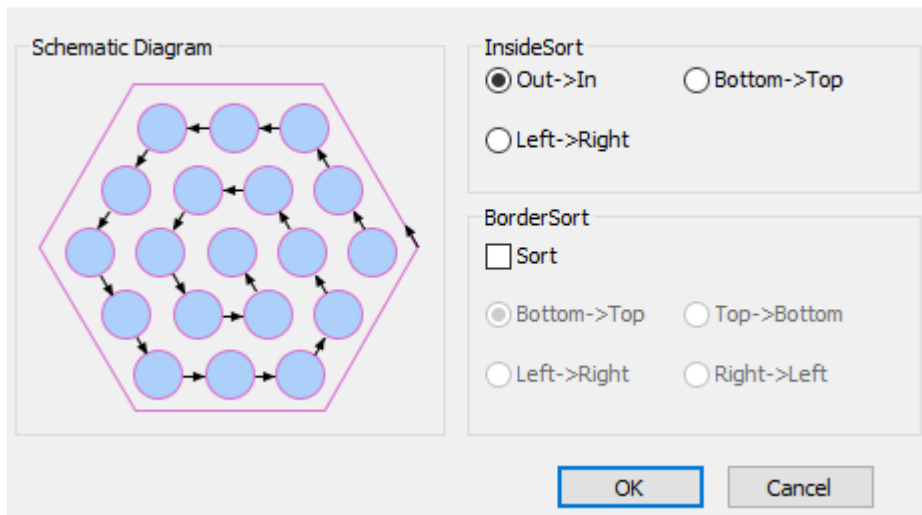


8.2.3 LED Scan

Operation Steps:

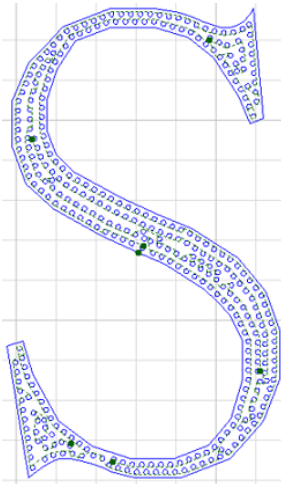
1. Select multiple objects.
2. Select any of the following methods to open the **Scan LED on Text** dialog box:
 - In the common toolbar, click Scan drop-down box → **LED Scan**.
 - In the menu bar, click **Tool Path** → **Scanning** → **LED Scan**.

Scan LED on Text




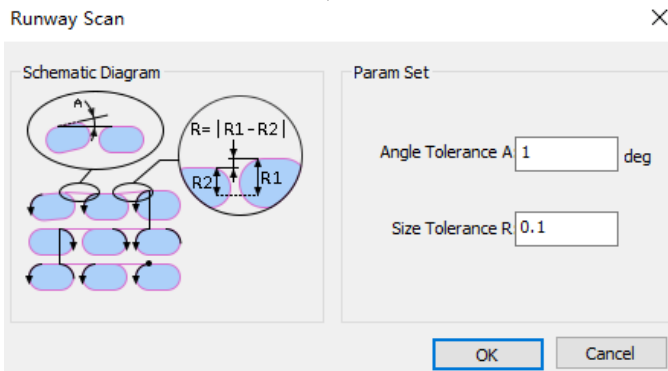
3. Set inside and border sort:
 - **Inside Sort:** To sort all circles in the inner of the target objects, and form a scanning group.
 - **Border Sort:** Sort between advertise words.

The effect diagram of LED scan is as follows:



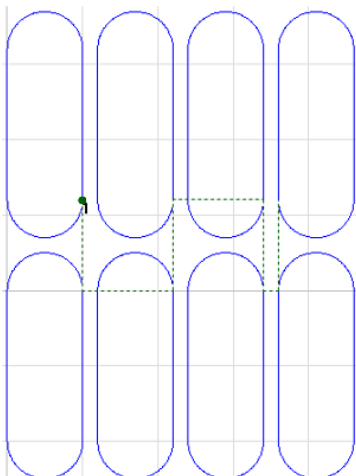
8.2.4 Runway Scan Operation Steps:

1. Select multiple objects.
2. Select any of the following options to open the **Runway Scan** dialog:
 - In the common toolbar, click  Scan drop-down box → **Runway Scan**.
 - In the menu bar, click **Tool Path** → **Scanning** → **Runway Scan**.




3. Set the following parameters:
 - **Angle Tolerance A**: If the angle difference is less than the set tolerance, the target objects are parallel. Range: 0°~5°.
 - **Size Tolerance R**: If the height difference between two runways is less than the set tolerance, the sizes of target objects are the same. Range: 0mm~1mm.

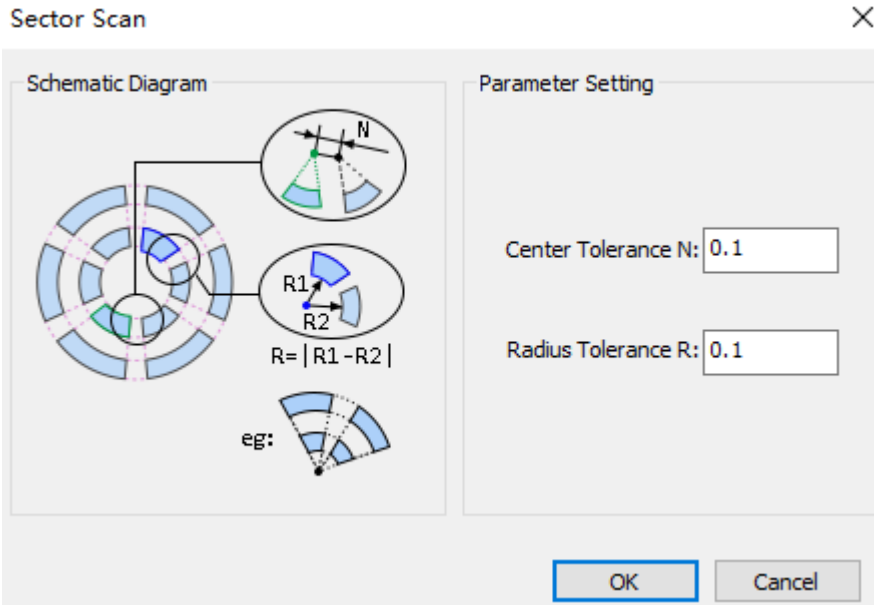
The effect diagram of runway scan is as follows:



8.2.5 Sector Scan

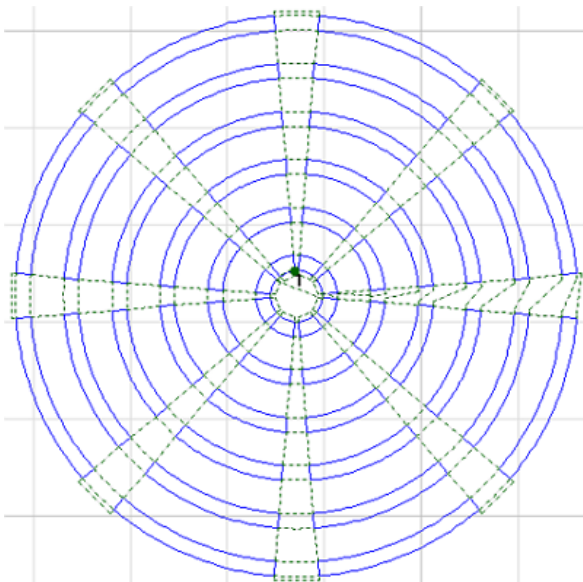
Operation Steps:

1. Select multiple objects.
2. Select any of the following methods to open the **Sector Scan** dialog box:
 - In the common toolbar, click  Scan drop-down box → **Sector Scan**.
 - In the menu bar, click **Tool Path** → **Scanning** → **Sector Scan**.



3. Set the following parameters:
 - **Center Tolerance N**: If the distance between circle centers of two circular rings is less than the set tolerance, the target objects are in a scanning group.
 - **Radius Tolerance R**: If the radius difference between two circular rings is less than the set tolerance, the target objects are in a scanning group.


The effect diagram of sector scan is as follows:



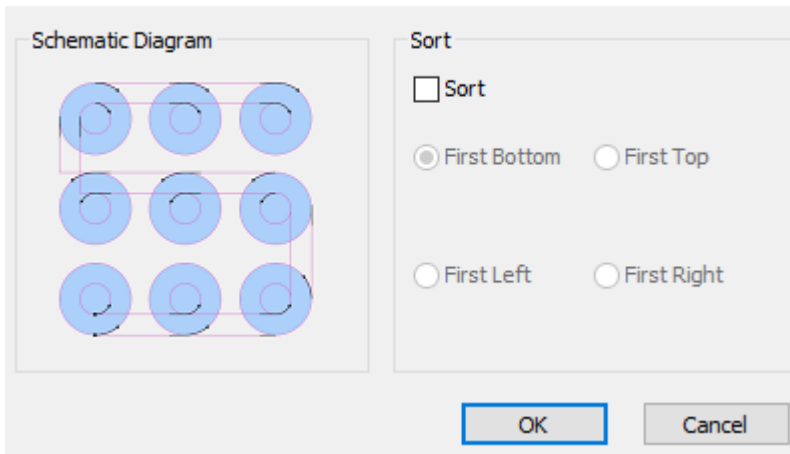
8.2.6 Ring Scan

Operation Steps:

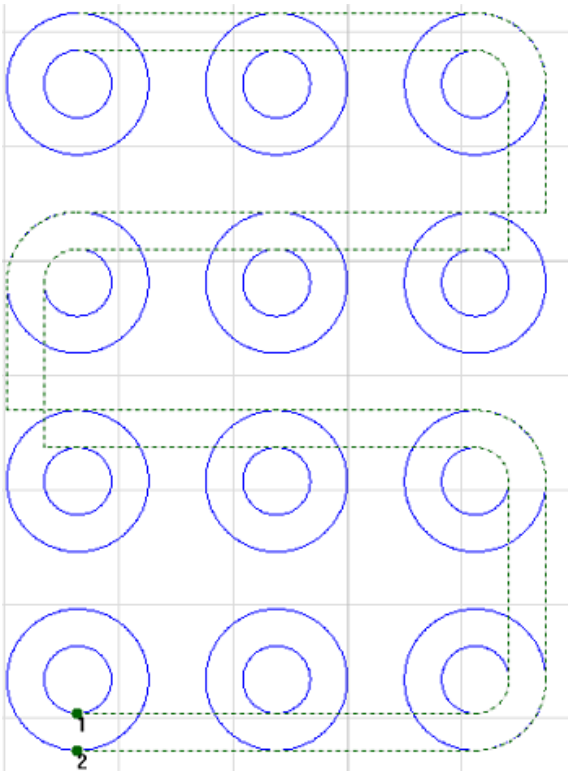
1. Select multiple objects.
2. Select any of the following methods to open the **Ring Scan** dialog:

- In the common toolbar, click  Scan drop-down box → **Ring Scan**.
- In the menu bar, click **Tool Path** → **Scanning** → **Ring Scan**.

Ring Scan



3. **Optional:** If need to scan the selected ring according to the sort strategy, check **Sort**, and select the sort strategy.
 4. Click **OK**, the system scans automatically.
- The effect diagram of ring scan is as follows:



9 Nest

Nest function is used to arrange the given parts on the plate reasonably. The number of optimization parameters are provided for adjustment during layout, such as part space, sheet margin, rotation strategy, rotation angle, efficiency/utilization, etc.

It is based on the principle of part nesting priority and material utility maximization, **Nest** function can achieve the following:


- Nest a kind of parts or several kinds of parts.
- Nest a kind of parts over the whole sheet.
- Preview the nesting effect and analyze nesting results. Including plate usage rate and waste distribution, etc.
- Fill the round holes in the advertise words.

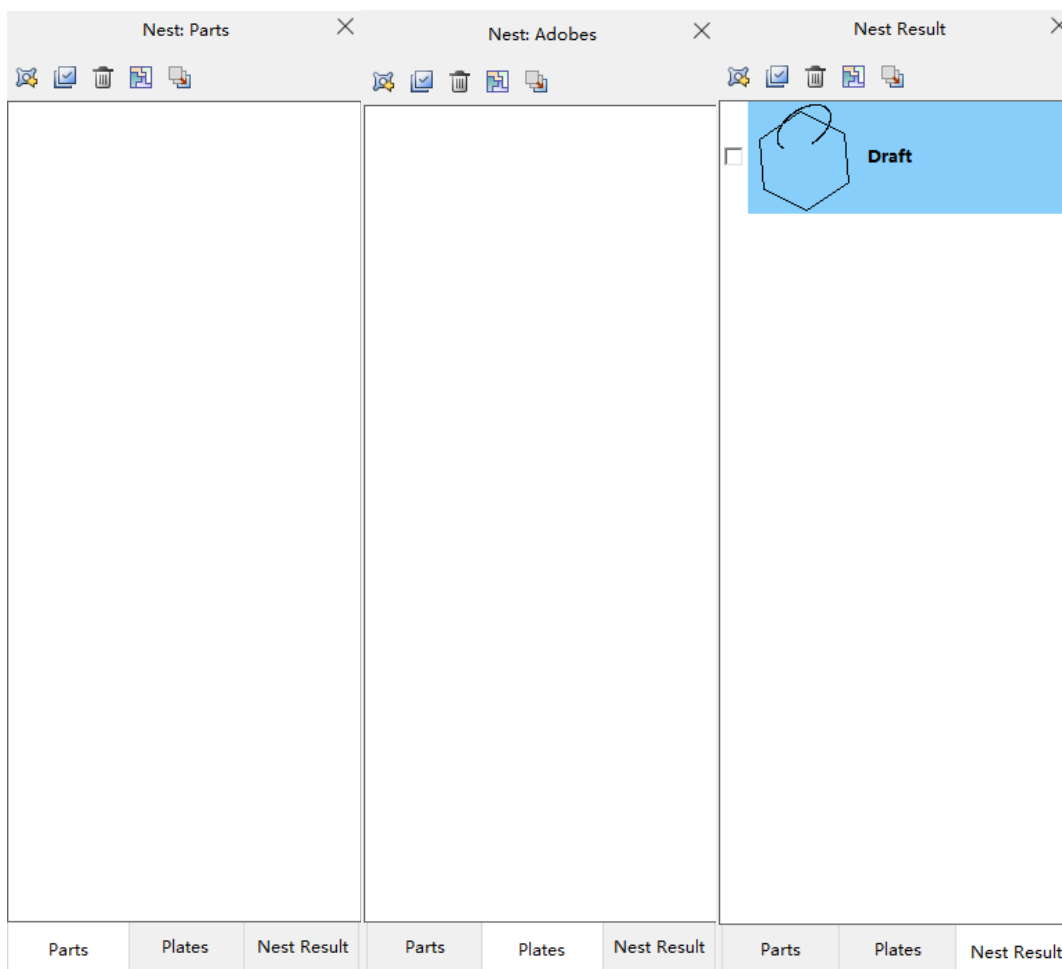
If need to generate nest report, click **Machining** → **Nest Report** in the menu bar.

Prerequisite:

Before nesting, make sure the USB dongle has been successfully inserted into the host, or imported an authorized file.

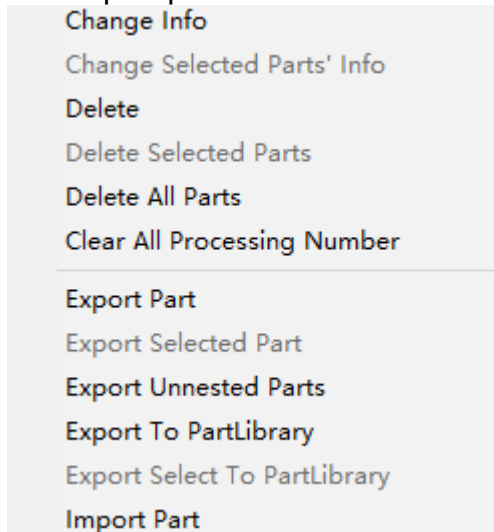
9.1 Nest Sidebar

In the common toolbar, click  **Nest** to open/close the **Nest Sidebar**:

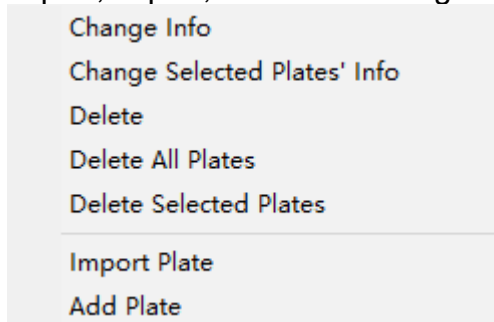


- Parts: Display parts as thumbnail.
 - Click on the part to modify the name, total and machined quantity.

