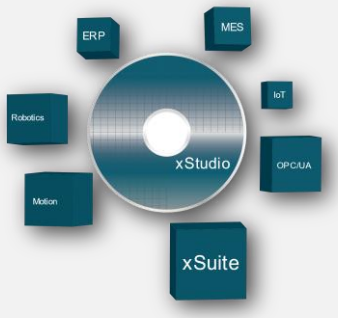
XC6000 SERIES

Motion Control System of Laser Cutting - User Manual

A CNC System

B Laser Delivery



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Document History

Edit date	Version	Topic, revision, action taken
2024/9	V1.0	First edition

Thank you for choosing our product!

This manual describes the installation and commissioning of laser cutting motion control system in details so that you can use this product quickly. You can consult us directly for more details.

Due to the continuous updating of product functions, the product you receive may differ from the introduction in this manual in some aspects.

If you find any errors in this document, please inform us as soon as possible. The data contained in this manual is only used to describe the product and shall not be regarded as a statement of security interest.

For the benefit of our customers, we will constantly try to ensure that the products we develop comply with the latest technology.

Raytools AG

Email: sales@raytools.com
Website: www.raytools.ch

Disclaimer

- We reserve the right to change the design in order to improve the quality or expand the application or comply to manufacturing workmanship.
- We will not bear any responsibility for losses and accidents caused by wrong operation or improper handling of our products.
- Dismantling of product will lose all warranty claims excluding the normal replacement of worn parts and components required for maintenance or commissioning operations.
- Unauthorized modification of products or use of non-original spare parts will directly lead to the invalidation of warranty and liability exemption.
- It is recommended to only use the spare parts provided by us or submit them to us or the designated professional team for installation.

Use Regulations

- Ensure that the product is used in a dry environment.
- Ensure that the product is used in the environment required by EMC standards.
- The product is only allowed to run within the parameters specified in the technical data.

Personnel Responsibilities

- Be familiar with the basic provisions of work safety & accident prevention and have received equipment operation guidance.
- Read and understand basic safety instructions and operations.
- You must have studied the relevant regulations and safety instructions and understand the possible hazards.
- Comply with relevant regulations and implement corresponding protective measures.

Safety Instructions

Prevent Electric Shock

-  Parts of the laser head such as nozzle, sensor, sensor interface and attached fasteners may not be fully protected by the ground wire due to function fault. These parts may have low voltage. When installing electrical equipment, please pay attention to taking anti electric shock measures for relevant personnel.
-  Note that the equipment shall be grounded as specified.

Guard against Danger

- Never put your hands or other body under the laser head.
- Repair and maintenance work can only be carried out after the power is turned off.
- Do not exceed the specified maximum pressure.
- It must be ensured that the laser head is in normal condition at all times.
- All fasteners such as bolts and nuts must be tightened.

 Laser Caution

- Avoid direct laser radiation or scattering to the skin.
- Do not stare at the laser beam even when wearing optical equipment.
- Use special laser protective eyeglasses that meet the requirements of safety standards IEC 60825-1.

Prevent Waterway Corrosion

- In order to avoid corrosion, use the specified coolant and comply with relevant requirements and specified maintenance intervals.

Noise Prevention

- The corresponding measures shall be specified or explained and observed in order to prevent personnel from being harmed by noise when the cutting air pressure is high.

Storage and Transportation

- Observe the storage temperature range allowed by the technical data.
- Take reasonable measures to prevent fire, vibration or impact.

Do not store in or near the magnetic field.

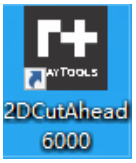
Contents

1 Quick Start

1.1 Introduction

1.1.1 Open the Software

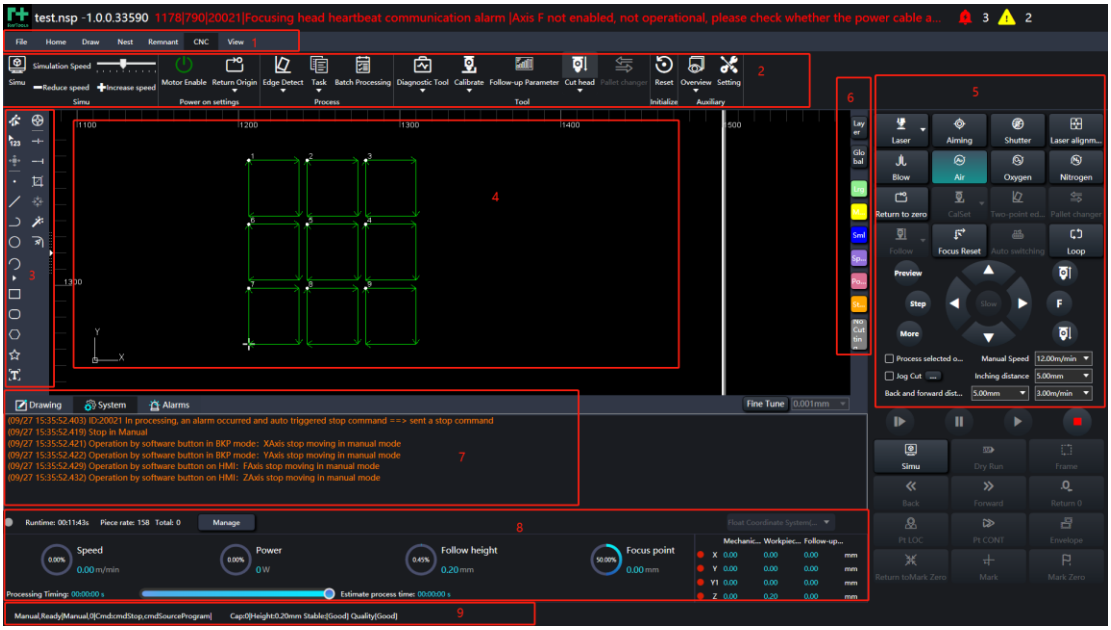
Once the software has been installed, the icon will appear on the desktop, as shown on the right.



Double-click left mouse button on it to run CNC System: 2DCutAhead 2.0.

1.1.2 Main Interface

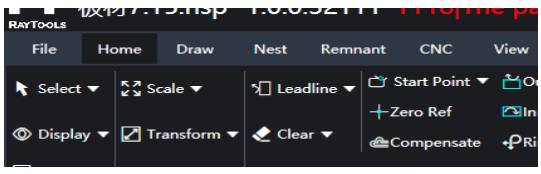
1: Menu
2: Toolbar
3: Quick Drawing Toolbar
4: Drawing Area
5: Control Panel
6: Process Toolbar
7: Log
8-9: Status Bar



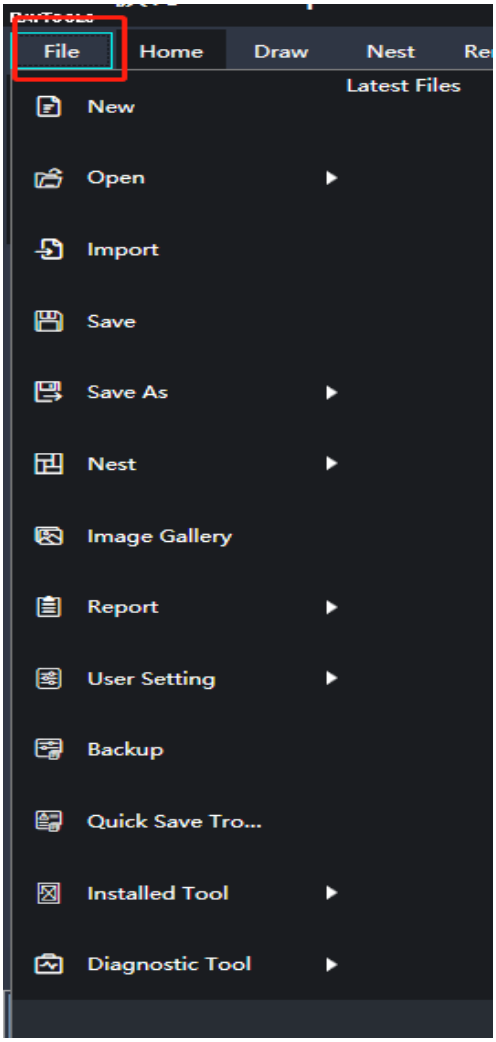
1.1.3 Menu and Toolbar

As shown below, the toolbar includes 7 sub-pages: File; Home; Draw; Nest; Remnant; CNC; View.
Select a sub-page to display its contents. When it is in processing, the "In Processing" page appears and cannot be switched to another page until the process stops.

Some function buttons have a dropdown button , which can preform a list of items to be selected.



1.1.4 File Sub-page



- **New**

Create a new drawing and not save the current one.

- **Open**

Import graphics to be processed (file format: dxf, nc, an, ns, nspl).

- **Import**

Import a file to the drawing area and not clean the existing drawing.

- **Save**

Save current drawing. Click on the button to select a disc path for saving (file format: dxf、nc 、anc、nsp、nspl).

- **Save As**

Save the current drawing.

- **Nest**

Import parts or standard parts.

- **Image Gallery**

Import standard parts.

- **Report**

Print the processed graphics into a paper file or PDF document.

- **User Setting**

Set preferred parameters such as auto optimization of graphic import, layer color, advanced parameters, hotkeys and snap.

- **Backup**

Select a disc path for saving the backup of system parameters.

- **Quick Save Troubleshoot Info**

Select a disc path for saving troubleshoot info.

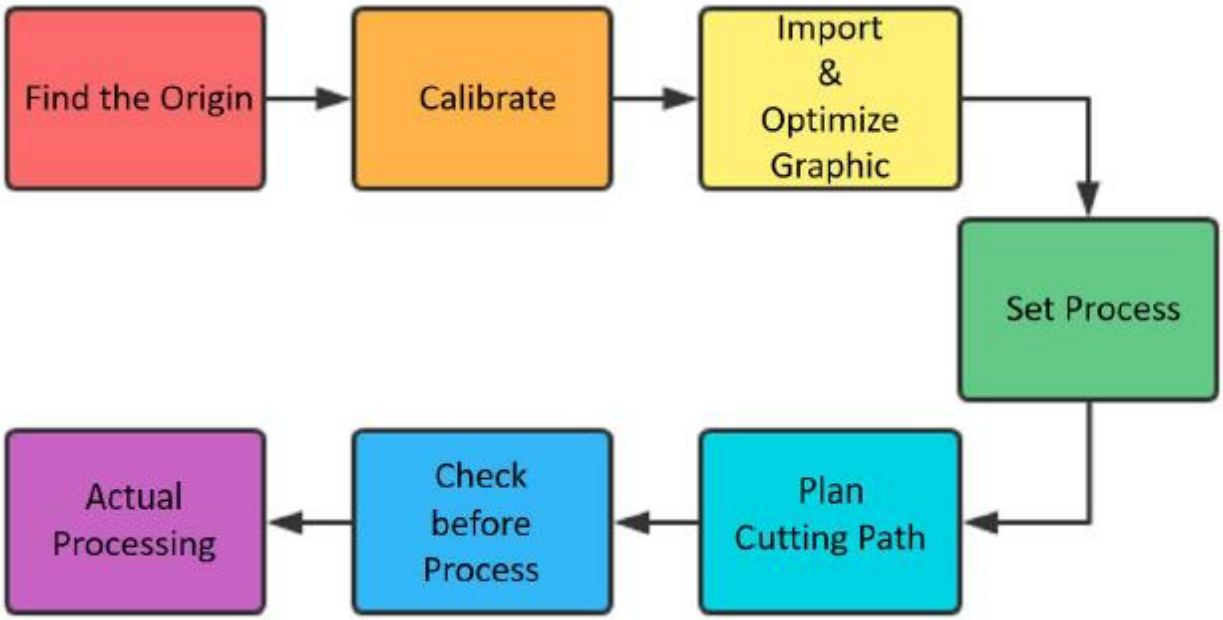
- **Installed Tool**

Factory setting includes ballbar and interferometer.

- **Diagnostic Tool**

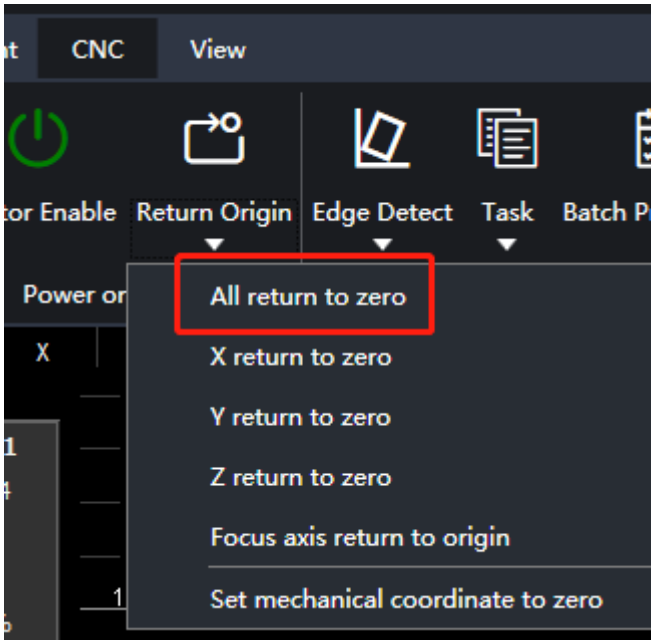
Include Remote Test, IO Monitor, Capacitive Sensor, Hardware Info, Gas DA Correction, Machine Coordinate Info, Burn-in Test, and Auto Tuning.

1.1.5 Operation Flow



1.1.6 Return Origin

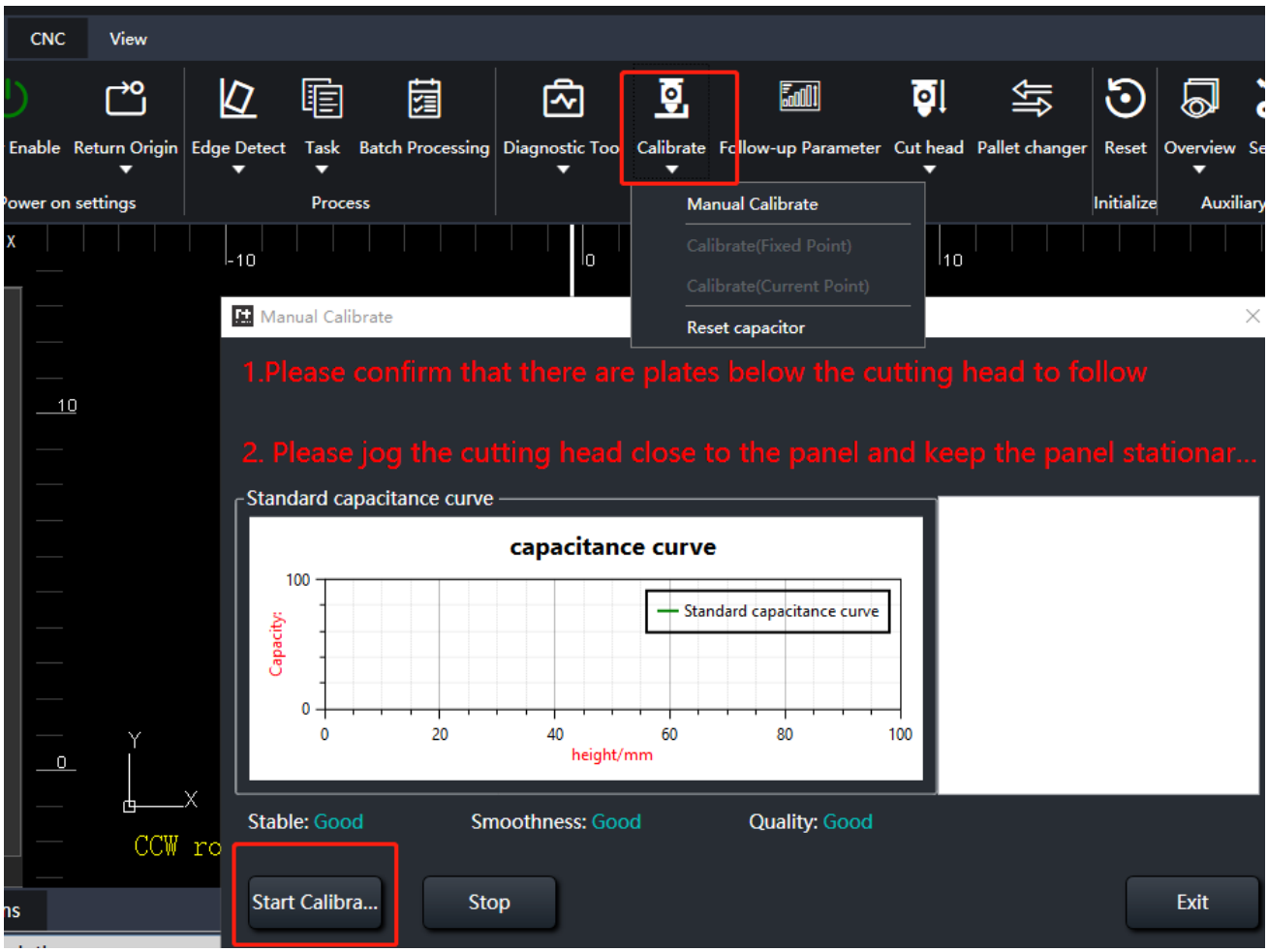
After opening the software, click on “Return Origin” in CNC sub-page. Select “All return to zero” and wait for the machine to find the origin, as shown below:



1.1.7 Calibrate

After the machine returned origin, move the cutting head above the smooth sheet to be cut.

Click on the dropdown button of “Calibrate” in CNC sub-page, and select “Manual Calibrate”, as shown below

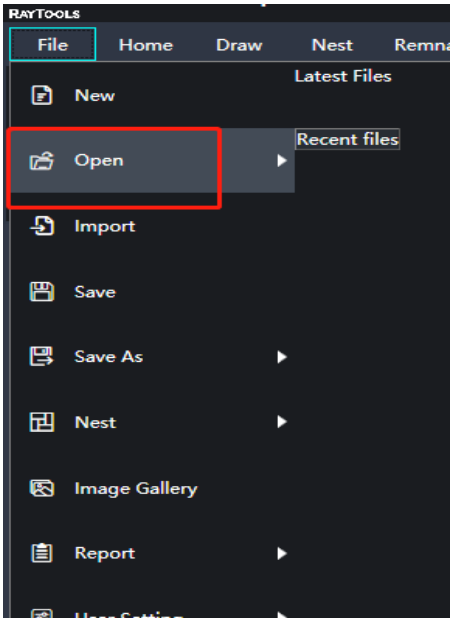


1.1.8 Auto Tuning

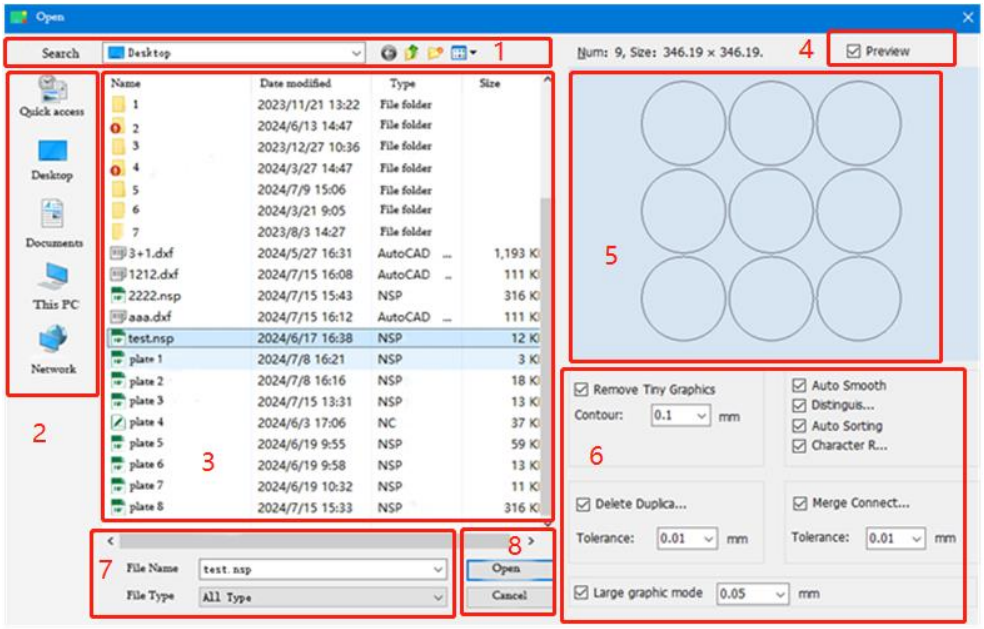
After the calibration is completed, double-click the alarm prompt in the log to auto tuning and apply.

1.1.9 Import and Optimize Graphic

After auto tuning, import the graphic to be processed by clicking on “Open” in File sub-page, as shown below:



Open a graphic and enter the following interface. Select the graphic in the disc and click on “Open”. Currently supported file formats include dxf, nc, anc, nsp, nspl, as shown below：



(1) Current disc path

Show the current file path.

(2) Discs

Select the disc with required file.

(3) Files

Display all files and folders complying with the filter criteria in current disc path.

(4) Preview

Select to preview the graphic or not.

(5) Preview area

Display graphic of the selected file after clicking on “Preview”.

(6) Optimize graphic

After importing, the graphic can be auto-optimized according to options selected and parameters filled in.

(7) Filter

Select the file type by the filter.

(8) Open and Cancel

Click on “Open” to import the graphic, or click on “Cancel” to cancel the importing.

1.1.10 Process Setting

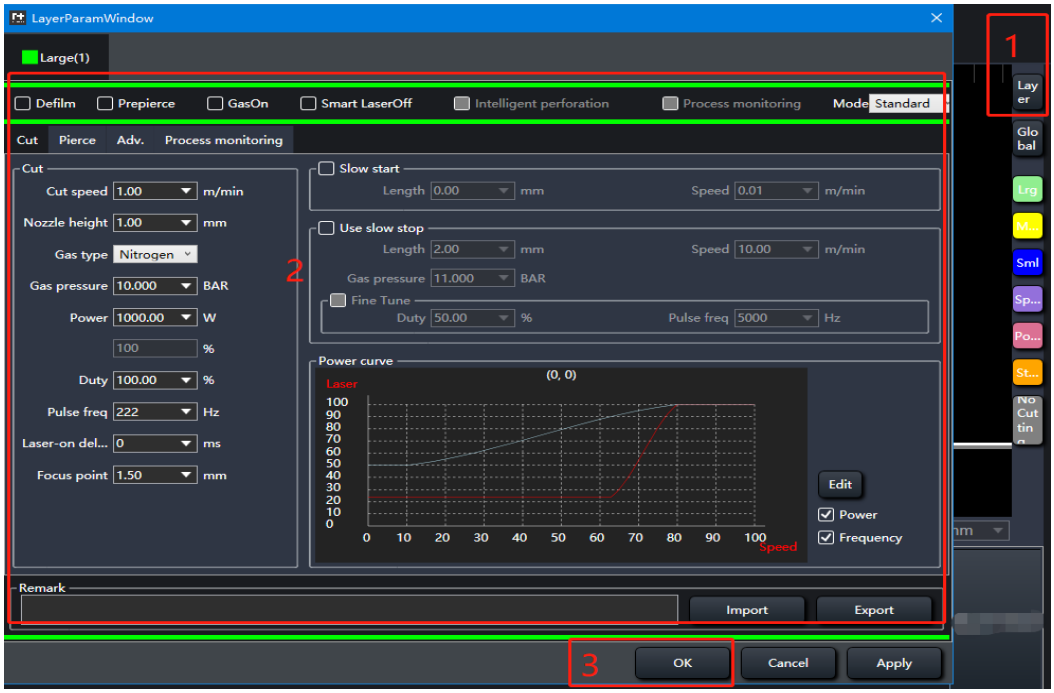
After the graphic import is completed, parts of functions in the Process Setting in Home sub-page can be used, as shown below:

- Leadline: add to avoid incomplete cutting caused by piercing.
- Start Point: set the start point of graphic processing.
- MicroJoint: insert small segments not to be cut in the graphic to avoid the part falling.
- Compensate: compensate the cutting seam.
- Reverse: set processing direction of the graphic (clockwise or anticlockwise).
- Cooling Point: protect the workpiece corners to be complete.

Change the processing layer of graphic.

1) Select the graphic requiring to change a layer.
2) Click on “Layer” to change processing layer, which can be distinguished by observing graphic colors.

Click on “Process” to set process parameters for the current graphic. Then click on OK, as shown below:

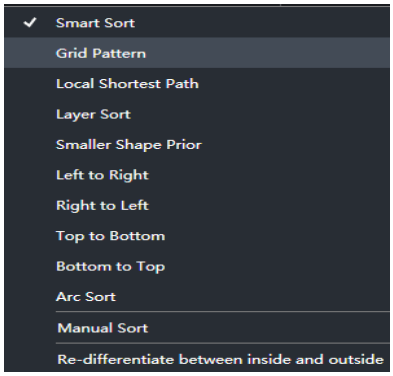


If users need to save process parameters of current layer, click on “Export” to save them. For the next cutting, click on “Import” to import these parameters and select the material thickness, then click OK to apply them.

1.1.11 Tool Path Planning

This function can sort the graphics to be processed. Click on “Sort” in Home/ Draw/ Nest subpage to auto sort the graphics. Click its dropdown button 

can display different sorting ways, as shown below.



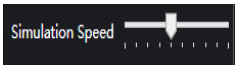
It’s available to group graphics: select the graphics to be grouped and click on 

in Home/ Draw/ Nest subpage. These graphics will make a whole and their processing sequence are fixed. Later sorting operation will not affect the processing sequence in current group.

1.1.12 Pre-processing Inspection

After sorting the graphics, check the cutting path by clicking on 

in CNC sub-page or “Simu” in the control panel.

The graphic will start simulated processing in the drawing area, and the simulation speed 

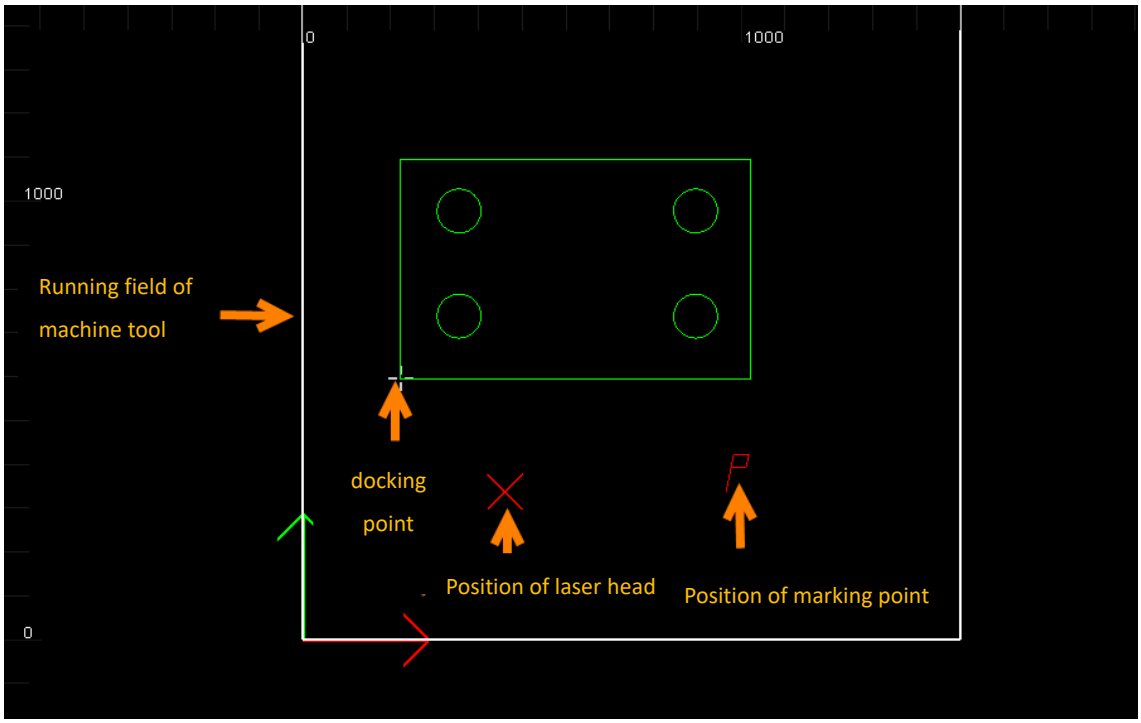
can be adjusted. This function is used to check whether the sorting sequence is proper.

1.1.13 Actual Processing

Please note that the machine tool will actually move, please operate with caution!

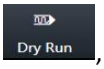
1) Preparation for processing: click on 

in the control bar, and the graphics to be processed will be gathered in the drawing area. Then users should check whether the graphics actually processed correspond to the workpiece on the machine tool. These graphics and the position of the cutting head correspond to the position of the actual cutting head and the processing sheet, so as to better check processing positions. There are common icons in the drawing area, as shown in the following figure:



After finishing above operations correctly, click on 

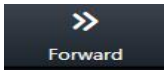
in the control bar, and the cutting head will run along the outermost periphery of the graphic to be processed. Users can check the actual processing position or whether there are obstacles.

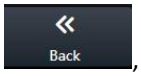
If without issues of above operations, click on 

, and the cutting head will run along the trajectory of the graphic to be processed, without laser or gas, so as to check abnormalities better.

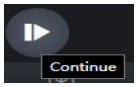
If without issues of dry-run operations, click on 

, and the cutting head will actually start processing with laser on and gas on. During processing, click on 

, and the automatic processing will be suspended. Users can manually control the lifting and gas blowing of the cutting head, or click on 

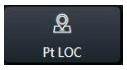
or 

, and the cutting head will move forward or backward along the processing trajectory.

Click on 

to continue processing along the unfinished contour.

Click on 

to stop processing. If the workpiece has not been processed when processing stops, and there is no new graphic or graphic change, click on 

to move the cutting head to another place. Click on 

, and the cutting head will move to the position where the last processing stopped.

2 Graphic Operation

2.1 Home

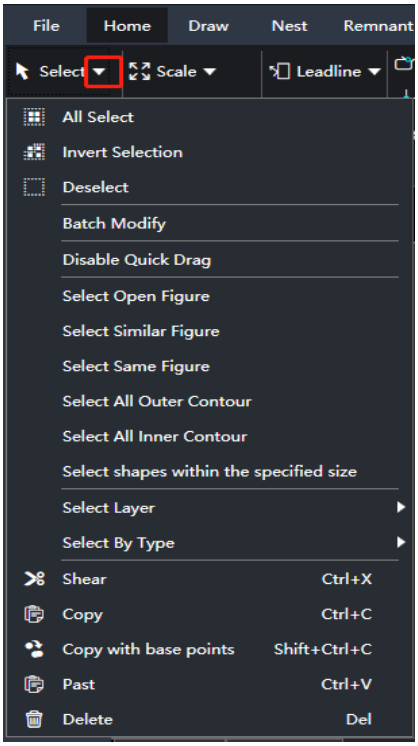
2.1.1 Select

There are various ways to select graphics. Basic operation is click on the graphic contour. Another way is box selection. Left click and hold the mouse. Then, drag it to create a translucent box to select the graphic.

There are two types of box selection.

- When drag the mouse from left to right, only the graphic completely covered in the selection box will be selected.
- When drag the mouse from right to left, once part of the graphic is in the box, the graphic will be selected.

Click on “Select” in Home sub-page, and more advanced functions will be displayed, as shown below:



(1) **All Select**: select all the graphics in current drawing.

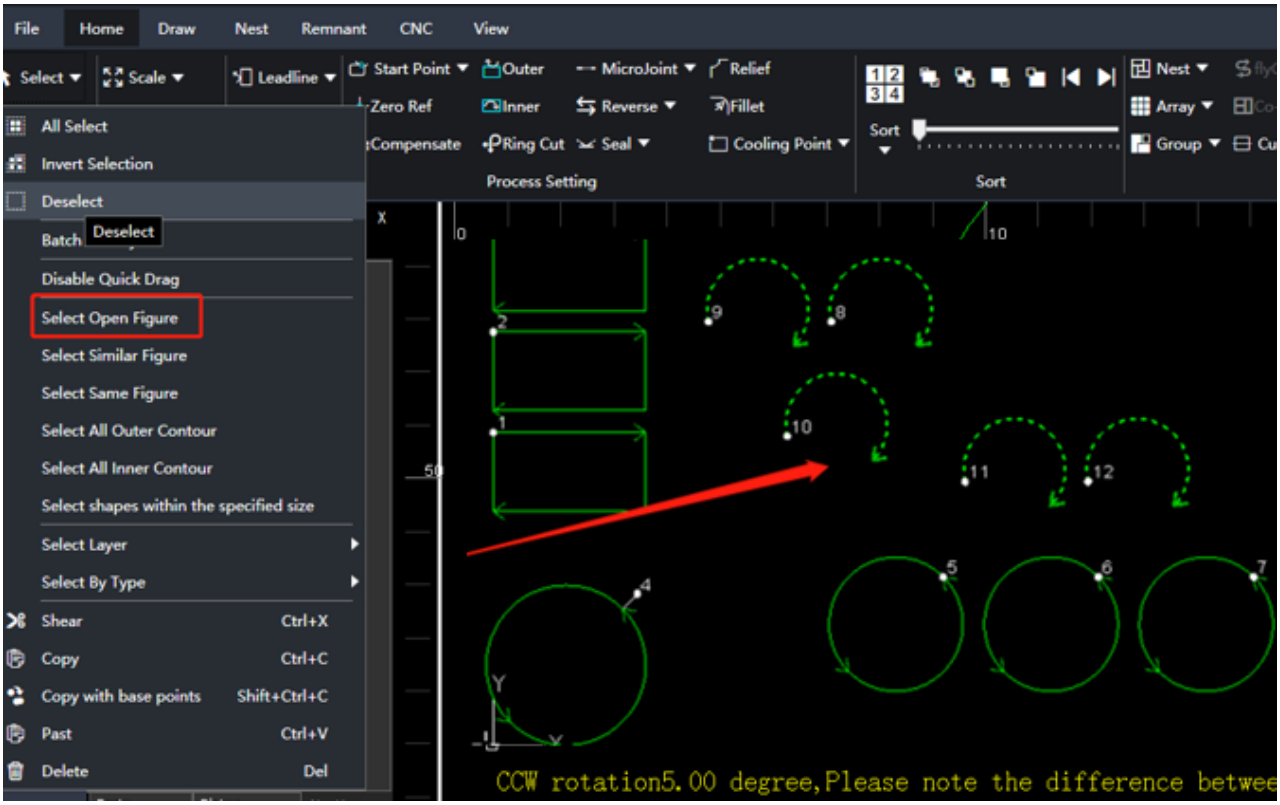
(2) **Invert Selection**: change current selected graphics into unselected or vice versa.

(3) **Deselect**: deselect the selected graphics.

(4) **Batch Modify:** batch modify same graphics.

(5) **Disable Quick Drag**: after checking, graphics in current drawing area can’t be dragged.

