

Friendess, Inc.

# Friendess HypCut Laser Cutting Control System

# User Manual

: 1.0.2220.5



# Welcome

Thank you for using Friendess HypCut laser cutting control system!

HypCut system is designed for planar laser cutting. The application consists of several modules of production management, cutting technique, machining control, intelligent automation, quick debug, device diagnosis& maintenance, local and remote assistance, to help users product with high efficiency.

HypCut must work with HypTronic master motion controller.

Please note that this user manual is only used as an operation instruction for the main program of HypCut system. Please refer to other manuals or contact us directly for other advanced settings or tools with limits installed with HypCut.

This document is based on HypCut version 1.0.2220.5. Due to the continuous updating of software functions, the HypCut system you use may differ from the statements in this manual in some aspects.

If you have any questions or suggestions in usage of our products, please feel free to contact us!



The working and cutting performance of the machine are directly related to the material, laser, cutting gas, gas pressure and the parameters setup. Please be cautious in setting the parameters!

Improper parameter setting and operation may reduce the cutting performance, damage machine components and even human body. Hypcut system has already provided multiple protections, meanwhile manufactures and users must follow the safety operation rules in case of any accidents and injuries.

Shanghai Friendess Electronic Technology Corporation Limited does not bear any direct, indirect, incidental or corresponding losses and liabilities arising from the improper use of this manual or this product.



## Content

Welcome .....	1
1. Quick Start .....	2
1.1. Features .....	2
2. Access, Upgrade, and Restore of the System .....	3
2.1 Operation Process .....	3
2.2 Start Operation .....	3
2.2.1 Activate System .....	3
2.2.2 User Interface .....	5
2.2.3 Select Mode .....	6
2.2.4 Import Task/File .....	6
2.2.5 Graphic Correction .....	7
2.2.6 Cutting technique .....	8
2.2.7 Zero Point .....	10
2.2.8 Accessibility .....	11
2.2.9 Start Machining .....	13
3. Plan .....	15
3.1 Brief Introduction .....	15
3.2 Task File & Drawing .....	16
4. Production .....	16
4.1 Batch Production/Flexible Production .....	17
4.1.1 Drawing Information Bar .....	17
4.1.2 Machining Information Bar .....	18
4.1.3 Mark Point .....	19
4.2 Task .....	21
4.3 Function .....	21
4.3.1 Find Edge .....	25
4.3.2 Partition Machining .....	29
4.3.3 Plate Split (Quick CutOff) .....	30
4.3.4 Gas Calibration (This feature must go together with BLT Cutter) .....	31
4.3.5 Jog laser on .....	31
4.3.6 Manual Lubricate .....	32
4.3.7 Clean Nozzle .....	33
4.3.8 Nozzle Auto-Change .....	34
4.3.9 Create Border Contour .....	36
4.3.10 Burn-in Test .....	37
4.3.11 Vertex Marking .....	37
4.3.12 Unloading .....	38
4.3.13 Maintenance .....	38
4.3.14 Mark out-plate height .....	39
4.3.15 Multi-Station Machining .....	39
4.4 Production Count .....	40



4.5 Prepare List .....	40
4.6 Custom .....	42
5. Debug .....	42
5.1 Introduction of Graphics Editing .....	43
5.1.1 Select Graphics .....	43
5.1.2 Geometric Transformation .....	43
5.1.3 Size Modification .....	43
5.1.4 Automatic Snap .....	44
5.1.5 Cutting Technique .....	44
5.1.6 Cooling Point .....	45
5.1.7 Fly Cut .....	45
5.1.8 Ring Cut .....	46
5.1.9 Relief .....	46
5.1.10 Array .....	47
5.2 Start and Dry Run .....	48
5.3 Simulation .....	49
5.4 Measure Error .....	49
5.5 Cutter Information (Only with BLT Cutter) .....	50
5.6 Laser on a while .....	50
5.7 Focus auto-test .....	51
5.8 Paper test .....	52
6. Process .....	52
6.1 Process Library .....	53
7. Diagnosis .....	53
7.1 Input and Output .....	54
7.2 Alarm .....	55
7.3 Machine Bed .....	55
7.4 Cutting head .....	56
7.5 Assist Pressure .....	56
7.6 BCS100 .....	57
7.7 Water Chiller .....	58
7.8 Visual .....	58
7.9 Laser .....	58
8. Maintenance .....	58
9. Settings .....	59
9.1 PLC Process .....	60
9.2 Global Parameters .....	60
9.3 BCS parameter .....	61
10. Coordinate System .....	62
10.1 Machine Coordinates .....	62
10.1.1 Program Coordinates .....	62
10.1.2 Return Zero under Abnormal Situations .....	63