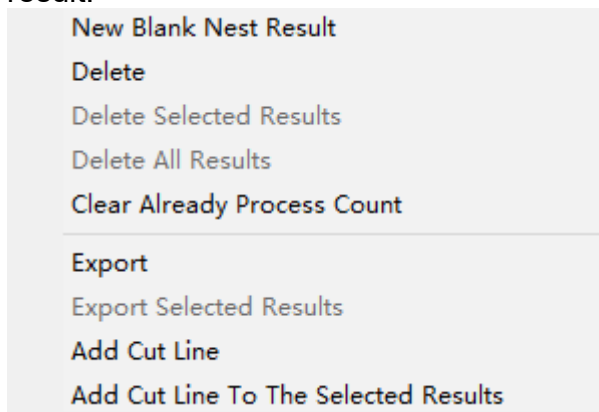
- Double click the part to display the part in the drawing area, and it can be modified.
- After selecting the part, right click to modify part information, delete, export and import parts.



- Plates: Display plates as thumbnail.
 - Click on the part to modify the plate name, total and used quantity.
 - Double click the plate to display the plate in the drawing area.
 - After selecting a plate, right click to modify the plate information, delete, export, import, and add rectangular plate.



- Nest result: Display nest results as thumbnail.
 - Click the nest result to modify the name and the number of nest machined.
 - Double click the nest result to display the nest result in the drawing area.
 - After selecting the nest result, right click to new, delete, and export the nest result.



9.2 Part Nest

Nest the parts in the current tool path, and edit the quantity, residual material type and rotation angle of the nested parts.

Before setting nest, make sure that the parts and plates added to the list are closed graphics.

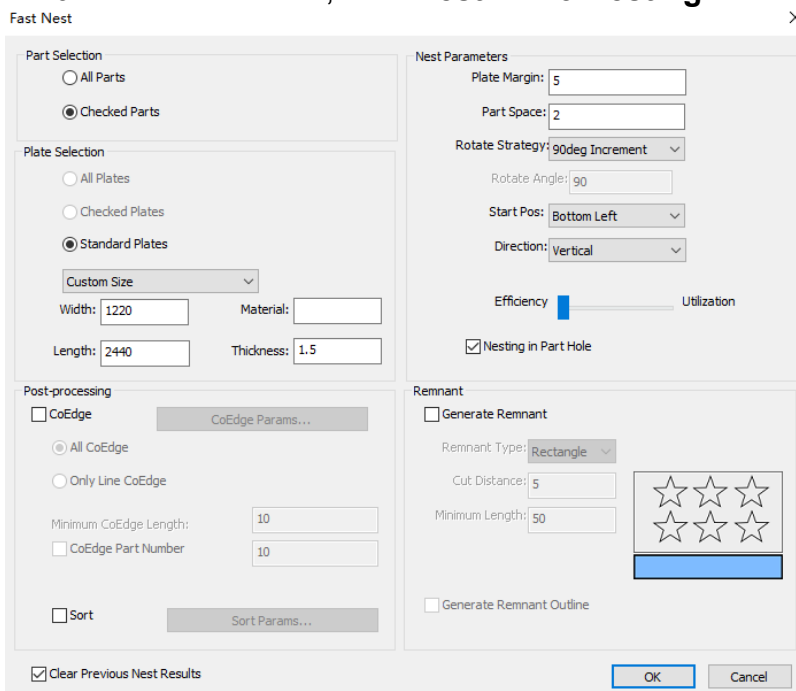
Operation Steps:

- Optional:** If the parts list does not have the required part, add the part or plate to the parts/plates list:
 - Select any of the following methods to import parts/plates:
 - In the common toolbar, click **Nest**, click on the pop-up **Nest Sidebar** **Import** → **Import Part / Import Plate**.
 - In the menu bar, click **Nest** → **Import Part / Import Plate**.
 Supported part and plate file formats for import include: dxf, dwg, ncex and lxd.
 - In the drawing area, select the drawn graphics and add:
 - Right click to call the shortcut menu, click **Add to Part List / Add to Plate List** to edit the quantity of parts and plates.
 - In the menu bar, click **Nest** → **Add to Part List / Add to Plate List** to edit the quantity of parts and plates.

After clicking **OK**, the **Nest Sidebar** will pop-up automatically.

If need to view the added parts or plates, double click the target parts or plates in the list to display them in the drawing area.

- Optional:** If need to select the machining part/plate, check the check box in front of the part/plate in the list. Otherwise all parts/plates in the nest list are defaulted.
- Select any of the following options to open the **Nest** dialog box:
 - Click **Nest** in the **Nest Sidebar**.
 - In the common toolbar, click **Nest** drop-down key → **Nest**.
 - In the menu bar, click **Nest** → **Do Nesting**.



4. In the **Part Selection** area, select all parts or checked parts in the machining parts list.

Note: If no parts are checked in **Nesting Sidebar**, the checked parts here are gray and cannot be checked.

5. In the **Plate Selection** area, set the plate information.
 - If you select all the plates in the plate list or check the plates, you can set the material and thickness of the plates.
 - If you select the standard plate, you can set the width, length, material and thickness of the plate.
6. In the **Nest Parameters** area, set the nest parameter information. The parameters are described as follows:

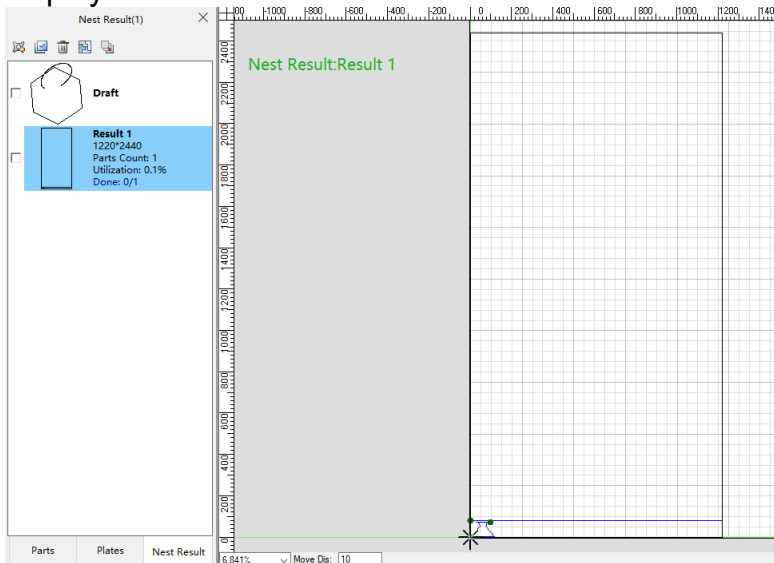
| Parameter | Description |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Plate Margin | The distance between the part and the edge of the sheet. |
| Part Space | Distance between parts. |
| Rotate Strategy | The system provides 9 rotation strategies. Among them, the Intelligent Strategy system automatically specifies the optimal rotation angle, and the Specified Angle strategy can freely set the rotate angle. |
| Rotate Angle | If Intelligent Strategy or Specified Angle is selected for Rotate Strategy , you can customize the rotate angle. |
| Start Pos | Select the top left, bottom left, top right, and bottom right position to start nesting. |
| Direction | Select the direction of nest horizontal or vertical. |
| Efficiency/Utilization | Slide Efficiency/Utilization to choose to focus on time efficiency or material utilization. |
| Nesting in Part Hole | The inner hole belongs to the waste area. To nest a single part into the inner hole of the nested graphics, check Nesting in Part Hole . |

7. In the **Post-processing** area. The parameters are described as follows.

| Parameter | Description |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CoEdge: | Check CoEdge: and select the CoEdge method, you can click CoEdge Params to view and modify the CoEdge parameters. For details, please see CoEdge . |
| All CoEdge | All CoEdges. |
| Only Line CoEdge | The sides of the line of the part share the same side, and the sides of the curve do not share the same side. |
| Minimum CoEdge Length | Lines smaller than Minimum Coedge Length will not be shared with other lines during nesting. |
| CoEdge Part Number | The maximum of several parts are allowed to share edges. |
| Sort | After selecting Sort , the results after nesting will be automatically sorted according to the sort strategy set last time. Click Sort Params to view and modify the sort strategy. For details, please see Auto Sort . |

8. In the **Remnant** area, check **Generate Remnant**. Choose the right remnant type (rectangle, T, L) to maximize material savings.
9. **Optional:** Check **Clear Previous Nest Results** to clear the current nest list and output new nest results.

10. After the setting is complete, click **OK**, the system will automatically nest and display the nest results.



The nest result column in the left show the number of parts, utilization rate and machined times.

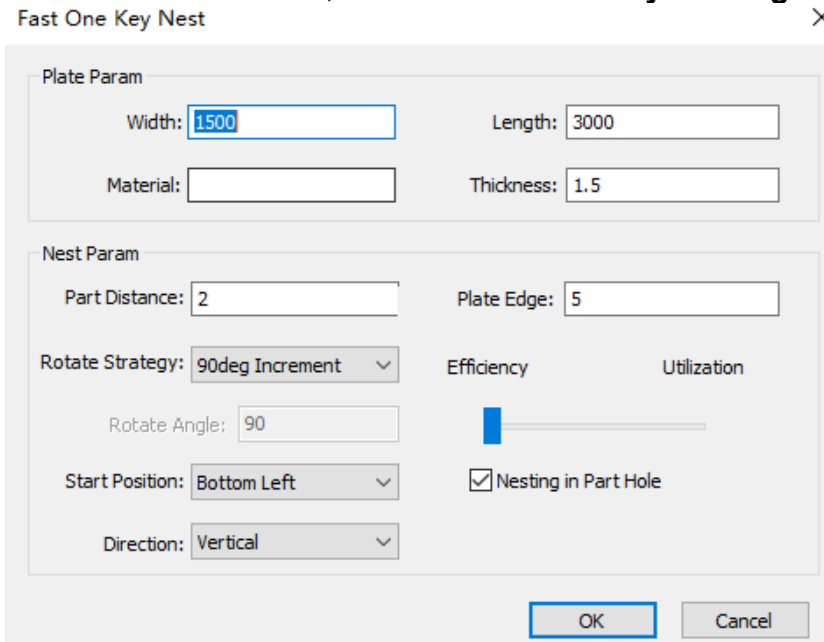
If you need to edit graphics, you can make adjustment in the drawing area.

9.2.1 One Key Nesting

The shortcut for nesting, simplifying the operation steps. Nested parts cannot be edited individually.

Operation Steps:

1. In the parts list or drawing area, select the target object.
2. Select any of the following methods to open the **Fast One Key Nest** dialog box:
 - In the common toolbar, click **Nest** drop-down key → **One Key Nesting**.
 - In the menu bar, click **Nest** → **One Key Nesting**.



3. In the **Plate Param** area, set the width, length, material and thickness of the plate.

- In the **Nest Param** area, set the nest parameter information. The parameters are described as follows:

| Parameter | Description |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Part Distance | Distance between parts. |
| Plate Edge | The distance between the part and the edge of the sheet. |
| Rotate Strategy | The system provides 9 rotation strategies. Among them, the Intelligent Strategy system automatically specifies the optimal rotation angle, and the Specified Angle strategy can freely set the rotate angle. |
| Rotate Angle | If Intelligent Strategy or Specified Angle is selected for Rotate Strategy , you can customize the rotate angle. |
| Start Position | Select the top left, bottom left, top right, and bottom right position to start nesting. |
| Direction | Select the direction of nest horizontal or vertical. |
| Efficiency/Utilization | Slide Efficiency/Utilization to choose to focus on time efficiency or material utilization. |
| Nesting in Part Hole | The inner hole belongs to the waste area. To nest a single part into the inner hole of the nested graphics, check Nesting in Part Hole . |


- After the setting is complete, click **OK**, the system will automatically make nest and display **Nest Result**.

If you need to edit graphics, you can make adjustments in the drawing area.

9.2.2 Bestrew Nest

It is mainly used for bestrew page cutting of the single graphic. The software quickly covers the whole plate according to the selected parts, set parameters and plate.

Operation Steps:

- Select the graphic in the drawing area.
- In the common toolbar, click  **Nest** drop-down key → **Bestre Nesting**.

Fast Bestrew Nest ×

Plate Param

Plate Width: Plate Length:

Nest Param

Part Distance: Plate Edge:

Rotate Strategy: ▼

Rotate Angle:

- In the **Plate Param** area, set the length and width of the plate.
- In the **Nest Param** area, set the following parameters:

| Parameter | Description |
|----------------------|----------------------------------------------------------|
| Plate Edge | The distance between the part and the edge of the sheet. |
| Part Distance | Distance between parts. |

| Parameter | Description |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rotate Strategy | The system provides 9 rotation strategies. Among them: <ul style="list-style-type: none"> ▪ Intelligent Strategy system automatically specifies the optimal rotation angle. ▪ Specified Angle strategy can freely set the rotate angle. |
| Rotate Angle | If Intelligent Strategy or Specified Angle is selected for Rotate Strategy , you can customize the rotate angle. |

5. After the setting is complete, click **OK**, the system will automatically make nest and display nest result.

If you need to edit graphics, you can make adjustments in the drawing area.

9.3 Advertise Words Fill

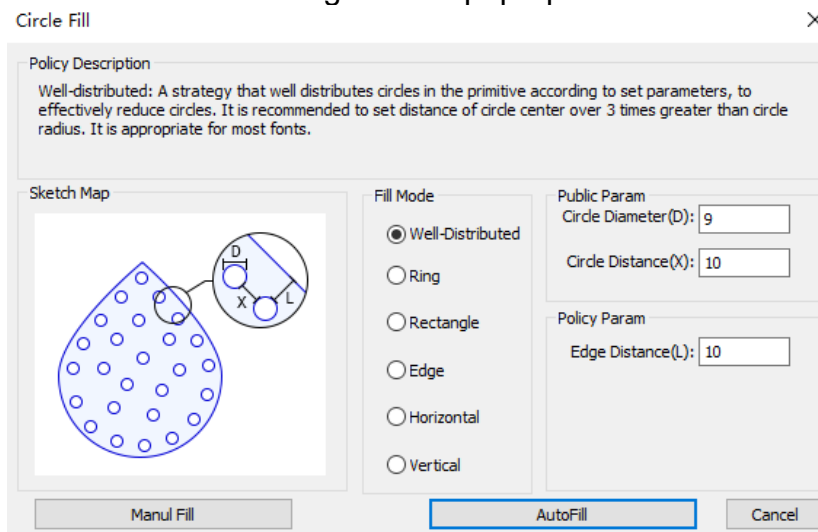
It is commonly used to fill circle holes in advertising board graphics. The circle holes are evenly and orderly arranged in the advertise word.

9.3.1 Circle Fill


Distribute circle holes evenly in the middle of the element according to the set parameters, and effectively reduce the number of light holes arranged. It is recommended to set the circle spacing to be more than 3 times the circle radius, which is suitable for most fonts.

Operation Steps:

- Manual fill
 - In the menu bar, click **Nest** → **Advertise Words Fill** → **Circle Fill**, and the **Circle Fill** dialog box will pop-up:



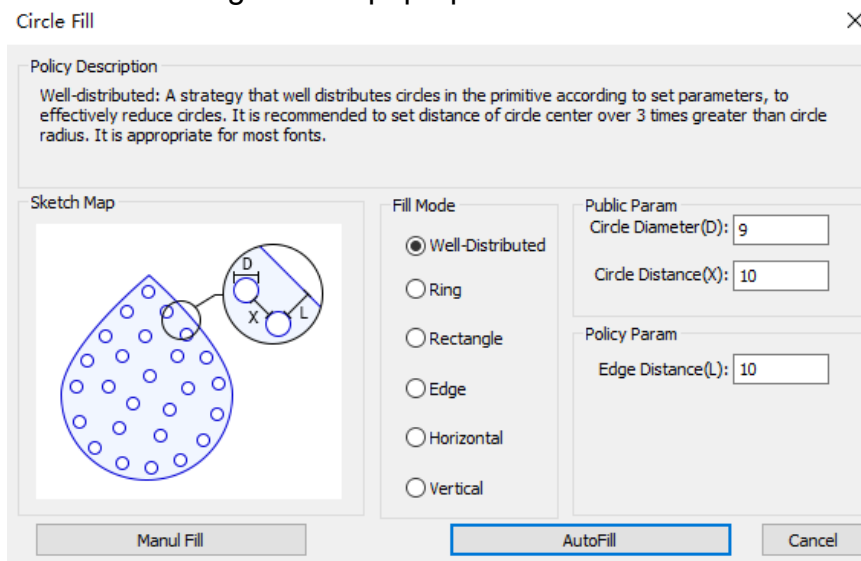
- Set **Public Param**.
- Click **Manual Fill** to automatically close the **Circle Fill** dialog box, and the

cursor changes to .

Note: The big white circle of the cursor is a circle with circle spacing added, which makes it easier to control the distance from the surrounding circle during manual fill.