(6) **Select Open Figure**: select all the open graphics in the drawing area, as shown below:

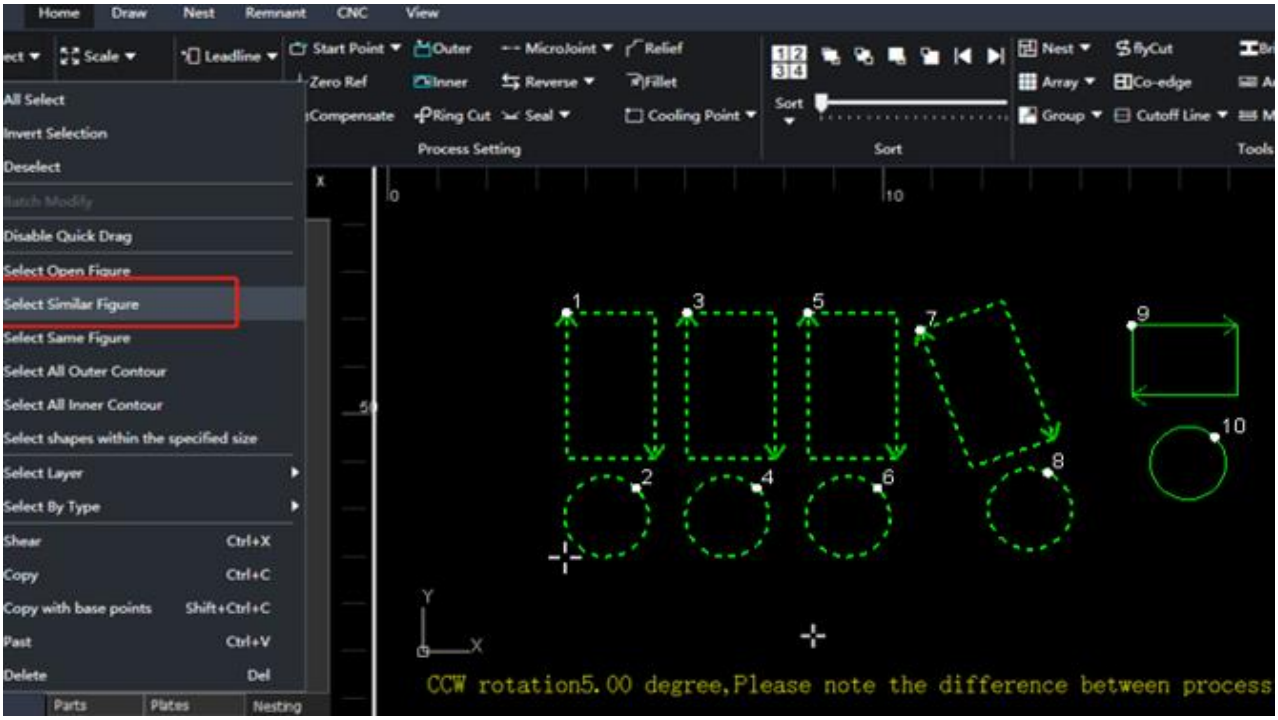


(7) Select Similar Figure: select all similar graphics in the current drawing, as follows:

a. Select a target graphic (take squares and circles for reference),

b. Click on “Select Similar Figure”,

c. All squares and circles of the same size in the drawing are selected.

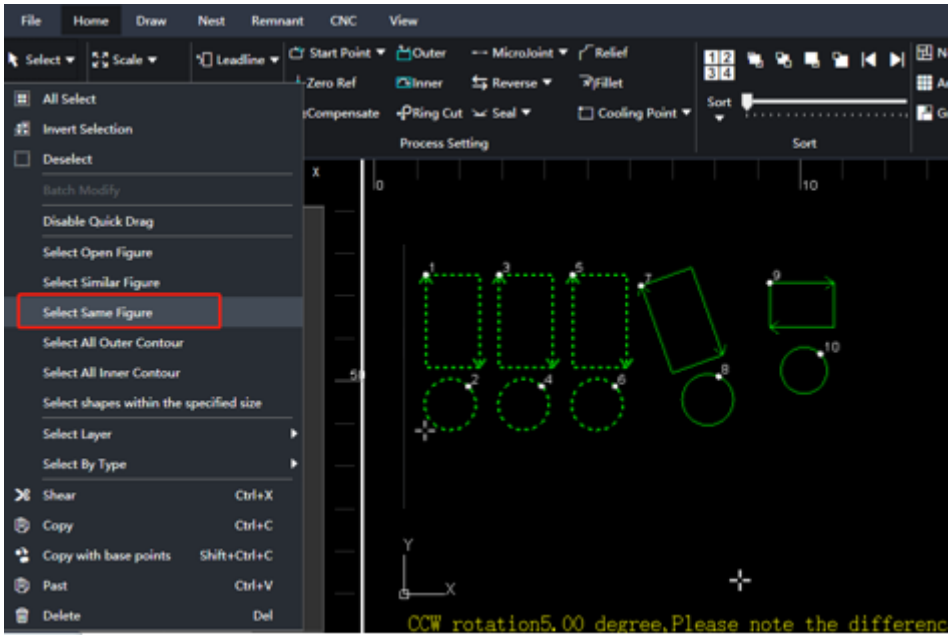


(8) Select Same Figure: select all same contours in the current drawing, as follows:

a. Select a target graphic (take squares and circles for reference),

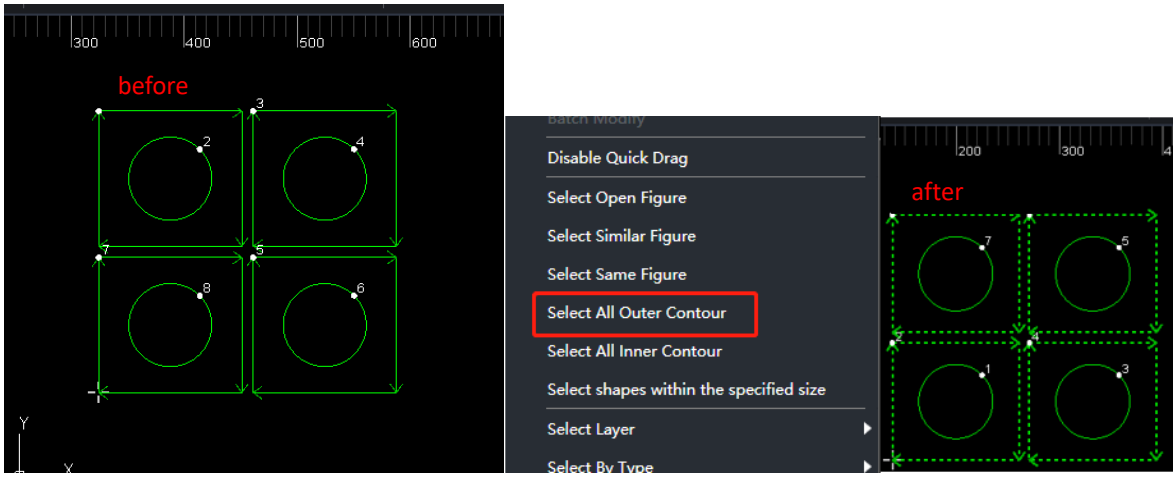
b. Click on “Select Same Figure”,

c. All same squares and circles in the drawing are selected.



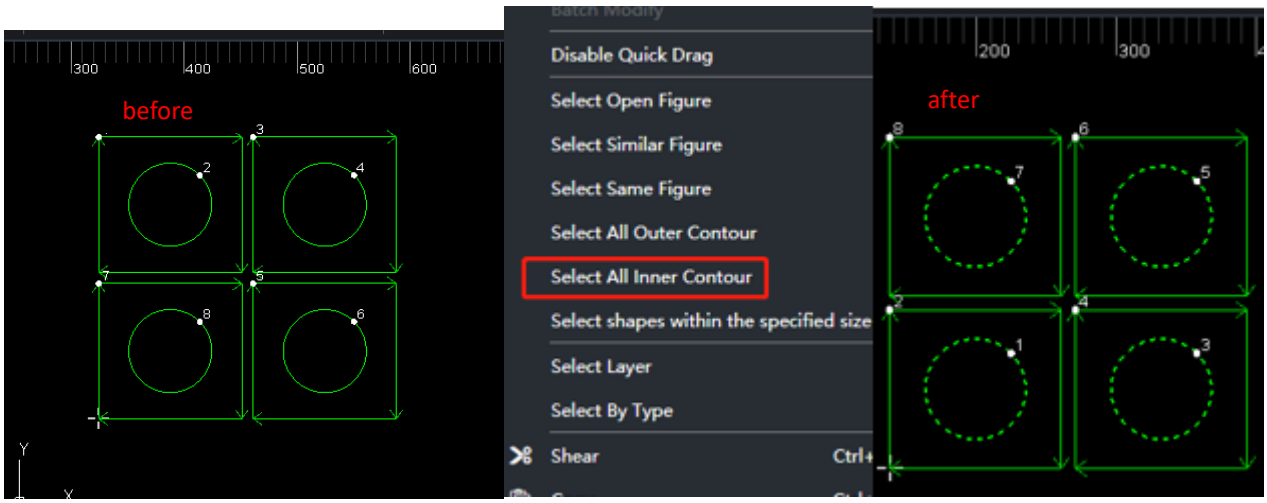
(9) Select All Outer Contour: select all outer contours in the current drawing, as follows:

Click on “Select All Outer Contour” and all outer contours in the current drawing are selected, as shown below.



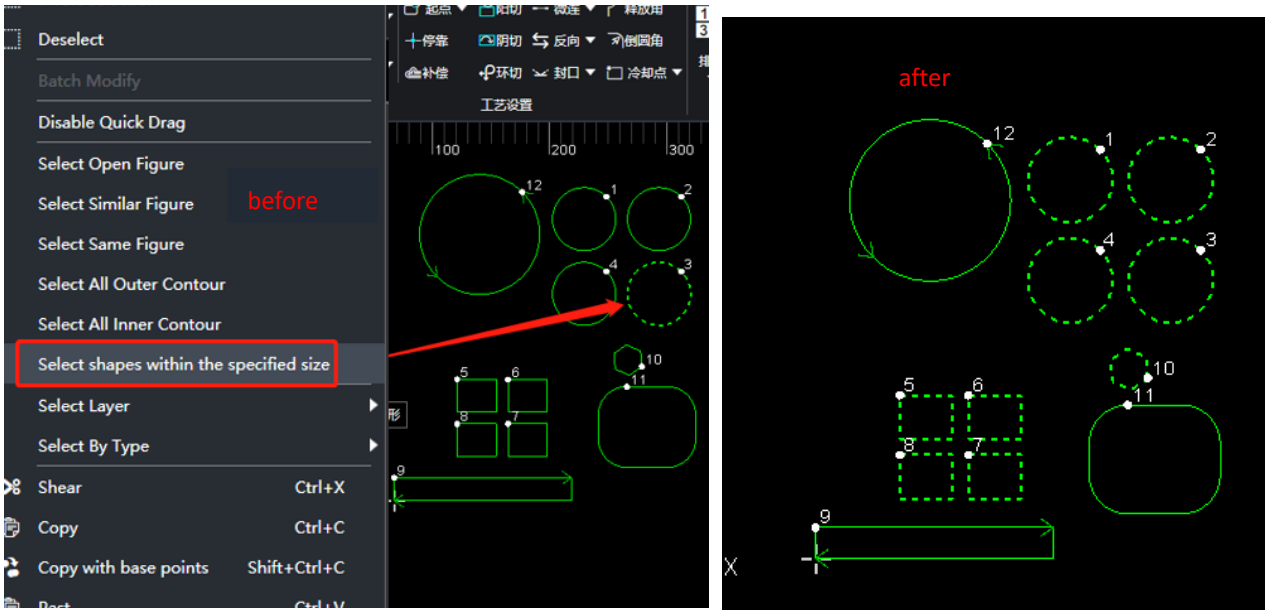
(10) Select All Inner Contour: select all inner contours in the current drawing, as follows:

Click on “Select All Inner Contour” and all inner contours in the current drawing are selected, as shown below:



Note (of the inner/ outer contour): the contours are distinguished by their positional relationship. The outermost is the outer contour; the next is the inner contour; then, the outer one, and so on. Open graphics have no contour.

(11) Select shapes within the specified size: Select graphics, click on “Select shapes within the specified size”, and select graphics size, then all graphics smaller than the graphics size are selected. As shown below:



(12) Select Layer: select all layers in the current drawing, as follows:

Click on “Lrg”, and all outer large contours in the current drawing are selected. Select other layers by the same way.

(13) Select By Type: select line/circle/point/text.

(14) Shear: cut selected graphics from drawing area.

(15) Copy: copy the graphic, as follows：

Select the graphic needs to be copied in current drawing. Click on “Copy”. Drag the graphic copied to the proper position and click on it.

(16) Copy with base points: Select the graphic to be copied, click on “Copy with base points”, select a base point, and click on “Paste” or press “ctrl + v”, then the graphic will move to the position to be pasted.

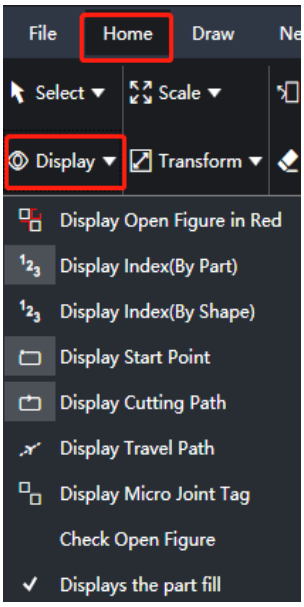
(17) Paste: paste the copied graphic.

(18) Delete: delete the graphic, as follows：

Select the graphic needs to be deleted in current drawing. Click on “Delete” and the graphic selected will be deleted.

2.1.2 Display

Click on “Display” in the Home sub-page to display more items, as shown below:



(1) Display Open Figure in Red: change open graphics into red.

(2) Display Index (By Part/By Shape): display the processing sequence of parts/graphics in current drawing.

(3) Display Start Point: display the start point of graphics in current drawing.

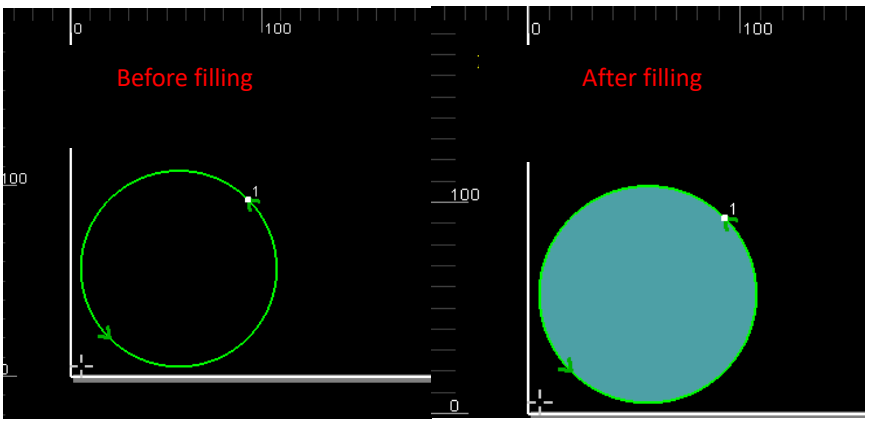
(4) Display Cutting Path: display the cutting direction of graphics in current drawing by their contours.

(5) Display Travel Path: display the travel path between the end of one graphic and the start of the next graphic.

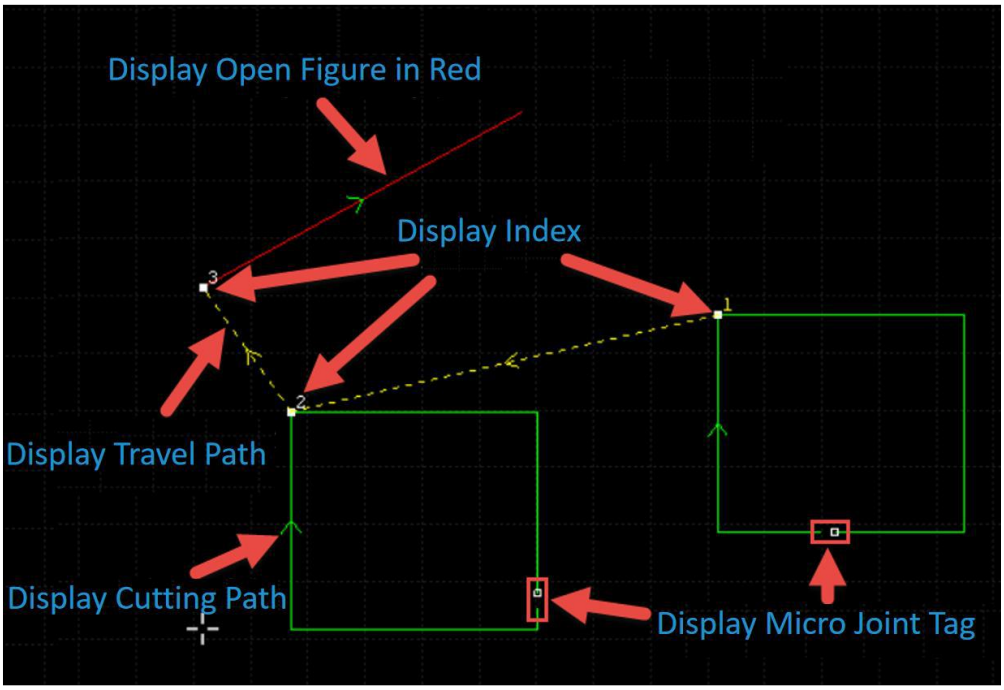
(6) Display Micro Joint Tag: display marks of the micro joint used in the graphic in current drawing clearly.

(7) Check Open Figure: display open graphics.

(8) Displays the part fill: display filled parts.



As shown below:



2.1.3 View

Click on “View” to enter the user parameter setting interface:

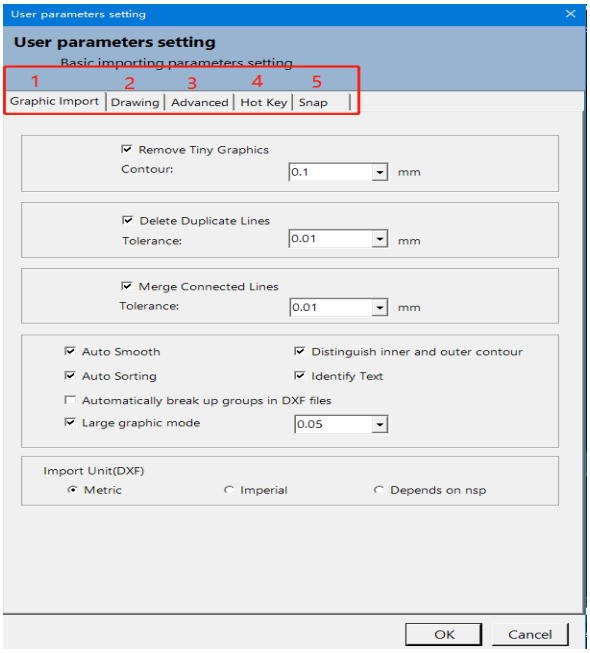
(1) **Drawing Import**: optimize imported graphics.

(2) **Drawing**: change the color of layers, main interface, grid, etc.

(3) **Advanced**: set advanced parameters such as machine tool name and graphic accuracy.

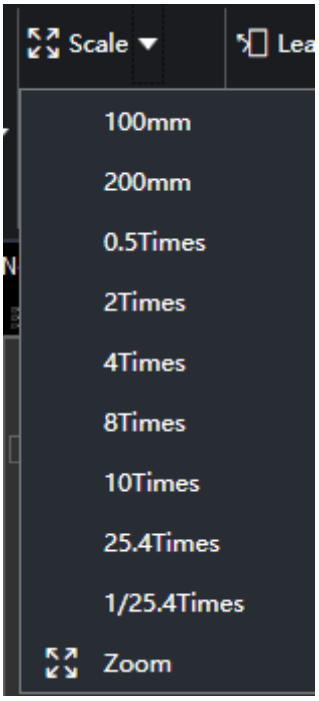
(4) **Hot Key**: set shortcut keys for commonly used functions.

(5) **Snap**: set the required snap point.

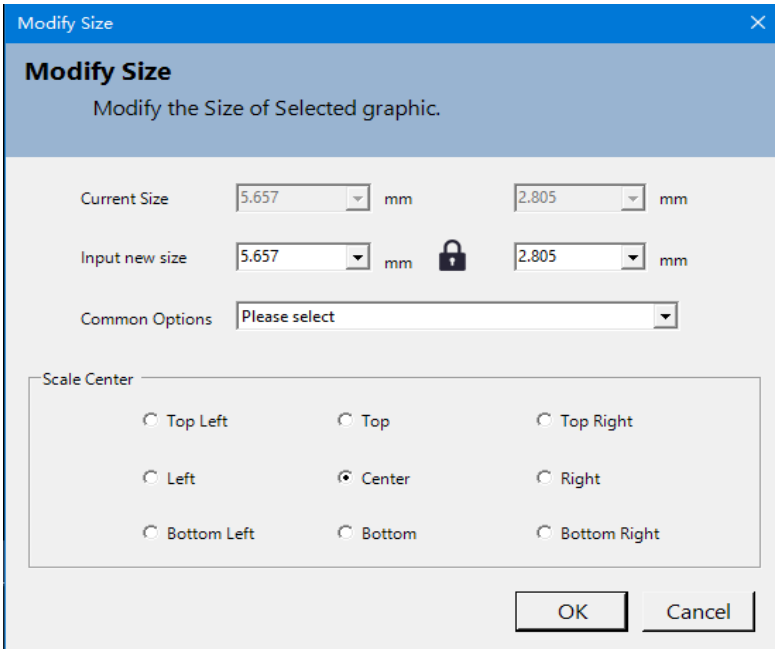


2.1.4 Scale

Select the graphic and click on the drop-down button of “Scale” to change graphic sizes, as shown below:



To input accurate sizes, select the graphic and click on “Scale” to enter the following interface. Then input a new size and click on “OK” to modify graphic size, as shown below:



(1) When the status of the lock is , the length and width of the graphic will change according to its original scale. To set length and width respectively, click on to unlock it and then input sizes.

(2) Common Options: select the option as required to scale the graphic.

(3) Scale Center: set the reference point for scaling according to the positional relation of the scaled graphic and the original one.

2.1.5 Transform

Click on “Transform” in the Home sub-page to display different ways of transforming, as shown below:

(1) **Translate**: select the graphic to be translated and click on “Translate”. Click on one reference point in the drawing area and move the mouse to drag the graphic to a position. Then click on the drawing area to complete.

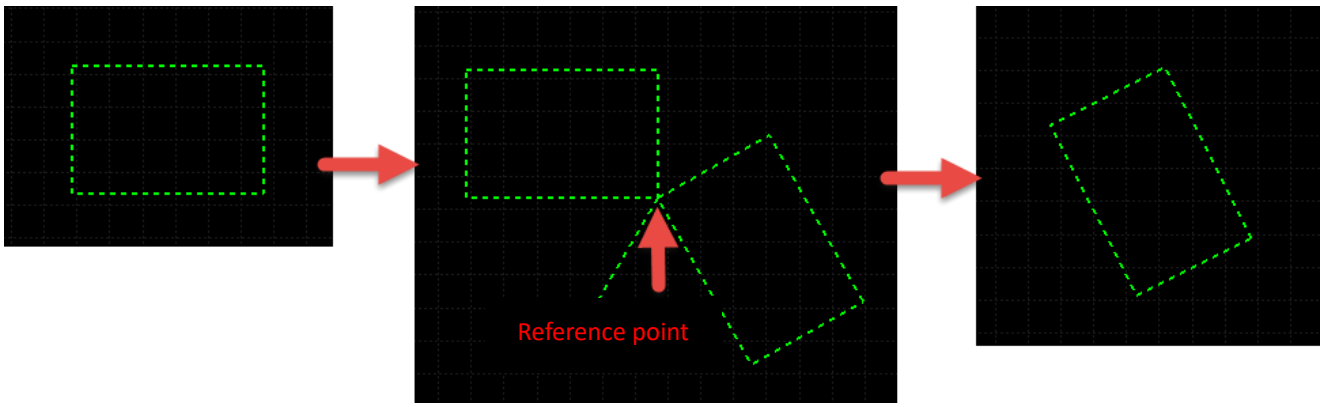
(2) **Zoom**: select the graphic to be zoomed, click on “Zoom”, confirm a based point in the drawing area and another zooming point. Then left click the mouse.

(3) **Align**: select the graphic to be aligned and click on “Align” to display different alignment ways, which can be selected to align graphics.

(4) **Flip Horizontal**: select the graphic to be flipped and click on “Flip Horizontal”.

(5) **Flip Vertical**: select the graphic to be flipped and click on “Flip Vertical”.

(6) **Flip**: select the graphic to be flipped and click on “Flip”. Click on the drawing area for a reference point. Move the mouse to drag the graphic to a position and click on the drawing area, as shown below:



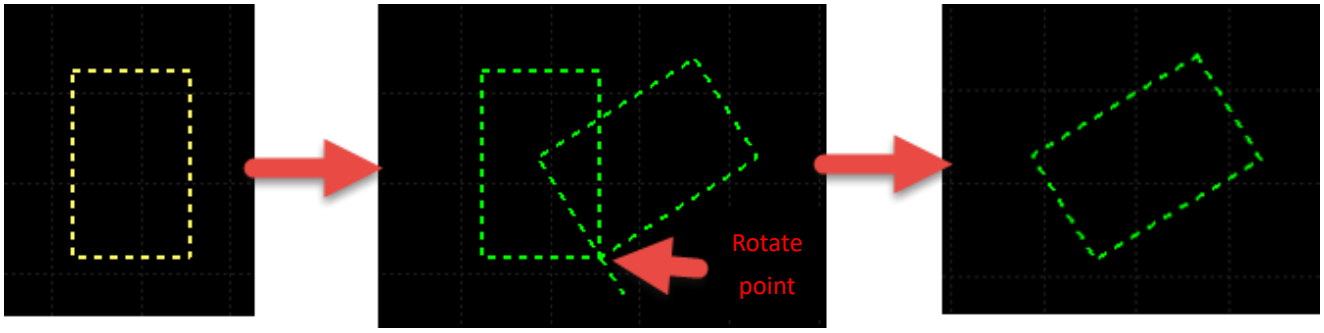
(7) Rotate CCW90°: select the graphic to be rotated and click on “Rotate CCW90°”.

(8) Rotate CW90°: select the graphic to be rotated and click on “Rotate CW90°”.

(9) Rotate 180°: select the graphic to be rotated and click on “Rotate 180°”.

(10) Rotate: select the graphic to be rotated and click on “Rotate”. Click on the drawing area for a reference point.

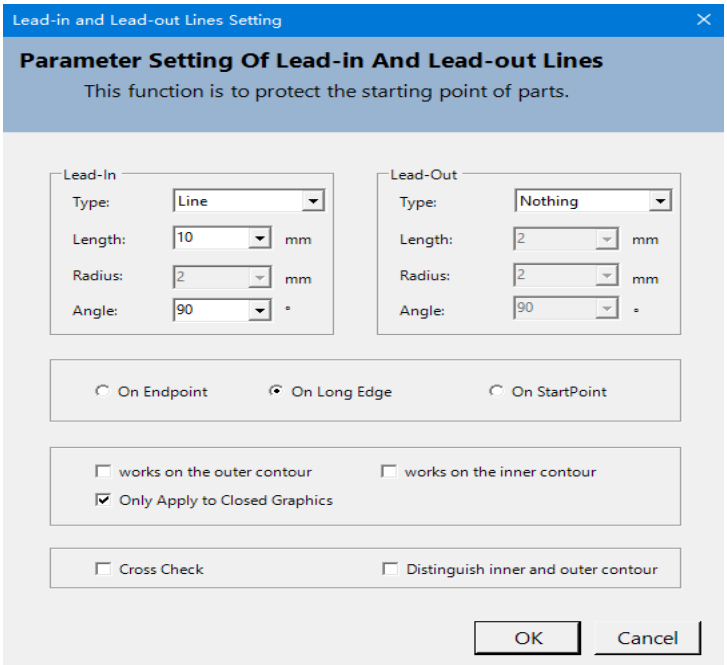
Move the mouse to drag the graphic to a position and click on the drawing area, as shown below:

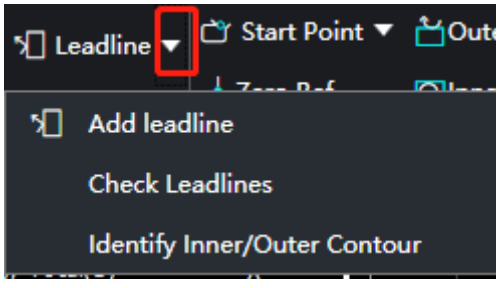


2.1.6 Leadline

Add lead-in and lead-out lines for the selected graphic, including line, arc, and line + arc.

Supported lead-in positions include vertex (On Endpoint), long edge (On Long Edge) and start point (On StartPoint). It’s optional to add the leadline to the closed graphics and add cross-check after adding leadline, as shown below:





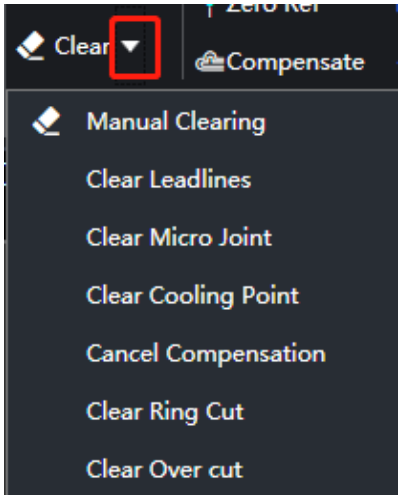
(1) Add leadline: click the dropdown button of “Leadline” and select “Add leadline”.

(2) Check Leadlines: reduce the length to avoid breaking the contour, when the leadline crosses the cutting contour as the leadline is too long.

(3) Identify Inner/Outer Contour: the contours are distinguished by their positional relationship. The outermost is the outer contour; the next is the inner contour; then, the outer one, and so on. Open graphics have no contour.

2.1.7 Clear

Click on the dropdown button of “Clear" in the Home sub-page to display different options, which can clear previous operations of the graphic, as shown below:

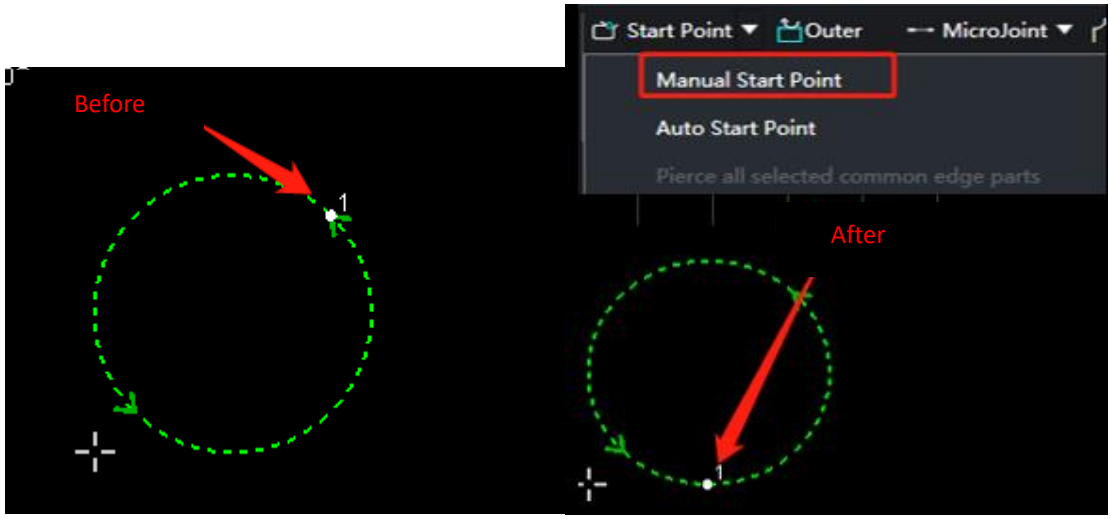


2.1.8 Starting point

Set the starting point to process graphics.

Click on “Start Point” in the Home sub-page to show two items: Manual Start Point and Auto Start Point.

(1) Manual Start Point: click on it and select the contour of the graphic, as shown below:

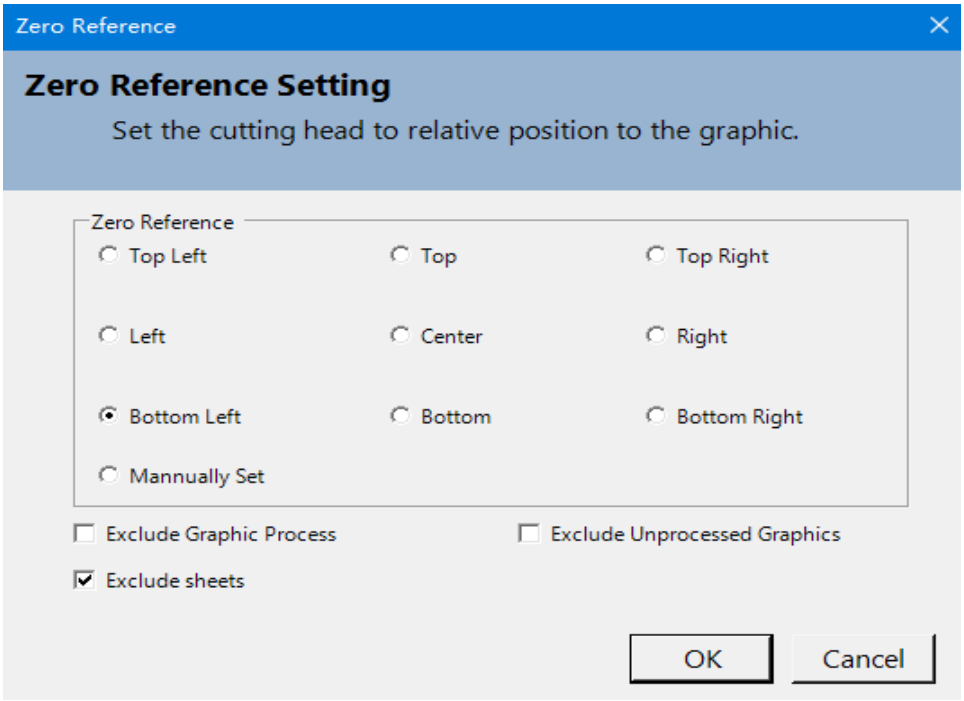


(2) Auto Start Point: select the graphic requiring to modify the start point, click on “Auto Start Point” and set the start point, then click on “OK”, as shown below:

2.1.9 Zero Ref

Set the cutting head to a relative position to the graphic as the zero reference (docking position).
Bottom Left is recommended.

Click on “Zero Ref” in the Home sub-page, set relevant parameters and click on “OK”, as shown below:

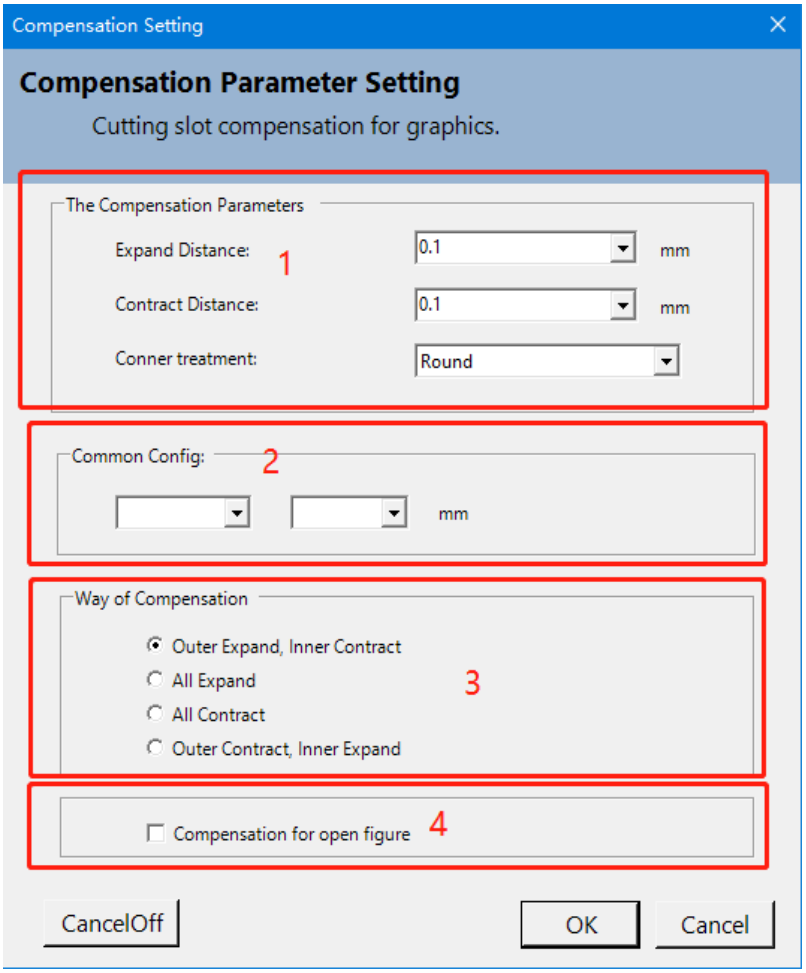


Note: “Select the zero reference by following the graphic” can be selected in the “Advanced Selection” in the Configuration Tool.

2.1.10 Compensate

By scaling the graphic, compensate cutting slots to ensure processing accuracy of graphics.

Select the graphics requiring to be compensated, click on "Compensate" in the Home sub-page and set parameters, then click on "OK", as shown below



(1) The Compensation Parameters

- Expand Distance: the value that increases in equal intervals outwards.
- Contract Distance: the value that decreases in equal intervals inwards.
- Corner Treatment: select sharp or round processing in corners.

(2) Common Config

- Read the configuration in the compensation library by selecting materials and thickness to quickly apply.
- Modify default parameters in the compensation library by selecting materials and thickness.

(3) Way of Compensation:

- Include Outer Expand, Inner Contract; All Expand; All Contract; Outer Contract, Inner Expand.

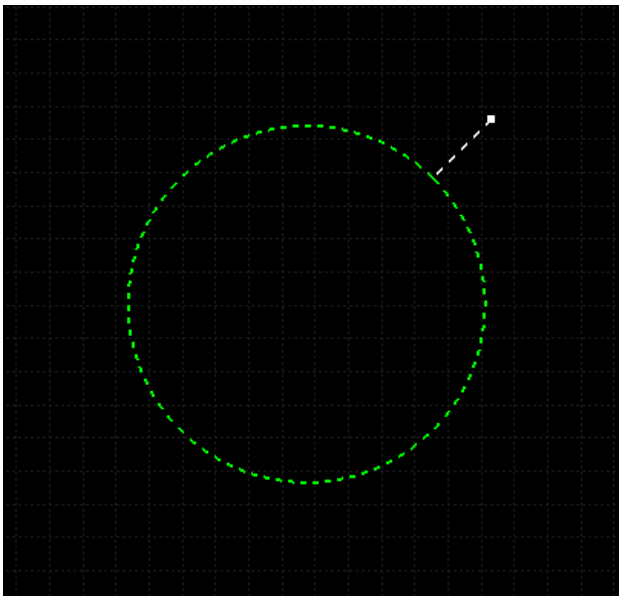
(4) Compensation for open figure:

- Check to compensate open graphics.

2.1.11 Outer

Outer refers to adding a leadline outside the graphic contour.

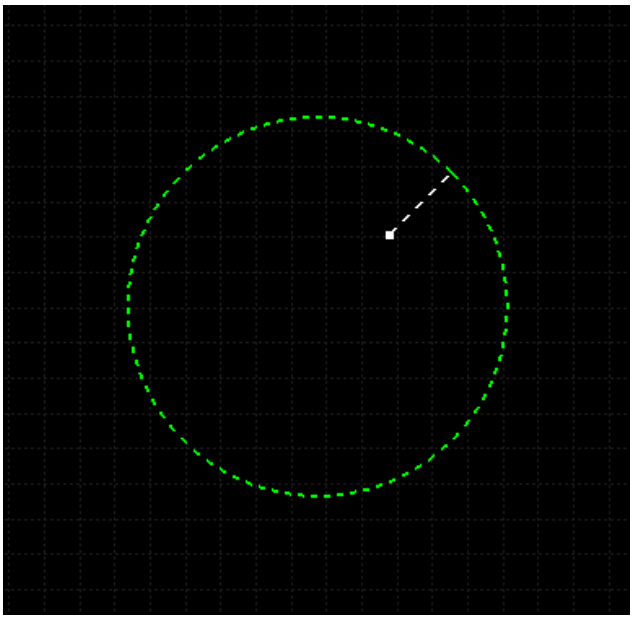
Select the graphic with a leadline and click on “Outer” to set the leadline as outer leadline, as shown below:



2.1.12 Inner

Inner refers to adding a leadline inside the graphic contour.

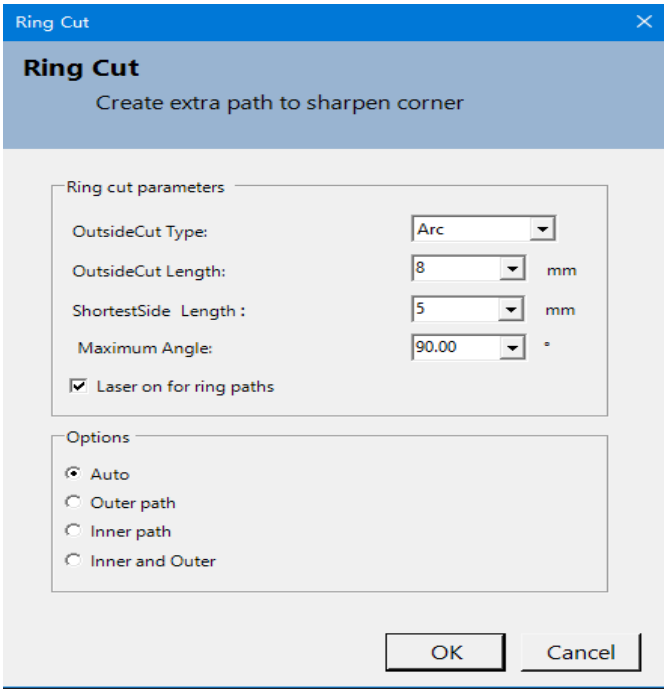
Select the graphic with a leadline and click on “Inner” to set the leadline as inner leadline, as shown below:



2.1.13 Ring Cut

Add Ring Cut to the graphic.

Select the graphic requiring ring cut, click on “Ring Cut” in Home sub-page, and set the parameters in the following interface, then click on “OK”, as shown below:



OutsideCut Type: select the arc or triangle as the contour of outside cutting.

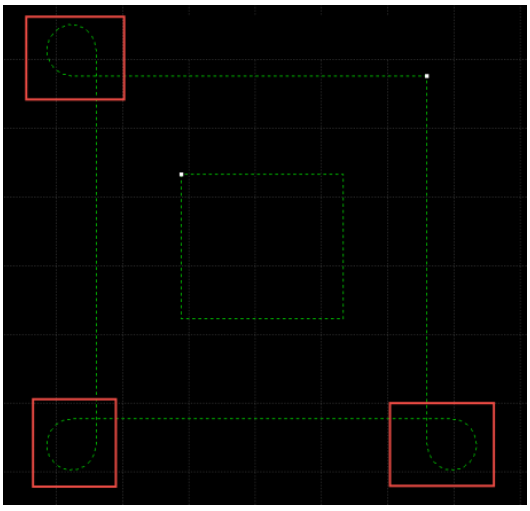
OutsideCut Length: set the perimeter of the contour of outside cutting.

ShortestSide Length: edge smaller than this value will not use the outside cutting..

Maximum Angle: corner bigger than this angle will not use the outside cutting.

Laser on for ring paths: whether to beam out in ring cut sectors.

The graphic added with ring cut is shown below:

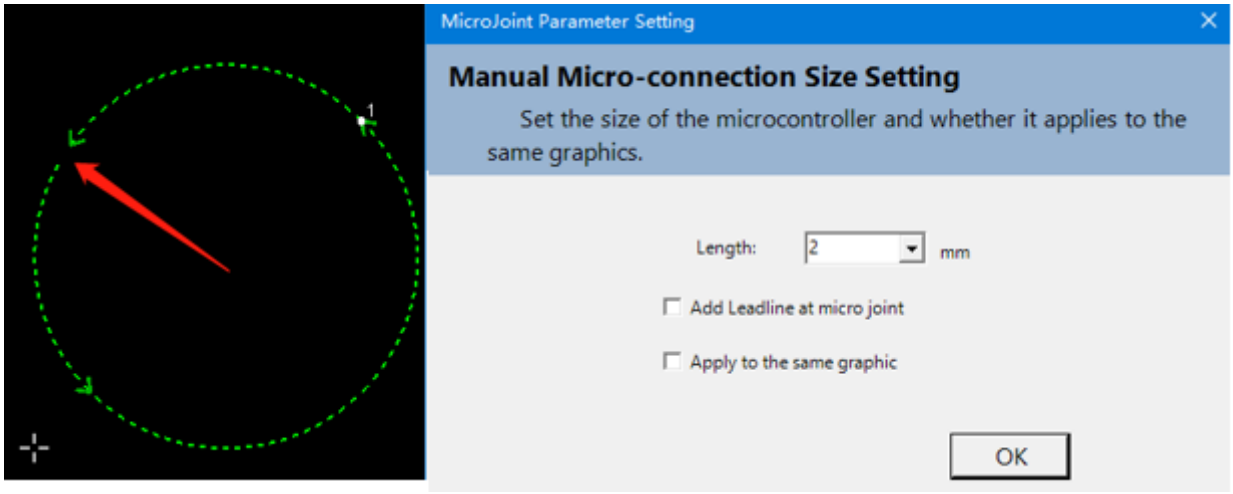


2.1.14 MicroJoint

The workpiece with micro connections can avoid falling off.

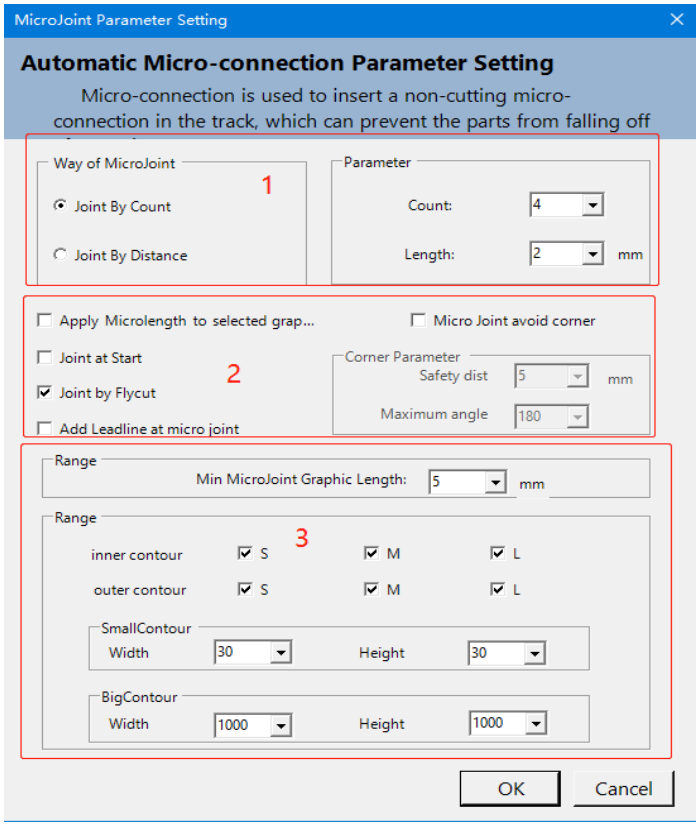
(1) Manual MicroJoint

Select the graphic to micro connect and click on “MicroJoint” in Home sub-page. Set the parameter for manual microjoint and click on “OK”. Then, click on the contour of graphic to complete. The setting of manual microjoint is shown as below:



(2) Auto MicroJoint

Select the graphic to micro connect and click on the drop-down button of MicroJoint. Click on “Auto MicroJoint”, set the parameter in the following interface and click on “OK”, then the microjoint is added automatically, as shown below:



(1) Way of Microjoint

- Joint by Count: add microjoint for each contour by a fixed number.
- Joint by Distance: add microijoint for contours by a fixed distance.

(2) Parameter

- Count: the amount of microjoint in each contour.
- Length: the length of the microjoint.

(3) Advanced Options

- Apply MicroJoint to selected graphic: change the microjoint size of selected graphics into the same size.
- Joint at Start: check to add microjoint at the start point.
- Joint by Flycut: check to add micro joint in fly cutting.
- Add Leadline at micro joint: check to auto add a leadline at microjoints. If unchecked, the leadline can only be added after separating microjoints.

(4) Corner Parameter

- Micro Joint avoid corner: check to use the function.
- Safety dist: the determination range of corners.
- Maximum angle: the determination angle of corners.

Take the parameters in the figure above as an example: For a corner with its angle less than 180°, areas around 5mm of the corner can't be added microjoint, though meeting microjoint conditions.

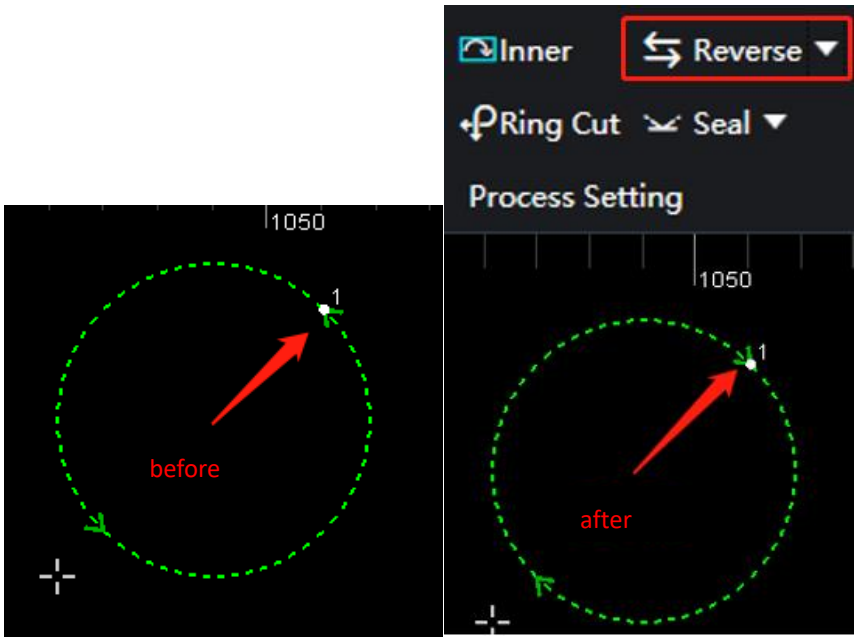
(5) Range

Min MicroJoint Graphic Length: graphics with its perimeter less than this value can't be added microjoint.

2.1.15 Reverse

Adjust the processing direction of graphics: CCW (anticlockwise) ⇔ CW (clockwise)

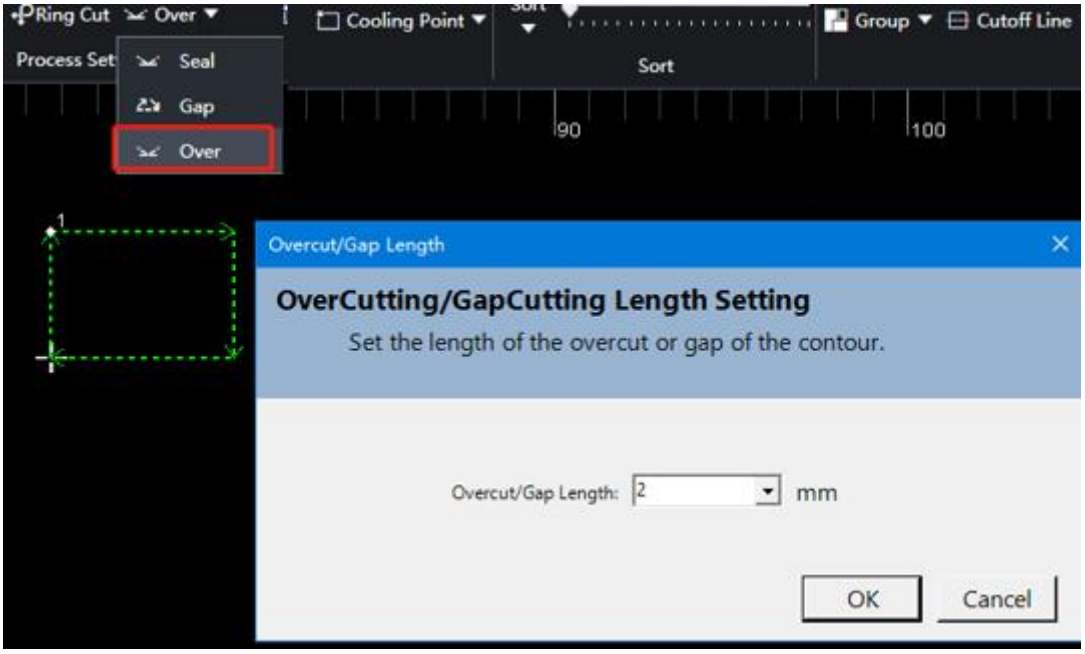
Reverse: if the processing direction now is clockwise, select the graphic and click on "Reverse". Then, the selected graphic will be processed in an anticlockwise direction, as shown below:

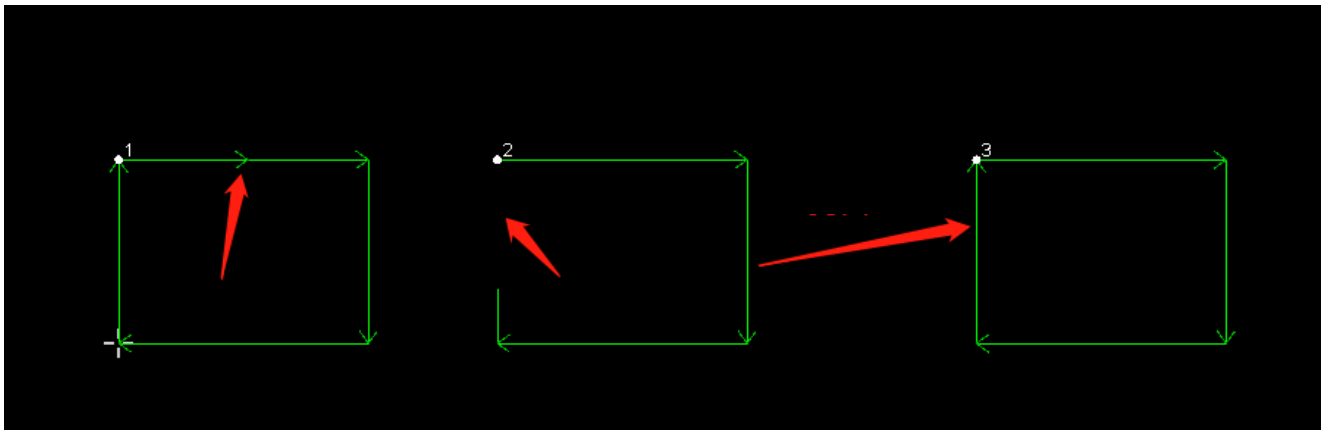


2.1.16 Over

Set the overcut length for the selected contour.

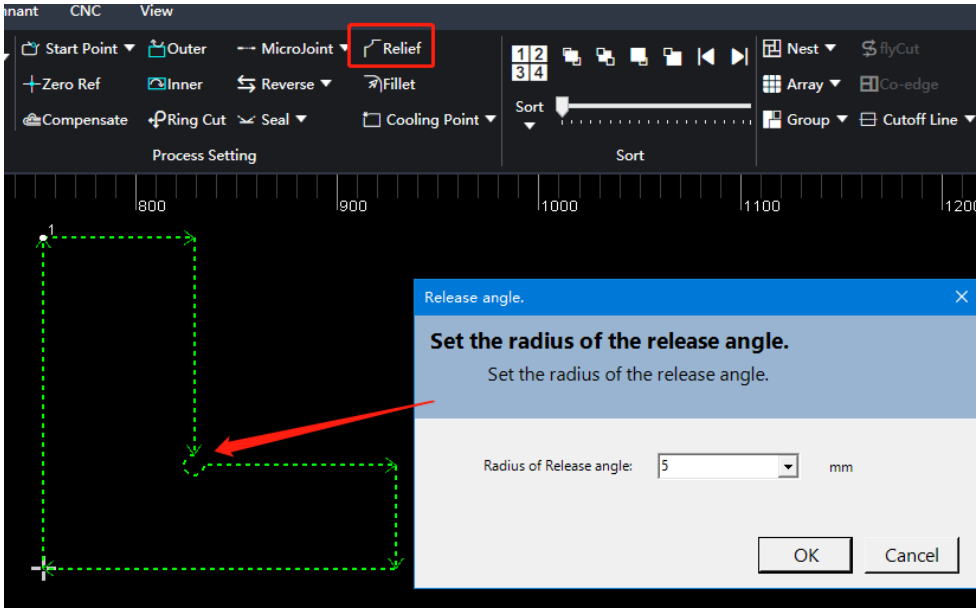
Select the graphic to be overcut and click on “Over” in the Home sub-page. Set the overcut length in the following length and click on “OK”, as shown below:





2.1.17 Relief

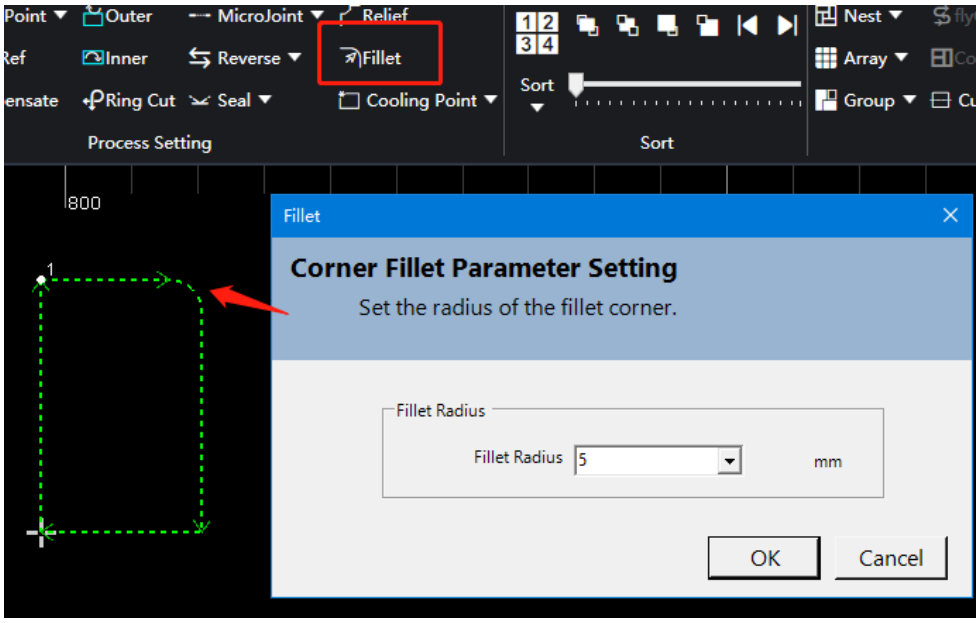
Click on “Relief” to generate relief angle for following bending.



2.1.18 Fillet

Switch the sharp corners into the filleted corner.

Select the graphic needs fillet and click on “Fillet” in the Home sub-page. Set the fillet radius and click on “OK”. Then, click on the corner of the graphic to complete, as shown below:

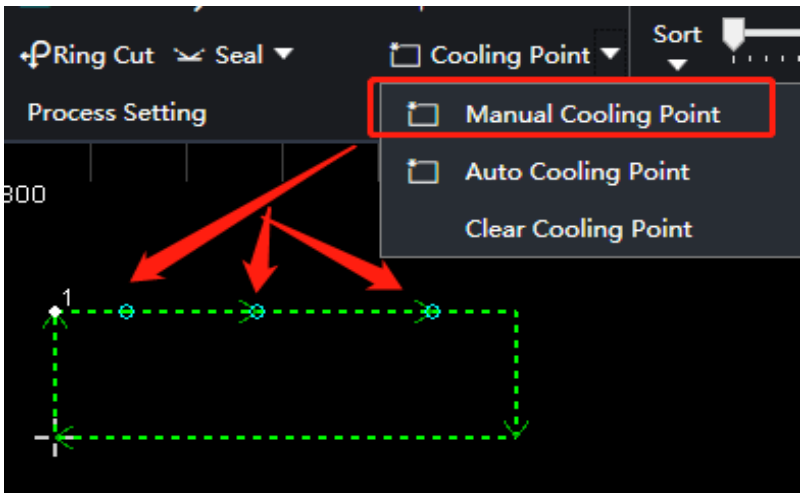


2.1.19 Cooling Point

The cooling point is used to avoid the workpiece being incomplete for overheating.

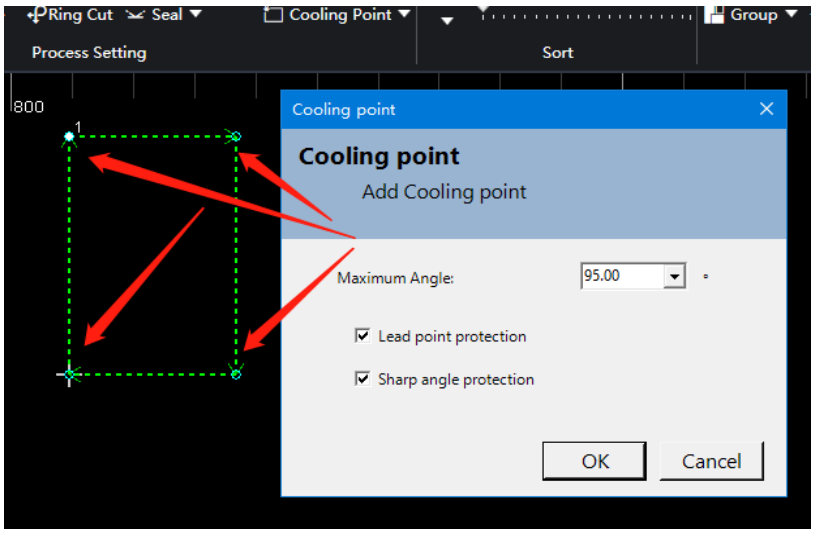
(1) Manual Cooling

Click on “Manual Cooling Point” in the Home sub-page and select the contour of the graphic, as shown below:



(2) Auto Cooling Point

Select the graphic to be added cooling point and click on the drop-down button of “Cooling Point”. Click on “Auto Cooling Point”, set the parameter in the following interface and click on “OK”, as shown below:



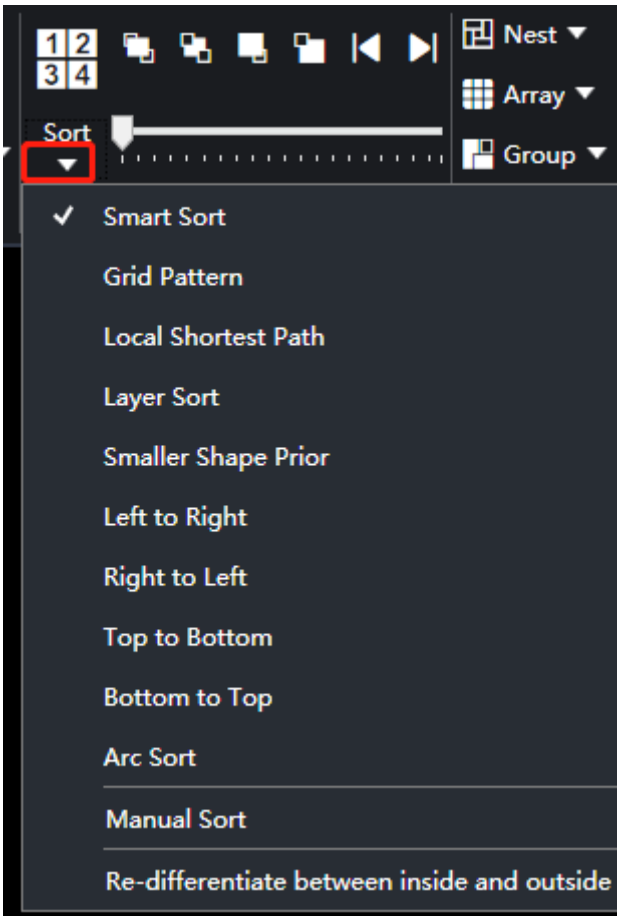
- Maximum Angle: corners bigger than this value will not add cooling point.
- Lead point protection: check to add cooling point at the start point of the graphic.
- Sharp angle protection: not add cooling point at corners if unchecked.

Select the graphic and click on “Clear Cooling Point” in the drop-down button of “Cooling Point” to clear cooling points in the graphic.

2.1.20 Sort

Sort graphics to cut based on different requirements.

Select the graphics to be sorted and click on “Sort” in the Home sub-page, then graphics will be auto sorted. Click on the drop-down button of “Sort” to show different sorting methods, as shown below.



Four manual sorting buttons can be used to adjust the graphics after auto-sorting, as shown below:

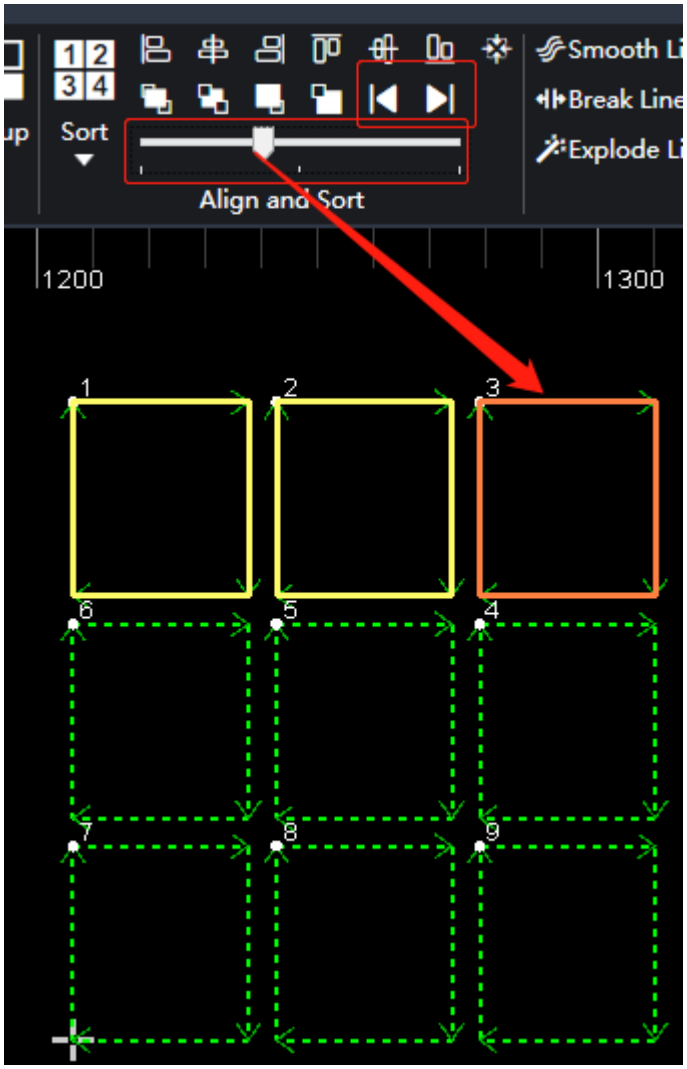
 Move first: move the selected graphic to the first.

 Move Last: move the selected graphic to the last.

 Move front: move the selected graphic forward

 Move behind: move the selected graphic backward.

There are corresponding manual buttons and barcodes, used to browse the processing sequence of the graphics corresponding to the processing progress, as shown below:



Orange: the third graphic to process;
Yellow: processed already.

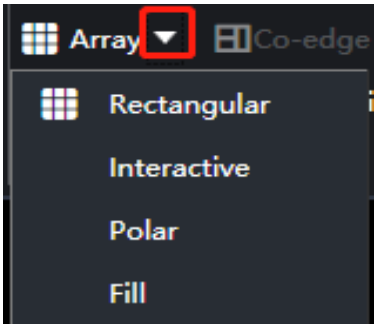
Move before: back to the last processing graphic

Move after: start to process the next graphic.

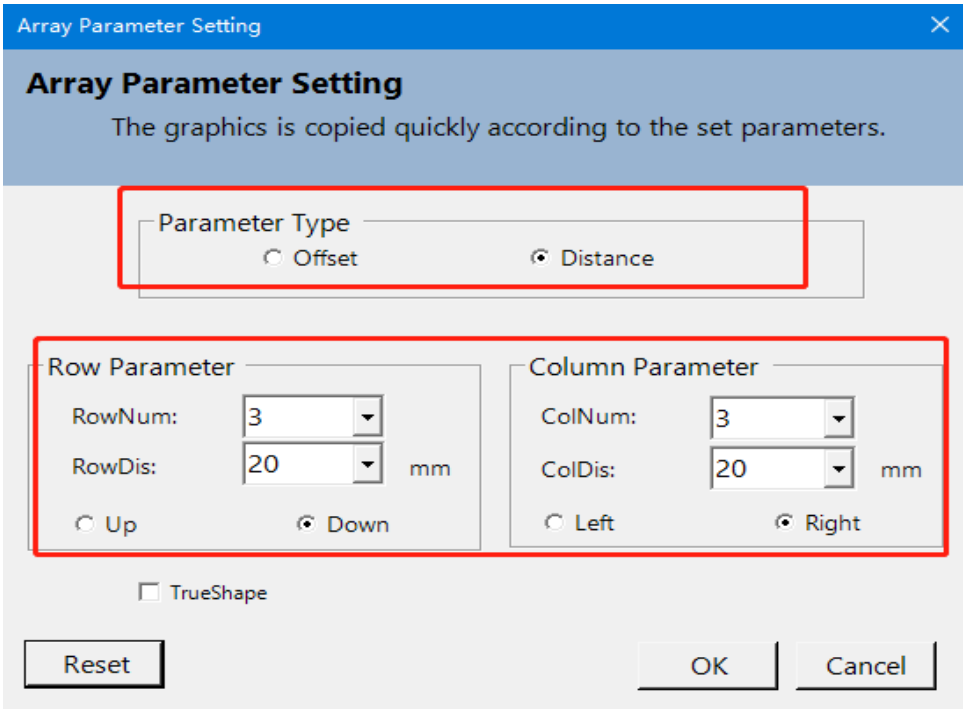
2.1.21 Nest

Refer to Chapter 2.3.4.

2.1.22 Array



1) Rectangular

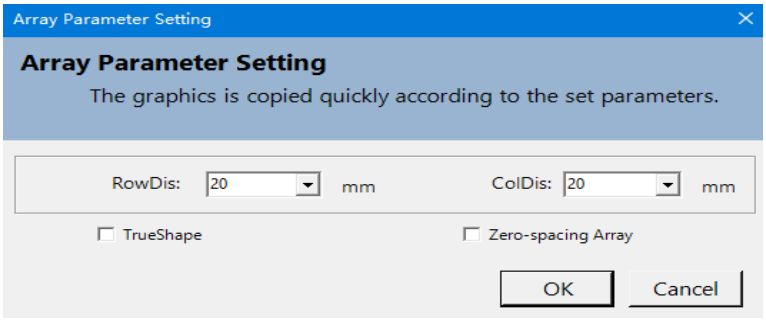


Select the graphic to be copied in an array, click on the dropdown button of “Array” and click on “Rectangular”, then set parameters in the following interface and click on “OK”. The parameter setting is shown as below:

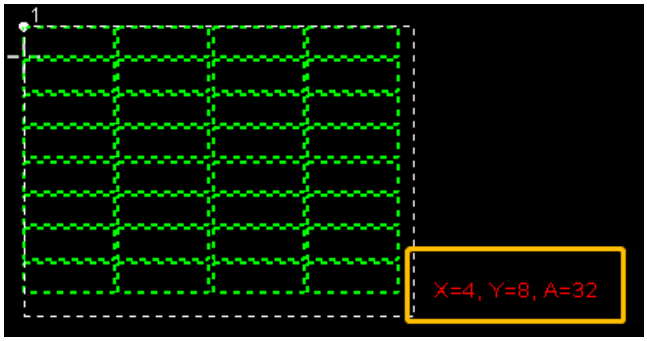
- Parameter Type: select to array by offset or distance.
- RowNum / ColNum: row /column number in the array
- RowDis / ColDis / Offset: distance/ offset value of the array.
- Up / Down / Left / Right: direction of the array

2) Interactive

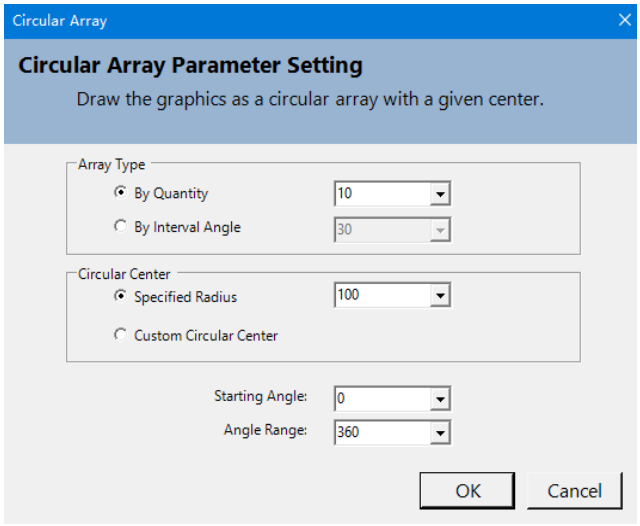
Select the graphic to be copied in an array, click on the dropdown button of “Array” and click on “Interactive”, then set parameters in the following interface and click on “OK”. The parameter setting is shown as below:



Drag the mouse to confirm the amount of array.