- Click the target position to generate circle hole.
 - Right click or press **ESC** to exit.
- Auto fill
 - Select the object to be filled.

- b. In the menu bar, click **Nest** → **Advertise Words Fill** → **Circle Fill**, and the **Circle Fill** dialog box will pop-up:



- c. Select fill method:


| Method | Description |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Well-distributed | To well distribute circles in the object so as to effectively reduce circles. It is appropriate for the irregular fonts. |
| Ring | According to the set parameters, the system shrinks the graphics layer by layer and fills the circle holes on the shrink contour lines. |
| Rectangle | According to the set parameters and the external frame of the selected graphic, the system automatically divide the external rectangle of the graphic into a single small rectangular frame, and place the circle hole in the center of the small rectangular frame. |
| Edge | According to the set parameters, the system fill the circle holes along the edge. Space gaps are manually filled with circle holes. Suitable for narrower fonts. |
| Horizontal | To arrange circles on the line that is parallel with X-axis, so as to make circle centers of each row are on the same horizontal line. Suitable for founder fonts or graphics. |
| Vertical | To arrange circles on the line that is parallel with Y-axis, so as to make circle centers of each row are on the same vertical line. Suitable for founder fonts or graphics. |

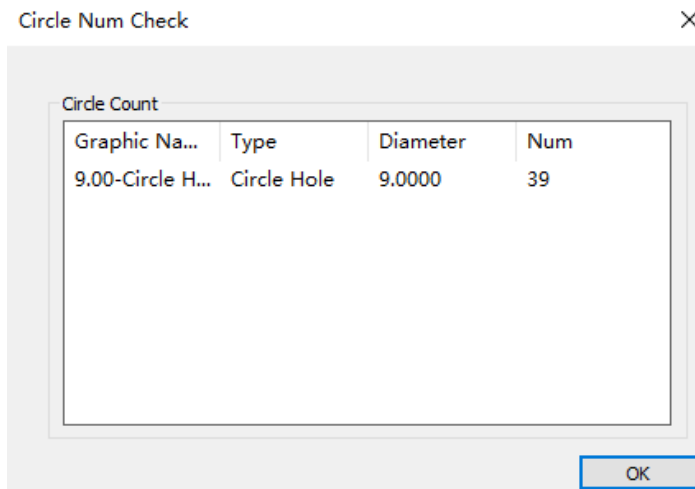
- d. Set public parameter and policy parameter.
 e. Click **Auto Fill**.

9.3.2 Check Circle Quantity

Used to count the quantity and size of circle holes.

Operation Steps:

- In the menu bar, click **Nest** → **Advertise Words Fill** → **Circle Check**. The cursor becomes .
- Select the target region. The result shows in **Circle Num Check** dialog box:



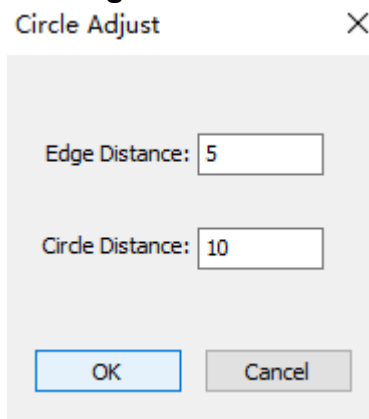
3. Right click or press **ESC** to exit.


9.3.3 Circle Adjust

It is used to change the distribution of certain circles, so as to solve the problem that the circles cannot be filled in certain regions or its filling effect is not good.

Operation Steps:

1. In the menu bar, click **Nest** → **Advertise Words Fill** → **Circle Adjust**.
2. Set **Edge Distance** and **Circle Distance**.




3. Click **OK**, the cursor becomes to .
4. Select the target region.
The system automatically deletes circles in the target region and according to the set **Edge Distance** and **Circle Distance**, use rectangle filling to fill the circle hole in this area.
5. Right click or press **ESC** to exit.

9.3.4 Circle Erase

It is used to delete redundant circles in the objects.

Operation Steps:

1. In the menu bar, click **Nest** → **Advertise Words Fill** → **Circle Erase**. The cursor becomes .
2. Select the target area with a frame to erase the circle holes in the graphic.
3. Right click or press **ESC** to exit.

10 Machining Operation

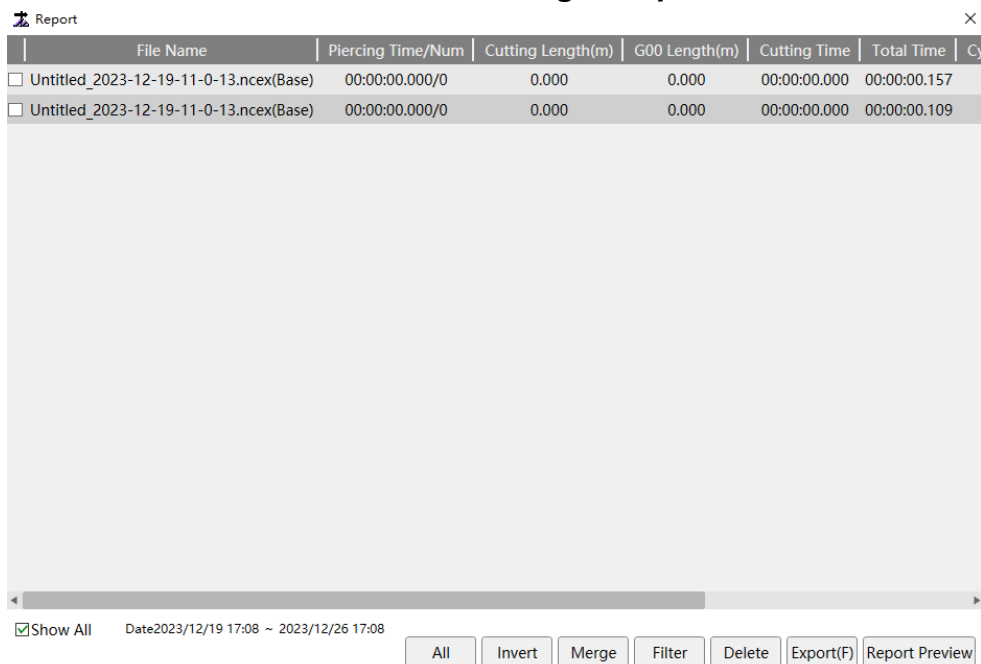
10.1 Run Report

Generate machining statistics report to view the number, cutting length, cutting time, piercing quantity and piercing time of each type of parts produced by each machining, as well as charging for machining, etc., to reflect the results of machining.

Before checking machining information statistics, make sure that the target tool path file has been machined at least once.

Operation Steps:

- Select the following method to open the **Report** dialog box:
 - In the run report column, click **Report**.
 - In the menu bar, click **Machining** → **Report**.

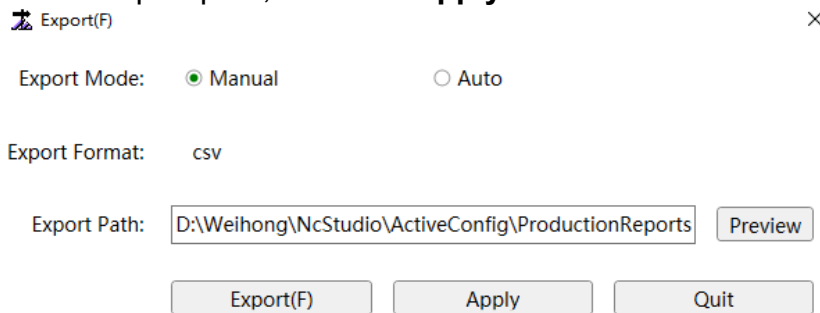


| File Name | Piercing Time/Num | Cutting Length(m) | G00 Length(m) | Cutting Time | Total Time | Cy |
|-----------------------------------------------------------------|-------------------|-------------------|---------------|--------------|--------------|----|
| <input type="checkbox"/> Untitled_2023-12-19-11-0-13.ncex(Base) | 00:00:00.000/0 | 0.000 | 0.000 | 00:00:00.000 | 00:00:00.157 | |
| <input type="checkbox"/> Untitled_2023-12-19-11-0-13.ncex(Base) | 00:00:00.000/0 | 0.000 | 0.000 | 00:00:00.000 | 00:00:00.109 | |

Show All Date: 2023/12/19 17:08 ~ 2023/12/26 17:08

- Check statistics information.
 - Merge: Merge the same machining files.
 - Filter: Filter files based on start/end time.
 - Show all: Display all machining reports, that is, merge and filter hidden data to display.
- Check the target item. According to need, do the following:
 - Charge: Click **Charge**, enter each unit price, click **Calculate**, and the system will automatically calculate the total cutting cost.
If modify the charge method and unit, click **Machining** → **Price Setting** in the menu bar.
 - Output report: Click **Report Preview** to generate a report for each statistics information, and you can export a .pdf file.
 - Export: Click **Export**, and in the pop-up dialog box, perform operations as required:
 - Export the running report of the checked items: Select **Manual**, set the export path, and click **Export**.


- Enable auto export running report function: Select **Auto**, set the export path, and click **Apply**.




10.2 Production Report

Before machining, charge each statistics information or machining can estimate the number of pierce, length, time and cost before actual machining.

Operation Steps:

1. **Optional:** If you need to charge for machining, you need to set the machining unit price.
 - a. In the menu bar, click **Machining** → **Price Setting**.
 - b. Set the billing method, unit and unit price.
 - c. Click **Confirm**.
2. According to the objects that need to generate reports are different, select to perform the following operations.
 - Generate production reports for all objects in the drawing area.
 - a. In the menu bar, click **Machining** → **Production Report**.
 - b. Enter material and display information, click **Confirm**.
 - Generate production reports for selected target objects.
 - a. In the drawing area, select the target object.
 - b. Click  in the machine control bar.
 - c. In the menu bar, click **Machining** → **Production Report**.
 - d. Enter material and display information, click **Confirm**.

Note: If the object is not selected in the drawing area, but  is clicked in the machine tool control bar, the production report cannot be generated.

10.3 Nest Report

The nest report can be generated for the nest results in the nest result list. Charge each statistics information or machining can estimate the number of pierce, length, time and cost before actual machining. Among them, part graphics and names are generated to facilitate users to identify parts and sort materials after machining.

Operation Steps:

1. **Optional:** If you need to charge for machining, you need to set the machining unit price.
 - a. In the menu bar, click **Machining** → **Price Setting**.
 - b. Set the billing method, unit and unit price.
 - c. Click **Confirm**.

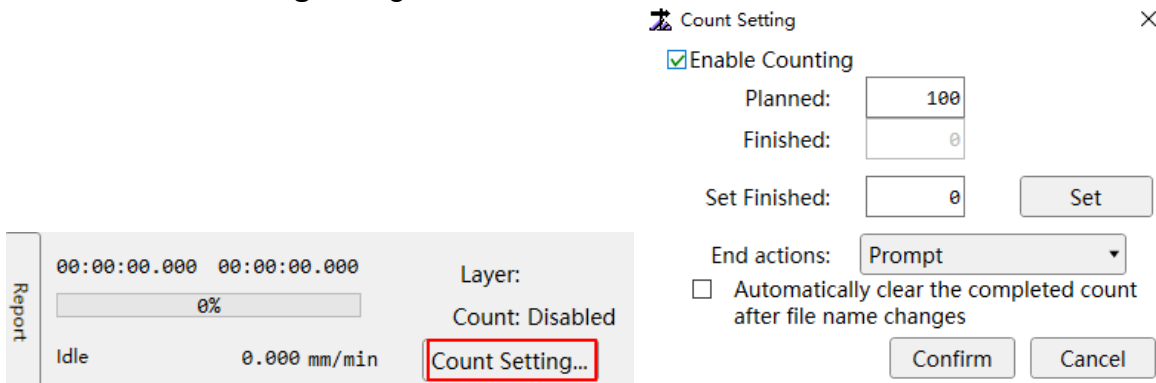
2. In the menu bar, click **Machining** → **Nest Report**.
3. Set the material information and the information displayed in the report, click **Confirm** to generate the report.
4. Support to save as PDF format export or print directly.

10.4 Count Setting

Used to count machining quantities.

Operation Steps:

1. In the machining information statistics column, click **Count Setting** to open the **Count Setting** dialog box:



2. After checking **Enable Counting**, set planned, finished, and end actions according to the actual situation.
3. **Optional:** If you need to automatically clear the machined number when changing the machining file. Check **Automatically Clear the Completed Count after File Name Changes**.

The system automatically count according to the following rules:

- After the file is completely machined, the count plus one.
- If stopped during machining, the count plus one will occur after the breakpoint resume and complete whole machining.

10.5 Lubricate Screw

After the machine tool has been running for a period of time, the screw need to be lubricated.

Select the following methods to lubricate screw:

- [Auto Lubricate Screw](#): Perform lubricate during the auto machining according to the set system parameters.
- [Manual Lubricate Screw](#): Manually control the machine tool to perform lubricate.

10.5.1 Auto Lubricate Screw

Operation Steps:

1. In the menu bar, click **System** → **System Parameters** → **External Device** → **3.1 Lubricate** to set the parameter **Lube Type**:
 - 0: None
 - 1: Auto lube (time)
 - 2: Auto lube (dist.)
 - 3: Auto lube (software start)
2. According to the selected lubricate type, set the following parameters:
 - **Auto Lube Duration**

- **Auto Lube Interval:** Set when the lubricate type is **Auto Lube (Time)**.
- **Auto Lube Dist.:** Set when the lubricate type is **Auto Lube (Dist.)**.
- **Enable Lube Pressure Detection**
- **Lube Pressure Detection Delay**

After setting, the system **Auto Lube Interval/Auto Lube Dist./**automatically open the lubricate port for **Auto Lube Duration**.

10.5.2 Manual Lubricate Screw

Operation Steps:

1. In the menu bar, click **Machining** → **Lubricate** to open the **Lubricate** dialog box:

2. After setting the corresponding parameters, click **Start**. The system start to perform the lubricate action.

10.6 Jiggle Y1Y2 Axis

Joggle Y1-axis and Y2-axis provide independent, quantitative control of the Y1-axis and Y2-axis. According to the actual synchronization deviation of Y1-axis and Y2-axis, adjust the feedback coordinates of Y1-axis and Y2-axis to be consistent to complete manual correction.

Operation Steps:

1. In the menu bar, click **Machining** → **Gantry Axes Jiggle** to open the **Gantry Axes Jiggle** dialog box:

2. Turn **Enable Gantry Axes Correction** to **ON** status.
3. Select the step length 0.01mm, 0.1mm, 1mm or click the input box to customize the step value (default value 5mm).

- Click **Y1+** / **Y1-** / **Y2+** / **Y2-** to adjust the feedback coordinates of the Y1-axis or Y2-axis.

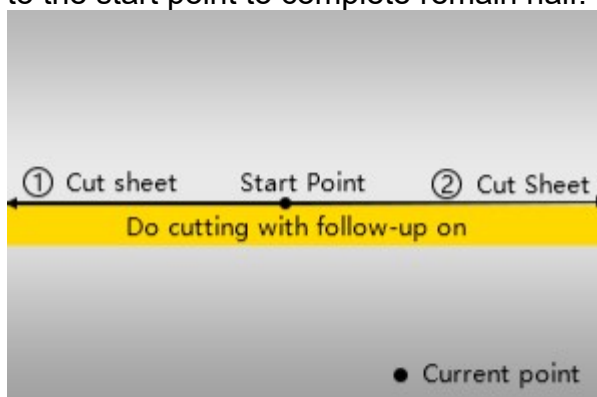
10.7 Cut Sheet

The function of cut sheet is to whole sheet horizontal cutting. It is mainly used to cut off excess waste materials to generate remain materials, or cut long sheets to appropriate size.

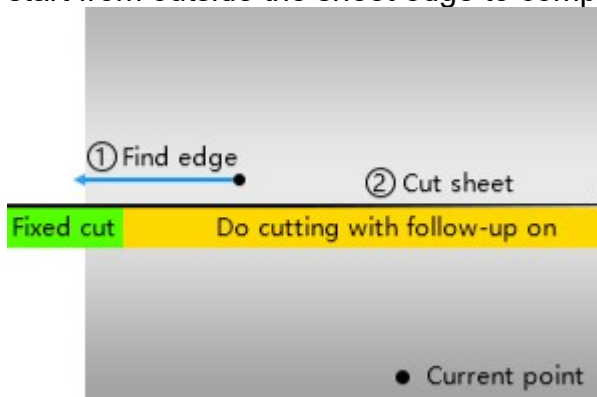
10.7.1 Cut Sheet Mode

The cut sheet function has two modes: thin and coarse, depending on the material and thickness of the sheet to be cut. Only the cut sheet action process is different between the two modes. The remaining setting methods are consistent.