3) Polar

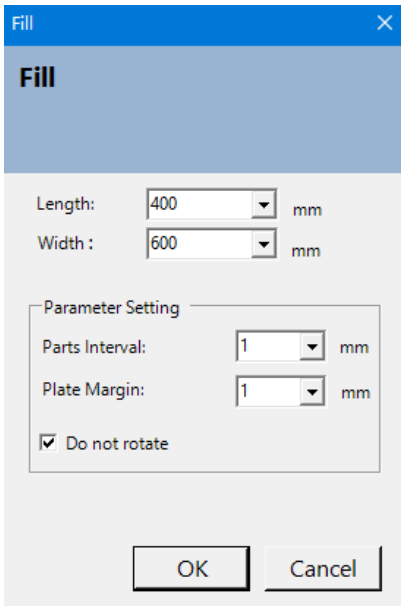


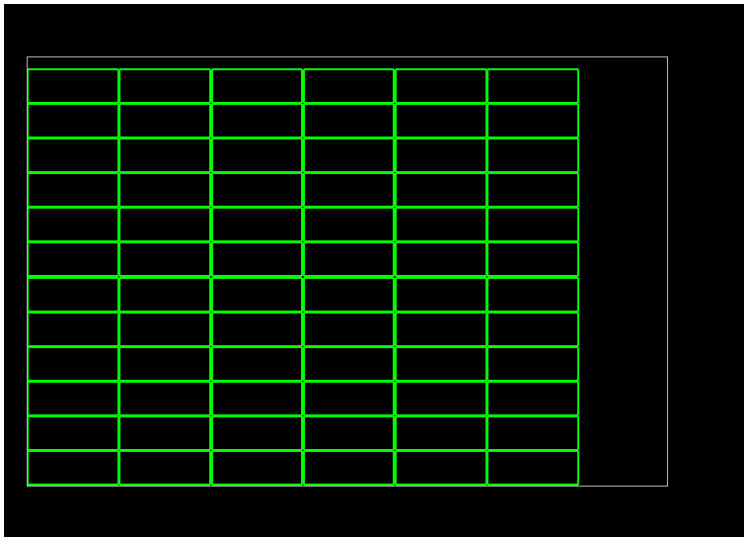
Select the graphic to be copied in an array, click on the dropdown button of “Array” and click on “Polar”, then set parameters in the following interface and click on “OK”. The parameter setting is shown as below:

- Array Type: array by quantity or interval angle.
- Circular Center: set by specified radius or custom stretching in the drawing area.
- Starting Angle: starting angle of the array.
- Angle Range: array within the angle range.

4) Fill

Select the graphic to be copied in an array, click on the dropdown button of “Array” and click on “Fill”, then set parameters in the following interface and click on “OK”. The parameter setting is shown as below:

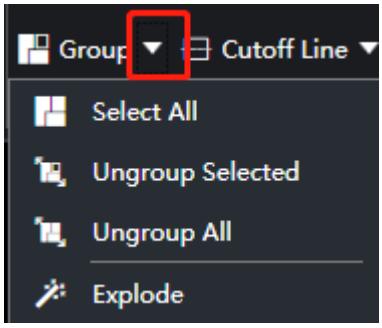




2.1.23 Group

Grouping several graphics into a whole to fix their relative position when being dragged.

Select several graphics and click on “Group” in Home sub-page to make them a whole. Then the graphic sorting, relative positions and layers are fixed and will not change when a new sorting or dragging starts.

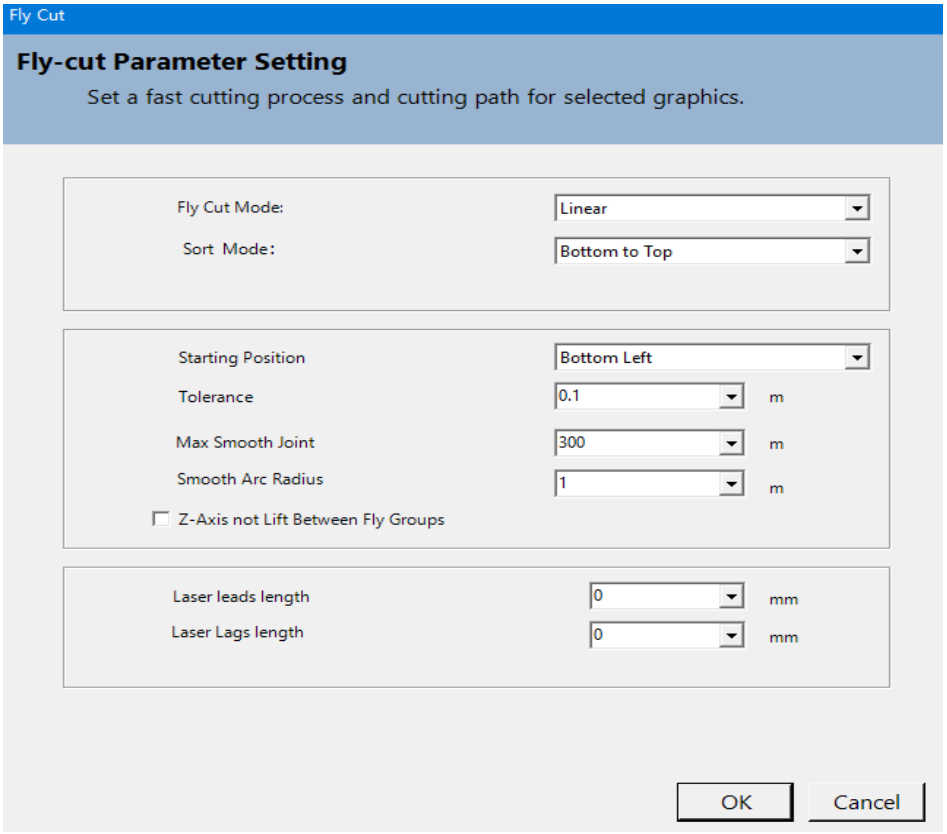


Click the dropdown button of “Group” to show different group methods:

- Select All: select all groups in the current drawing.
- Ungroup Selected: cancel grouping of selected graphics.
- Ungroup All: cancel grouping of all graphics in the current drawing.
- Explode: break the selected graphic into the smallest line/arc.

2.1.24 Fly Cut

Set cutting path and layer for selected graphics. The parameter setting is shown below:



- Fly Cut Mode:

Circle: select to cut in circular path.

Linear: select to cut in rectangular/polygon-shaped path.

Radar: linear cutting path without smooth arcs.

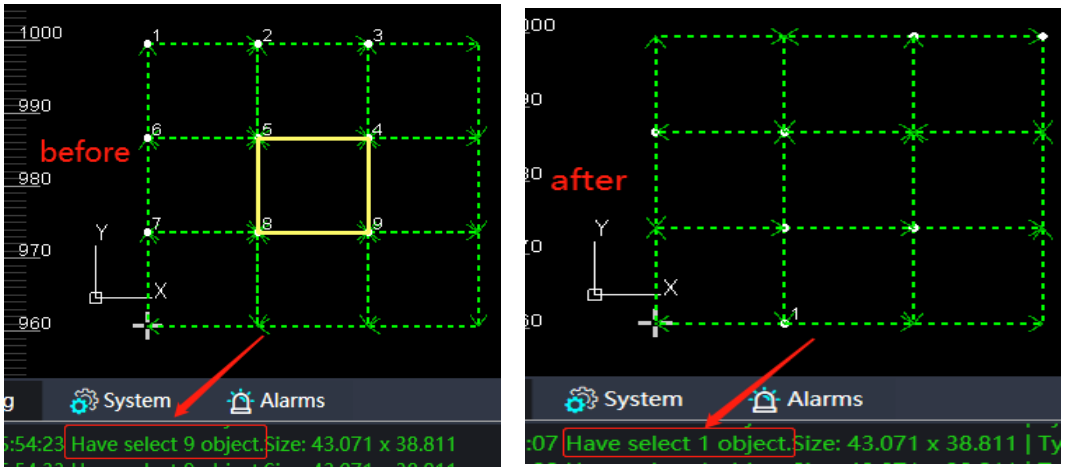
Waist: select to cut in waist-shaped path.

Leadline: select for graphics with leadline

- Sort Mode: select different sort modes to use corresponding fly cutting paths.
- Starting Position: select the start position of the graphic to be processed.
- Tolerance: if the horizontal and vertical length of the graphic is smaller than the tolerance, the graphic will be in a line or an array; if larger, the graphic will be in multiple lines or arrays.
- Max Smooth Joint: if the distance between two graphics is less than the max smooth joint length, an arc tangent will be auto-added to the cutting path to speed up processing and improve efficiency.
- Smooth Arc Radius: radius of the arc in Max Smooth Joint.
- Z-axis not Lift Between Fly Groups: select to lift the Z-axis in the travel between two groups in fly cutting.
- Laser leads length: laser on in advance for better cutting off the workpiece.
- laser Lags Length: as over-cutting distance, laser off delay is for better cutting off the workpiece.

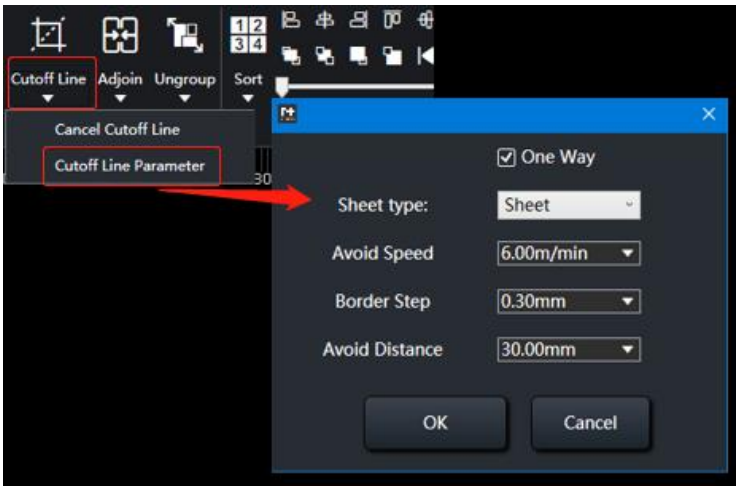
2.1.25 Co-edge

Combine workpieces to share one edge for cost reduction and processing efficiency improvement.
Select graphics to be co-edged and click on “Co-edge” in the Home sub-page. Then set co-edge types and sorting methods and Click on “OK”. After co-edging, the graphics will be grouped into one contour to avoid sorting errors. The result of co-edge is shown below:



2.1.26 Cutoff Line

Cut off the waste sheet after processing. Draw a path to be cut in the sheet and set it as the cutoff line.



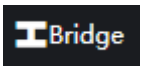
The cutoff line includes one way cutting and two ways cutting. As for the former, the cutting head will detect and cut to the edge along the sheet, after cutting actual length; If unchecking “One Way”, the cutting head will detect the edge of sheet in the opposite direction before cutting, by two ways cutting. When reaching the edge, it starts to cut towards start point, and runs in the same way of one way cutting.

- Sheet Type: select thick/thin sheet.
- Avoid Speed: the speed of cutting head when detecting the edge.
- Border Step: the sensitivity judged when detecting the edge of sheet. The greater the value, the lower the

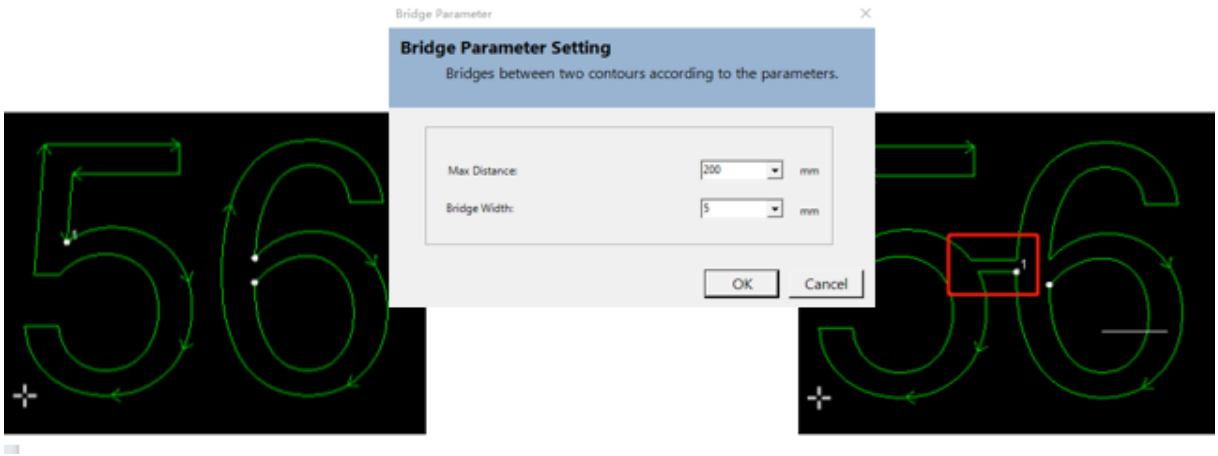
sensibility, and the longer the Z-axis overshoot; The smaller the value, the higher the sensibility, and it's more possible to misjudge undulation position of sheet as its edge.

- Avoid distance: move towards the direction opposite to edge detection from the starting point of the cutoff line, and then start to detect the edge, so as to avoid hitting the sheet when the start point is near the edge.

2.1.27 Bridge

Bridge is used to connect separate shapes.
After setting the maximum distance of the adjacent curves to and the bridge width, users can add bridge for selected contours by clicking on 

Select the graphic to be bridged and click on "Bridge" in the Home sub-page. According to prompts in the log, double-click the drawing area to generate bridge line. Then set parameters in the following interface and click on "OK".



Bridge Parameters:

- Max Distance: add bridges to curves on the bridging path less than this distance.
- Bridge width: the width of bridging.

2.1.28 Arc Detection

Click on "Arc Detection" to display two detection methods: Empty Operation Mode and Machining Mode.
Click on its dropdown button to clear detection track.

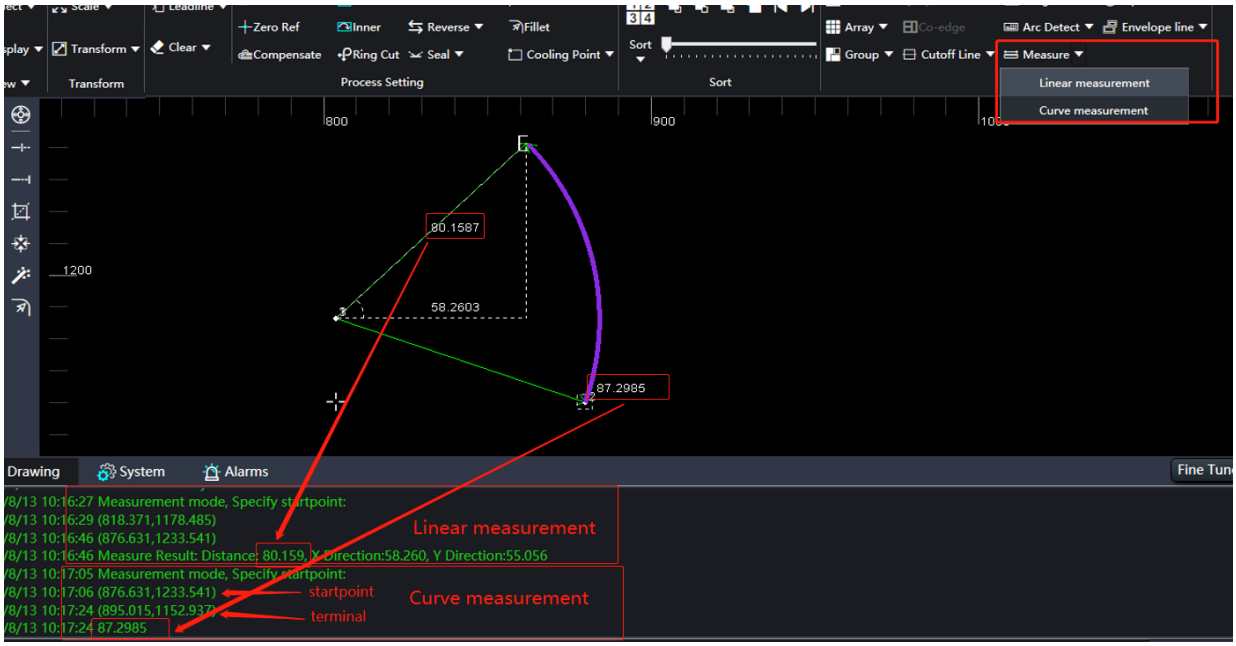
After checking, next cutting path will be recorded, when commissioning servo parameters. The overlap between the actual motion path and the graphic can be a reference for debugging servo parameters.

Note: Do not check this function in normal processing.

2.1.29 Measure

Measure the distance between two points.

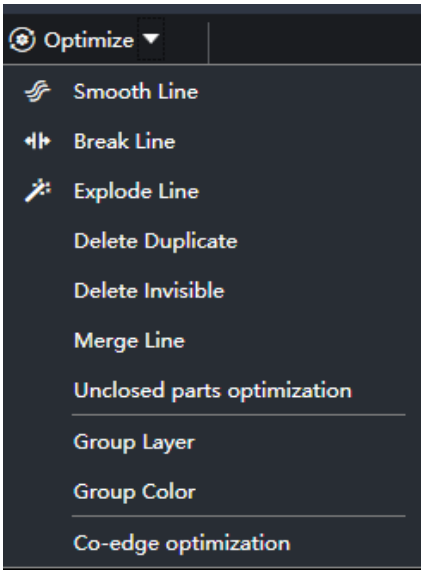
There are two measurement methods: linear measurement and curve measurement. Click on “Measure” in the Home sub-page, and click on the start and terminal points in drawing area, according to system logs.



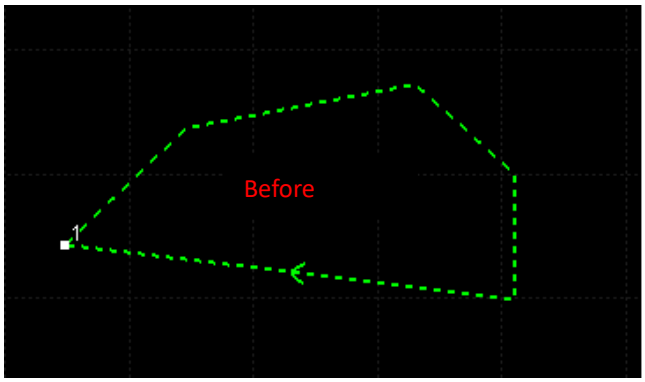
2.1.30 Optimize

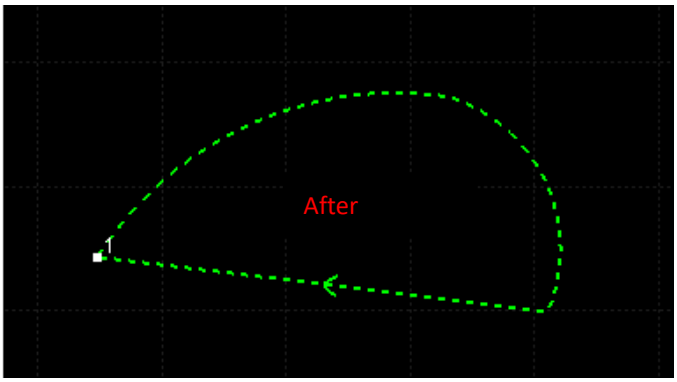
Optimize the graphics.

Click on the dropdown button of “Optimize” in the Home sub-page, to show a list of optimization ways, as shown below:

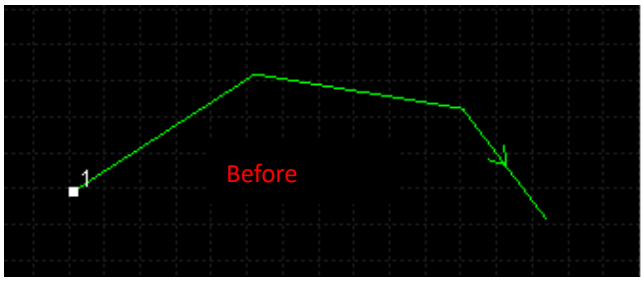


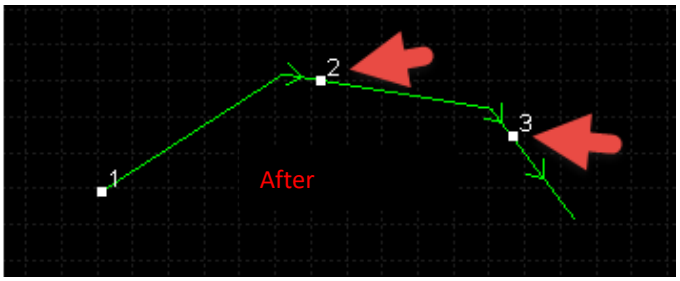
(1) Smooth Line: select various lines to be optimized and click on “Smooth Line”. Then set the smooth precision and click on “OK”. The graphics will be auto-optimized, as shown below:



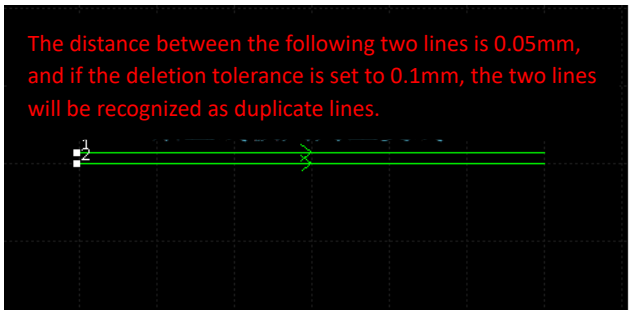


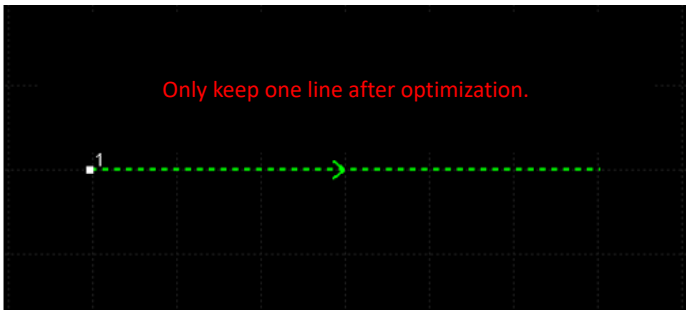
(2) Break Line: click on “Break Line” and then click on a point of the graphic contour to break it. The process can be Continuous, but can also be canceled by pressing the ESC button, as shown below:





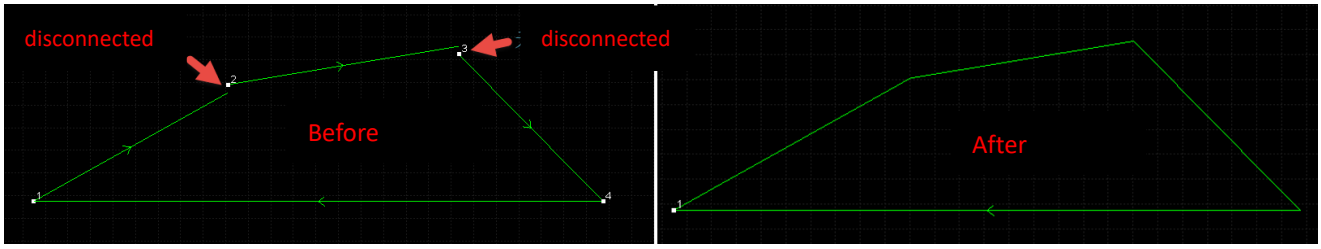
(3) Delete Duplicate: some lines are duplicates though visually not. Select the graphic, click on “Delete Duplicate”, and set the deletion tolerance. If the max distance of two contours are less than the tolerance, they are duplicate. After parameters setting and click on “OK”, as shown below:



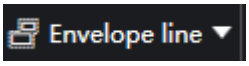


(4) Delete Invisible: In the imported graphics, there may be some small graphics difficult to recognize or possible to move to an abnormal position when processing. Then users can click on “Delete Invisible” to set the minimum contour size and click on “OK” to delete graphics whose size is smaller than the value.

(5) Merge Line: There may be some graphics are connected visually but actually not. Click on “Merge Line” and set the merging tolerance, that is, if the interval of the nearest breakpoints of two contours is within the tolerance, they will be connected. After tolerance setting, click on “OK”, as shown below:



2.1.31 Envelope Line

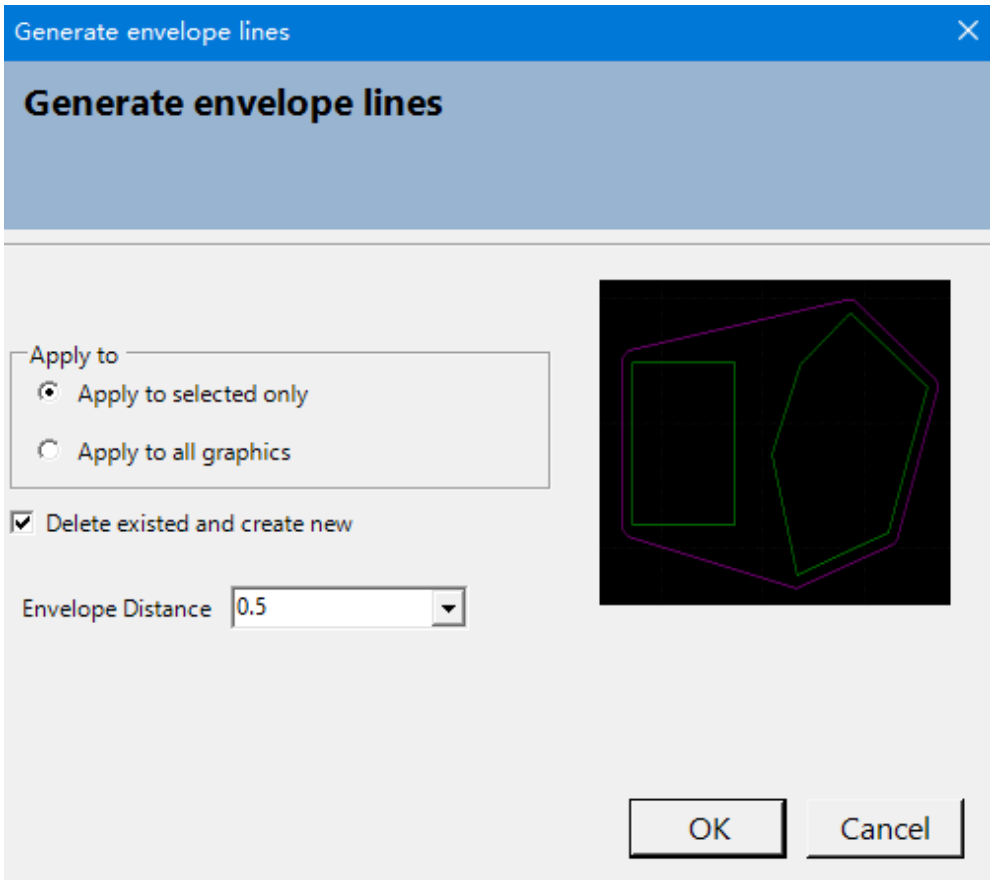
Click on the dropdown button of 

to display two items: generate envelope line and clear envelope line. Parameters are shown as below:

1) Apply to: select to apply to selected graphics only or all graphics;

2) Delete existed and create new: delete an existing envelope line.

3) Envelope Distance: set the closest distance between the envelope line and the graphic. The larger the value, the larger the range of envelope line.



After setting parameters, click “OK” in the above interface, then the system will generate an envelope line surrounding the maximum outer contour of the part for the selected drawing.

Envelope lines are mainly used in remnant cutting, to improve the sheet utilization and avoid loss caused by cutting to the outside of sheet. Compared with frame, envelope lines are closer to the graphic with small range of motion.

2.2 Draw

When drawing a graphic in the drawing area, there will be a prompt of next step in the log area, which can assist users to finish the drawing.

2.2.1 Line

Click on “Line” in the Draw sub-page and click on the start point and next point in the drawing area with the prompt in log to complete the drawing of a line.

Multiple lines can be drawn by continuously clicking on the next points. The end point of the line will be the start point of the next one. Press Enter to complete the drawing.

2.2.2 Rectangle

Click on “Rectangle” in the Draw sub-page and click on the drawing area to set the first corner. Click on another point to set another and complete the drawing of a rectangle.

Click on the drop-down button of “Rectangle to show different options: Rectangle, RoundRect, and Obround. Click on RoundRect or Obround by the prompt in log to draw the needed graphic.

The drawing can also be done by inputting a fixed size. Left-click in the drawing area to set the first corner. Then press D on the keyboard and input the value of width and height with commas to separate them. Then press Enter to complete the drawing. For example, “D50, 100” means 50 wide and 100 high.

2.2.3 Circle

Click on the drop-down button of “Circle” in the Draw sub-page to show different options: Circle, 3-Point Arc, Scan Arc, and Ellipse.

- **Circle**: click on “Circle” and left-click in the drawing area to set the center. Then, input the radius and press Enter to complete.
- **3-Point Arc**: click on “3-Point Arc” and click on three different points in the drawing area to complete the drawing.
- **Scan Arc**: click on “Scan Arc” and click in the drawing area to set the center. Then, click on another point to set the radius and drag to set the arc size.
- **Ellipse**: click on “Ellipse” and click in the drawing area to set the center. Then, click on one point to set the vertex of the short axis and another point to set the vertex of the long axis to complete.

It is suggested to use “Circle” to draw graphics.

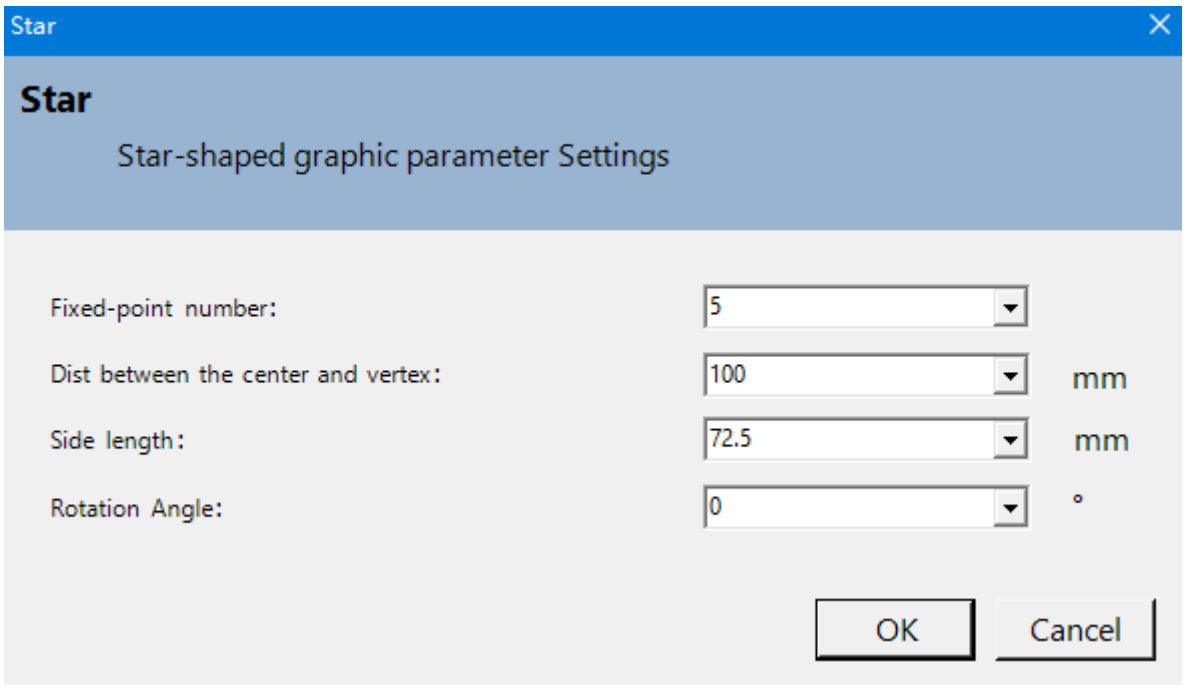
2.2.4 Polyline

Click on the drop-down button of “Polyline” in Draw sub-page to show different options: Polyline, Polygon, and Star.

• **Polyline**: click on “Polyline” and click in the drawing area to set the start point. Drag the mouse and click again, and then repeat to draw graphics with multiple lines. The default is to draw a line, but it’s available to switch it to arc by pressing A on the keyboard, and switch back to line by pressing L. Press C to make the contour closed and press Enter to complete the drawing.

• **Polygon**: click on “Polygon” to set the number of edges and choose to be inner or outer tangent to the circle. Click on “OK” in the setting interface. Click in the drawing area to set the center and drag the mouse to click on another point to set the radius of the polygon.

• **Star**: set relevant parameters in the following interface. The star-shaped graphic will be auto-drawn, after clicking on a point in the drawing area to set the star center.



2.2.5 Point

Click on “Point” in the Draw sub-page and click in the drawing area to draw a point.

2.2.6 Text

Click on “Text” in the Draw sub-page, set relevant parameters, click on “OK” and then click in the drawing area to compelte.

2.2.7 Clip

Click on “Clip” in the Draw sub-page. Then click on the graphic contour in the drawing area to delete selected contours.

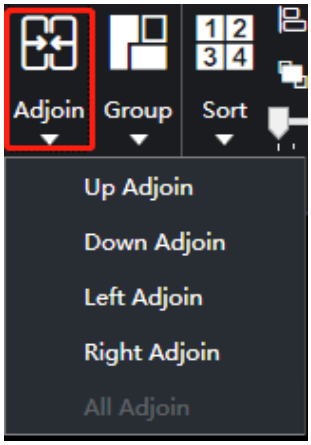
2.2.8 Extend

Click on “Extend” and click on the line in the drawing area. The line will extend when intersecting with another graphic contour.

2.2.9 Cutoff Line

2.2.10 Adjoin

Click on the dropdown button of “Adjoin” to show four adjoining methods, as shown below:
Click on graphics to be joined and select required adjoining methods to apply.

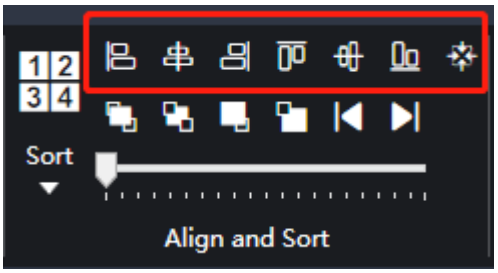


2.2.11 Group

Refer to 2.1.23.

2.2.12 Sort and Align

Sorting here shares the same function with that in the Home sub-page. For more details, please refer to 2.1.20.
Select graphics to be aligned and click on one of following aligning methods to align graphics.

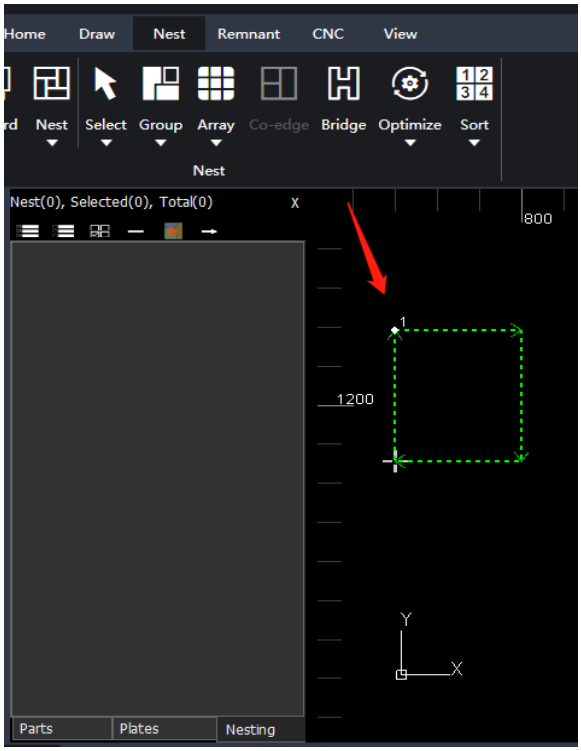


2.2.13 Optimize

Refer to 2.1.30.

2.3 Nest

XC6000 is designed with auto-nesting function, which will be explained here in detail. Then users can better use the software and improve processing efficiency.
Enter the Nest sub-page and import or draw a graphic. Take drawing a rectangle for reference.

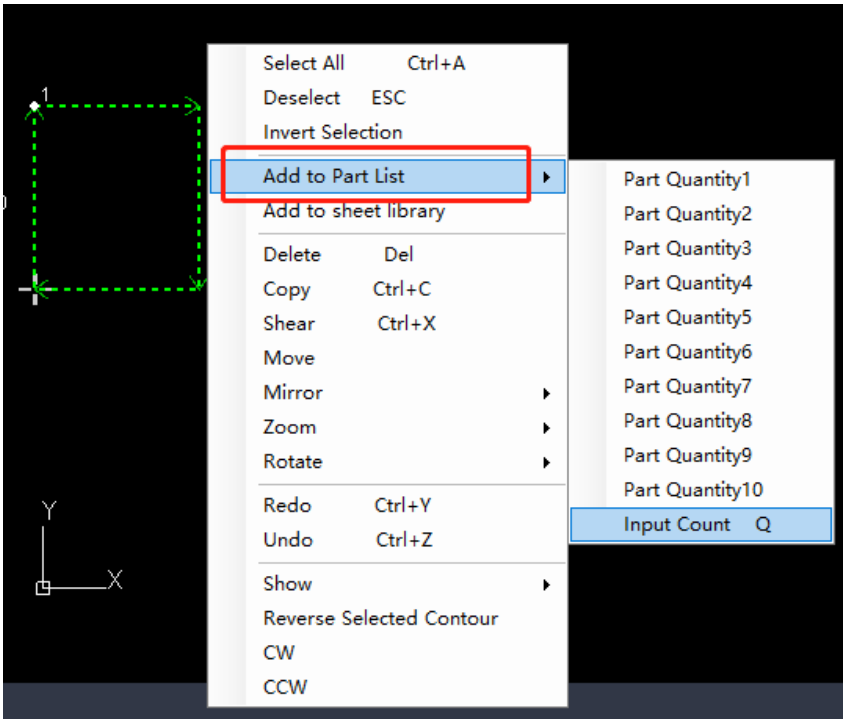


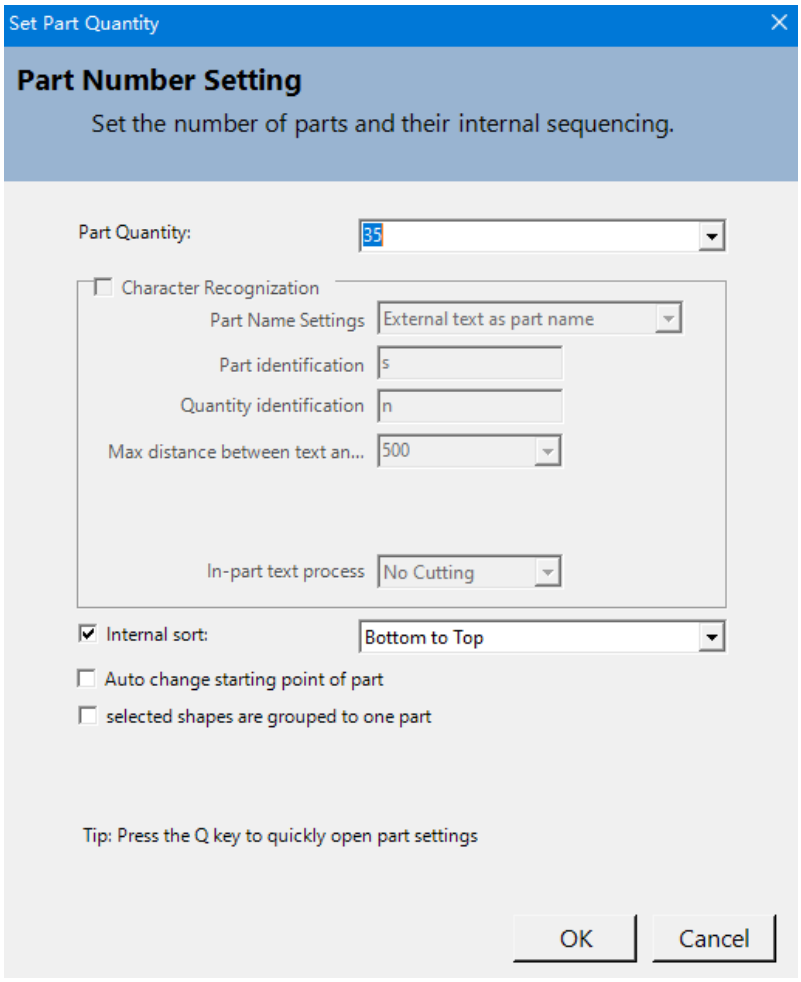
2.3.1 Part

Before nesting, turn the graphics into parts for cutting. A part consists of inner and outer contours, and the inner contour is not requisite.

How to add parts: select the graphics and right-clicking to add them to the parts list or right-clicking in the left sidebar to import parts.

How to set the selected graphic as a part: right-click in the drawing area and select “Add to Part List”, and set the part quantity and its internal sorting method. If checking “selected shapes are grouped to one part”, all the selected graphics will be taken as a part.

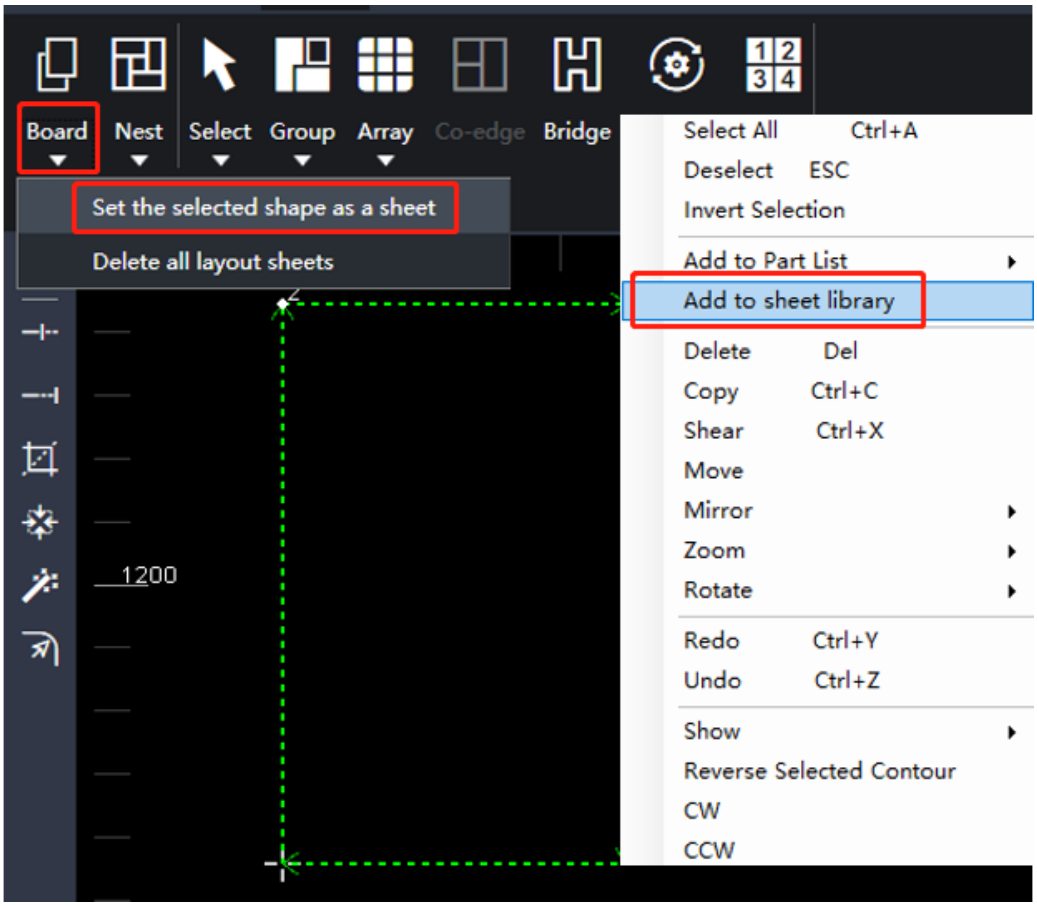

Select All Ctrl+A
Deselect ESC
Invert Selection
Add to Part List
Add to sheet library
Delete Del
Copy Ctrl+C
Shear Ctrl+X
Move
Mirror
Zoom
Rotate
Redo Ctrl+Y
Undo Ctrl+Z
Show
Reverse Selected Contour
CW
CCW
Part Quantity1
Part Quantity2
Part Quantity3
Part Quantity4
Part Quantity5
Part Quantity6
Part Quantity7
Part Quantity8
Part Quantity9
Part Quantity10
Input Count Q
1
Y
X


Set Part Quantity
Part Number Setting
Set the number of parts and their internal sequencing.
Part Quantity:
35
Character Recognization
Part Name Settings
External text as part name
Part identification
s
Quantity identification
n
Max distance between text an...
500
In-part text process
No Cutting
Internal sort:
Bottom to Top
Auto change starting point of part
selected shapes are grouped to one part
Tip: Press the Q key to quickly open part settings
OK
Cancel

2.3.2 Board

Before nesting, users should add sheets first, which can be done by the following two methods:

1. Click on the dropdown button of “Board” and select “Set the selected shape as a sheet”.
2. Select a graphic and right clicking to select “Add to sheet library”.



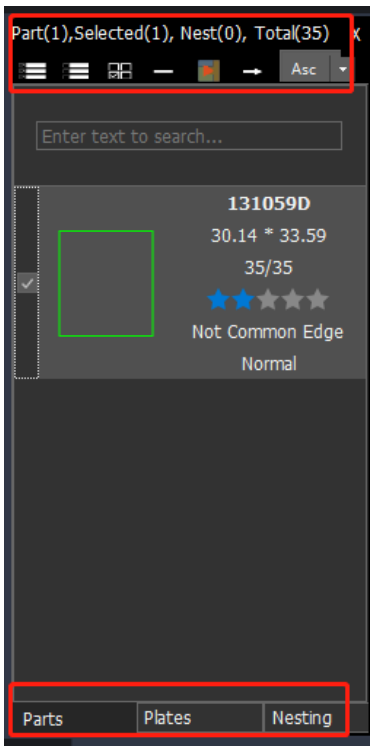
2.3.3 Nesting Bar

With parts in the drawing area, there will be a left sidebar for nesting where users can set parts and sheets.

(1) **Quick Access Toolbar**: quickly select, delete and nest parts and sheets.

(2) **Part Bar**: display all added parts.

(3) Check parts, sheets or nesting result.

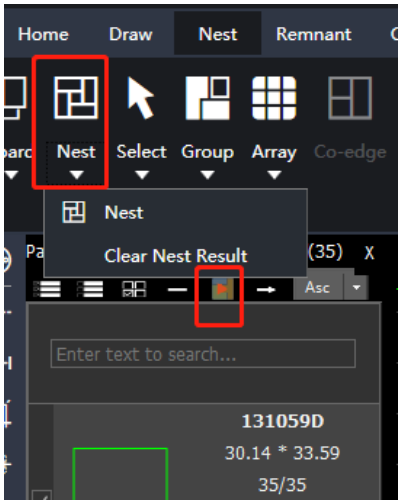


Right-click to select different ways to delete.

- **Delete**: delete current selected graphic.
- **Delete Selected Results**: delete current selected graphics.
- **Delete All Results**: delete all sheets in the list, and the progress is normal.

2.3.4 Nest Parameter

Two buttons below are available to apply nesting function.



Set the nesting parameters.

(1) **Parameter Setting**: set the interval between parts and between parts and the edge of sheets.

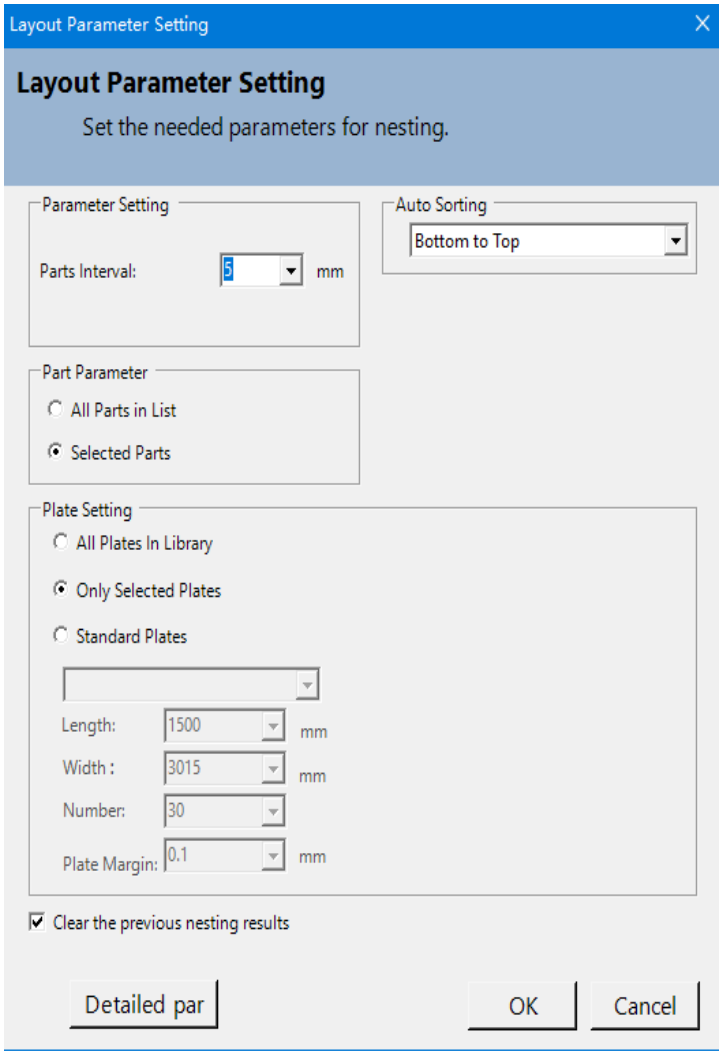
(2) **Auto Sorting**: set the sorting way and the nesting direction of the parts.

(3) **Part Parameter**: select parts to nest.

(4) **Plate Setting:** select all plates/only selected plates/standard plates to nest.

(5) **Clear the previous nesting results**: whether to continue the nesting based on previous nesting result.

(6) **Detailed par**: click to set the detailed parameters.



2.3.5 Detailed par

(1) **Starting Point**: set the start point of nesting.

(2) **Mirror image**: whether to allow the mirroring of the graphic to improve the utilization of the sheet.

(3) **Nesting Dir**: set the priority of nesting direction.

(4) **Best Nesting Direction**: Auto select the best horizontal/vertical orientation for max. nesting utilization.

(5) **Angle of Rotation**: the angle of placing the part (the smaller the value, the better the nesting effect and the slower the nesting speed).

(6) **Inside the hole**: whether to place the part in the hole in the waste area of another part. Check to improve the

utilization of the sheet and slow down the nesting speed.

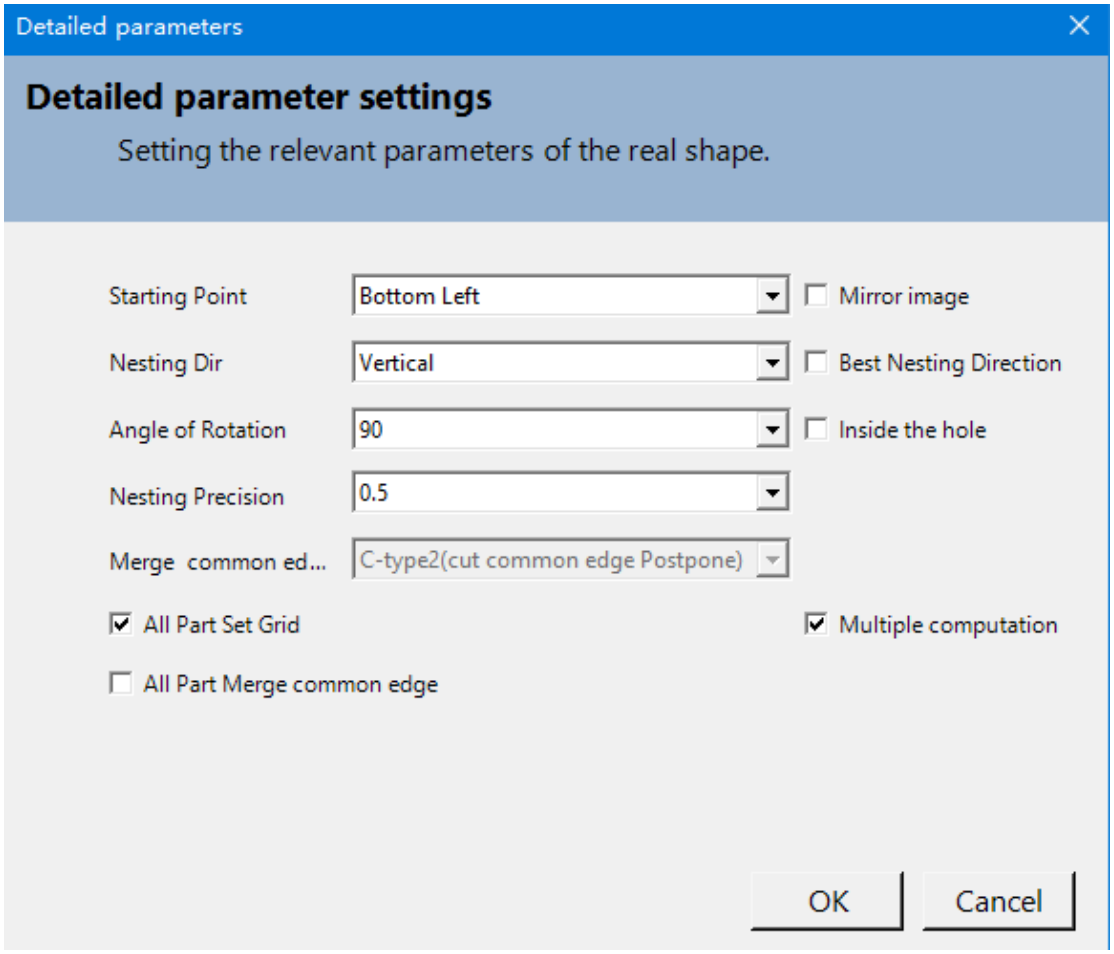
(7) **Nesting Precision**: the precision of nesting. The smaller the value, the better the nesting effect and the slower the nesting speed.

(8) **Merge common edge**: select co-edge type.

(9) **All Part Set Grid**: Maximize the utilization of nesting according to sheet and part dimensions.

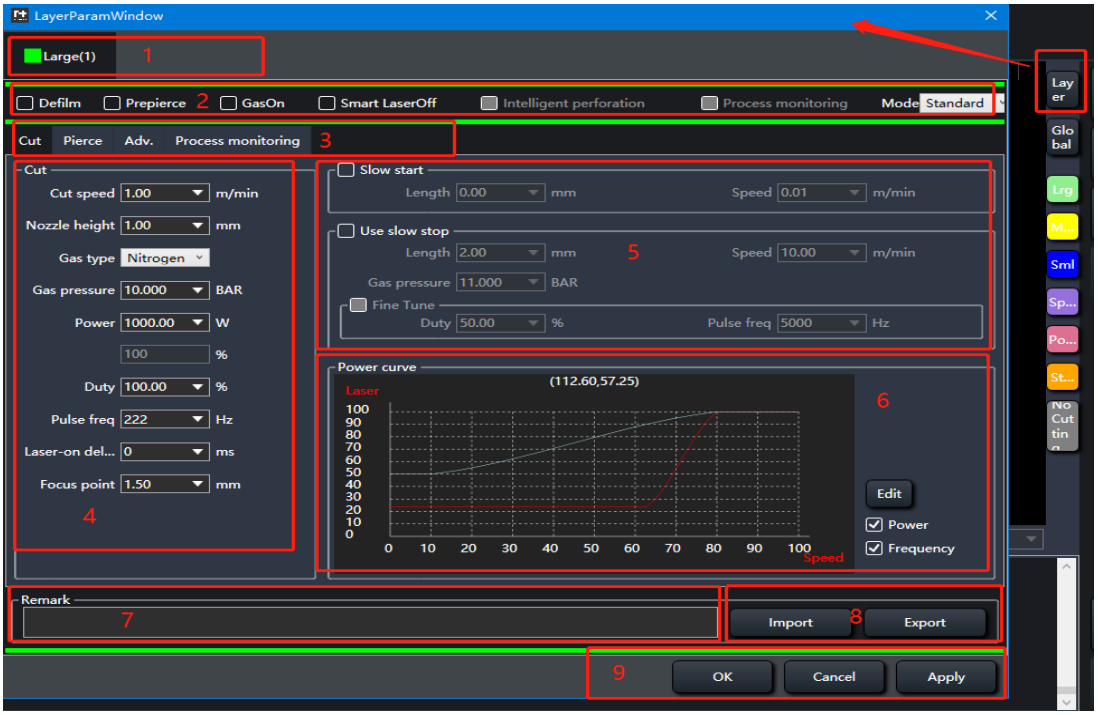
(10) **All Part Merge common edge**: Set parts to co-edge nesting.

(11) **Multiple computation**: Multiple calculations of part nesting for higher utilization.



3 Process Parameter

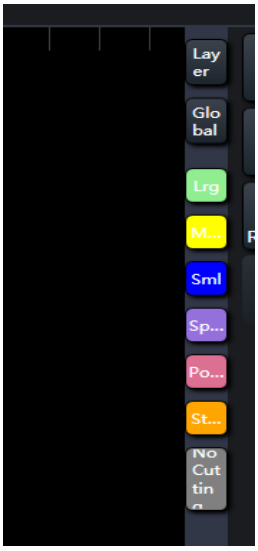
Click on “Process” to enter the interface of processing parameter setting. Parameters for each layer are independent.



3.1 Layer

There are 7 processing layers in total, each of which can be set individually.

Select the graphic in the drawing area and click on the corresponding layer button on the right. Then the graphic will be Processed, according to the selected process, as shown below:



3.2 Processing Mode

Processing Mode	
Defilm	After checking the function, the process runs along the cutting path using the film parameters to defilm firstly, and then starts the normal process according to the layer parameters. Checking this function to enter the interface of defilm parameter setting.
Prepierce	After checking the function, prepierce at the start of the graphic or the leadline, before actual cutting. And the function of auto-group prepiercing can be selected in the global parameter.
GasOn	Keep blowing gas when processing.
Smart LaserOff	The cutting power at then end of processing is half of that at the normal cutting.
Intelligent perforation	Monitor piercing state by the built-in sensor of laser cutting head. If piercing is not finished, the cutting head will back to process, which improves processing efficiency and stability greatly.
Process monitoring	Monitor cutting state by the built-in sensor of laser cutting head. If cutting is not finished, the cutting head will back to process, which improves processing efficiency and stability greatly.
Mode	Select standard or fixed-height cutting. Fixed-height cutting refers to cutting at a fixed height, without following.
Nozzle pressure correction	After checking the function, the corresponding relationship between DA proportional valve voltage and gas pressure is automatically corrected, so that the gas pressure output is more accurate.

3.3 Cutting Parameter

Cutting Parameter	
Cutting speed	Set the command speed of cutting.
Cutting height	Set the cutting height from the nozzle to the sheet.
Gas type	Set the assist gas type, including air, nitrogen and oxygen.
Gas pressure	Set the assist gas pressure in cutting.
Power	Set the peak power of the laser in cutting.
Duty	Set the duty cycle of the laser in cutting. It refers to the ratio of beam-out duration in one beam-out cycle and the total time. The higher the ratio value, the higher the average power is. When it is 100%, it means the average power equals the peak power.
Pulse freq	Set the frequency of the laser in cutting. It refers to the time of beam out in 1 second. The higher the value, the more continuous the laser beam is. 5000Hz is a successive beam.
Laser-on delay	Set the delay at the start point of graphic processing to improve cutting effect.

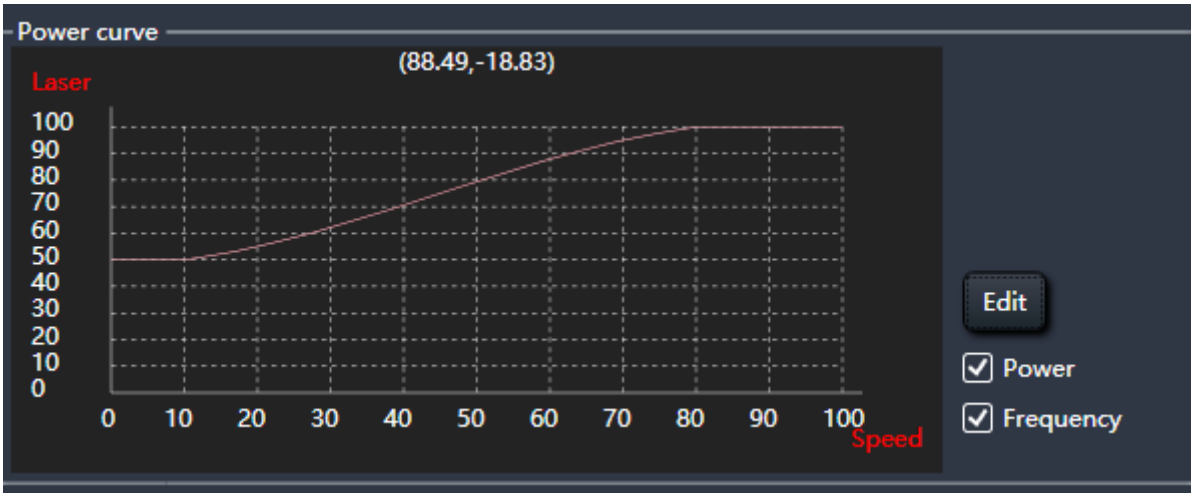
3.4 Other Parameter

Other Parameter	
Slow start	Check to use the slow start function.
Length	Set the effective range of slow start, calculating from the start of the contour and including the leadline, so as to avoid insufficient piercing in cutting thick sheets.
Speed	Set the slow start speed.
Use slow stop	Check to use the slow stop function.
Length	Set the distance from slow stop starting to the end of cutting path.
Speed	Set the cutting speed when using slow stop function.
Duty	Set the duty cycle of beam out when slow stopping.
Pulse freq	Set the laser frequency when slow stopping.
Beam off early	Set the beam-off distance in advance from starting slow stop to reaching the end of cutting path.
Control mode	Set the control mode of slow stop.

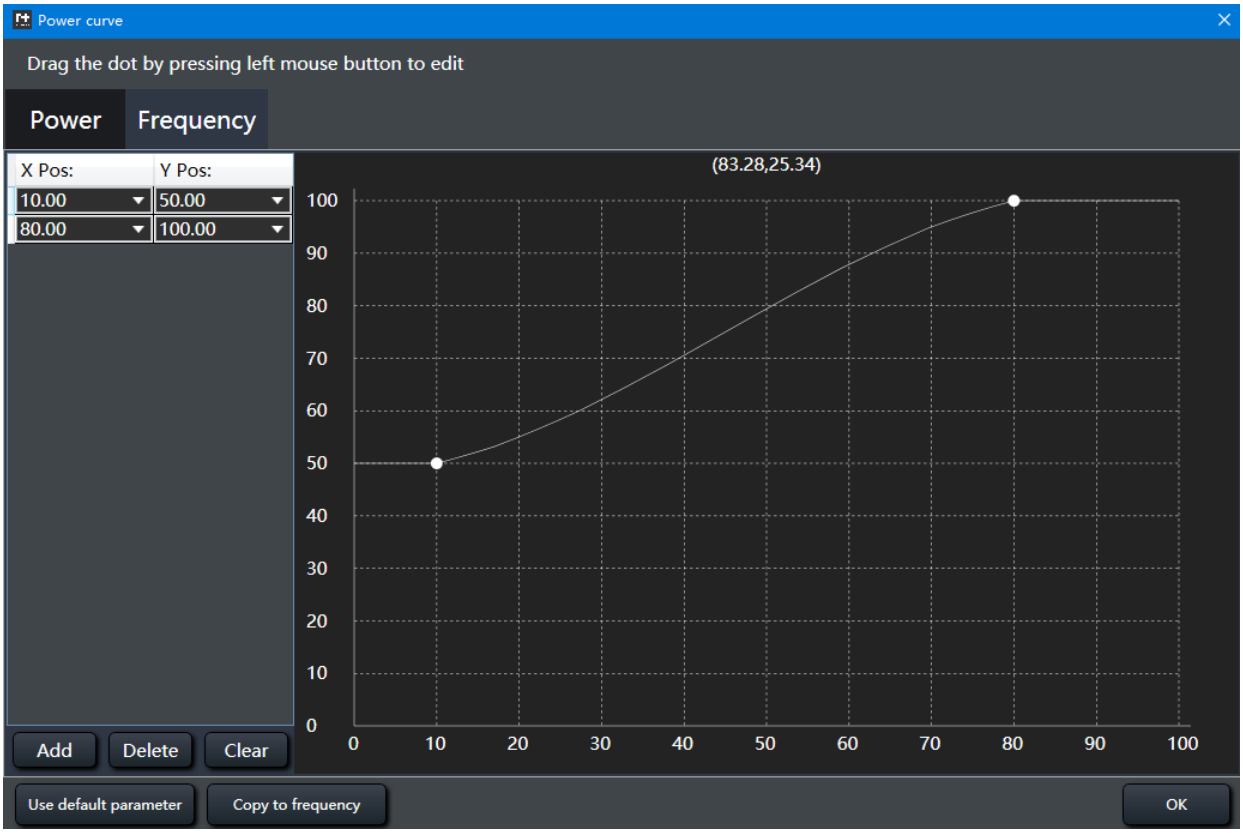
3.5 Power Curve

Check corresponding options to display the curve of laser output.

It's available to display two curves: power - speed and frequency-speed. It is suggested to check Power only for more obvious effect and convenient commissioning.



Click on “Edit” to edit the curves, as shown below:



The power curve is fitted as a spline curve with good smoothness, with the horizontal coordinate for speed and the vertical coordinate for laser output. The interfaces for editing can be chosen as shown above.

Take the figure above as an example: the duty cycle is 50% when the speed is about 0%, and nearly 100% when the speed is 90%. As in the processing, the duty cycle is nearly 100% for a cutting speed of 10m/min, the duty cycle is 60% for a cutting speed of about 2-3m/min.

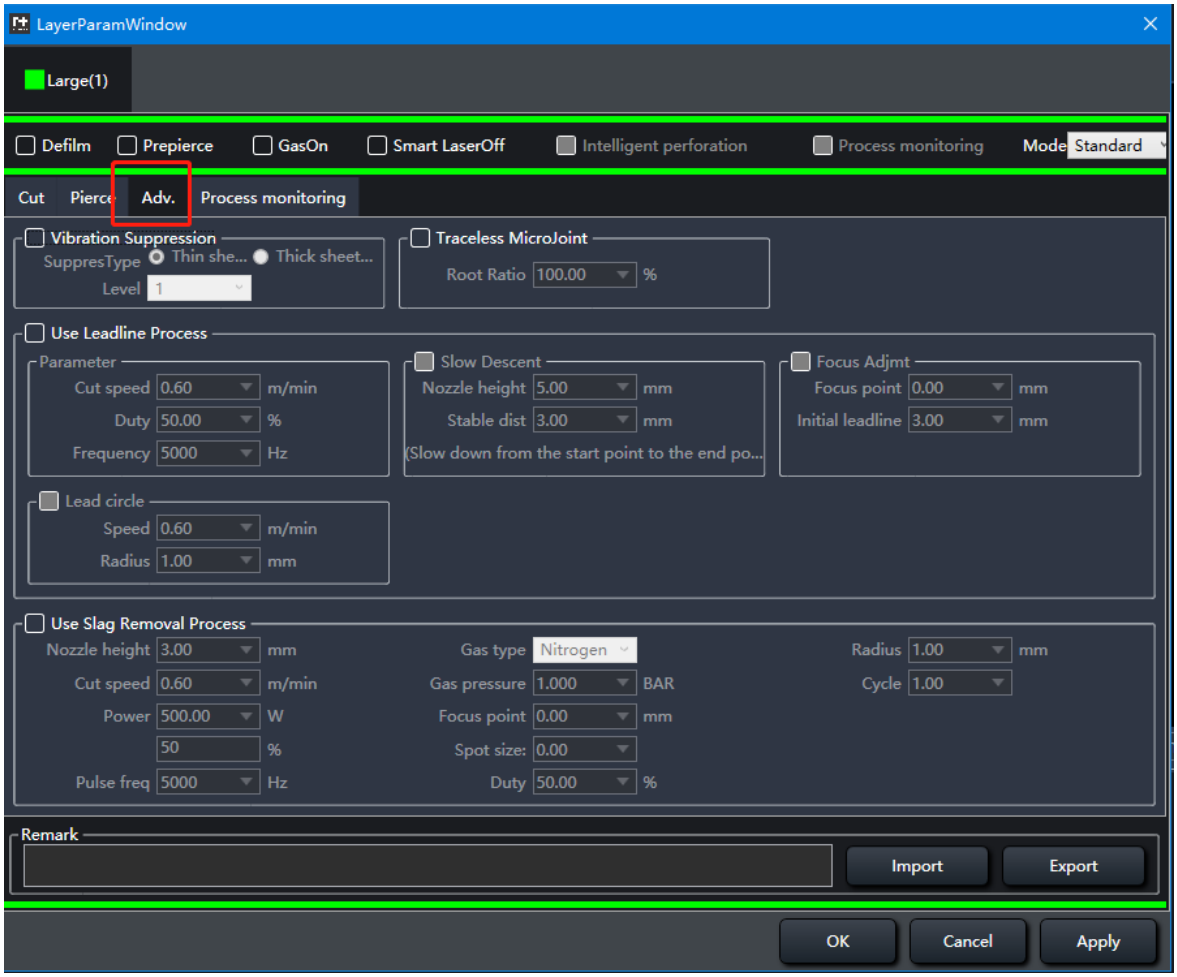
The default parameter meets a majority of needs in processing. Users can fine-tune the curve base on the default paramters.

3.6 Piercing

Piercing Parameter	
Smooth Pierce	Check to use the noninductive piercing. Height: set the height of the nozzle from the sheet. Time: set the time for noninductive piercing. Focus point: set the focus point for noninductive piercing. Laser adjmt.: select to adjust the beam-out parameter for noninductive piercing. Power: set the laser power for noninductive piercing. Duty: set the duty cycle for noninductive piercing. Frequency: set the laser frequency for noninductive piercing.
Pierce level	The piercing is sequential from level 5 to level 1 and can't be selected across levels. The sequence of piercing is five - four - three - two - one.
Pierce type	Segment pierce: the height of nozzle from the sheet is fixed during piercing. Follow pierce: the height of nozzle from the plate changes at a constant speed to the piercing height of next level. Lightning pierce: the height of nozzle from the sheet is fixed. The frequency and duty cycle can be changed at a constant speed during piercing.
Pierce time	Set the piercing time.
Nozzle height	Set the height of the nozzle from the sheet during piercing.
Gas type	Set the assist gas type for piercing, including air, oxygen, and nitrogen.
Gas pressure	Set the assist gas pressure for piercing.
Extra blow	The pressure of nozzle cooling gas for piercing.
Power	Set the peak power of the laser in piercing.
Frequency	Set the beam-out frequency in piercing.
Duty cycle	Set the beam-out duty cycle of the laser in piercing. It refers to the ratio of beam-out duration in one beam-out cycle and the total time. The higher the ratio value, the higher the average power is when beam out. When it is 100%, it means the average power equals the peak power.
Start Focus	Set the focus position when start piercing.
Extra blow (ms)	The time of no laser and blowing gas only for cooling the sheet after piercing.
Extra blow	Set the assist gas type for piercing, including air, oxygen, and nitrogen.
Extra blow （bar）	The time of no laser and blowing gas only for cooling the sheet after piercing, which reduces the impact to the next process caused by high temperature.

3.7 Advanced Parameter

Click on “Adv.” to enter the following interface of setting advanced parameters, as shown below:



Advanced Parameter	
Vibration Suppression	Slags may remain on the sheet after piercing a thick sheet. The vibration suppression can improve the cutting effect.
Suppress Type	The suppression is used for both thin and thick sheets. Please select the type as required.
Level	The higher the level of suppression, the slower the response is.
Traceless MicroJoint	Check to use the traceless microjoint and make the thick sheet not cut off at the joint in processing.
Root Ratio	Set the percentage of the retention left in cutting
Use Leadline Process	Check to use the leadline.
Parameter	Cut speed: set the cutting speed of graphic with leadlines. Duty: set the beam-out duty cycle when laser cutting with leadlines. Frequency: set the beam-out frequency when laser cutting with leadlines.