- Thin: Thin mode is mainly used for no need pierce and can directly cut through thinner sheet. Thin start from the current point. Cut half of the sheet first, then return to the start point to complete remain half.



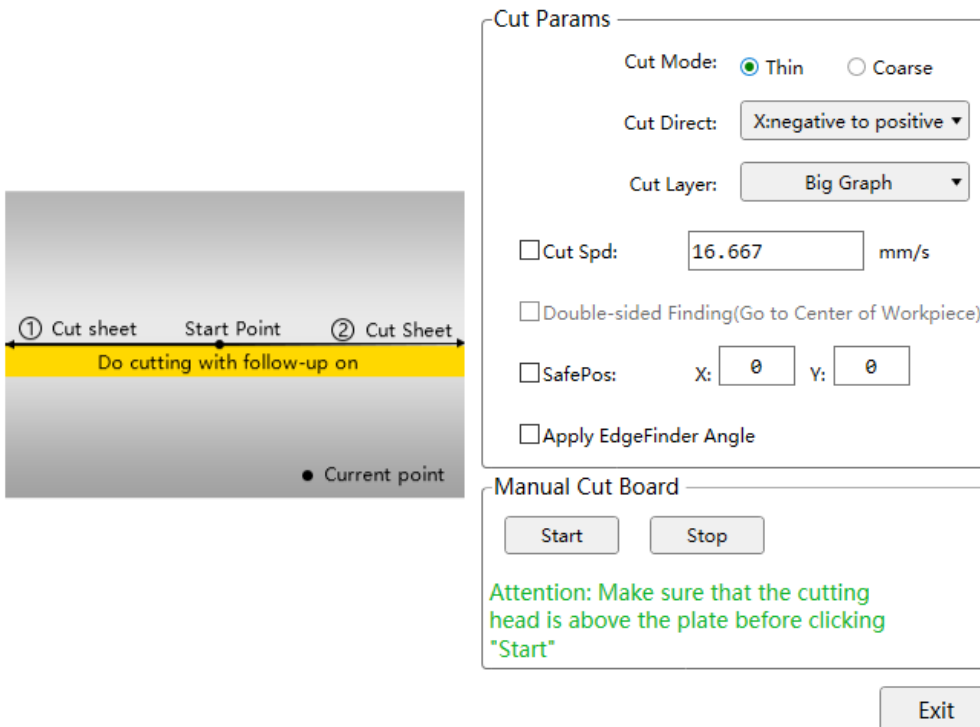
- Coarse: Coarse mode is mainly used for not add pierce technic. Directly cut sheets that cannot be cut through. Coarse edge find to one side first, and then light cut start from outside the sheet edge to complete the cutting.



10.7.2 Function Entry



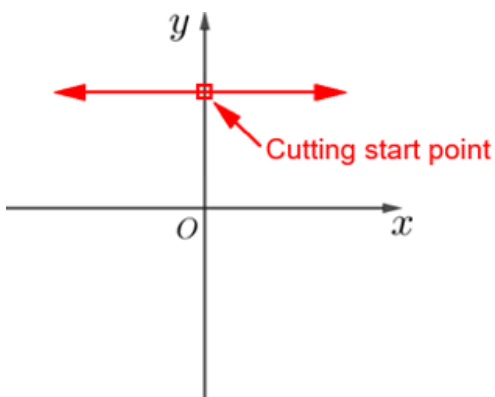
In the software operation bar, click **Cut Sheet** **Cut Sheet** to pop-up the cut sheet function interface.



10.7.3 Cut Sheet Action Introduction

10.7.3.1 Thin Mode

The thin cut sheet action is a double-sided cut sheet action. The action flow is as follows:

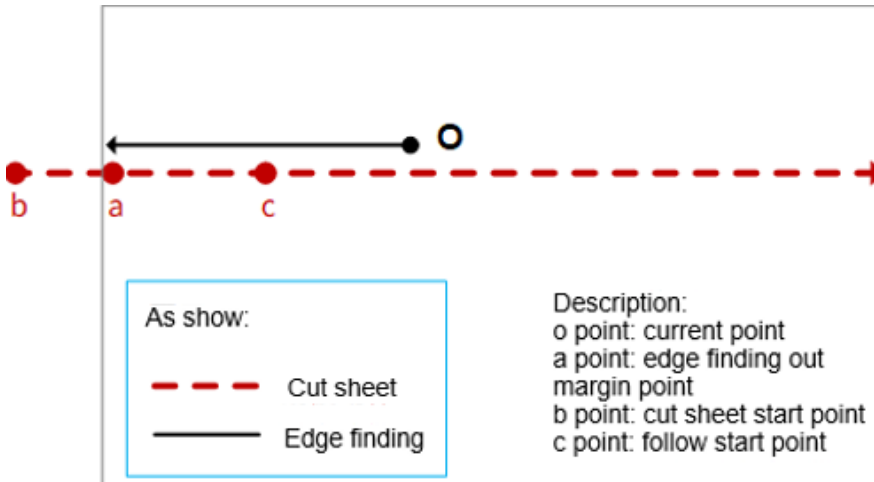


The cut sheet direction take the **X-axis from Positive to Negative** as an example (the picture above is the cut sheet diagram with the X-axis from positive to negative), and its motion track is along the direction parallel to the X-axis:

1. First, cut the cut sheet along the positive direction of the X-axis at the current point.
2. When cutting to the sheet edge, the Z-axis lift up and return to the start point of cutting.
3. Continue to cut sheet in the opposite direction to the first cut (negative direction of the X-axis).
4. After cutting in reverse to out margin, lift the cut sheet on the Z-axis to end.

10.7.3.2 Coarse Mode

The coarse cut sheet action is divided into three steps: edge finding, fixed height cutting, and follow-up cutting. The specific cut sheet process is as follows:



1. Start to cut sheet, and at 0 point (current point) the cutting head follow the sheet to edge finding in the direction opposite to the set direction.
2. After finding the boundary, the cutting head return to the position **One Click Cut Board Fixed Height Distance** from the boundary.
3. Move the fixed height position to the emit light point (outside the boundary, **Distance from Boundary + One Key Outside the Cut Sheet**) and start lighting (b point: cut sheet start point).
4. After the light is emitted, the cutting head cut at the set fixed height **One Click Cut Board Out Distance + One Click Cut Board Fixed Height Distance** distance (the distance from b point to c point is the fixed height cutting distance).
5. After cutting out margin along the set cutting direction, lift the Z-axis and the cut sheet ends.

A series of related system parameters are used in the coarse cut sheet. For details, please see [Cut Sheet System Parameter](#).

10.7.3.2.1 Double-sided Edge Finding

In the cut sheet interface, you can check the **Double-sided Finding** function when select the coarse mode. This function is mainly used to prevent the cutting head from downward after advance lift or out margin at the end of the cut sheet.

When **Double-sided Finding** is checked, the action process of coarse cut sheet is divided into two types: one cut and two cut.

Distinguished by the value of the system parameter **Double-sided Edge Finding Strategy**:

- When the parameter value is set to **Yes**, the cutting strategy is **Double-sided Finding and One Cut**;
- When the parameter value is set to **No**, the cutting strategy is **Double-sided Finding and Two Cut**.

Cut Params

Cut Mode: Thin Coarse

Cut Direct: X:negative to positive

Cut Layer: Big Graph

Cut Spd: 16.667 mm/s

Double-sided Finding(Go to Center of Workpiece)

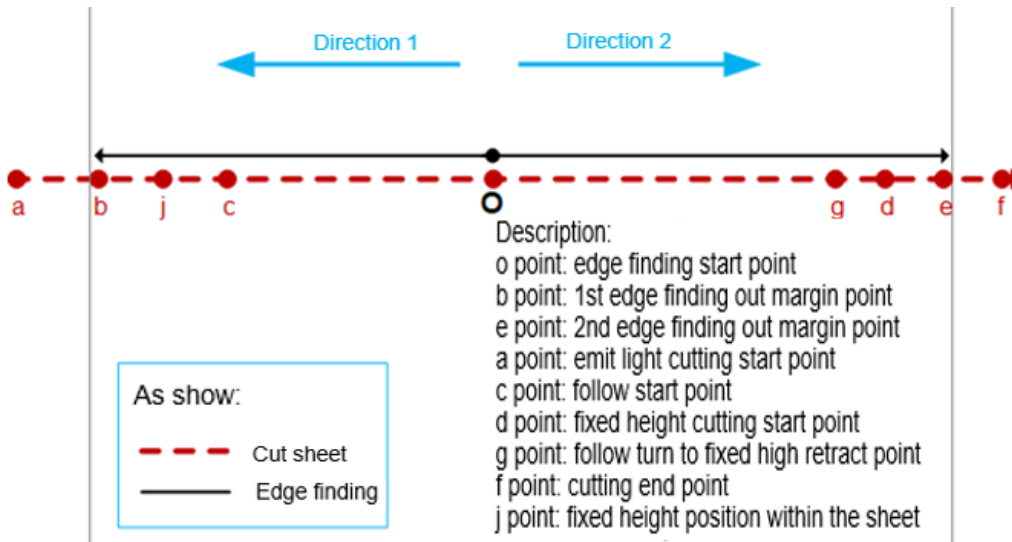
SafePos: X: 0 Y: 0

Apply EdgeFinder Angle

| Name | Value | Unit | Effective |
|-----------------------------------------|------------|------|--------------------|
| 4.7.3 Cut Sheet | | | |
| (Cut Sheet) Out Of Distance | 2 | mm | Immediately |
| (Cut Sheet) FixedCutHeight | 2 | mm | Immediately |
| (Cut Sheet) Flatness Of Tolerance | 0.6 | mm | Immediately |
| (Cut Sheet) Distance Of Fixed Cutt | 8 | mm | Immediately |
| (Cut Sheet) Distance Of Fixed Heig | 3 | mm | Immediately |
| Double-sided Edge Finding Strate | Yes | | Immediately |
| Overcutting distance for thick boe | 0 | | Immediately |
| Normal Graph of CutoffLine Cutti | 1 | | Immediately |
| End of CutoffLine Cutting Style | 1 | | Immediately |
| (Alien CutOffLine) Length of Appe | 0 | | Immediately |

10.7.3.2.1.1 One Cut

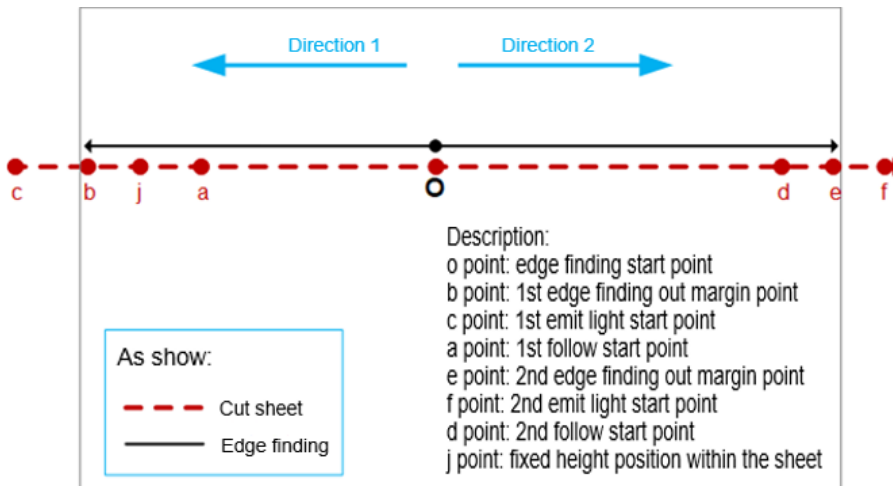
Take the "X-axis from negative to positive" direction as an example:



1. Start edge finding. The cutting head follow the sheet surface at the current position (O point), and first performs edge finding in the same direction as the set cut sheet direction (direction 2). After finding the edge (e point), the cutting head is lifted and moved to the edge finding start point (O point), and then followed again until the sheet surface face the direction opposite to the first edge finding (direction 1) and the next edge finding is performed.
2. After the edge search is completed, the cutting head returns to the position (c point) of **One Click Cut Board Fixed Height Distance** from the boundary.
3. Move the fixed height position to the position of emit light point (a point) (outside the boundary, **Distance from Boundary + One Click Cut Board Out Distance**) and start emit light for fixed height cutting.
4. After the light is emitted, the cutting head cuts along the set cutting direction at the set fixed height **One Click Cut Board Out Distance + One Click Cut Board Fixed Height Distance** distance (a point to c point).
5. After the fixed height cutting is completed, the cutting head start follow-up at the follow-up start point (c point) and continues cutting at the follow-up height until it reach the position (d point) of **One Click Cut Board Fixed Height Distance** from the other side of the sheet. Then retrace distance the **Coarse Cut Retrace Distance During Double-sided Edge Finding** at a fixed height to cut to the follow-up turn fixed height retrace point (g point).
6. Continue cutting at a fixed height. After fixed height cut the length for **Coarse Cut Retrace Distance During Double-sided Edge Finding + One Click Cut Board Fixed Height Distance + One Click Cut Board Out Distance** (g point to f point), the system turn off the light and Z-axis lift.
7. Cut sheet ends.

10.7.3.2.1.2 Two Cut

Take the "X-axis from negative to positive" direction as an example:

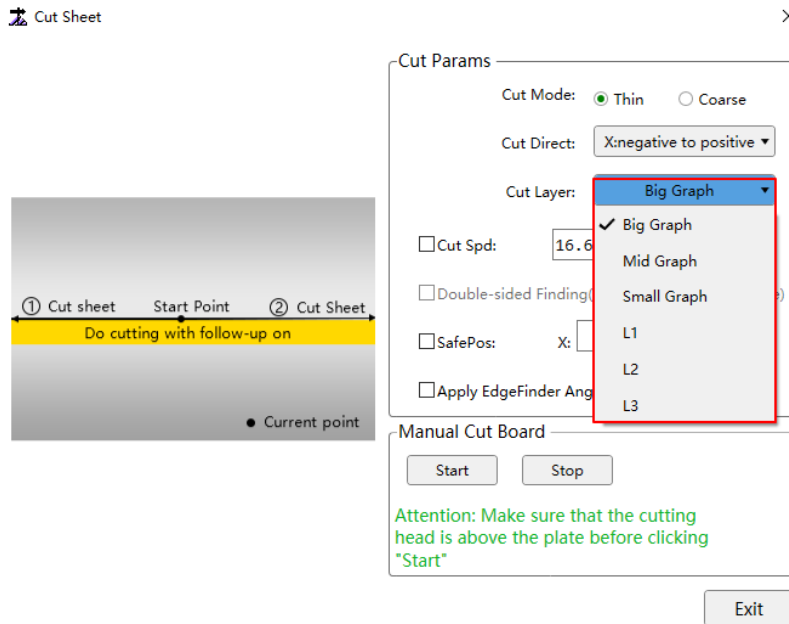


1. Start edge finding. The cutting head perform edge finding along direction 1 at O point.
2. After the edge find is completed, the cutting head return to the position (j point) of **One Click Cut Board Fixed Height Distance** from the boundary.
3. Move the fixed height position to the position of emit light point (c point) (outside the boundary, **Distance from Boundary + One Click Cut Board Out Distance**) and start emit light for fixed height cutting.
4. After the light is emitted, the cutting head cut along the same direction as the set cutting direction at the set fixed height **One Click Cut Board Out Distance + One Click Cut Board Fixed Height Distance** (c point to a point) distance.
5. After the fixed height cutting distance is completed, the cutting head start follow-up resume cutting at the follow-up start point (a point). When cutting to the edge finding start point (O point), turn off light and turn off follow-up.
6. Turn on follow-up again at O point and perform edge finding again in the same direction as the set cut sheet direction (direction 2).
7. After the edge find is completed, the cutting head return to the position (d point) of **One Click Cut Board Fixed Height Distance** from the boundary.
8. Move the fixed height position to the position of emit light point (f point) (outside the boundary, **Distance from Boundary + One Click Cut Board Out Distance**) and start to emit light and blow.
9. After the light is emitted, the cutting head cut along the opposite direction as the set cutting direction at the set fixed height **One Click Cut Board Out Distance + One Click Cut Board Fixed Height Distance** distance (f point to d point).
10. After the fixed height cutting distance is completed, the cutting head start follow-up resume cutting at the follow-up start point (d point). When cutting to the edge finding start point (O point), turn off light and turn off follow-up.