Slow Descent	Check to descent slowly when cutting with leadlines.
Slow Descent	Nozzle height: set the nozzle height when cutting with leadlines. Stable dist: slowly descent the leadline height to the stable height of the sheet in cutting. Set the stable distance of the leadline from the sheet.
Focus Adjmt	Focus Adjmt: check to use the focus adjustment of leadlines. Focus point: set the focus position when cutting with leadlines. Initial leadline: set the initial length of leadline of focus-adjust cutting.
Lead circle	Lead circle: check to use the lead circle. Speed: set the processing speed of the lead circle. Radius: set the radius of the lead circle.
Use Slag Removal Process	Check to use the process to remove slags.
Nozzle height	Set the cutting height from the nozzle to the sheet when removing slags.
Cut speed	Set the cutting speed when removing slags.
Power	Set the beam-out peak power of the laser when removing slags.
Pulse freq	Set the beam-out frequency of the laser when removing slags. It refers to the time of beam out in 1 second. The higher the value, the more continuous the laser beam is.
Duty	Set the beam-out duty cycle of the laser when removing slags. It refers to the ratio of beam-out duration in one beam-out cycle and the total time. The higher the ratio value, the higher the average power is when beam out. When it is 100%, the average power equals the peak power.
Gas type	Set the assist gas type when removing slags, including air, oxygen, and nitrogen.
Gas pressure	Set the assist gas pressure when removing slags.
Focus point	Set the focus position when removing slags.
Spot size	Set the size of beam out in removing slags.
Radius	Set the radius of cutting nozzle when removing slags.
Cycle	Set circle counts of cutting head when removing slags.

3.8 Remark

Users can input some notes of the current process and other relevant information, such as the nozzle size.

3.9 Import and Export

To import or export the process parameters of the layer, users should note that this operation will only use to import or export the process of the current layer. For example, if using both layers of large and medium contours, clicking on “Export” button in the layer of large contour will only export the process parameters here. The same applies to the import.

3.10 Global Parameter

Global parameter mainly includes Motion Control Parameter, Default Parameter, Unit Selection, Prepiercing and Defilm, which will affect the stability of machine operation, processing effect and efficiency.

Motion Control Parameter		
Parameter	Default	Remark
Travel speed	30	The travel speed of the X/Y axis from one contour to another in cutting. (Set the X and Y axis to be the same or separate with different parameters at the bottom of Motion Control Parameter.)
Travel acc	6000	The travel acceleration of the X/Y axis from one contour to another in cutting. (Set the X and Y axis to be the same or separate with different parameters at the bottom of Motion Control Parameter.)
Travel acc low-pass	5	The jerk in dry run. The larger the value, the slower the acceleration, which brings less impact to the machine. The less the value, the faster the acceleration, which brings more impact to the machine.
Curve precision	0.05	The maximum command error allowed by the software when machining curved path. The larger the value, the faster the curve path and the larger the path error, otherwise vice versa.
Cutting acc	5000	The maximum speed of each axis when cutting, and used with the cutting speed.
Cutting low-pass	5	The jerk in cutting, used with cutting acceleration
Corner precision	0.1	The maximum command error allowed by the software when machining corner path. The larger the value, the faster the corner path and the larger the path error, otherwise vice

		versa.
Frame speed	18	the speed of framing.
XY axis travel setting	Same	Set the X and Y axis to be the same or different.

Default Parameter		
Parameter	Default	Remark
Gas on delay	200	Gas on and delay for the set time before laser on.
First gas on delay	400	Set the time of gas out. Before cutting, there are air in the gas pipe. So, it takes a while for gas out before laser on to ensure stable cutting.
Pre gas on	500	Set the time to open the gas in advance after processing starts.
Gas switch delay	200	When switching to another type of gas in cutting, gas on first and gas off delay before laser on and continue cutting.
Cooling delay	1000	Set the time of staying on the cooling point.
Contour end closing	200	Set the delay of gas off at the end of cutting.
Contour end beam off	0	Set the delay of laser off at the end of cutting.

Gas Parameter		
Parameter	Default	Remark
Manual Air pressure	2	Set the air pressure of manual gas out
Manual Oxygen pressure	2	Set the oxygen pressure of manual gas out
Manual Nitrogen pressure	2	Set the Nitrogen pressure of manual gas out.
Use protective gas	Off	Open: open the protective gas and keep blowing once the system is enabled. Close: close the protective gas
Protective gas pressure	0.3	Set the pressure of protective gas.

Unit Selection		
Parameter	Default	Remark
Length	mm	“mm” and “inch” are available.
Time	ms	“ms” and “s” are available.
Speed	m/min	“m/min”, “mm/s”, “inch/min”, and “inch/s”.
Acceleration	mm/s^2	“mm/s^2”, “inch/s^2”, and “G(10m)/s^2”.
Gas pressure	BAR	“BAR”, “PSI” and “MPa”.
Power rating	W	“W” and “%”.

CNC System Delay and Advanced		
Parameter	Default	Remark
Power control delay	2000	Set the delay of the system power output.
Flycut delay	0	Set the delay of laser on when fly cutting.
Slag Power Control	uncheck	Curve power control in slag removal.

Prepiercing and Defilm:		
Parameter	Default	Remark
Prepiercing/Film type:	Group	Single Vector: check to process the single contours. Whole board: check to process the whole sheet. Group: check to process graphics in groups.
Sequence:	Prepiercing first	Prepiercing first: check to prepierce first before defilming. Defilm first: check to defilm first before prepiercing.

Follow Control	
Parameter	Remark
Z axis pos	Click to set current Z coordinate as 0.

3.11 OK, Cancel and Apply

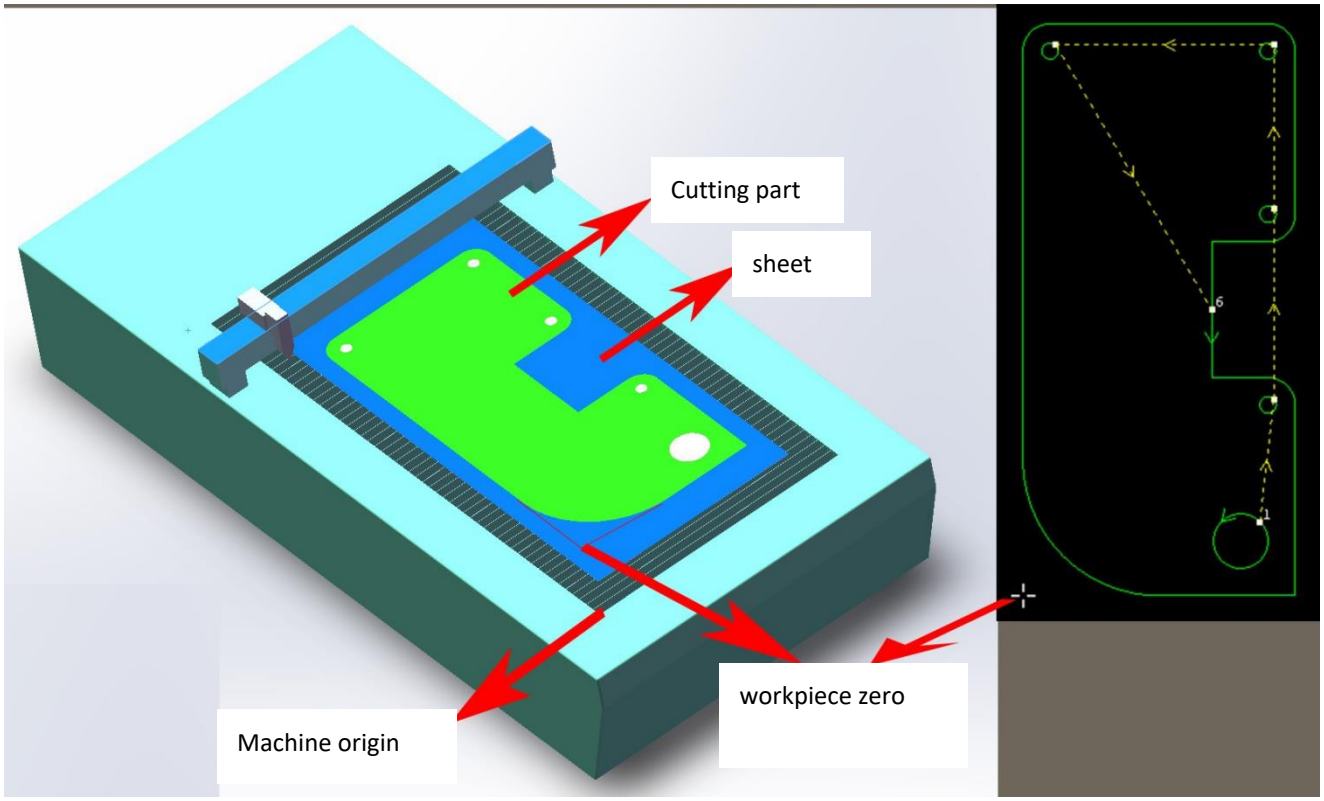
- **OK**: click on “OK” to save the process parameters.
- **Cancel**: click on “Cancel” and the parameters set for the layer will be ineffective.
- **Apply**: click on “Apply” after modifying the parameters for the layer. The parameters will be effective.

4 Control Panel

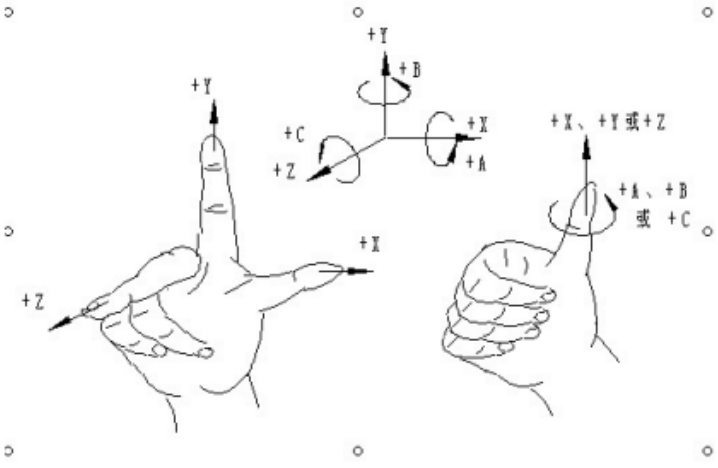
The processing control module mainly introduced in this chapter locates on the right of the drawing area. Functions are selectable in the control panel, such as the coordinate system, manual and auto control, etc.

4.1 Coordinate System

All the motions of the cutting head in processing are relative to the workpiece. The workpiece zero is marked as  in the drawing area. The correspondence between the machine coordinate systems and the workpiece coordinate system is shown below:



Click on “Preview” in the control panel to display the positional relationship between the machine and graphic.



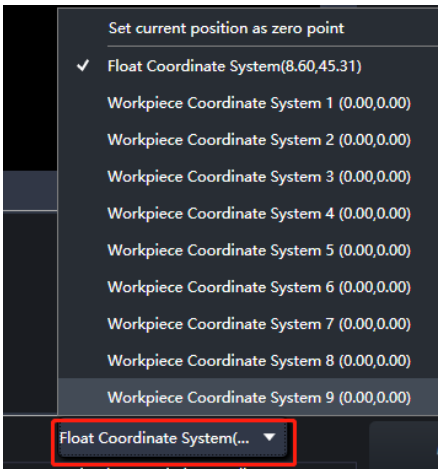
The coordinate system is the right-handed Cartesian coordinate system. As shown in the figure, the thumb is pointing in the positive direction of the X axis, the forefinger is pointing in the positive direction of the Y axis, and the middle finger is pointing in the positive direction of the Z axis. With the X, Y, and Z coordinates determined, it is easy to determine the direction of the A, B, and C rotational coordinates according to the right-hand spiral rule.

4.1.1 Machine Coordinate System

The machine coordinate system is only determined by the machine structure and its parameters. It can be established by clicking on “Return Origin”, or by clicking on this button in the CNC sub-page to re-establish the machine coordinate system while initial installation, for any derivation for abnormal reasons.

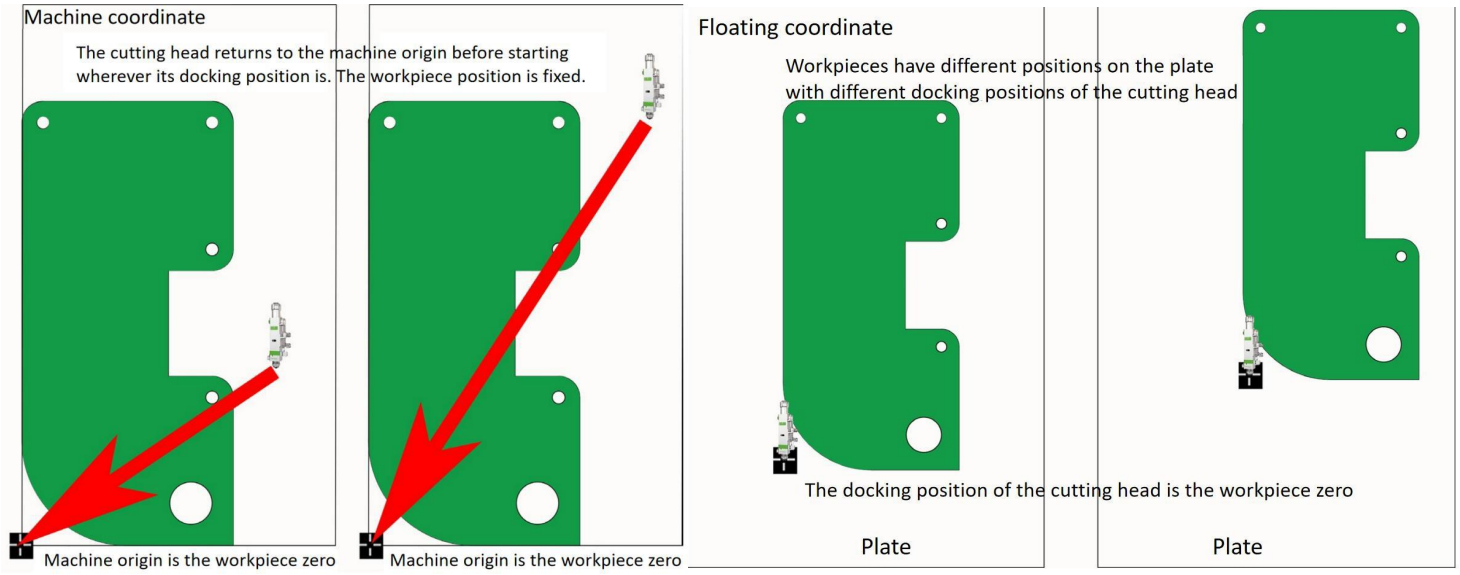
4.1.2 Program Coordinate System

As the position of the workpiece may vary, it is necessary to introduce a workpiece coordinate system. All the program coordinate systems in the software are identical in direction to the machine coordinate system. Only the zero point of the coordinate system is different, known as the program zero. The program coordinate system contains a floating coordinate and workpiece coordinates.



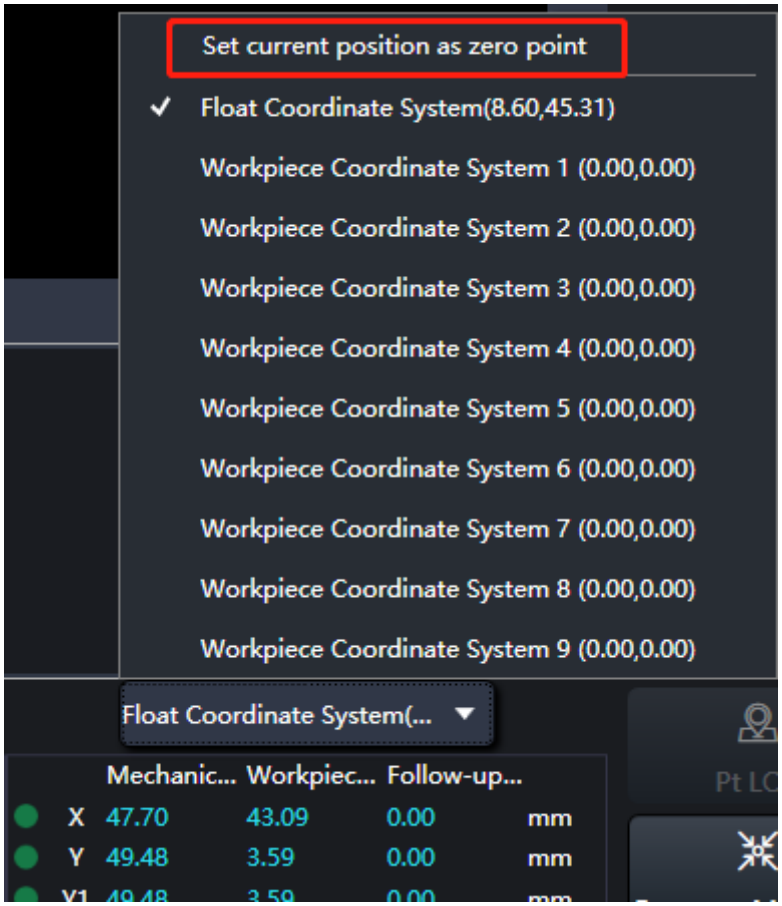
The button at the top of the control panel is used to select the float coordinate system and other nine workpiece coordinate systems.

The float coordinate system is generally used for informal processing and can be regarded as starting processing from wherever the laser head moves. The zero point of the float system is automatically set to the current position of the laser head when the user clicks on “Frame”, “Dry Run”, or “Start” in the control panel, as shown below:

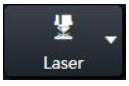


When selecting workpiece coordinate 1 to 9, the workpiece zero point is set manually by the user by clicking on “Mark”, and will keep until the next setting. So the workpiece coordinate system is suitable for batch production of workpieces, whose position is generally determined by a fixed fixture. The coordinate 1-9 supports to keep the processing in the same position each time, which can be set by clicking on the status bar.

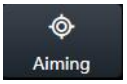
It’s available to select mechanical (program) coordinate, and users can set zero point of these two coordinates. Click on "Set current point as zero point" to position the cutting head at the specified position.



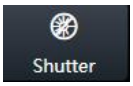
4.2 Manual Control



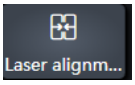
click on “Laser” to beam out to check laser on/off status. Relevant beaming parameters can be set by clicking on its dropdown button.



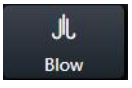
Click on “Aiming” to control red on/off when connecting the pin of the red light to the system.



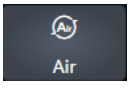
Click on “Shutter” to control shutter on/off when connecting the pin of shutter to the system.



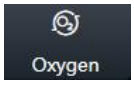
Similar function to “Laser”, used to control the axis of focus adjustment.



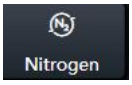
click on “Blow” to manually turn on/off the protective gas.



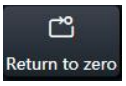
Click on “Air” to blow air.



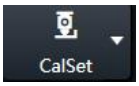
Click on “Oxygen” to blow oxygen.



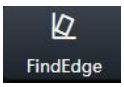
Click on “Nitrogen” to blow nitrogen.



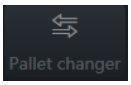
Click on “Return to zero” to back to mechanical zero point.



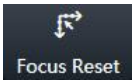
Refer to Chapter 5.8.



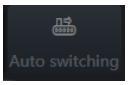
Click on “Find Edge” to start edge finding and calculate the tilt angle of sheet.



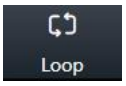
This function is applicable after turning on the function of pallet changer. Click on it to enter the interface of parameter setting, including input/output signal and button control. Refer to Chapter 5.11 for more details.



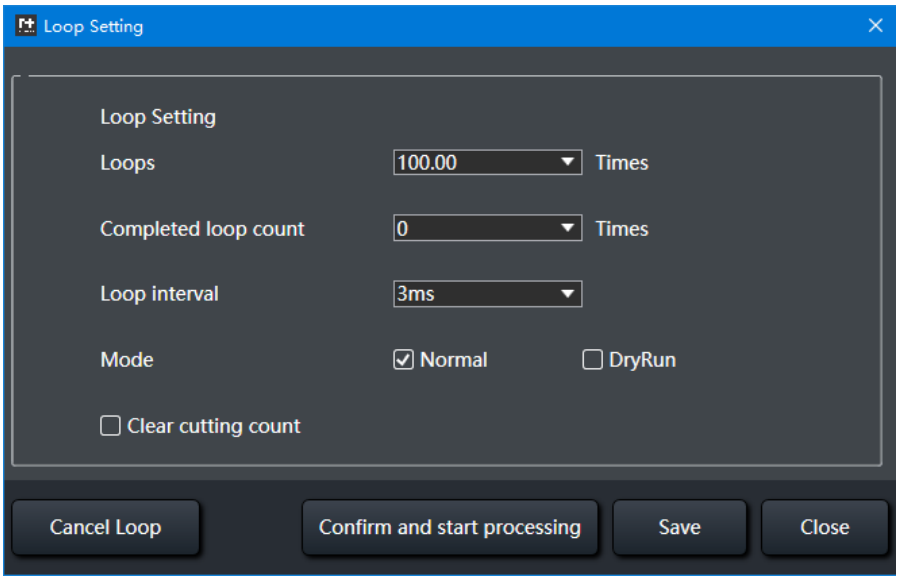
Click on “Focus Reset” to reset F axis.



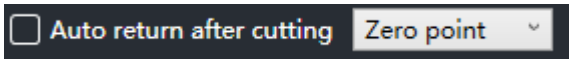
Click on “Auto Switching” to auto change pallet.



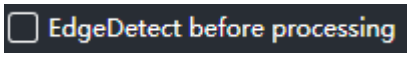
Click “Loop” to set cycle processing and enter the following interface:



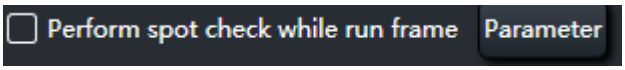
- Loops: number of cycle processing.
- Completed loop count: number of finished processing.
- Loop interval: waiting duration between last processing and next processing
- Mode: Normal means cutting normally. /Dry Run means moving only based on the workpiece path without beaming, gas out and following.
- Clear cutting count: check to clear the previous processing count.



After checking, the cutting head will auto return to the selected mark point after finishing one processing.

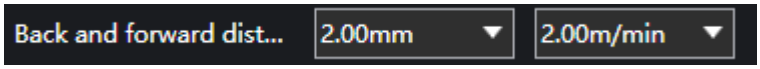


After checking, click on "Start", and the machine tool will auto detect edge before auto processing.

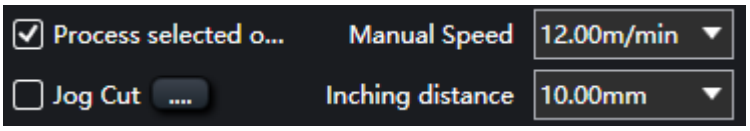


After checking, point shooting to check whether there is a sheet in the frame. Users can set probe parameters and process parameters, etc. by clicking on “Parameter”.

After checking, pierce again when the breakpoint continues.

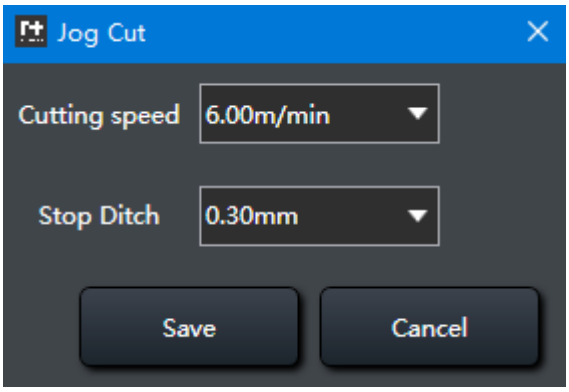


Set the manual back/forward distance.



1) Process selected only: After checking, only selected graphics will move when using “Start”, “Stimulate” or “Frame” functions.

2) Jog Cut: After checking, click the axis movement button and hold it. The cutting head will follow down and start cutting with laser on based on the current process. Release the button to end the jog cutting; each movement of axes will auto uncheck “Jog Cut”. Click on  to set cutting speed and stop ditch, as shown below:

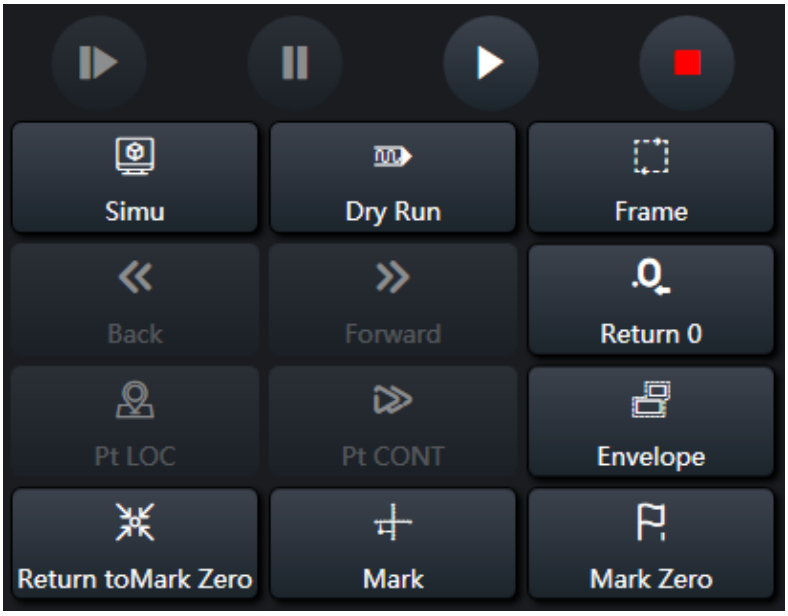


- Cutting speed: The maximum speed limit of spot cutting. When the process speed is greater than this speed, cutting head will run with this speed.
- Spot Ditch: the sensitivity of judgment when detecting the edge of the sheet. The greater the value, the less sensitive it is, and the greater the Z-axis overshoot distance; The smaller the value, the more sensitive it is, and it’s more likely to mis-detect the undulation of sheet as its edge.

3) Manual Speed: set high/low processing speed.

4) Inching distance: set the step distance of axes.

4.3 Processing Control



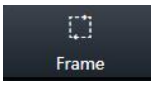
 click on “Start” to start or continue the processing. After clicking on it, the mode interface will display auto-running status.

 click on “Pause” when starting running, and the auto processing will pause. The mode interface will display auto-pause status.

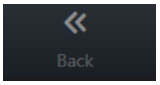
 click on “Stop”, and the processing will reset to the initial status and the system will be ready again.

Simulate before processing. Click on “Simu” to check the cutting path by simulation.

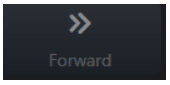
Dry run is different from the actual processing, with no laser, no gas, and no following-up, and other steps are the same as the actual ones.
Note: If users want to continue to dry run after clicking on “Pause”, click on “Dry Run” to resume the simulation. In pause status, clicking on “Start” to start the actual processing from the position.



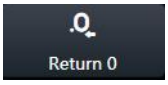
click on “Frame”, and the cutting head will move along the outer contour of the graphic in a rectangle shape for users to observe the graphic position in the sheet.



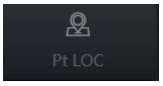
click on “Back” in pause status, and the cutting head will move backward along the cutting path. Click on “Pause” to stop the motion.



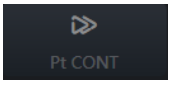
click on “Forward” in pause status, and the cutting head will move forward along the cutting path.



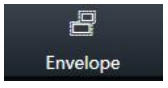
click on “Return 0” to return to the mechanical zero point.
Note: After opening the software, users should click on it to enable all functions in the control area.



Enter the PT mode in paused status only. In PT mode, most functions in the control area will be locked. Users can move the cutting head by button for manual operating or wireless remote, or calibrate the height.



click on “Pt CONT”, and the cutting head will move back to the located position and resume processing.

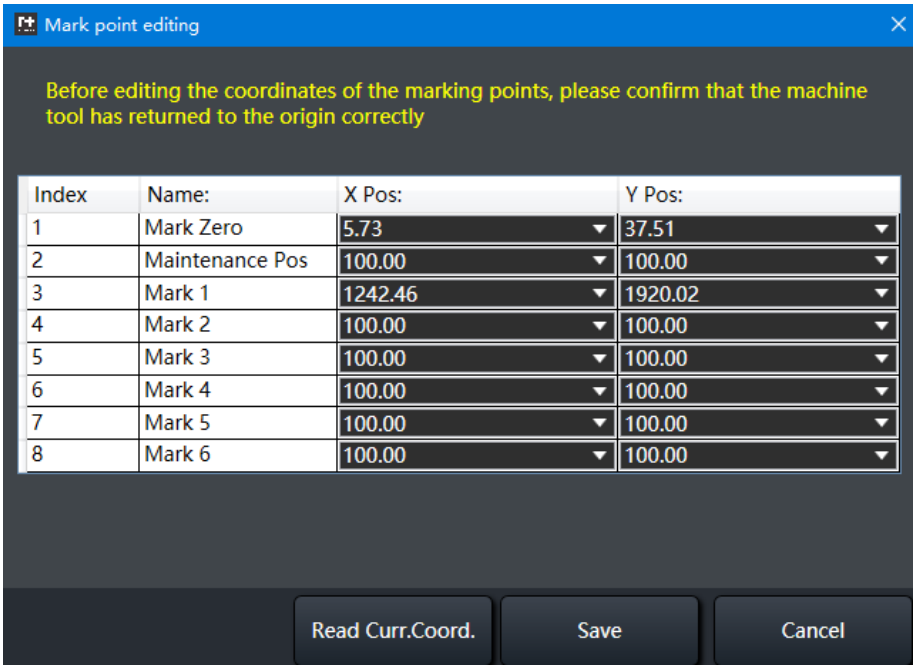


Click on “Envelop”, and the cutting head will move along the path of envelope line.

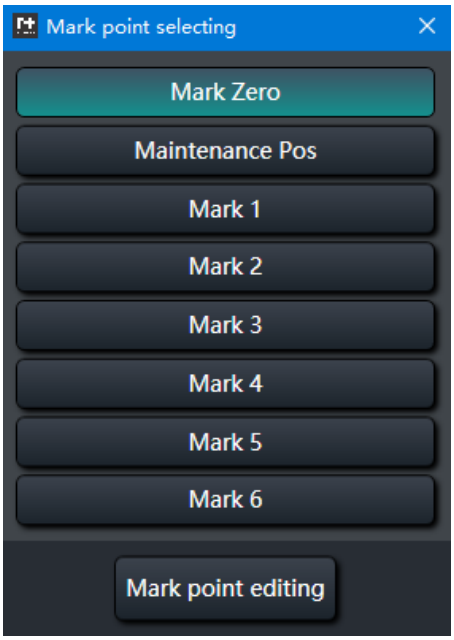
Click on “Return to Mark Zero”, and the cutting head will move back to currently marked position.

Click on “Mark” to enter the following interface

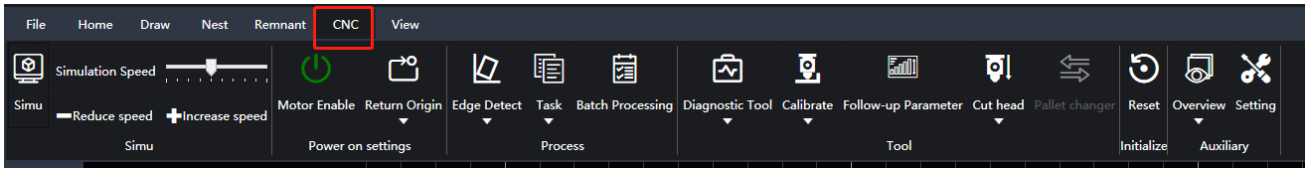
Select an index to be marked and click “Read Curr. Coord.” to mark the current coordinate at the selected index.



Click on “Mark Zero” to display 8 marking position of machine tool, used to select marking points to be selected, as shown below:

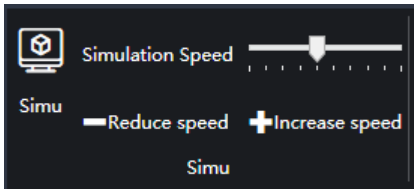


5 CNC Function



5.1 Simulate

Before processing, check the cutting path by simulation. Click on  in the CNC sub-page, and simulate cutting of the current graphics. The simulation will be displayed in the drawing area, as shown below:



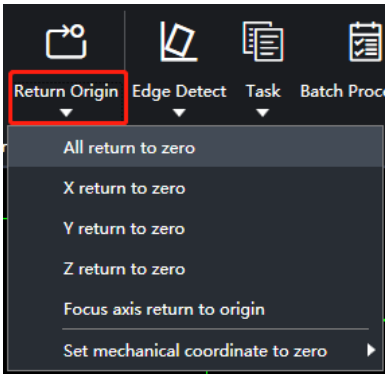
Simulated Speed: the speed of the cutting simulation.

5.2 Motor Enable

The servo will be auto power-on when opening the software, then the machine can work. Users can also click on “Motor Enable” to control the servo.

5.3 Return Origin

After opening the software, the system should return origin first. Click on “Return Origin” to enter the following interface: select “All return to zero” and wait the machine tool to return origin.

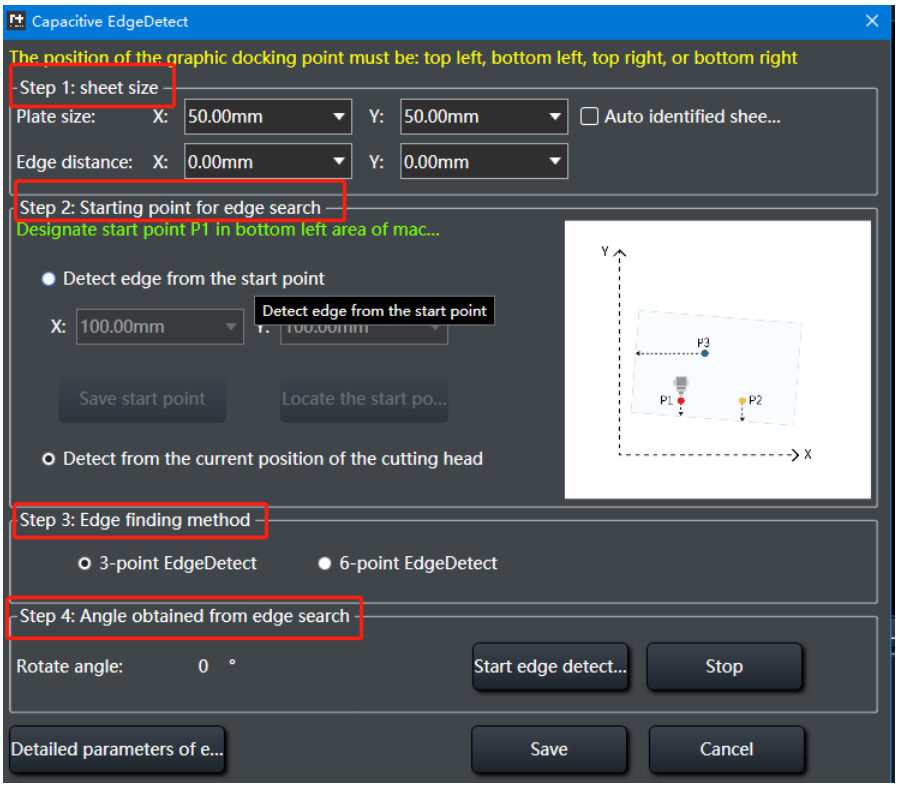


5.4 Edge Detect

There are 4 types of edge detection, including auto, manual, and disc and 2-point edge detection.
Auto edge detection supports 3-point or 6-point.

- **Auto Edge Detection**

Click on the drop-down button of “Edge Detect” in the CNC sub-page to enter the following interface:



After completing the parameter setting, click on Save and start edge detection button, and the machine will start working. The result will be shown below the drawing area.
The following are the parameters for auto edge detection:

1) Auto identified sheet size: select to auto calculate the sheet size after edge detection.
2) Plate size: the length of the sheet in X/Y-axis direction.
   Please note that inputting the wrong sheet size will cause collision of the cutting head. Please confirm the sheet size is proper when inputting.
3) Edge distance: set the positional deviation of point P for edge detection. A positive value shifts the zero point of the sheet inward, and a negative value outward.
4) Edge finding method: 3-point and 6-point. It is suggested to use the 6-point edge detection on the thin sheet. Detect the edge 6 times by a single point to avoid interference from the tooth tip.
5) Detect from the current position of the cutting head: After checking, the edge detection will start from the current position of the cutting head. Please move the cutting head into the range of the sheet.
6) Detect edge from the start point: After checking, the edge detection will start from a fixed position. Move the cutting head into the range of the sheet and click on “Save start point”. The current position of the cutting head will be recorded as a fixed position for detecting edge.