10.7.4 Cut Params

10.7.4.1 Cut Sheet Technic

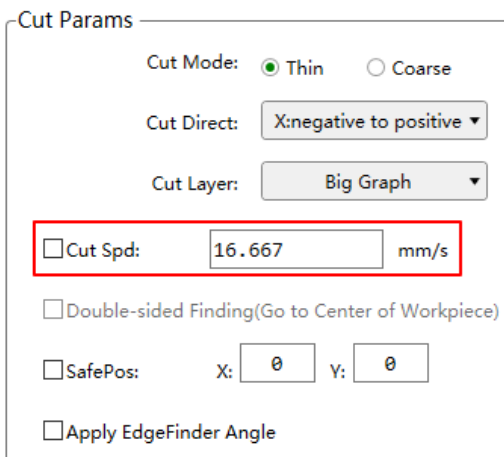
For the technic of cutting sheet, select the corresponding layer in the parameter **Cut Layer** of the one key cut sheet function.



The layer in the parameters refer to the technic parameters in the cutting layer, that is, the technic parameters we set in the corresponding cutting layer will be applied when actually cut sheet.

10.7.4.2 Cut Sheet Speed

There are two setting methods for cut sheet speed:



- If **Cut Spd** is unchecked, the cutting speed in the layer parameters we selected will be used for cutting when cut sheet.
- If **Cut Spd** is checked, the speed set in the bar after the check option will be used for cutting when cut sheet.

10.7.4.3 Cut Sheet Direction

Take the position of the cutting head as the start point, the cutting direction is the cut sheet direction.

Cut sheet is divided into four directions: X-axis from negative to positive, X-axis from positive to negative, Y-axis from positive to negative, and Y-axis from negative to positive.

Cut Params

Cut Mode: Thin Coarse

Cut Direct: X:negative to positive ▾

Cut Layer: X:negative to positive
 X:positive to negative
 Y:negative to positive
 Y:positive to negative

Cut Spd: 16.6

Double-sided Finding

SafePos: X: 0 Y: 0

Apply EdgeFinder Angle

10.7.4.4 Safe Position

The safe position applies to both positive and negative limit ends. The definition of the safe position is the distance between the artificially set sheet boundary and the soft limit. When cutting sheet, if the cutting position reach the safe position and the out margin signal is not detected, the system will consider that the boundary has been cut and will not continue cutting, and then perform the next step. At this time, the system will give the following prompt: The target point movement failed, possible reasons: 1. The movement is limited 2. No signal is obtained!.

Cut Params

Cut Mode: Thin Coarse

Cut Direct: X:negative to positive ▾

Cut Layer: Big Graph ▾

Cut Spd: 16.667 mm/s

Double-sided Finding(Go to Center of Workpiece)

SafePos: X: 0 Y: 0

Apply EdgeFinder Angle

Take thin cutting, the X-axis safety position is 10 as an example. If the out margin signal is not detected when the first cutting is 10mm away from the soft limit, then the cutting head will directly light off and lift. Then move to the cutting start point in the opposite direction to continue cutting. During cutting in the opposite direction, when the out margin signal is not detected until the other side cutting is 10mm away from the soft limit, the system stop cut sheet and lift the cutting head.

Note: Before arrival the safe position during the cut sheet process, if the out margin signal is detected at any point, the current action will end normally.

10.7.4.5 Cut Sheet System Parameter

Setting position of cut sheet system parameters: **System Parameters** → **Advanced Function** → **4.7 Other Param** → **4.7.3 Cut Sheet**.

System Parameters

| Name | Value | Unit | Effective |
|---------------------------------------|-------|------|-------------|
| 4.7.3 Cut Sheet | | | |
| (Cut Sheet) Out Of Distance | 2 | mm | Immediately |
| (Cut Sheet) FixedCutHeight | 2 | mm | Immediately |
| (Cut Sheet) Flatness Of Tolerance | 0.6 | mm | Immediately |
| (Cut Sheet) Distance Of Fixed Cut | 8 | mm | Immediately |
| (Cut Sheet) Distance Of Fixed Height | 3 | mm | Immediately |
| Double-sided Edge Finding Strategy | Yes | | Immediately |
| Overcutting distance for thick board | 0 | | Immediately |
| Normal Graph of CutoffLine Cutting | 1 | | Immediately |
| End of CutoffLine Cutting Style | 1 | | Immediately |
| (Alien CutOffLine) Length of Approach | 0 | | Immediately |

| Parameter | Description |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| One click cut board out distance | When cutting thick sheet, the distance between the start point of emit light cutting and the edge of the sheet. |
| One click cut board fixed cut height | Fixed height when coarse cutting sheet, fixed height of cutting head in cutting stage. |
| One click cut board flatness tolerance | Used to adjust the sensitivity of out margin detection. The smaller the setting, the higher the sensitivity, the easier to detect out margin signal. |
| One click cut board fixed cut distance | Coarse mode fixed height cutting process, distance within the sheet. |
| One click cut board fixed height distance | In coarse mode, the position of the fixed height out margin point in the sheet from the edge of the sheet after edge finding is completed. |
| One click cut board double edge find strategy | Select the cutting method after double-sided edge finding: Yes: One cut; No: Two cut |
| One click cut board over cutting distance | Coarse cut sheet use double-sided edge finding, the retract distance when the edge of the sheet change from follow-up to fixed height during the one cut cutting strategy. |

11 Advanced Operation

11.1 Set Cycle Machining

Set the times and interval times of cycle machining, and check the current machined times.

Cycle machining is suitable for formal machining and dry run.

Operation Steps:

1. In the menu bar, click **Advanced** → **Cycle Machining** to open the **Cycle Machining** dialog box:

2. After checking **Enable**, set the cycle times and interval time.

The system automatically count according to the following rules and fill the results into the **Dones** input box, display the current machining times in real time:

- If pause or stop machining before not arrival the set cycle times, this indicate the current actual cycle times.
- Program complete execute count as one cycle.

After the machining is completed and the set times are needed, if need to clear the machined times, click **Clear**.


11.2 Nozzle Information Management

Configure the nozzle type and aperture for configuration when setting the layer technic.

Operation Steps:

- Check nozzle information
 - a. In the menu bar, click **Advanced** → **Nozzle Info. Management** to open the **Nozzle Info. Management** page.
 - b. In the drop-down key of the **Nozzle Type** area, select the nozzle type. The corresponding nozzle information is displayed on the left according to the nozzle type.

| No. | Shorthand | Name | Nozzle Dia |
|-----|-----------|--------|------------|
| 1 | S | Single | 1 |
| 2 | S | Single | 2 |
| 3 | S | Single | 3 |

- Add nozzle
 - a. In the drop-down key of the **Nozzle Type** area, select the nozzle type to be added.
Note: If there is no suitable nozzle type, you need to add a new nozzle type: click , in the pop-up **Nozzle Information** dialog box, fill in the nozzle abbreviation and name, and click **OK**.
 - b. Fill in the **Nozzle Dia** information.
 - c. Click **Add**.
- Delete nozzle information
 - a. Select the nozzle information to highlight it.
 - b. Click **Delete**.
- Save nozzle information
 - a. Click **Confirm** to save and close the dialog box.

Note: Since the dialog box will close after click **Confirm**, it is recommended to click **Confirm** after complete add and delete operations.

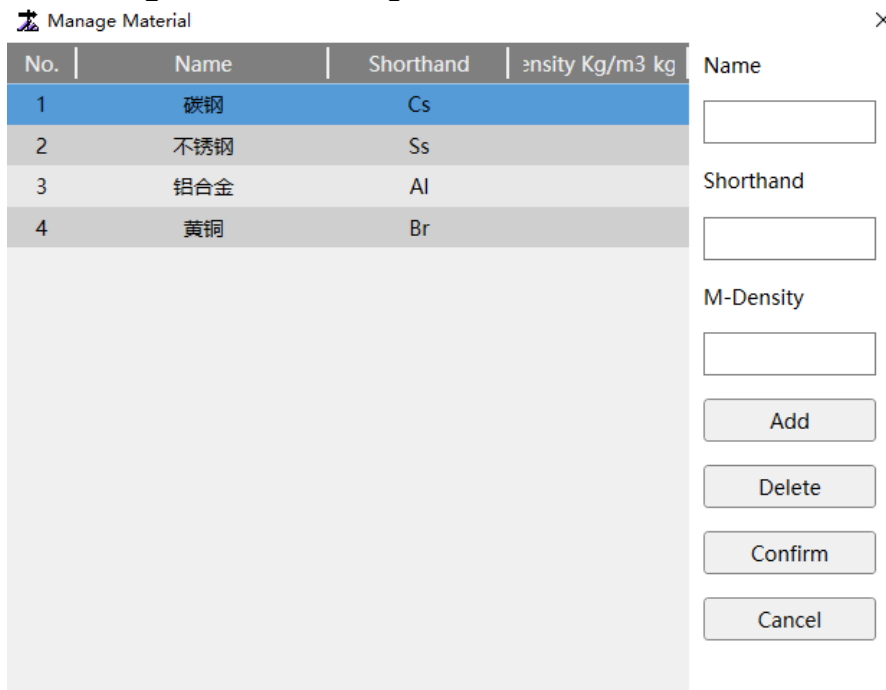
If save is not needed, click the **Cancel** or  to close button.

11.3 Manage Material

Add or delete material

Operation Steps:

- Add material
 - a. Click **Advanced** → **Material Info Management** in the menu bar to pop-up the **Manage Material** dialog box:



| No. | Name | Shorthand | Density Kg/m3 kg |
|-----|------|-----------|------------------|
| 1 | 碳钢 | Cs | |
| 2 | 不锈钢 | Ss | |
| 3 | 铝合金 | Al | |
| 4 | 黄铜 | Br | |

Name
 Shorthand
 M-Density

- b. Click the **Name** and **Shorthand** input boxes respectively and enter name and shorthand.
 - c. Click **Add** → **Confirm** to add material.
- Delete material

- a. Click **Advanced** → **Material Info Management** in the menu bar to pop-up the **Manage Material** dialog box:
- b. Click to select the target material to highlight it.
- c. Click **Delete** → **Confirm** to delete material.

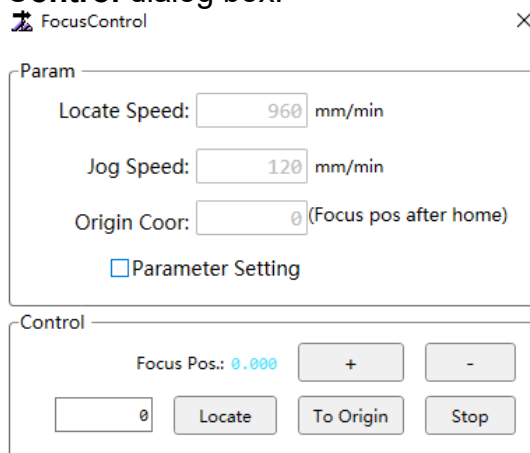
11.4 Focus Control

Cutting different sheets has different focus requirements; different focus requirements are also required to ensure machining quality when piercing and cutting. The **Focus Control** function is used to automatically adjust the focus during machining.

In the actual machining process, set the cutting parameter **Cut Focus** or piercing param **Focus** in the **Layer Setting** dialog box to use this function.

Operation Steps:

1. Enable focus control function.
 - a. In the menu bar, click **System** → **System Parameters** to open the **System Parameters** page.
 - b. In the parameter tree on the left, select manufacturer permissions, select the node **Overview** → **External Device** → **3.5 Focus Control** → **3.5.1 General Parameters**, and set the parameter **Enable Focus Control** to **Yes**. Enable focus control and restart for the setting to take effect.
2. Adjust focus before machining.
 - a. In the menu bar, click **Advanced** → **Focus Control** to pop-up the **Focus Control** dialog box:



- b. Check **Parameter Setting** and set the corresponding parameters.
Description of parameters and buttons in the control area:

| Button | Description |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Focus Pos. | Indicate the current actual focus position, that is, the actual focal length. |
| + / - | Use Jog Speed to adjust the focus position and control the W-axis lens to move in the positive/negative direction of the W-axis. |
| Text box | Desired focal length. |
| Locate | W-axis moves at Locate Speed to the desired focal length set in the text box. |
| To Origin | W-axis return to origin. |
| Stop | W-axis stop the current motion. |

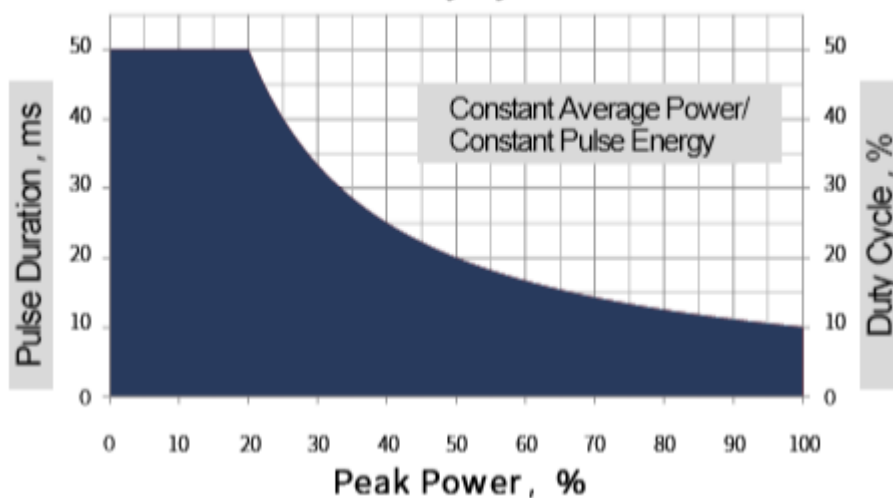
11.5 Set Laser

QCW laser can operate in jog and pulse modes. Generally used in welding and precision cutting fields.

- **Features:**

- The peak power of a QCW laser is much greater than the average power of the laser output. The relationship between both is generally 10 times, for example, the average power is 150W and the peak power can reach 1500W.
- In pulse mode, the peak power, duty ratio, and pulse width are limited to a certain range (such as the shaded area in Figure 1 is the operating range of the IPG laser in pulse mode). If the actual output relationship is incorrect, the laser will stop emit light and issue a corresponding alarm.

Pulse Duration & Duty Cycle vs. Peak Power

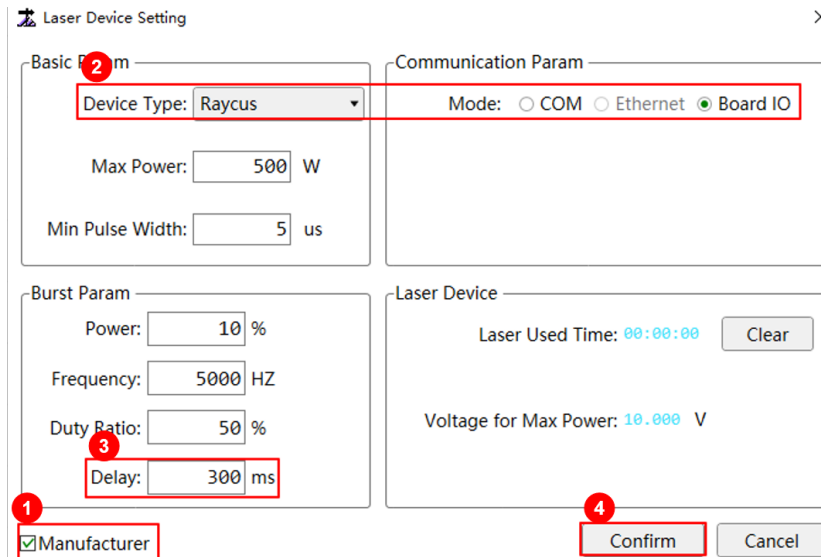


- **Difference:**

- **Control:** The main difference in control between QCW laser and ordinary jog laser is that it need to follow the QCW laser parameter setting requirements. Limit peak power, duty ratio and pulse width setting to avoid setting parameter values that are not within the normal working range of the laser, causing the laser to alarm.
Currently supported QCW laser types: QCW laser with peak power, duty ratio and pulse width consistent with the working range in Figure 1.
- **Wiring:** In general, QCW laser is the same as ordinary jog laser and system hardware wiring. The main difference is that the maximum analog input value of QCW lasers is 4V.

Operation Steps:

- Basic setting: Select laser type and communication method.
Setting entry: In the menu bar, click **Advanced** → **Laser Device Setting** → **Basic Setting** to open the **Laser Device Setting** page.

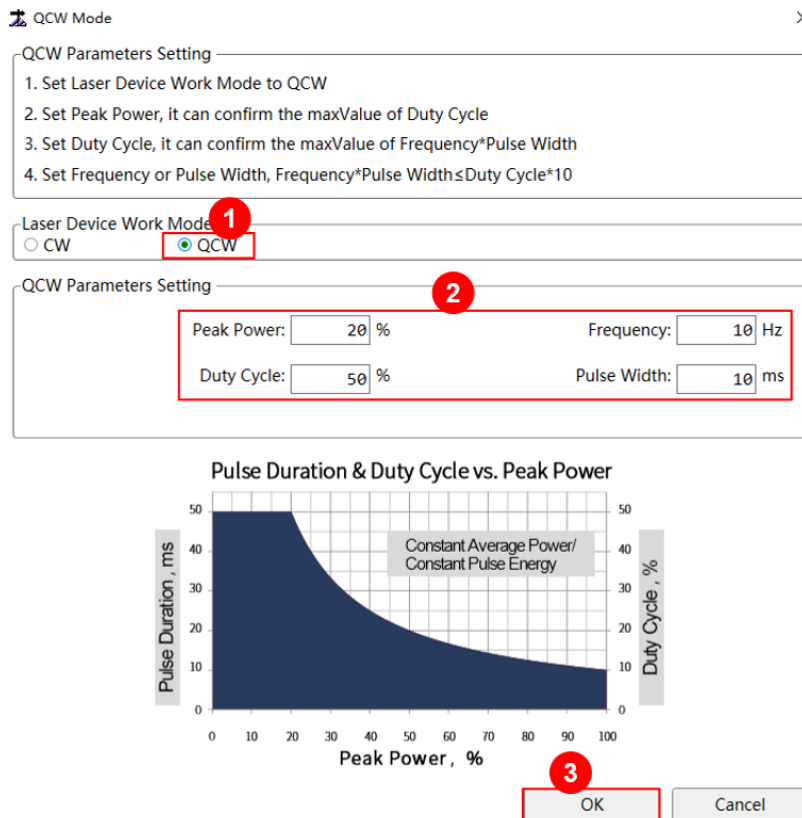


- a. In the **Laser Device Setting** page, check the **Manufacturer** in the lower left corner and activate the **Basic Param** area and **Communication Param** area.
- b. Select the laser type in the **Basic Param** area and select the communication method in the **Communication Param** area.

The communication methods supported by each laser type are as follows:

| Communication Method | COM | Ethernet | Board IO |
|----------------------|-----|----------|----------|
| Raycus | √ | × | √ |
| IPG-YLR | √ | √ | √ |
| YLR-K | √ | √ | √ |
| Maxphotonics | × | × | √ |
| SPI | √ | × | √ |
| IPG(US) | × | √ | √ |
| IPG(GER) | × | √ | √ |
| Linpin | × | × | √ |
| Feibo | × | × | √ |
| GW | × | × | √ |
| JPT | × | × | √ |
| Trumpf | × | × | √ |
| Nlight | × | × | √ |
| Reci | × | × | √ |
| Hansphotonics | × | × | √ |

- c. In the **Burst Param** area, set the **Delay** parameter.
 - d. Click **Confirm** and restart the software to take effect.
- Set QCW mode
Setting entry: In the menu bar, click **Advanced** → **Laser Device Setting** → **QCW Mode** to open the **QCW Mode** page.



- a. In the **Laser Device Work Mode** area of the **QCW Mode** page, click **QCW**.

Note: After selecting the QCW mode, the laser power parameter value can only be set on this page. The power parameter setting entry turns gray in other interfaces, such as the burst, cutting and piercing interfaces.

- b. In the **QCW Parameters Setting** area, set the peak power, duty cycle, frequency, and pulse width parameters.
- i. First set the peak power. The peak power determines the maximum value of the duty cycle. The relationship between the peak power and the duty cycle is as follows:
 - When the range of peak power is [20,100], then
Maximum value of duty cycle = 1000/peak power
 - When the range of peak power is [0,20), then
Maximum value of duty cycle = 50%
 - ii. After the duty cycle setting is completed, the maximum value of the product of pulse width (ms) and frequency (Hz) is confirmed. The relationship is as follows:
Duty cycle × 10 = pulse width × frequency

Note: There are the above constraints between peak power and duty cycle, pulse width, and repetition frequency. When filling in, if there are errors, the input boxes will automatically correct each other's values with the maximum value.

- c. Click **OK**.

11.6 Monitor Laser

Check the status of the laser, such as: power level, temperature, water flow, mode, alarm, etc.

Prerequisite:

- The laser status is normal.
- **NcStudio** software communication is normal.

Operation Steps:

1. In the menu bar, click **Advanced** → **Laser Device Monitor**.
2. **Optional:** Select the host computer software under the target path. Start the laser device host computer software.

Note: After turning on the monitor laser, the path of the laser host computer software is automatically saved to the parameter **Laser Path**, and there is no need to select the path again.

11.7 Custom Command

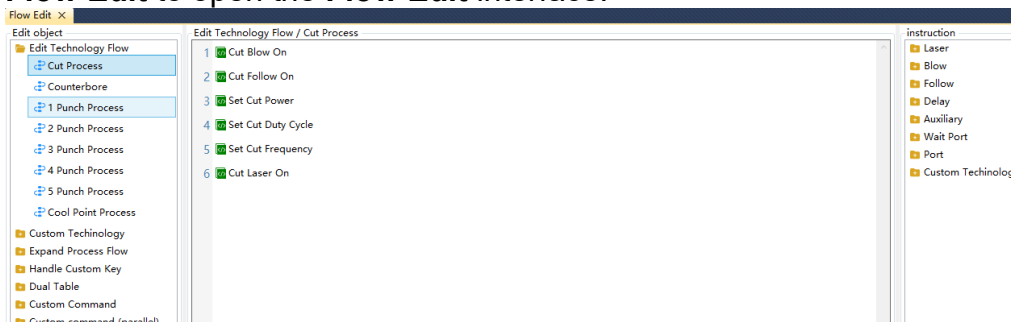
11.7.1 Edit Machining and Technic Flow






According to actual needs, customize technology, machining flow and command in **NcConfig**.

If you want to open **NcConfig** and **NcStudio** at the same time, you need to open **NcConfig** first and then open **NcStudio**.

Operation Steps:

1. Find NcConfig under the installation path C:\Program Files\Weihong\NcStudio\NcConfig, and double click to enter the **NcConfig** interface.
2. In the menu bar, click **View** → **Configuration**. In the pop-up left list bar, double click **Flow Edit** to open the **Flow Edit** interface:



3. In the **Edit Object** area, select the target edit object and related processes.
4. In the **Instruction** area, select the target command folder and double-click the command in the folder to add it to the process.
5. In the middle area, select the target command, click , , , move up, down or delete command.
6. In the menu bar, select the following method to save edit process:
 - If need to save the current edit process, in the menu bar, click  **Save**.
 - If need to save the whole edit process, in the menu bar, click  **Save All**.

Related Tasks:

After completing the editing, execute the customized process to check whether it is reasonable. For details, please see [Custom Instruction Debug](#).

11.7.2 Custom Instruction Debug

When the system is idle, the debugging process has edited the custom command. If no custom command has been edited, the debugging command drop-down list will be empty.

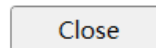
Warning: If the process is written incorrectly, the machine tool may be damaged. Please be careful to stop debugging in time during execution.

Operation Steps:

1. In the menu bar, click **Advanced** → **Custom Instructions Debug** to pop-up the **Custom Instructions Debug** dialog box:



Tips: Debug custom instruction in this dialog.



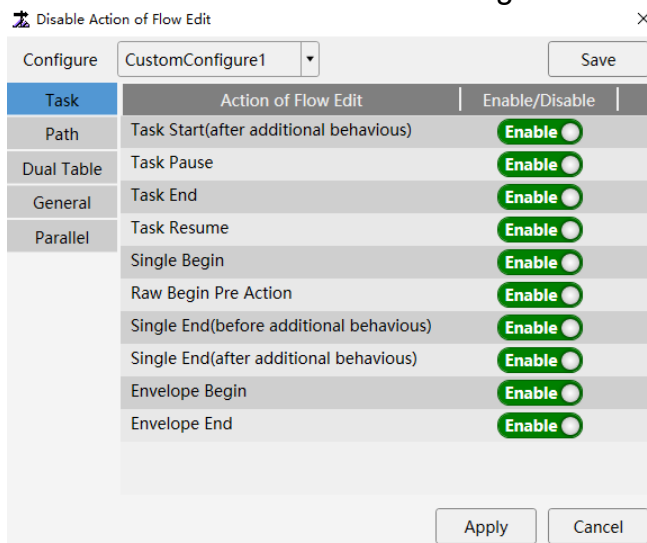
2. Select the command from the **Debuggee** drop-down box.
3. Click **Run**. Exiting the dialog box is not allowed during debugging. If close the dialog box, the execution of the debugging action will be terminated. During the debugging process, if meet E-stop, click **Stop** to terminate the execution of the current action.

11.7.3 Disable Action of Flow Edit



Provide shield or enable expanded machining processes and custom commands.

Operation Steps:

1. In the menu bar, click **Advanced** → **Disable Action of Flow Edit** to pop-up the **Disable Action of Flow Edit** dialog box:



The actions in the **General** tab are customized commands.

2. Disable or enable flow edit action as needed.
 - Disable: That is, the button is set to  status.
 - Enable: That is, the button is set to  status.
3. After setting is complete, click **Apply**.

12 System Operation

12.1 Auto Exhaust

A large amount of smoke will be generated during the laser cutting process, so a smoke exhaust fan is added at the bottom of the machine tool to remove the smoke. This operation is used to automatically control the fan to turn on to extract smoke during laser cutting.


In the menu bar, click **System** → **System Parameters** → **External Device**. Set the manufacturer parameters **Enable Auto Exhaust** to **Yes** under the **Exhaust** category. Enable auto exhaust function.

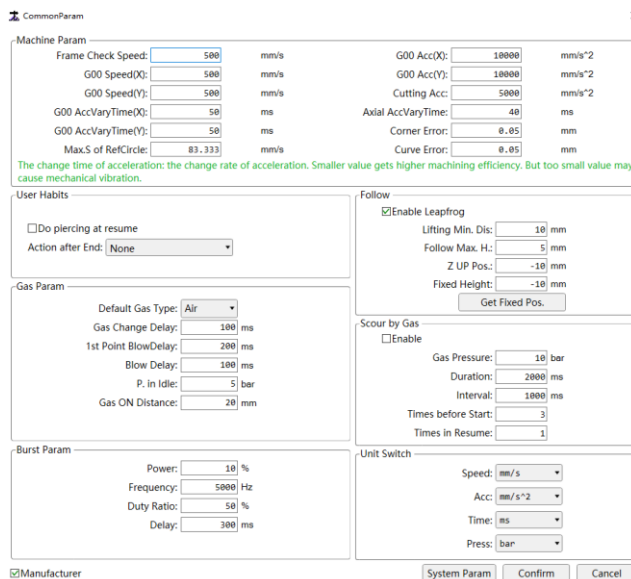
Set the parameter **Exhausting Interval** according to the actual fan distribution position, and set other exhaust related function parameters according to operation habits.

12.2 Set Common Parameter

Common parameter include machine tool motion parameter, user habits, gas parameter, burst parameter, follow-up control, gas flushing, and unit switching.

Operation Steps:

- Select the following method to open the **Common Param** dialog box:
 - In the toolbar, click  **ComParam**.
 - In the menu bar, click **System** → **Common Parameters**.



The screenshot shows the 'Common Param' dialog box with the following sections and parameters:

- Machine Param:** Frame Check Speed (500 mm/s), G00 Speed(X) (500 mm/s), G00 Speed(Y) (500 mm/s), G00 AccVaryTime(X) (50 ms), G00 AccVaryTime(Y) (50 ms), Max.S of RefCircle (83.333 mm/s), G00 Acc(X) (10000 mm/s²), G00 Acc(Y) (10000 mm/s²), Cutting Acc (5000 mm/s²), Axial AccVaryTime (40 ms), Corner Error (0.05 mm), Curve Error (0.05 mm).
- User Habits:** Do piercing at resume (checkbox), Action after End (None), Enable Leapfrog (checkbox), Lifting Min. Dis (10 mm), Follow Max. H (5 mm), Z UP Pos (-10 mm), Fixed Height (-10 mm), Get Fixed Pos (button).
- Gas Param:** Default Gas Type (Air), Gas Change Delay (100 ms), 1st Point BlowDelay (200 ms), Blow Delay (100 ms), P. in Idle (5 bar), Gas ON Distance (20 mm).
- Scour by Gas:** Enable (checkbox), Gas Pressure (10 bar), Duration (2000 ms), Interval (1000 ms), Times before Start (3), Times in Resume (1).
- Burst Param:** Power (10 %), Frequency (5000 Hz), Duty Ratio (50 %), Delay (300 ms).
- Unit Switch:** Speed (mm/s), Acc (mm/s²), Time (ms), Press (bar).

Buttons at the bottom: System Param, Confirm, Cancel.

- In the following areas, set common parameters:
 - Machine param (need to check the **Manufacturer** to activate parameters.)
 - User habits
 - Gas param
 - Burst param
 - Follow
 - Scour by gas
 - Unit switch
- Click **Confirm** to complete the setting change.
- If need to switch to system parameters, click **System Param**.

12.2.1 Machine Tool Motion Parameter

| Parameter | Description |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frame check speed | The running speed during the cut frame process. Range: 0mm~60000mm. |
| G00 speed | During machine tool machining, each axis G00 speed. Range: 1mm~100000mm. |
| G00 acc vary time | During machine tool machining, the G00 acceleration change time of each axis. Range: 1mm~10000mm. |
| Max.S of ref circle | The maximum allowable speed corresponding to a reference circle with a diameter of 10mm. Range: 1mm~1000000mm. |
| G00 acc | During machine tool machining, each axis G00 maximum acceleration. Range: 0.001mm~50000mm. |
| Cutting acc | During machine tool machining, the total acceleration in the acceleration phase. Range: 0.1mm~50000mm. |
| Axial acc vary time | The change time of single-axis acceleration during machining. |
| Corner error | Maximum error in corner transition. Range: 0mm~0.3mm. |
| Curve error | Arc shrink error after FIR filtering. Range: 0mm~1mm. When the value is 0, the vibration suppression coefficient auto control error will be used. When the value is less than 0.001, it is treated as 0.001. |

12.2.2 User Habits

| Parameter | Description |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Do piercing at resume | When coarse cutting, need to enable breakpoint resume piercing. When breakpoint resume, if need to set the retract distance, please set the parameter Breakpoint Resume Retract Distance in the system parameters. |
| Action after end | Including none, back to mark position, back to fixed point, back to work origin and other additional behaviors of the X-axis and Y-axis after machining is completed. |

12.2.3 Gas Param

| Parameter | Description |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Default gas type | Open the blow port to use the default gas. When the user choose to blow O2, the proportional valve enable port will be opened. |
| Gas change delay | Mainly used for increment piercing and segment piercing. If the cutting gas is different from the piercing gas, the laster will not be turned off during the delay process of switching gas after the piercing is completed. |
| 1st point blow delay | Blow delay after machining start/breakpoint resume. |

| Parameter | Description |
|-----------------|--------------------------------------------------------------------------------------|
| Blow delay | When the blow port switch from OFF to ON status, the blow delay will be executed. |
| P. in idle | The pressure value of manual blow in idle status. |
| Gas ON distance | The maximum straight line distance between two primitives switching without gas OFF. |

12.2.4 Burst Param

| Parameter | Description |
|------------|-------------------------------------------------|
| Power | Set the laser intensity during burst. |
| Frequency | The frequency of pulse emit light during burst. |
| Duty ratio | Corresponds to the duty ratio during burst. |
| Delay | The laser ON duration when performing burst. |

12.2.5 Follow

| Parameter | Description |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Enable leapfrog | Whether to enable leapfrog function. |
| Lifting Min. dis | When the distance is less than this value, the cutting head not perform leapfrog and directly traverse to the next start point of the figure. |
| Follow Max. H. | When the cutting height/piercing height is less than this value, it will directly follow to the set height; when the cutting height/piercing height is greater than this value, it will first follow to 1mm and then lift to the set height. |
| Z up Pos. | The machine coordinate position of the Z-axis berth when turn off follow after return to the machine origin or machining is completed. |
| Fixed height | After enable fixed height cutting, the follow-up is not enabled during the cutting process, and the Z-axis is fixed at a Fixed Height Position . You can move to actual height, click to get the position or manual input. |

12.2.6 Scour by Gas

The scour by gas function blow before cutting, which is used to clean the nozzle and at the same time make the gas more clearly in the tube to ensure the actual cutting quality.

| Parameter | Description |
|--------------------|--------------------------------------------------------------|
| Enable | Whether to enable gas flush function. |
| Gas pressure | The percentage of pressure used during gas flush. |
| Duration | The duration for perform once gas flush. |
| Interval | The time between flushes when flush times is greater than 1. |
| Times before start | The times for gas flush when start machining. |
| Times in resume | The times for gas flush when execute breakpoint resume. |

12.3 Detect Encoder

Detect whether the encoder feedback and the rotation direction of the motor are consistent, and automatically calculate the number of feedback pulses per turn and the encoder direction.