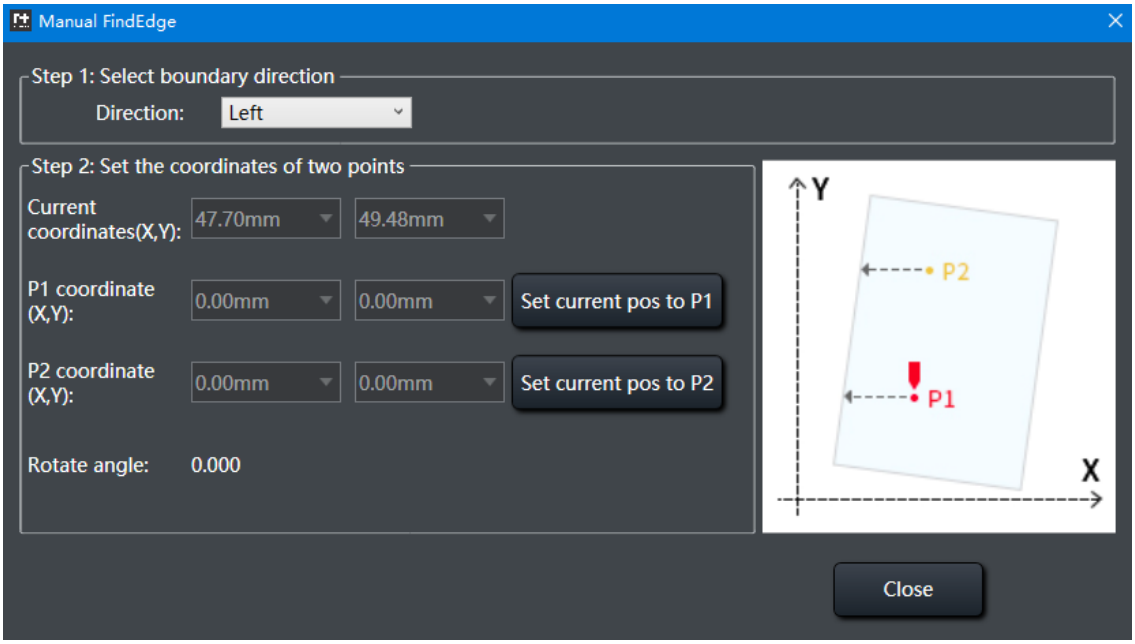
7) Angle obtained from edge search: the rotation angle from edge detection.
8) Detailed parameters of edge detection: set the basic parameters for capacitive edge detection.
9) Height: the height from the cutting head to the sheet during edge detection.
10) Step height: the sensitivity of judgment when detecting the edge of the sheet. The greater the value, the less sensitive it is, and the greater the Z-axis overshoot distance; The smaller the value, the more sensitive it is, and it's more likely to mis-detect the undulation of sheet as its edge.
11) Speed: set the speed of edge detection.
12) XY-axis zero correction: after edge detection, correct the edge detection result by setting a positive value to shift inward and a negative value outward.

Click on the drop-down button of Edge Detection. Select "Clear Angle after Task Ends" in the drop-down bar. The edge detection angle will be auto cleared each time after processing is completed.

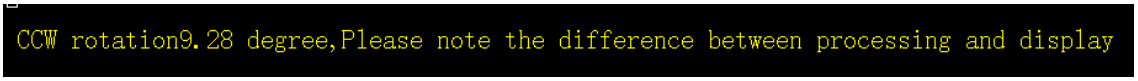
Click on the drop-down button of Edge Detection. Select "Clear EdgeDetect Angle" in the drop-down bar. The current edge detection angle will be cleared.

- **Manual Edge Detection**

Click on the drop-down button of "Edge Detect" in the CNC sub-page to enter the following interface:

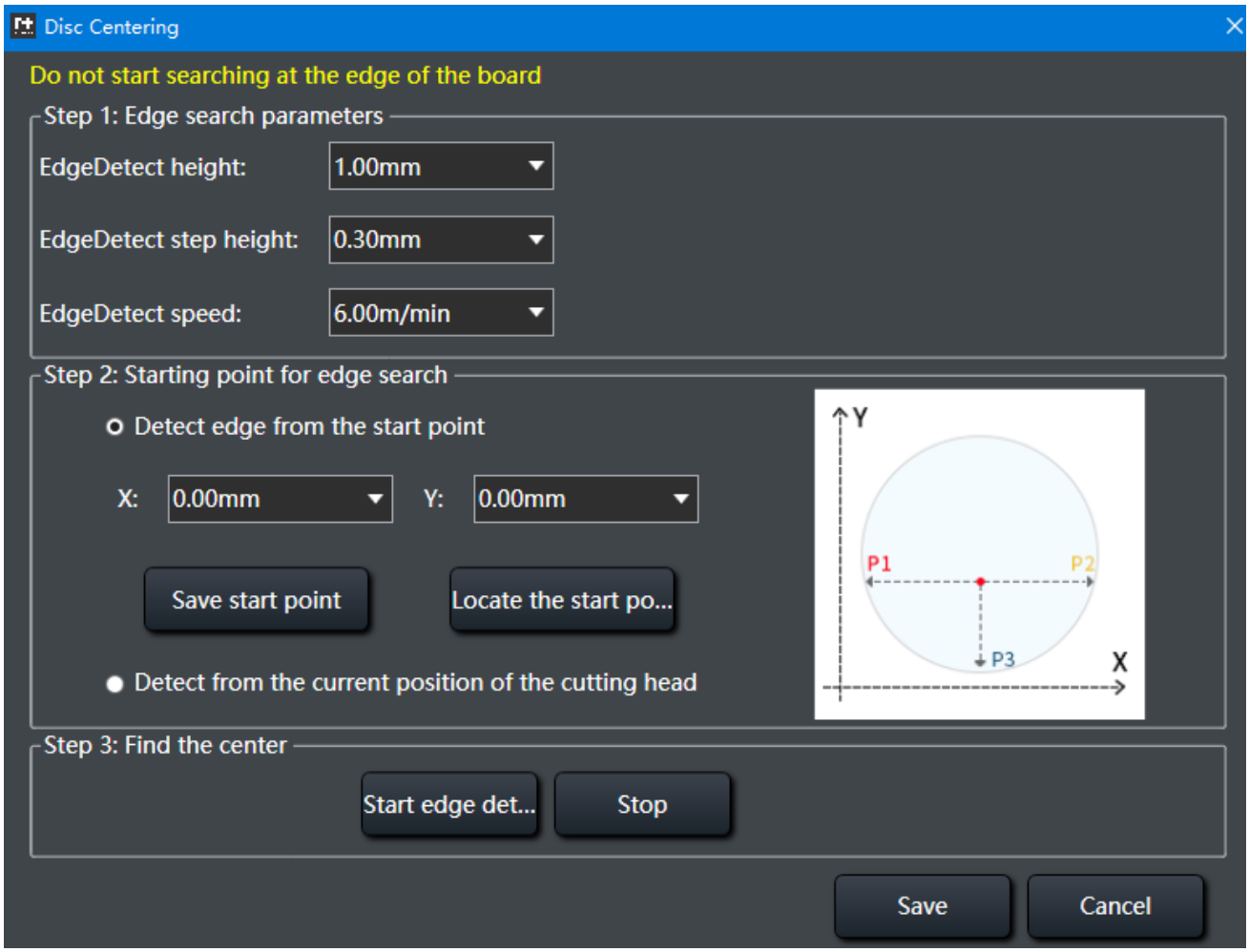


According to the diagram, the sheet is placed at an angle. Click on the button for axis movement to move to the X-axis edge. Click on P1 to obtain the coordinate of point 1. Click on the button for axis movement to move to another point on the X-axis edge. Click on P2 to obtain the coordinate of point 2. Click on "Calculate Angle" to complete setting. The result will be shown below the drawing area, as shown below:



- **Disc Edge Detection**

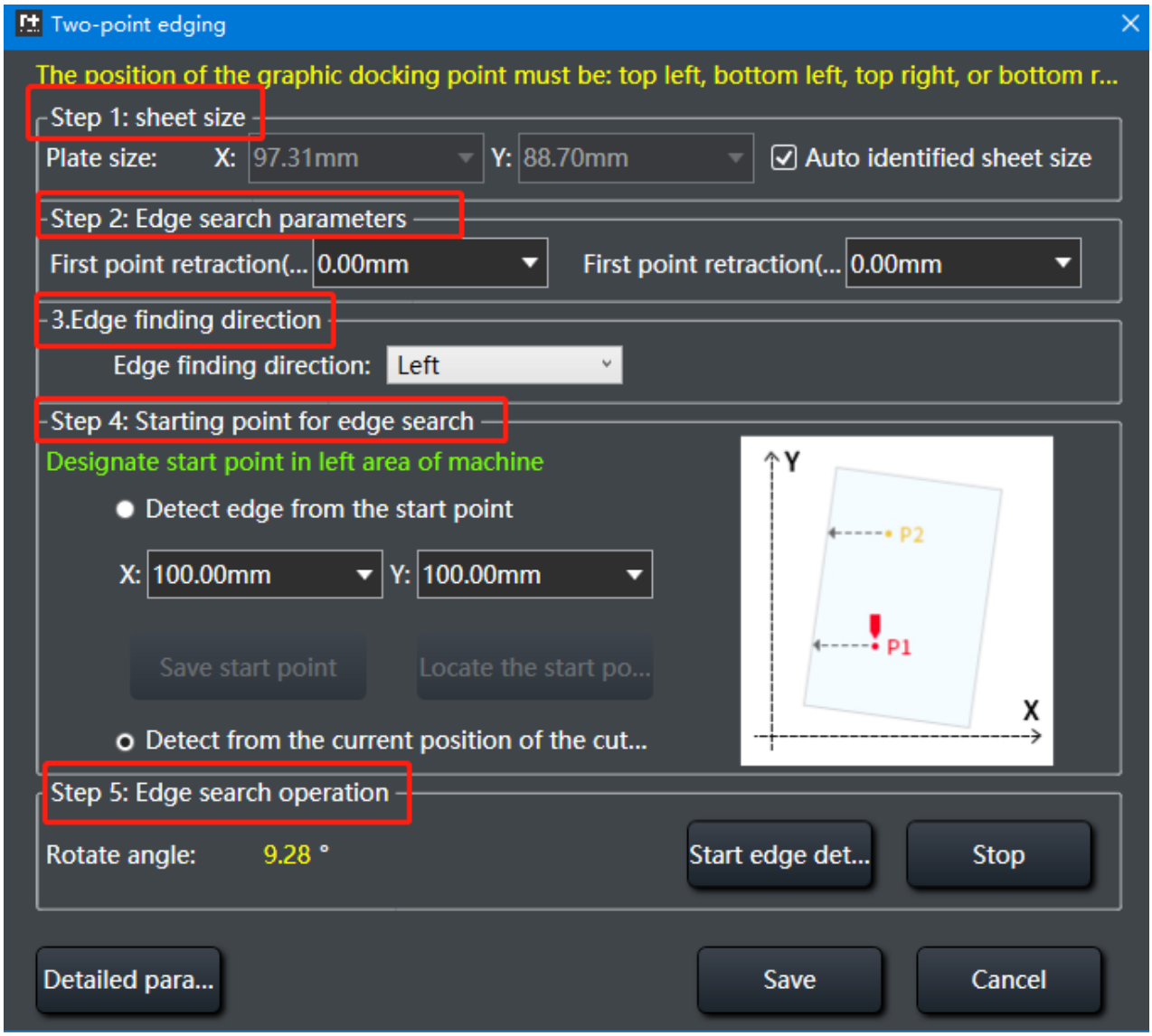
Click on the drop-down button of “Edge Detect” in the CNC sub-page to enter the following interface:



1) Edge Detect height: the height from the cutting head to the sheet during edge detection.
2) Edge Detect step height: the sensitivity of judgment when detecting the edge of the sheet. The greater the value, the less sensitive it is, and the greater the Z-axis overshoot distance; The smaller the value, the more sensitive it is, and it’s more likely to mis-detect the undulation of sheet as its edge.
3) Edge Detect speed: set the speed of edge detection.
4) Detect edge from the start point: After checking, the edge detection will start from a fixed position. Move the cutting head into the range of the sheet and click on “Save start point”. The current position of the cutting head will be recorded as a fixed position for detecting edge.
5) Detect from the current position of the cutting head: After checking, the edge detection will start from the current position of the cutting head. Please move the cutting head into the range of the sheet.

- **2-point Edge Detection**

Click on the drop-down button of “Edge Detect” in the CNC sub-page to enter the following interface:



1) Auto identified sheet size: select to auto calculate the sheet size after edge detection.
2) Plate size: the length of the sheet in X/Y-axis direction.
   Please note that inputting the wrong sheet size will cause collision of the cutting head. Please confirm the sheet size is proper when inputting.
3) First point retraction: retraction distance of cutting head before edge detection.
4) Edge finding direction: select the movement direction of cutting head.
5) Detect from the current position of the cutting head: After checking, the edge detection will start from the current position of the cutting head. Please move the cutting head into the range of the sheet.
6) Detect edge from the start point: After checking, the edge detection will start from a fixed position. Move the cutting head into the range of the sheet and click on “Save start point”. The current position of the cutting head will be recorded as a fixed position for detecting edge.
7) Rotate angle: the rotation angle from edge detection.

8) Detailed parameters of edge detection: set the basic parameters for capacitive edge detection.
9) Height: the height from the cutting head to the sheet during edge detection.
10) Step height: the sensitivity of judgment when detecting the edge of the sheet. The greater the value, the less sensitive it is, and the greater the Z-axis overshoot distance; The smaller the value, the more sensitive it is, and it's more likely to mis-detect the undulation of sheet as its edge.
11) Speed: set the speed of edge detection.
12) XY-axis zero correction: after edge detection, correct the edge detection result by setting a positive value to shift inward and a negative value outward.

- **Memory edge detection angle**

1) Restore edge detect angle only: restore the angle of the last edge detection.
2) Restore edge detect angle and return origin: restores the angle of the last edge detection and return to the zero point of workpiece.
3) Set edge detect angle: set proper edge detect angle manually.
4) Clear edge detect angle after processing: auto delete the angle of current edge detection after processing.
5) Clear edge detect angle: manually delete edge detection angle.

- Cut off

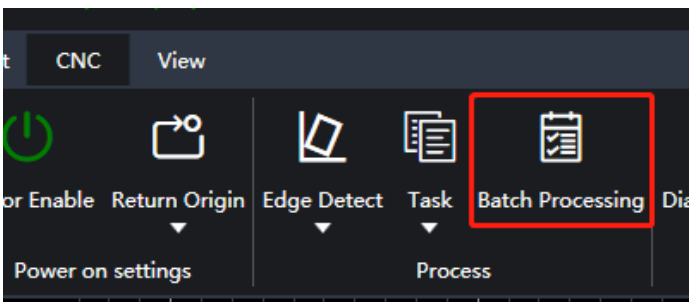
1) Cut off in the X-axis direction: select to detect edge in the X direction and cut off.
2) Cut off in the Y-axis direction: select to detect edge in the Y direction and cut off.

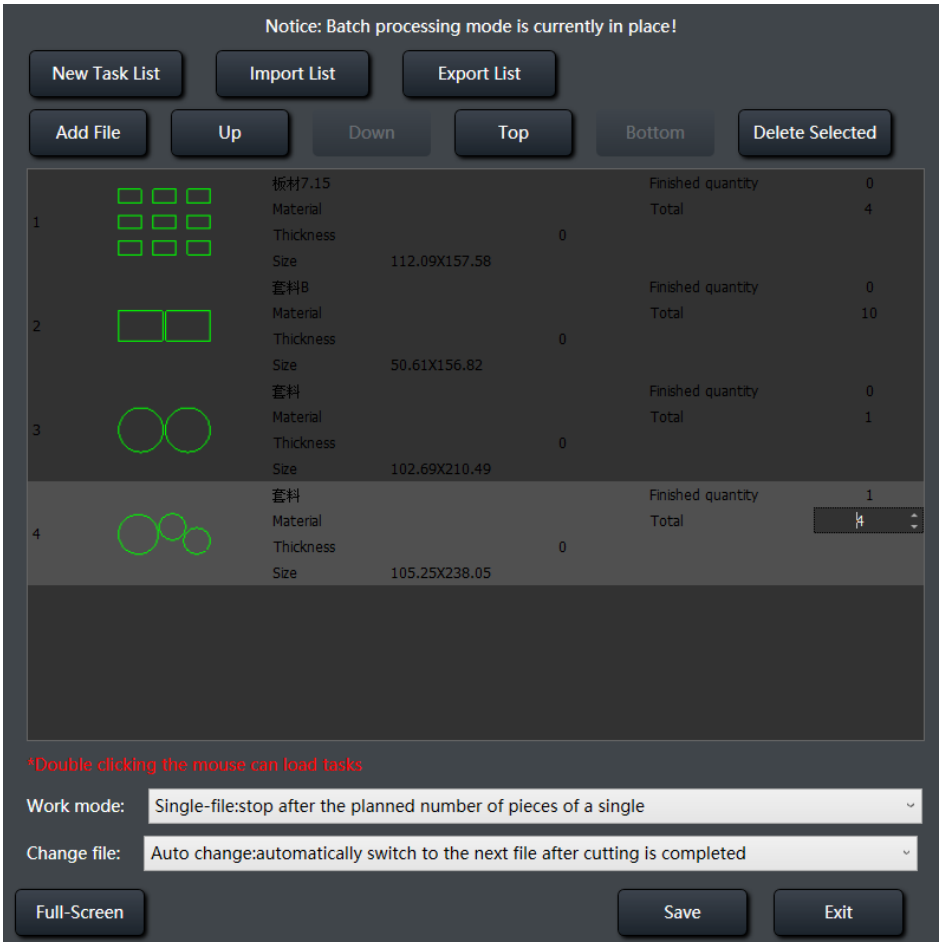
5.5 Task

If there comes an urgent task in the cutting process and the current graphics have not been completed yet, users can save the current process by clicking on "Save" in the dropdown bar of "Task". Then create a new drawing. After the urgent task is completed, click on "Load In" in the dropdown bar of "Task" to import the processing file. Then the machine can resume the rest work and complete it. When any interference makes the machine stop processing, click on "Restore Task before Power-off" to resume the processing.

5.6 Batch Processing

Click "Batch Processing" on the CNC sub-page to enter the following interface as shown below:





1) New Task List: After clicking on “New Task List”, all tasks in the current list will be cleared.
2) Import List: import a file saved before.
3) Export List: save current files, processing quantity and sequence as listed files (including drawings)
4) Add File: import files (including formats: dxf, nsp, etc.)
5) Up: change the processing sequence between the current file and the file before it.
6) Down: change the processing sequence between the current file and the file after it.
7) Top: move the current file to the first.
8) Bottom: move the current file to the end.
9) Delete Selected: delete the selected file.

Note: Users can customize total count of single processing graphic and finished processing count, by clicking on a file.

There are three work modes:

1. Single-processing: stop after processing a single file once.
2. Single file: stop after the planned number of a single file.
3. List-planning: stop after planned processing count.

If auto processing is required, select single-processing or single-file; If requiring to process multiple graphics continuously, select list-planning.

There are two modes to change files:

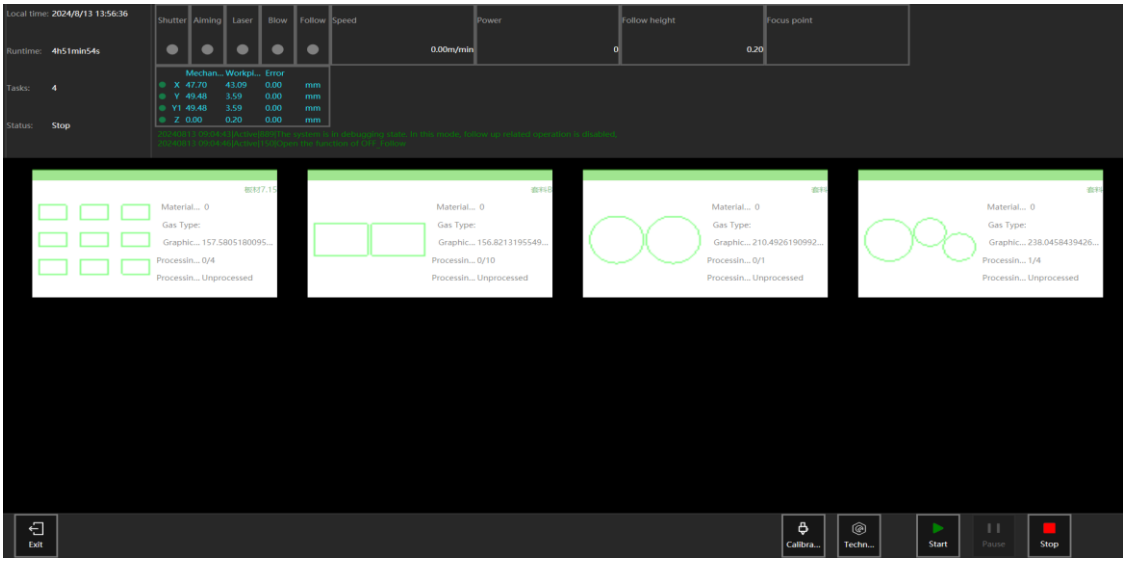
1. Manual change: stay in the current processing file after processing is completed

2. Auto change: auto change to the next file to be processed after processing is completed

(When selecting list-planning, the mode must be auto change)

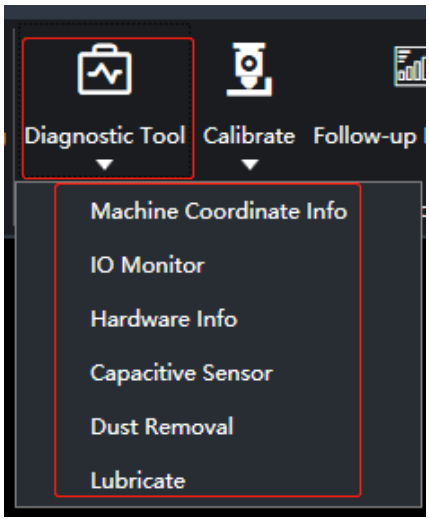
Full-screen mode: Users can enter the batch processing interface to monitor the processing quantity of each file.

When starting processing, double-click the first file in the processing list to read the drawing



5.7 Diagnostic Tool

Click on “Diagnostic Tool” to display the following options.

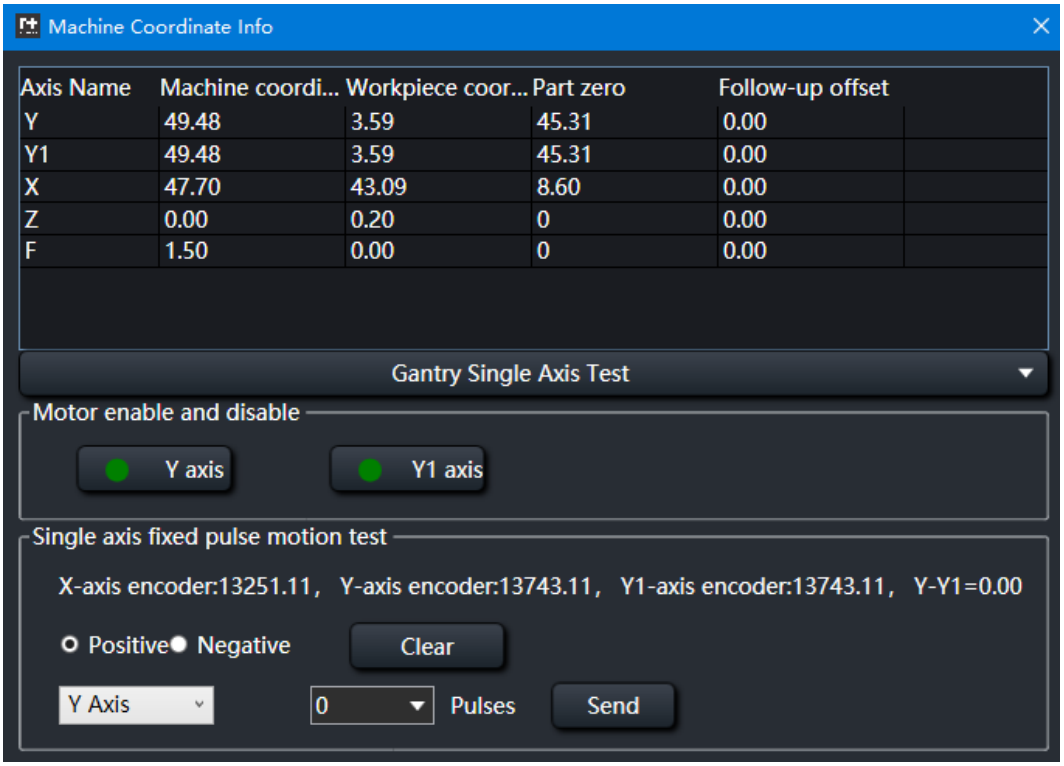


1) Machine Coordinate Info

To monitor the machine coordinates, workpiece coordinates, etc. of each axis;

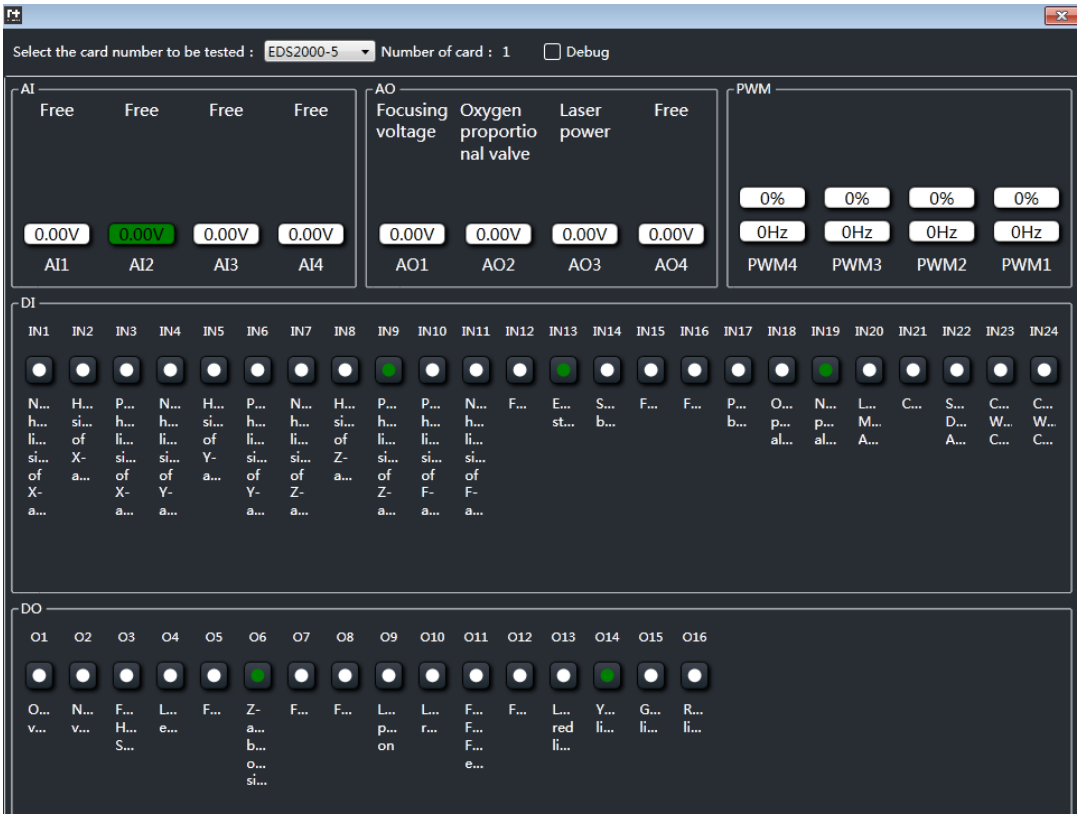
Support motor enable/disable of gantry single axis;

Test Y-axis and fixed pulse motion of single axis.



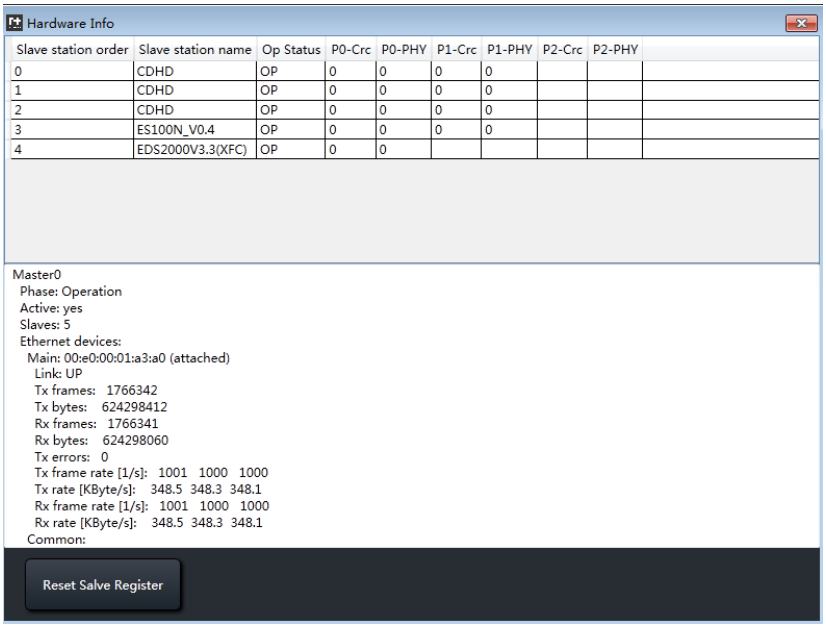
2) IO Monitor

To monitor the status of input and output.



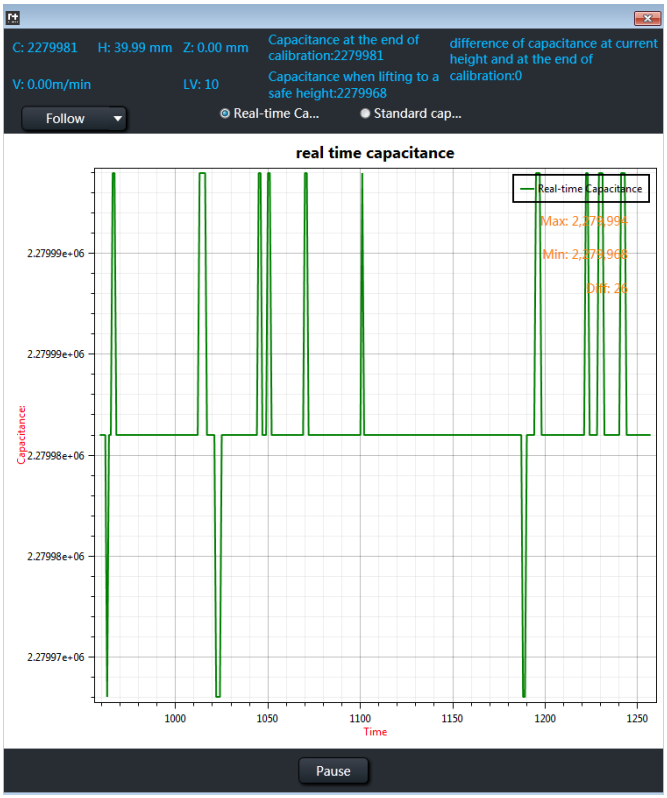
3) Hardware Info

To monitor the status of slave OP.



4) Capacitive Sensor

Click on it to enter the following interface:



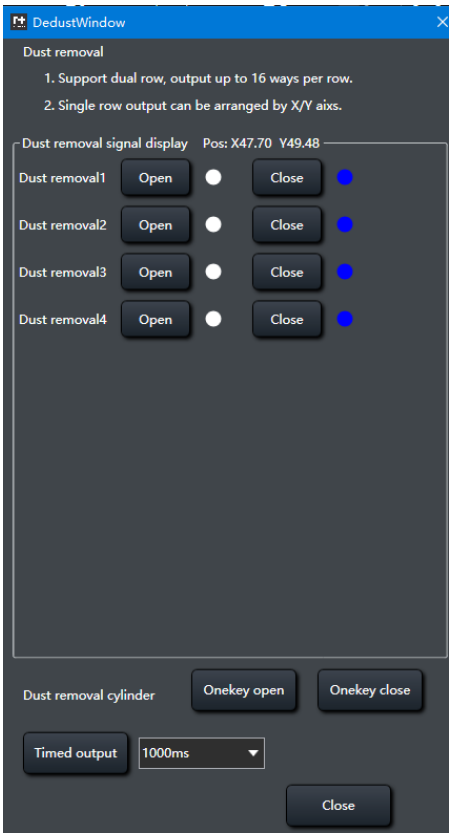
Display capacitance curve and current capacitance. Click on “Export calibration data” to export the current data. Click on “Reset capacitor” to reset the current capacitance, and a new calibration is required.

Click on the dropdown button of “Capacitive Sensor”, and click on “Quick Calibrate” to calibrate the cutting head with sheet under it.

5) Dust Removal

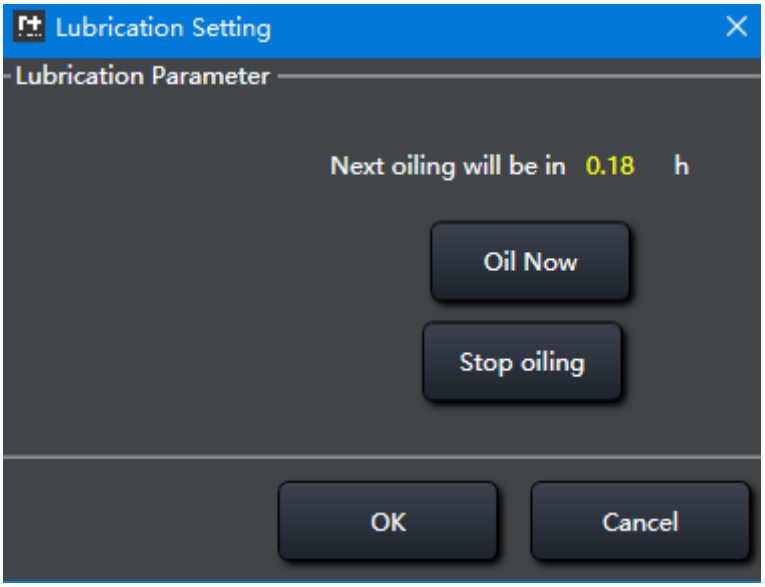
To control the opening, closing and time output of dust removal.