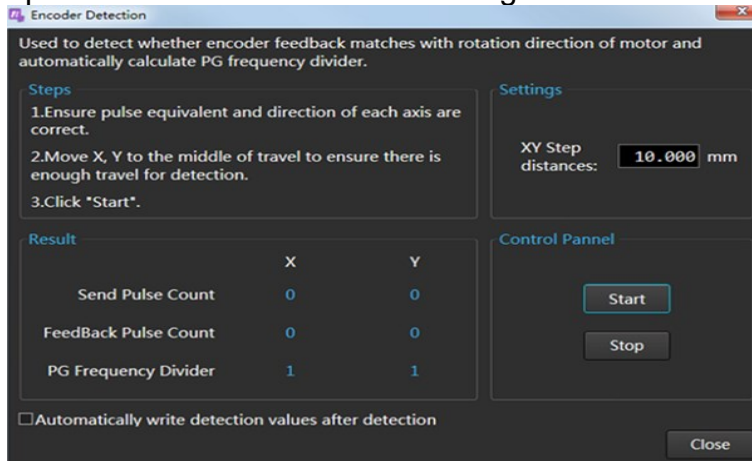
Before detect the encoder, make sure the following parameters are correct:

- Drive parameter.
- Each axis pulse equivalent.

- Axis direction.
- Per turn command pulse number.

Operation Steps:

1. Move the X-axis and Y-axis to the middle position of the machine tool's stroke to ensure that there is enough stroke for detection.
2. In the menu bar, click **System** → **Hardware Diagnose** → **Encoder Detection** to open the **Encoder Detection** dialog box:



3. **Optional:** If need to automatically write system parameters after detection, check **Automatically Write Detection Values after Detection**.
4. **Optional:** If need to set the XY step distance, set XY step distances in the **Settings** area.
The default distance is 10mm, which is generally set to one pitch length to minimize detection errors.
5. In **Control Panel** area, click **Start**.

12.4 Other Software Setting

12.4.1 Switch Language

Currently, the software support more than ten languages.

In the menu bar, click **System** → **Language**, select the language to switch under the submenu, and restart the software to take effect.

12.4.2 Switch Unit

Support metric and inch units.

In the menu bar, click **System** → **Unit**, select the unit to switch under the submenu, and restart the software to take effect.

12.4.3 Switch Theme

Support black and white themes.

In the menu bar, click **System** → **Theme**, select the theme to switch under the submenu, and restart the software to take effect.

12.4.4 Change Password

Change manufacturer password.

In the menu bar, click **System** → **Change Password**, enter the old password and new password in the pop-up dialog box, and the changes will take effect immediately.

13 System Maintenance

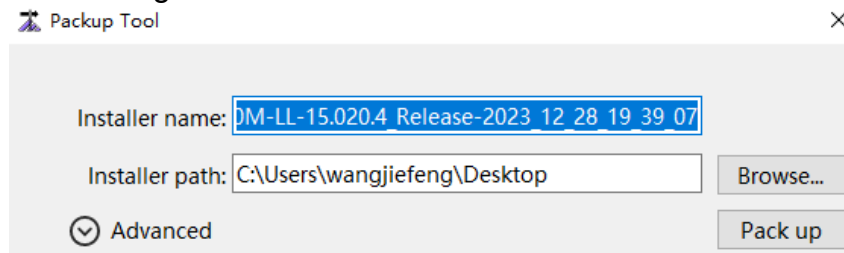
13.1 Generate Installation Package

Generate the whole installation program in the current CNC system. It is helpful to back up system files and save stable versions of system software.

Operation Steps:

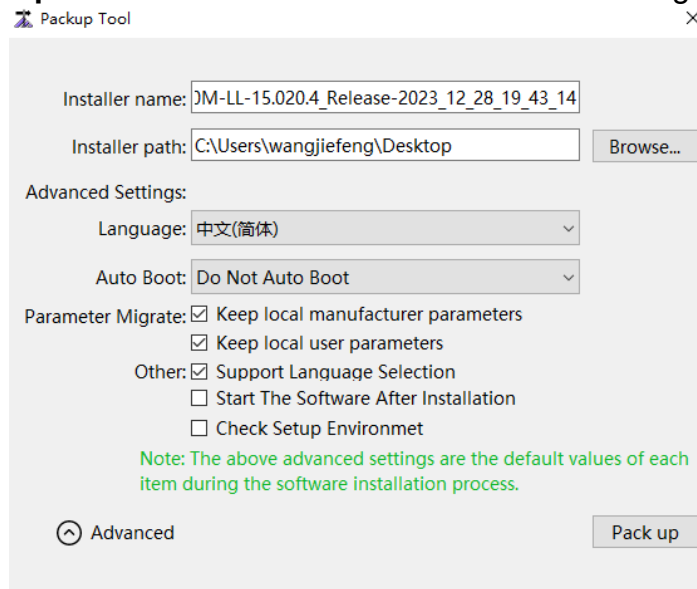
1. In the menu bar, click **File** → **Generate Installation Package** to open the **Packup Tool**

dialog box:



2. Modify the installation package name and select the installation package storage path.

3. **Optional:** Click **Advanced** and set the following parameters:



The parameter description of advanced setting is as follows:

| Parameter | Description |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Language | Support more than ten types of languages. |
| Auto boot | Whether to auto start the software when turn on the computer. |
| Parameter migrate | <ul style="list-style-type: none"> ▪ Save all local parameters. ▪ Only save local machine specific parameters. ▪ New installation: Not keep any parameters, use the initial parameters of the software. |
| Support language selection | Whether to support language selection during installation. |
| Start the software after installation | After the installation is complete, auto start software. |

| Parameter | Description |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Check setup environment | When installing this installation package, check whether the Windows environment of the current computer meet the software running requirements. |

4. Click **Pack Up**.

After the installation package is created, view the generated installation package in the selected storage path.

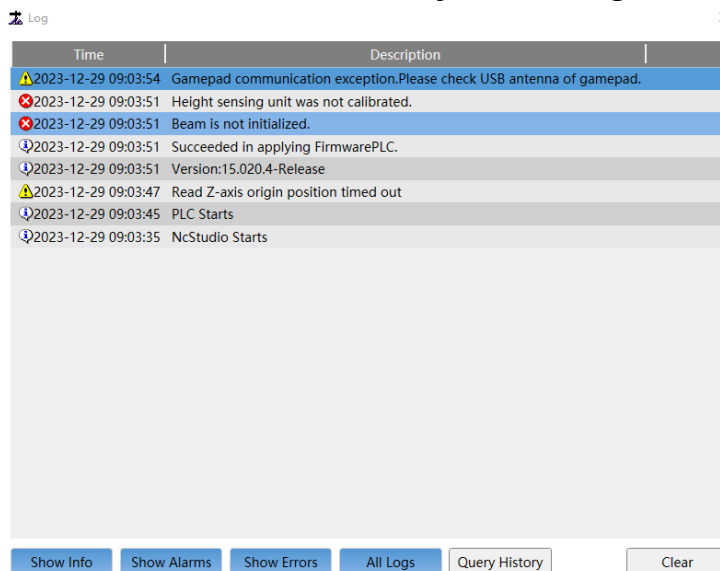
13.2 View Log




The log record important user operations, system events and time, including information and historical information after this system startup.

Every time the log file exceeds 50M, a backup log file (NcStudio_XXXX.log) is automatically generated in the User folder (path), and the original log content is cleared.

Operation Steps:

- Select the following methods to open the **Log** dialog box and view the log:
 - In the running information bar, double click **Alarm/Log**.
 - In the menu bar, click **System** → **Log**.



- Select the log type to view:
 - Click **Show Info** button to display the software running status information with the  icon.
 - Click **Show Alarms** button to display the warning information with the  icon.
 - Click **Show Errors** button to display the error information with the  icon.
 - Click **All Logs** button to display all corresponding log information since the system was started.

Buttons are highlighted by default.

- Optional:** If you want to view more log information, click **Query History** and select the date to view.
Maximum of 1 year of log information can be viewed.
- Optional:** If need to delete all log information, click the **Clear** button.

Note: Please clear the system log regularly! Otherwise, when the system log file is too large, it will affect the performance and response time of the system.

13.3 Register Board Card

It is used to restrict the system usage time.

Before registering the board card, make sure the machine tool is in idle or E-stop status.

Accounting to the following steps to register the board:

1. [Get Registration Code](#)
2. [Register Board Card Usage Time](#)

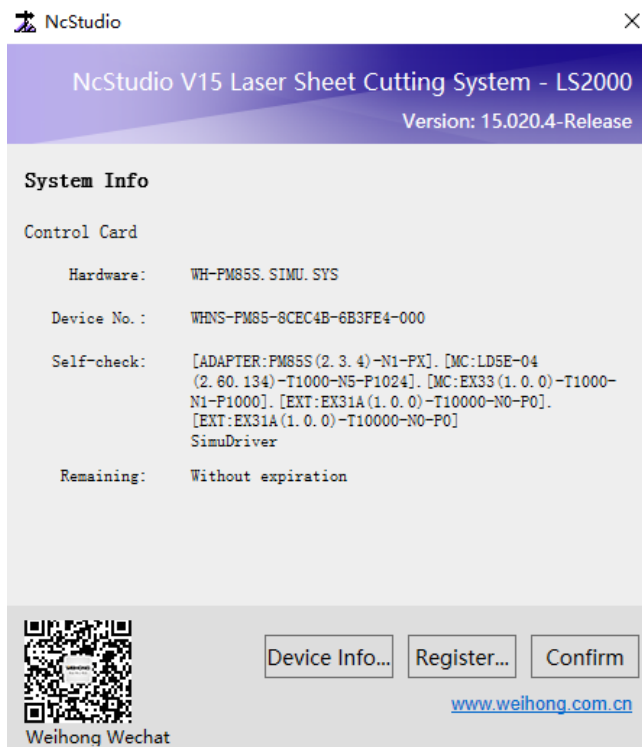
13.3.1 Get Registration Code

Prerequisite:

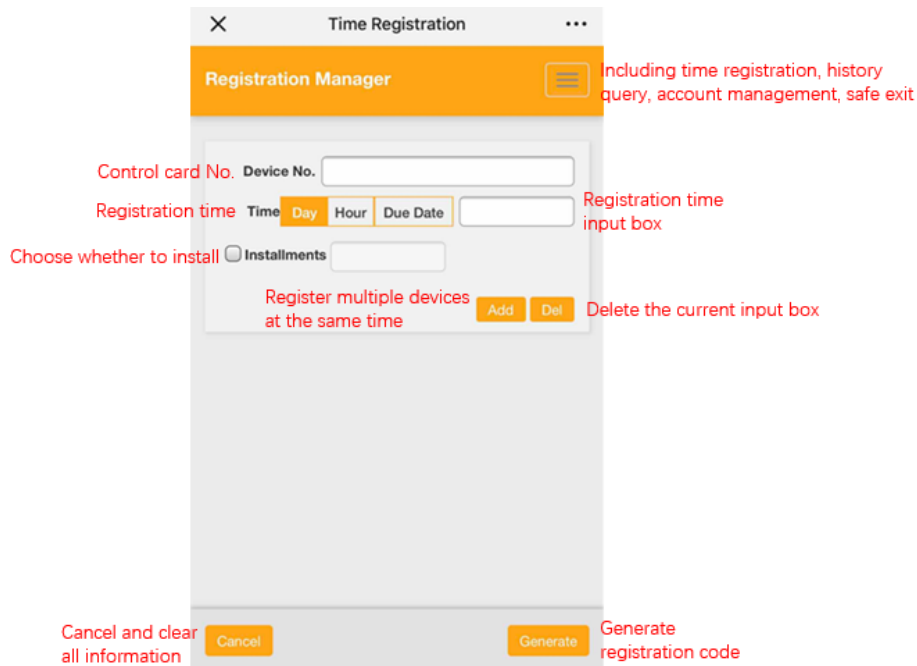
1. Select one of the following methods to obtain an account:
 - Contact local sales.
 - Dial 400-882-9188.
2. Fill in *Registration Information Confirmation Letter* and send it to Weihong Company after sealing it.


Operation Steps:

1. In the menu bar, click **Help** → **About** to open the **NcStudio** dialog box:



2. Record the device No.
The device number changes with the registration times and can be judged by the last three digits of the number.
For example: when the registration times is 0, the last three digits are 000; when the registration times is 1, the last three digits are 001.
3. Enter into **WEIHONG** official account in WeChat.
4. Click **Service** → **Register** → **Activate Account**, enter your mobile phone number, and obtain the temporary login password.
The temporary login password will be sent to the entered mobile phone number in the form of a text message, please pay attention to check the text message.
5. Return to the login interface, enter the temporary login password to log in, and fill in the information as shown to obtain the registration code:



If need to reset the password, click  to enter the account management interface to reset the password.

13.3.2 Register Board Card Usage Time

Operation Steps:

1. In the menu bar, click **Help** → **About** to open the **NcStudio** dialog box:
2. Click **Register** and enter the registration code in the pop-up dialog box.
For details, please see [Get Registration Code](#).

After registration is completed, restart the software to take effect.

When using the software later, you can check the remaining registration time in the **NcStudio** dialog box.

13.3.3 FAQ

Include:

- After the registration time expires, please register again if you want to continue using it.
- If the current board card and software do not match, please contact the manufacturer in time.

13.4 Install and Use Camera

When installing the **NcStudio V15 Laser Cutting Control System**, you can select whether to enable the camera function to monitor the on-site machining status and facilitate control machining.

Camera types are currently only supported: Hikvision, Dahua.

Accounting to the following steps to install and use the camera:

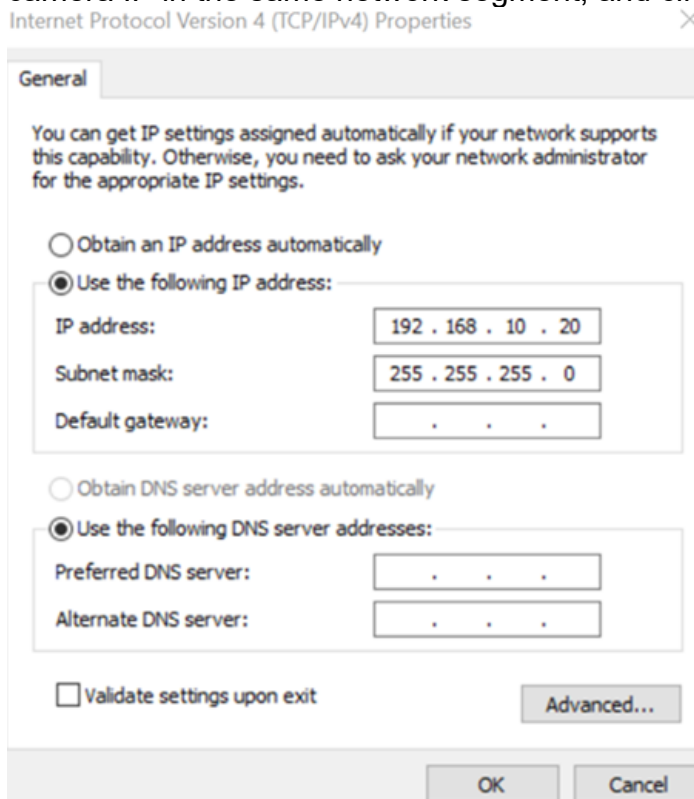
1. Connect the camera to the PC.
Up to two cameras can be connected at the same time.
2. According to the camera type, select the following methods to obtain the camera's IP address, port, subnet mask and default gateway information:
 - Hikvision: Install **SADPTool.exe** software to check.
 - Dahua: View it through the Dahua camera manufacturer manual.

3. Select one of the following methods to modify the IP address:
 - [Modify Computer IP Address](#)
 - [Modify Camera IP Address](#)

13.4.1 Modify Computer IP Address

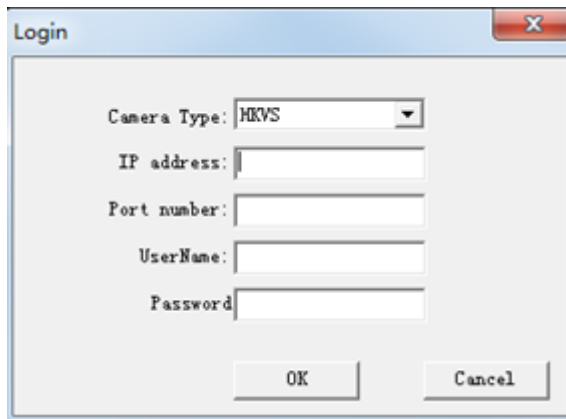
Accounting to the following steps to modify the computer IP address:

1. The network connection name take **Ethernet 3** as an example. Accounting to set the PC address based on the obtained camera address information. Accounting to the following steps to connect the PC and camera:
 - a. Click **Control Panel** → **Network and Sharing Center** → **Ethernet 3** to open the **Ethernet 3** dialog box.
 - b. Click **Properties** → **Internet Protocol Version 4 (TCP/IPv4)** → **OK**.
 - c. Select **Use the Following IP Address** to set the computer IP address and camera IP in the same network segment, and click **OK**:



When setting, the first three segments of the IP address, subnet mask and default gateway must be the same as those of the camera, and the last segment of the IP address must be different from that of the camera.

2. In the NcStudio software, click **System** → **System Parameters**, find the system parameter **Enable Camera** under the **3.0 Monitoring** category and set it to **Yes** in the menu bar.
3. In the camera monitoring area, right click to pop-up the shortcut menu, click **Login**, and the **Login** dialog box will pop-up:



4. Select the camera type, enter the IP address, port number, user name and password of the camera.

After logging in, the camera monitoring area will display the on-site machining status captured by the camera.

If need to zoom in a certain monitoring area, you can view the monitoring content more clearly. Double click on one of the camera areas. Double click again to exit the full status of a single camera.

If the camera is replaced later, in the camera monitoring area, right click to pop-up the shortcut menu, click **Logout** and log in again according to the above steps.

13.4.2 Modify Camera IP Address

Since the operation steps of **Hikvision** and **Dahua** are the same, we will introduce **Dahua** camera as an example. Accounting to the following steps to modify the camera IP address:

1. Open the online browser, enter the camera IP address, and the login page will pop-up.
2. Contact the camera manufacturer to obtain the initial password and log in:



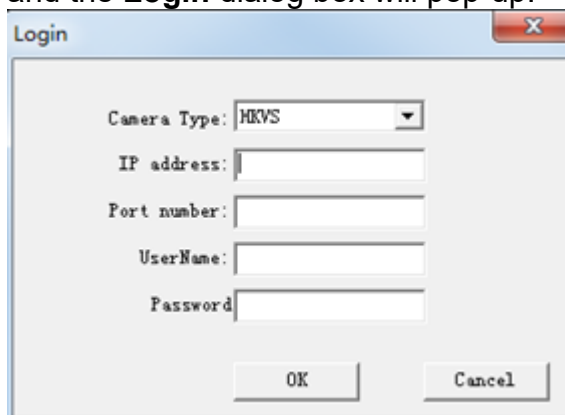
Note: For the first login, the password needs to be changed.

3. Accounting to the following steps, open the **TCP/IP** dialog box:
 - a. In the upper right area, click **Set**.
 - b. In the left list, click **Network Set**.
 - c. In the **Network Set** drop-down box, click **TCP/IP**.



When setting, the first three segments of the IP address, subnet mask and default gateway must be the same as those of the computer, and the last segment of the IP address must be different from that of the computer.

4. Click **Connect** to view **TCP Port**.
5. In the NcStudio software, click **System** → **System Parameters**, find the system parameter **Enable Camera** under the **3.0 Monitoring** category and set it to **Yes** in the menu bar.
6. In the camera monitoring area, right click to pop-up the shortcut menu, click **Login**, and the **Login** dialog box will pop-up:



7. Select the camera type, enter the IP address, port number, user name and password of the camera.

After logging in, the camera monitoring area will display the on-site machining status captured by the camera.

If need to zoom in a certain monitoring area, you can view the monitoring content more clearly. Double click on one of the camera areas. Double click again to exit the full status of a single camera.

If the camera is replaced later, in the camera monitoring area, right click to pop-up the shortcut menu, click **Logout** and log in again according to the above steps.

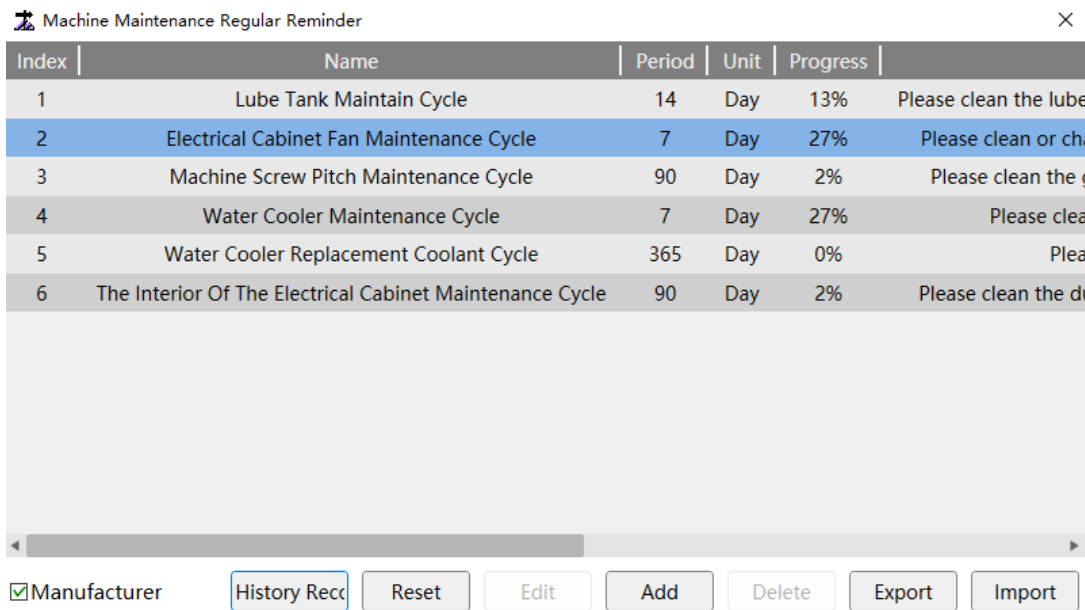
13.5 Machine Maintenance Regular Reminder

Machine maintenance reminder, as an essential function of every machine tool, can well remind customers to maintain the machine tool. The current machine tool maintenance reminder functions are as follows:

- Support customizing the content of maintenance reminders. For the default content of maintenance reminders, it can also be changed through manual editing permissions.
- All content support import and export, which is convenient for subsequent large updates, and the content can be directly imported without manual editing again.
- Distinguish between the authority of the manufacturer and the operator. When some particularly important maintenance content need to be canceled under the authority of the manufacturer (confirmed by the manufacturer), the authority of the operator cannot be reset at will to avoid damage to the machine tool components.

13.5.1 Function Entry

In the menu bar, click **System** → **Machine Maintenance Regular Reminder**.



| Index | Name | Period | Unit | Progress | |
|-------|----------------------------------------------------------|--------|------|----------|-----------------------|
| 1 | Lube Tank Maintain Cycle | 14 | Day | 13% | Please clean the lube |
| 2 | Electrical Cabinet Fan Maintenance Cycle | 7 | Day | 27% | Please clean or ch |
| 3 | Machine Screw Pitch Maintenance Cycle | 90 | Day | 2% | Please clean the c |
| 4 | Water Cooler Maintenance Cycle | 7 | Day | 27% | Please clea |
| 5 | Water Cooler Replacement Coolant Cycle | 365 | Day | 0% | Plea |
| 6 | The Interior Of The Electrical Cabinet Maintenance Cycle | 90 | Day | 2% | Please clean the d |

Manufacturer

13.5.2 Page Display Information Description

| Parameter | Description |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name | The maintenance item name must be unique. |
| Period/Unit | Choose between time/distance cycle. <ul style="list-style-type: none"> ▪ Time cycle description: How many days do maintenance needs to be carried out; the number of days is the world time obtained by computer. ▪ Distance cycle description: The machine tool needs to be maintained for every meter it runs; the distance is the movement distance of the machine tool. |
| Progress | The degree of progress in the maintenance cycle. |
| Notify type | Choose between alarm/notification. <ul style="list-style-type: none"> ▪ Alarm: The progress is displayed in red and an alarm dialog box pops up. ▪ Notification: The progress is displayed in red and a "warning" log is generated. |
| Description | Description of maintenance items, requiring clear and unambiguous explanation of maintenance content. |

| Parameter | Description |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Permissions | <p>Operator/manufacturer choice. Differentiate operations with different permissions. Reminder content for machine tool maintenance with manufacturer authority:</p> <ul style="list-style-type: none"> ▪ Operator permissions cannot be reset. ▪ After reaching 100% progress, you need to enter the manufacturer's password to confirm completion. |

13.5.3 Functional Operation Instruction

- **Manufacturer** Select the operation permission, if it is not checked, it means the operator permission, and you can only view the history record and reset the maintenance content items of the operator permission.
- **History record:** Display reset maintenance items, prompt/alarm content and completion status.
- **Reset:** Start the progress of existing maintenance items from zero.
- **Edit:** Modify existing maintenance items.
Modify the "maintenance cycle" of an existing maintenance item, and the progress will be calculated based on the new cycle and will not start from 0. Modify other content will not affect the progress.
- **Add:** Added maintenance items.
- **Delete:** Delete existing maintenance items.
- **Export:** Save the content of the current maintenance item to the current computer, the format is .dat, and the file name can be customized.
- **Import:** Import the content of the local maintenance items into the software in the format of .dat.
Import rules: Subject to "name". Projects with the same name will not be imported. If projects with different names are imported, the progress will be calculated from 0. For existing maintenance items before importing, the progress will not affect after import.

14 Handle Introduction

The WHB05 series wireless motion control handles are independently designed and developed by Weihong Company and customized and produced by Chengdu Xinhongchang. Among them, those adapted to Weihong Company **NcEditor V15** laser cutting control system include:

- WHB05L(V4) wireless handle: Suitable for sheet and tube integration.
- WHB05L(V5) wireless handle: Suitable for sheet and tube integration.

The WHB05 series wireless handle consists of two parts: handheld operation panel (transmitter) and USB receiver.

It can move freely within 40 m open area without being limited to the computer. The machining positioning is convenient, and the operation efficiency and material utilization rate are greatly improved.

14.1 WHB05L(V4) Wireless Handle

WHB05L is an upgraded version of WHB05S, adding W-axis (rotary axis) zero return control and some other function control buttons.

WHB05L(V4) wireless handle diagram as follows:



WHB05L(V4) wireless controller function button functions are defined as follows:

































Machining control buttons

- | | |
|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
|  Start |  Resume |
|  Stop |  Emergency stop |

Axis direction buttons

- | | |
|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
|  Y-axis positive movement |  X-axis positive movement |
|  Y-axis negative movement |  X-axis negative movement |
|  Z-axis positive movement |  W axis CW |
|  Z-axis negative movement |  W axis CCW |

Combination

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   Calibration |   Go mark point 工件回零 |
|   Simulation |   Set mark point 工件置零 |
|   Leveling and centering 走边框 |   Make axis W go zero Z/W回零 |
|    or |    X-axis high-speed movement |
|    or |    Y-axis high-speed movement |
|    or |    Z-axis high-speed movement |
|   Edge finding 寻边 | |

14.2 WHB05L(V5) Wireless Handle

WHB05L(V5) is the button text of WHB05L(V4) upgraded to an icon form version, which facilitates the image memory of functions.

The rotation axis of WHB05L(V5) is the B-axis.

WHB05L(V5) wireless handle diagram as follows:



WHB05L(V5) wireless controller function button functions are defined as follows:

Machining control buttons

- | | |
|-------|----------------|
| Start | Resume |
| Stop | Emergency stop |

Axis direction buttons

- | | |
|-------------------------------------|--------------------------|
| Y-axis positive movement | X-axis positive movement |
| Y-axis negative movement | X-axis negative movement |
| Z1 Z-axis positive movement | B axis CW |
| Z1 with LC Z-axis negative movement | B axis CCW |

Function buttons

- | | |
|--------------------------|--------------------------|
| Follow | Blow |
| Burst | Optical grating |
| Laser ON upon inching | Red light |
| Make axis Z go origin | Make all axes go origin |
| Backward | Forward |
| Rapid | Step |
| Set as workpiece origin | Go to workpiece origin |
| Cut frame | Dry run |
| K1 Custom sub-program R1 | K2 Custom sub-program R2 |

Combination

- | | |
|----------------------------------|----------------------------------|
| Aux Calibration | Aux Go mark point |
| Aux Simulation | Aux Set mark point |
| Aux Leveling and centering | Aux Make axis B go origin |
| Aux Edge finding | Aux Break point positioning |
| Aux K1 Custom sub-program AuxR1 | Aux K2 Custom sub-program AuxR2 |
| Aux or | X-axis high-speed movement |
| Aux or | Y-axis high-speed movement |
| Aux or | Z-axis high-speed movement |
| Aux or | B-axis high-speed movement |

14.3 Product Specification Parameter

Electrical Parameter

- Handheld terminal operation voltage current: 2 AA batteries, 3V/6mA
- Handheld terminal low voltage alarm range: <2.2V
- Handheld terminal transmit power: 14dB
- Receiver receive sensitivity: -90dB
- Wireless communication frequency: 433MHz band
- Delay time: 32ms

Other Parameter

- Button use life: 400,000 to 500,000 times
- Wireless communication distance: 40m in open environment
- Working temperature: -25°~70°
- Anti fall height: 1.5m
- Receiver port: USB2.0
- USB receiver: Comes with 1.5m USB double layer shielded cable
- USB communication transmission distance: ≤5m

14.4 Precautions for Use

Please note the following:

- Before start the software, please make sure the wireless controller is connected.
- The handle's operation panel and USB receiver are paired one-to-one, please do not mix them.
- When the yellow warning light on the handle light up, it means that the battery is about to run out. Please replace the AA battery as soon as possible to avoid affect normal operation.
- Please not fix the signal receiver inside the electrical cabinet to avoid affect signal reception.

14.5 FAQ

When using the wireless handle, if the following situations occur:

- After pressing the button, the machine tool action response is delayed.
- After pressing the button, the machine tool not respond.
- After pressing the button, the button automatically pop-up.

Please check the usage environment and usage method of the wireless handle:

Usage Environment: The wireless handle is used indoors and placed in a metal cabinet. USB extension cable is not used. The communication distance is ≤2m.

- **Reason:** Metal cabinets have a shield effect on wireless signals, causing unstable wireless transmission and causing abnormal situations.
- **Solution:** Place the receiver outside the cabinet to ensure no obstruction.

Usage Environment: The wireless handle is used indoors and placed outside the metal cabinet. Using a 2~3m USB extension cable, the communication distance is 10m.

- **Reason:** Using an extension cable will increase the instability of USB communication. When interference is severe, USB communication may be abnormal, resulting in delayed remote control operation.
- **Solution:** Not use extension cable.

15 Shortcut Key List

When using the **NcStudio-V15 Laser Cutting Control System**, refer to the following shortcut keys for easy operation:

Shortcut Key List

| Shortcut Key | Function | Shortcut Key | Function |
|----------------|--------------------------------------------|----------------|--------------------------|
| F1 | Show shortcut keys | Shift+ E | Quantity modify |
| F2 | E-stop | Shift+ V | Seal gap |
| F3 | Layer setting | Shift+ Z | Dispose unclose micro |
| F7 | Show direction | Shift+ Ctrl+ C | Datum copy |
| F8 | Simulate | Shift+ G | Explode |
| F9 | Show empty path | Ctrl+ 1 | Set big graph |
| F12 | Clear track | Ctrl+ 2 | Set mid graph |
| Alt+0 | Ports setting | Ctrl+ 3 | Set small graph |
| Num+ | Zoom in | Ctrl+ 4 | Set L1 |
| Num- | Zoom out | Ctrl+ 5 | Set L2 |
| Num* | Fit to window | Ctrl+ 6 | Set L3 |
| Ctrl+ N | New | Ctrl+ 7 | Set mark |
| Ctrl+ O | Open | Ctrl+ X | Cut |
| Ctrl+ S | Save | Ctrl+ C | Copy |
| Ctrl+ A | Select all | Ctrl+ V | Paste |
| Ctrl+ Shift+ A | Select invert | Delete | Delete |
| Shift+ A | Clear selected | Ctrl+ Z | Undo |
| Ctrl+ Shift+ S | Select similar | Ctrl+ Y | Redo |
| Shift+ D | Select similar(Strict in angle) | Ctrl+ G | Gallery |
| Shift+ S | Select Same(Strict in angle and directory) | Ctrl+ T | Shape check |
| Shift+ F | Select unclosed | Ctrl+ Shift+ 1 | Instant setting |
| Shift+ W | Select inner | Ctrl+ J | Combine |
| Shift+ Q | Select outer | Ctrl+ W | Set lead-in/out line |
| Shift+ T | Clip overlap line | Ctrl+ Q | Start cut point |
| Shift+ R | Reverse direction | Ctrl+ P | System parameters |
| Ctrl+ Shift+ 9 | Rotate CCW90 | Ctrl+ D | Set machining direction |
| Shift+ 9 | Rotate CW90 | Ctrl+ E | Auto set machining order |
| Shift+ B | Curve break | Ctrl+ R | Set kerf compensation |
| Shift+ X | Manual micro joint | End | Middle current point |
| Shift+ C | Auto micro joint | | |

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