The function of dust removal can be quickly opened and closed as below:



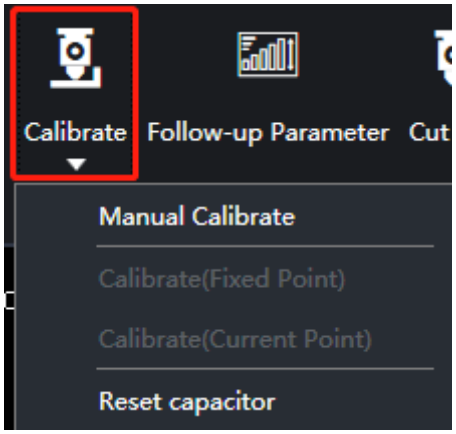
6) Lubricate

Click on the dropdown button of “Lubricate” to check the time for next oiling. Users can also click on "Oil Now" to lubricate the machine tool immediately, as shown below:



5.8 Calibrate

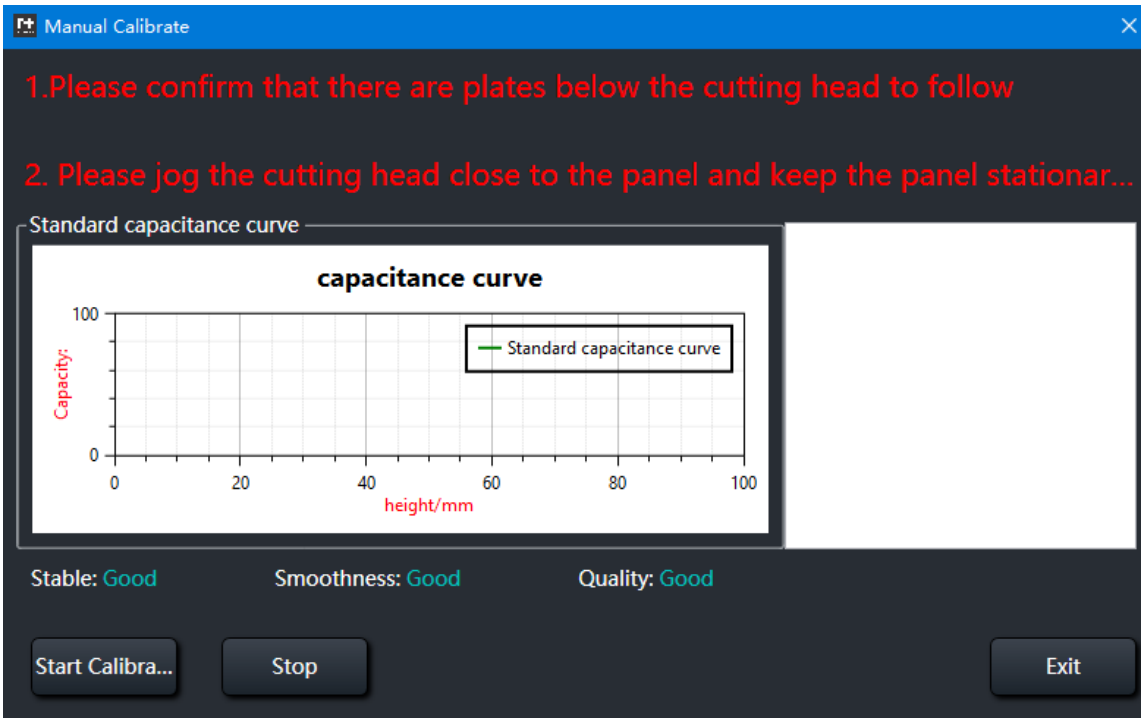
Click on the dropdown button of “Calibrate” to show different options, as shown below:



1) Manual Calibrate

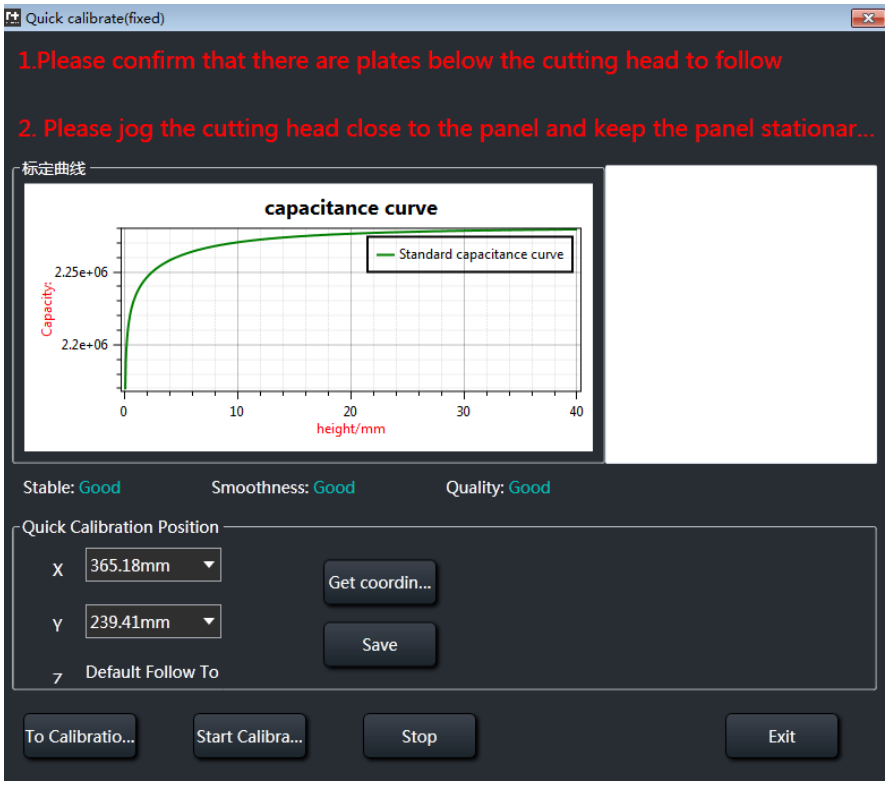
Before calibration, move the cutting head at the position with the sheet under it. Click on "Manual Calibrate", and click on “Start Calibrate”. In the following interface, the cutting head moves down at the current point for calibration.

Note: Manual calibration is required for opening the software at the first time.



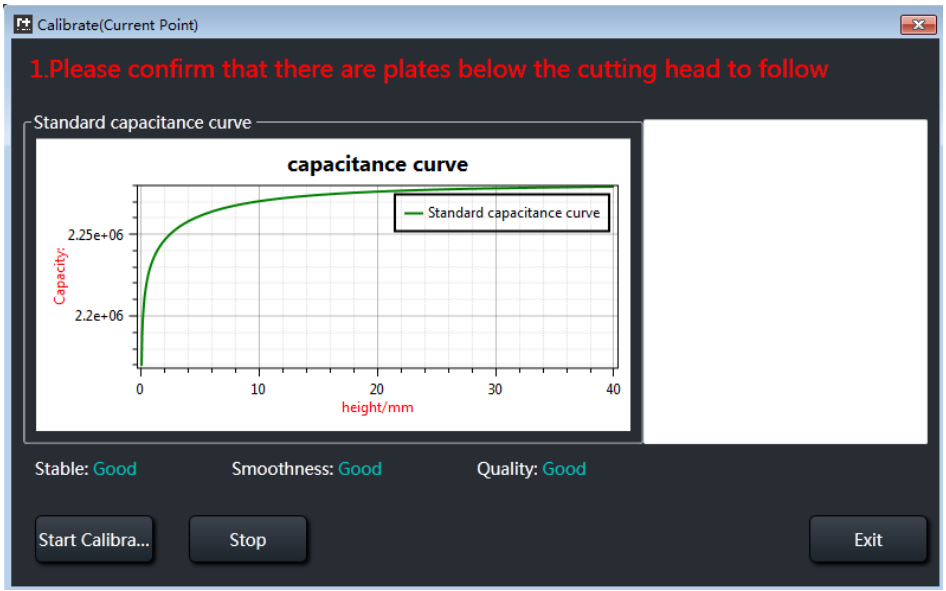
2) Calibrate (Fixed Point)

Before calibration, move the cutting head at the position with the sheet under it. Click on " Calibrate (Fixed Point)" to enter the following interface. Users can set the current point as the fixed calibration point, or set the fixed coordinates for calibration. After clicking on “Start Calibrate”, the cutting head will move to the corresponding coordinates for calibration, and the cutting head will quickly move down to a fixed height and then calibrate.



3) Calibrate (Current Point)

Before calibration, move the cutting head at the position with the sheet under it. Click on " Calibrate (Current Point)" to enter the following interface. After clicking on “Start Calibrate”, the cutting head will calibrate the current point, and quickly move down to a fixed height and then calibrate.



4) Reset capacitor

Click on “Reset capacitor” to reset current capacitance value, and a new manual calibration is required.

5.9 Height Sensor

Click on Height Sensor in CNC sub-page to set following parameters:

Lifting		
Parameter	Default	Remark
Max lifting height among vectors	30	The lifting height of the cutting head bases on its current position after Z-axis follow completes. It is recommended to set the value as half of the Z-axis travel. If the value is too large, the cutting efficiency maybe reduced.
Optimize short travel	Enable	Enable: use the function. Disable: not use the function.
Short travel	8	When using this function, if the linear distance between the end of the current contour and the start of the next contour is less than the value, the cutting head will move to the start of the next contour in the follow-up state.
Open LeapFrog	Enable	Enable: the cutting head will move and lift while completing cutting one contour and drying run to the next one. When the cutting head gets close to the cutting position, it will follow down in advance to improve efficiency. Disable: while completing cutting one contour and drying run to the next one, the cutting head will lift at first and then move to the start position of the next contour. Then it will follow down to reduce the risk of touching the sheet.
Leapfrog takeoff height	0	the takeoff height of leapfrog in dry run.
Max frog drop distance	20	the max distance of frog drop.

Follow-up Parameter		
Parameter	Default	Remark
Follow level	7	The default is fine, and generally no modification is required.
Follow speed	18	the maximum speed when following down.
Follow max height	5	If the follow height is larger than the value, the cutting head will follow up to 1mm from the sheet and then lift to the follow height. Meanwhile, the follow-up is in closed state to ensure an accurate height; If the follow height is smaller than the value, the cutting head will directly follow-up to the follow height to improve the efficiency.
Real-time calibrate	Disenable	Optimize the algorithm according to the set time to make the calibration data of capacitance more accurate.
Calibration jump value	1000	Select capacitance jump to be the touch-plate signal when calibrate, and the value will take effect. Parameter definition: during calibration, when the cutting head is seeking the sheet, if the absolute value of the difference between the capacitance value of the current cycle and the capacitance value of the previous cycle (1ms ago) is greater than this value, the cutting head is considered to have touched plate,

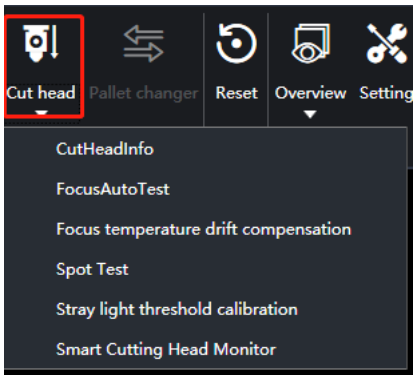
		and at this time the cutting head moves upwards and starts the calibration to record the capacitance value in relation to the height.
In place width	0.2	the range of height used to confirm if the cutting head follow-up is in place.
Servo Feedback delay	10	The delay can be auto-measured or adjusted by auto-tuning.
Height sensor delay	0.5	The delay can be auto-measured or adjusted by auto-tuning.

Touch-Plate Parameter		
Parameter	Default	Remark
Piercing delay	200	In piercing, the system will alarm and stop cutting if the duration of the touch-plate signal is greater than the value.
Cutting delay	100	In cutting, the system will alarm and stop cutting if the duration of the touch-plate signal is greater than the value.
Dry run delay	50	In dry run, the system will alarm and stop cutting if the duration of the touch-plate signal is greater than the value.
Pre-touch-plate height	0.1	This function is used to protect nozzle, and default value is recommended. If the current height is smaller than the value, it means the touch-plate signal is triggered.
Edge follow (to avoid touching plate)	Enable	Enable: prevent shaking and touching plate when the cutting head is at the edge of sheet.

Axis Speed		
Parameter	Default	Remark
Speed	1.8	The maximum speed of the machine running, calculated by the max motor speed and pitch generally. When the command speed is faster than it, refer to this value.
Acceleration	5000	the acceleration of cutting.
Acc time	50	The more the acceleration time, the slower the acceleration is, which brings less impact to the machine. The less the time, the faster the acceleration is, which brings more impact to the machine.
Slow speed	1.2	the axis speed by manual control.
Rapid speed	3	the axis speed by manual control in quick mode.

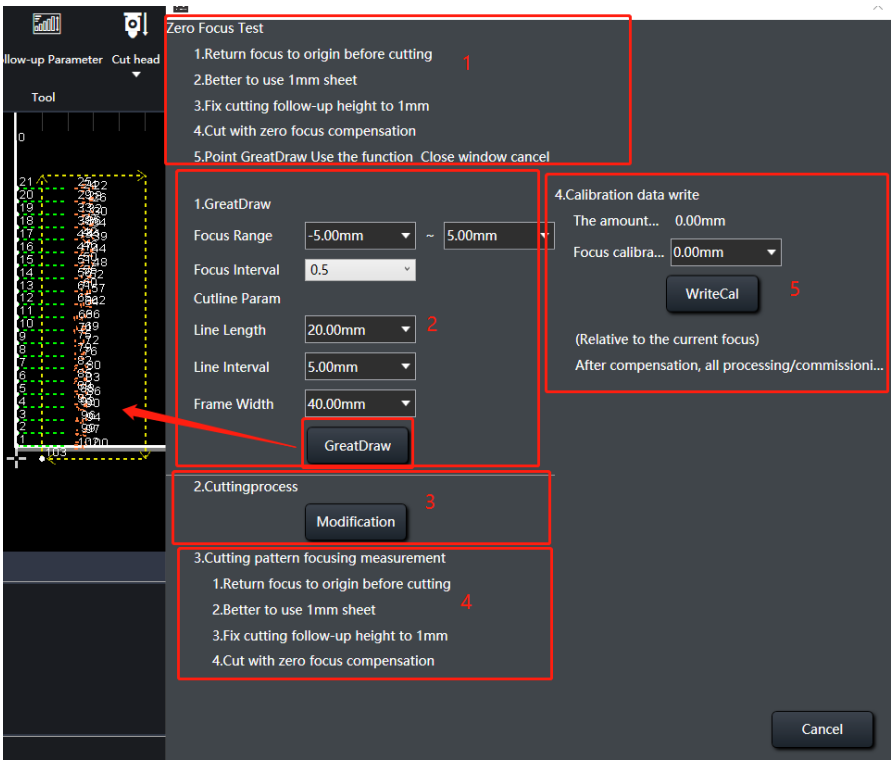
5.10 Cut Head

Click on "Cut Head" to display a list of items:



1) **Focus Auto Test:**

The purpose of focus auto test is to confirm the actual focus value of zero focus of the cutting head. Find out the one with the thinnest cutting slot by analyzing the cutting effects of different focuses, input the corresponding focus value in "Focus calibration", and click on "Write Cal" to write it to the system, as shown below:



1- test steps.

2- drawing size setting. Click on "Great Draw" to generate drawing in drawing area.

3- cutting process setting, including pierce, gas pressure, frequency and focus.

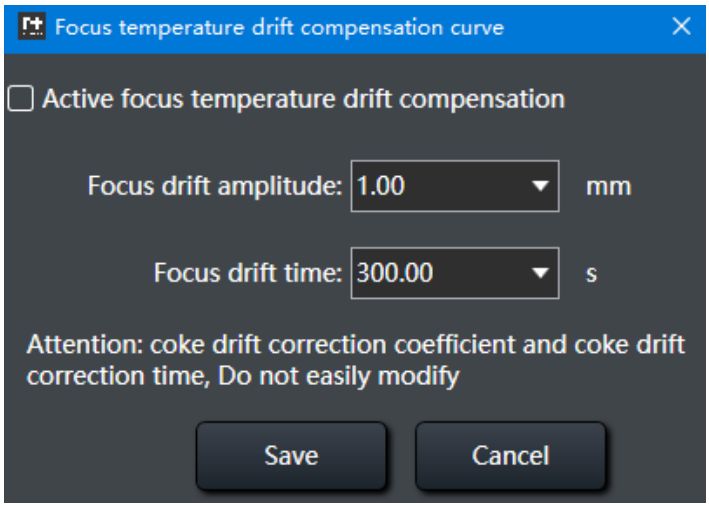
4- Prompts for test. Click on "Cancel" to cancel this function.

5- Input proper focus value.

2) **Focus temperature drift compensation**

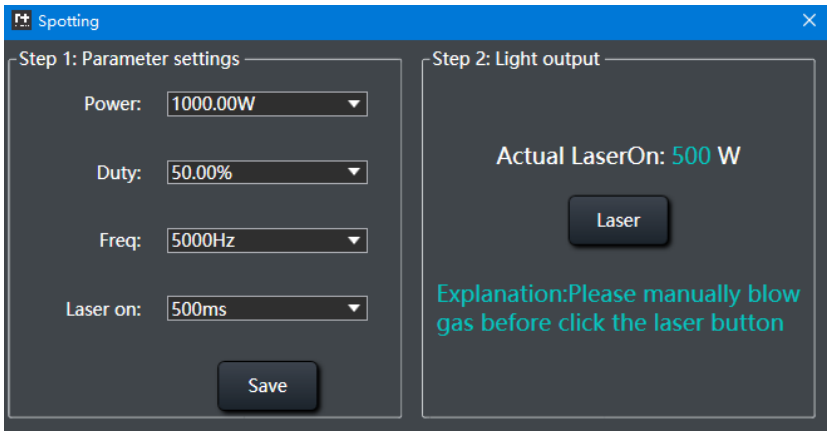
During the cutting process, the performance of the cutting head changes with different temperature. The function of focus temperature drift compensation can be used to adjust the temperature and further ensure the stability and accuracy of cutting.

Focus temperature drift compensation will be performed once during “Focus drift time.” It’s not recommended to modify the default value.



3) **Spot Test**

This function is used to check whether there is pollution in the optics system and the degree of pollution by laser spotting, as shown below:

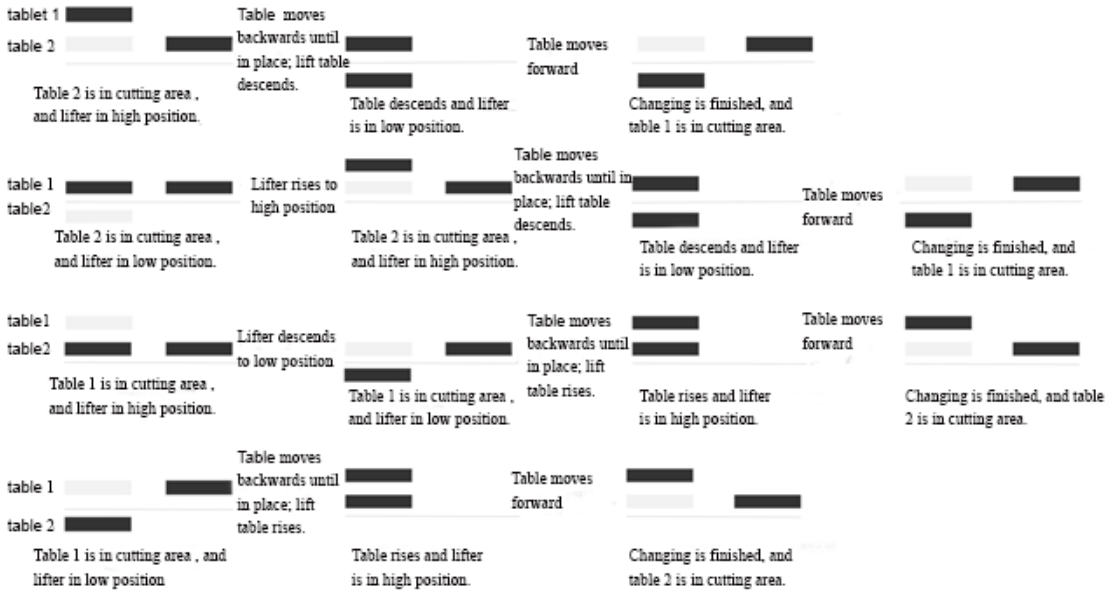


- Power: set the peak beam-out power of the laser.
- Duty: set the duty cycle of the laser. It refers to the ratio of beam-out duration in one beam-out cycle and the total time. The higher the ratio value, the higher the average power is. When it is 100%, it means the average power equals the peak power.
- Freq: set the frequency of the laser in cutting. It refers to the time of beam out in 1 second. The higher the value, the more continuous the laser beam is. 5000Hz is a successive beam.
- Laser on: set the duration of laser on.

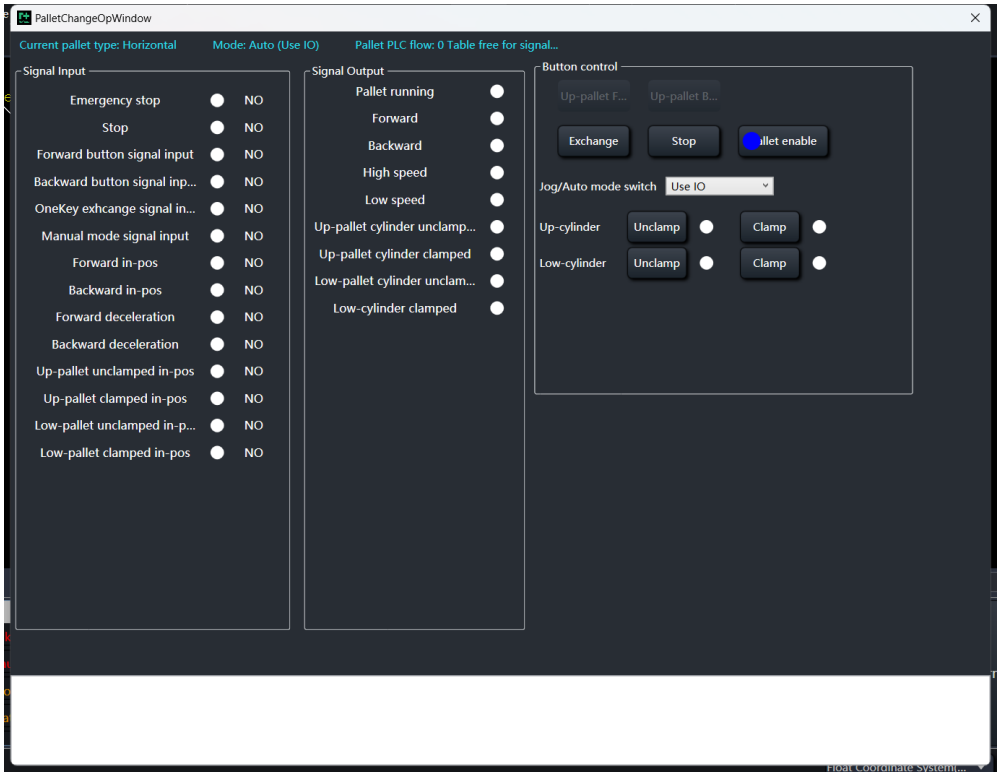
5.11 Pallet Changer

Click on “Exchange” to auto change pallet.

Auto change flow of lifting motor:



Click on “Pallet changer” to enter the following interface, including input signal, output signal and button control.

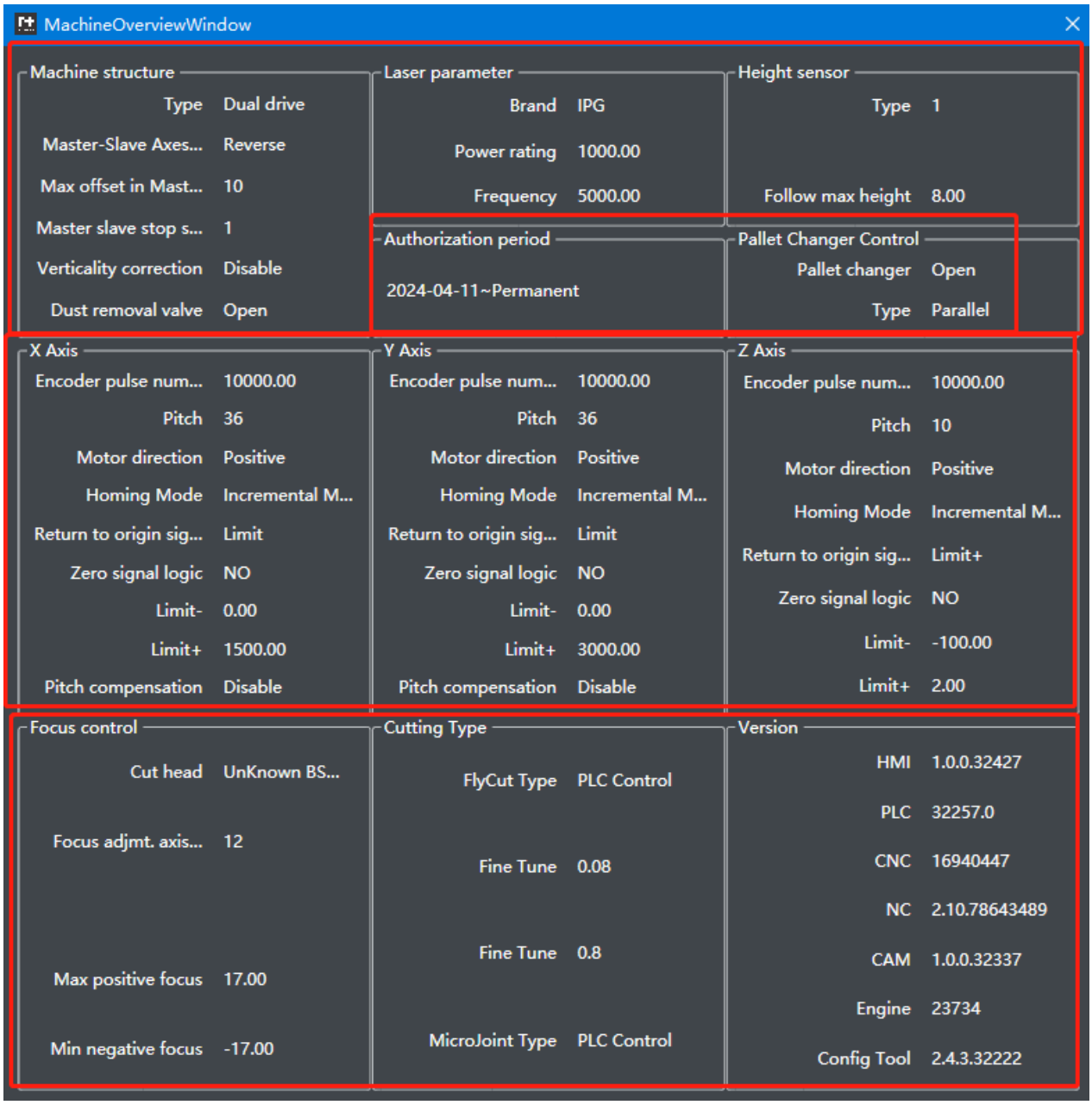


5.12 Reset

Click on “Reset” to stop motion of machine, when emergencies occur.

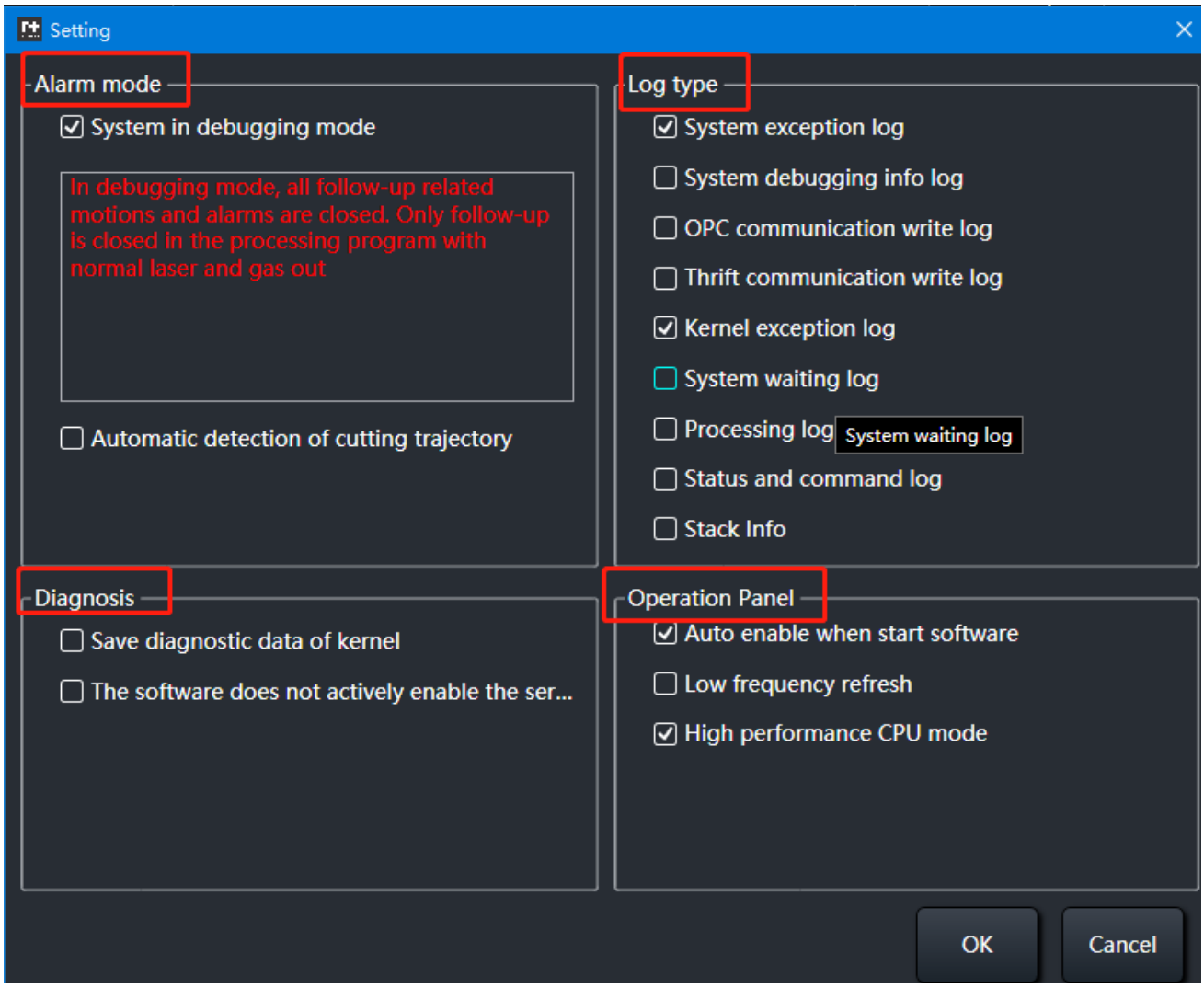
5.13 Overview

Click on “Overview” in the CNC sub-page to enter the following interface:



5.14 Setting

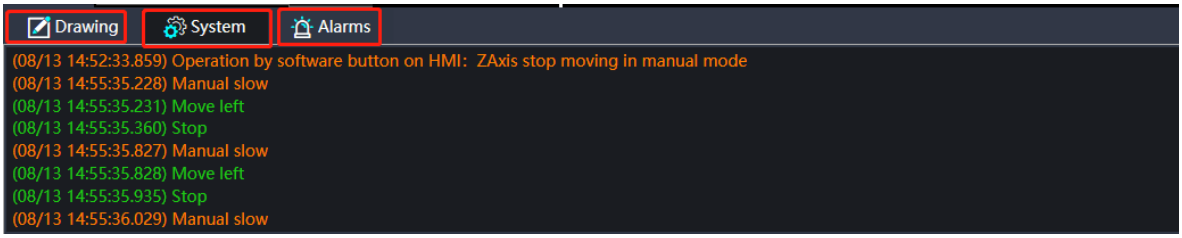
Click on “Setting” in the CNC sub-page to enter the following interface:



- Alarm mode: depend on actual demands while debugging. The default is deselect.
- Log type: check according to actual demands and selected logs can be viewed on the log area.
- Diagnosis: check to use two functions as required.
- Operation Panel:
  a. Auto enable when start software: check to auto enable when the software is opened.
  b. Low frequency refresh: avoid interface lagging in high-frequency mode.
  c. High performance CPU mode: check to auto turn on CPU high performance mode

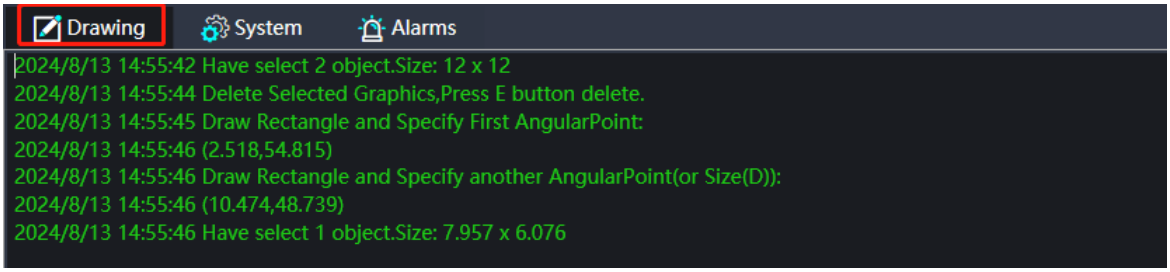
6 Status Bar

The status bar at the bottom mainly includes Drawing (drawing log), System (system log), and Alarms (system alarm). Click on a button to switch to view logs, as follows:



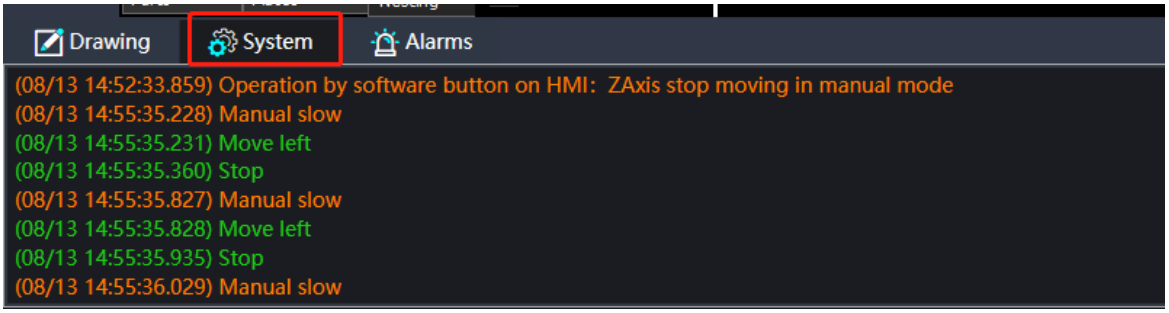
6.1 Drawing

To give prompts and guides for users' operations when drawing or editing the graphics, as shown below:



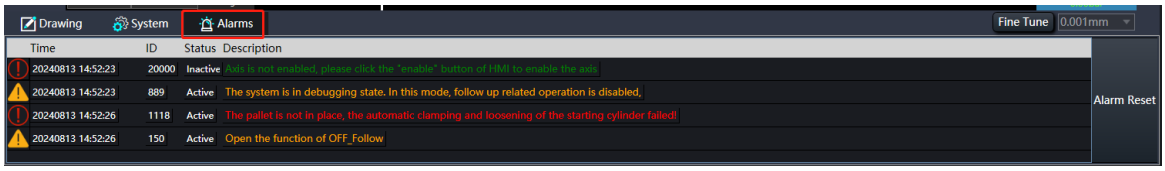
6.2 System

To record existing operations to the system, as shown below:



6.3 Alarms

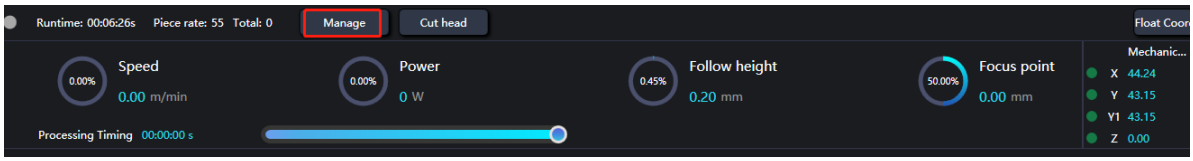
To display alarms or prompts of the system.



Note: when red alarm info occurs, please clear the alarm before processing. And yellow info will not affect processing, as for displaying prompts only.

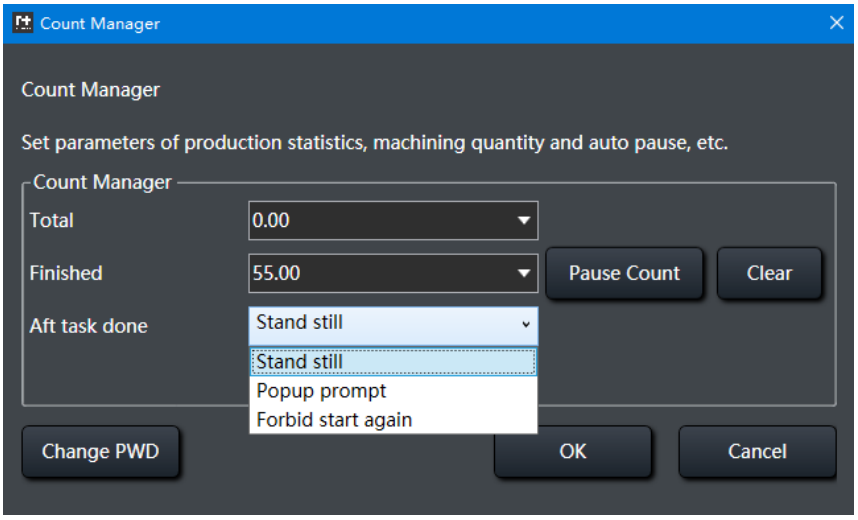
6.4 Run Status

Displays the current motion status of each axis, and their machining progress, as shown below:



- Runtime: the time of running the software.
- Piece rate: actual processing count.
- Total: the planned processing count.

Click "Manage" as above to enter the following interface:



- Total: set the planned processing count.
- Finished: displays the workpiece count of finished processing.
- Clear: Clear the currently processed count.
- Aft task done: the system will give corresponding prompts at the end of processing.
- Pause Count: temporarily stop processing counting.