# 1. Quick Start

## 1. 1. Features

- ❑ *Machining* module is separated from Nesting. The drawing-optimization functions are easy to use while the machining quality is guaranteed.
- ❑ *Plan* module can connect with CypNest to remotely send task file from office to machine, and manage local production data, automatically generate the report for benefit analysis.
- ❑ *Production* is the main module with Flexible and Volume production mode for options to reach the multiple-scenario and batch production requirements.
- ❑ *Debug* module is for adjusting cutting technique and cutting samples, supporting DXF、LXD、G、NC file format, and standard G code from ACTcut and Lantek.
- ❑ *Process* module can help users to build a well-established technique library and manage the material and cutting parameter data conveniently.
- ❑ *Diagnosis* highly integrates the management and data analysis of core machine device in nine block which is very convenient for users to troubleshoot and check usage information of each components.
- ❑ *Maintenance* module monitor the working status of each device of machine and give advice about the maintenance and repair according to the preset security line and equipment service time, so as to stabilize the machining, extend machine lifespan, and maintain accuracy.
- ❑ Support local editing and optimization of drawings to improve production efficiency.
- ❑ Support High-speed Capacitive FindEdge.
- ❑ Reproduction by visual remnant plus process monitor, Drag the graphic to the remnant plate and quick start production.
- ❑ Automatic nozzle clean and replace process, task file switch, follower calibration, laser beam centering and maintenance module for assisting production process.
- ❑ Support file optimization includes: remove duplicates, connect unclosed segments, remove minimal graphic and distinguish inner and outer contour and set machining sequence automatically.
- ❑ Support various piercing methods including flash piercing, segmented pierce, incremental pierce, pre-pierce, group pre-pierce. Users can also set separate parameters of pierce and cutting including duty cycle, frequency, laser pattern, gas, pressure, peak power, delay, cut height etc.
- ❑ Real-time frequency and power curve editing. Set slow start/end parameters.
- ❑ Support processing breakpoint memory, able to start cutting from breakpoint forward and backward.
- ❑ Support Positioning to and start cutting at any point in the process of Stop and Pause.
- ❑ Powerful expansion capacity with more than 30 PLC, over 50 programmable processes.<sup>1</sup>
- ❑ Provide programmable inputs, outputs, alarm and early warning inputs.

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<sup>1</sup>Experts required for editing.



## 2. Access, Upgrade, and Restore of the System

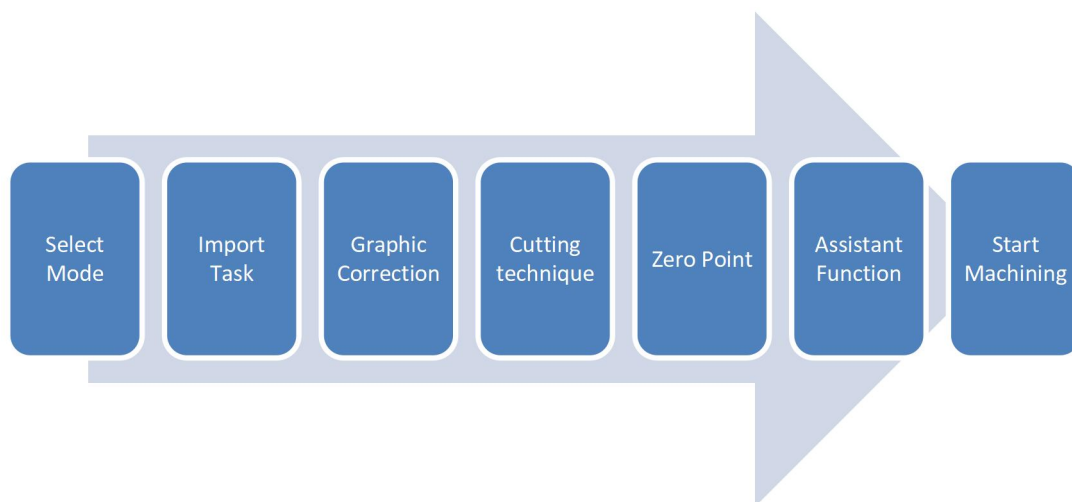
HypCut control software is pre-installed in HypTronic master motion controller by default so that it can be directly boot and put into use.

HypCut system only provide simple functions for graphic process. It will work in best performance with CypNest nesting software.

HypTronic main station provides quick restore function to help users restore the default setting when system error occur.

You can also contact your vendor or after-sale stuff to acquire installation package.

### 2.1 Operation Process



### 2.2 Start Operation

#### 2.2.1 Activate System



Double click  to open Friendess HypCut Laser Cutting Control System.

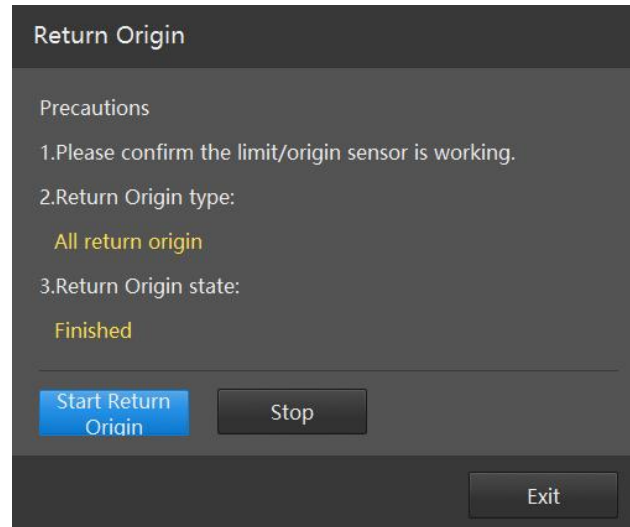


Please check if all electrical components are correctly connected and activated before using HypCut. Load module and do self-check before when activating the system. Go back to zero point dialog box will pop up after self-check done.

Accurate machine coordinate is a must for HypCut automated system functions, go back to zero point to calibrate once activated is recommended. Or the system will alarm with “please go back to zero point first” for safety reason, and can only jog in low speed until the alarm dismissed.

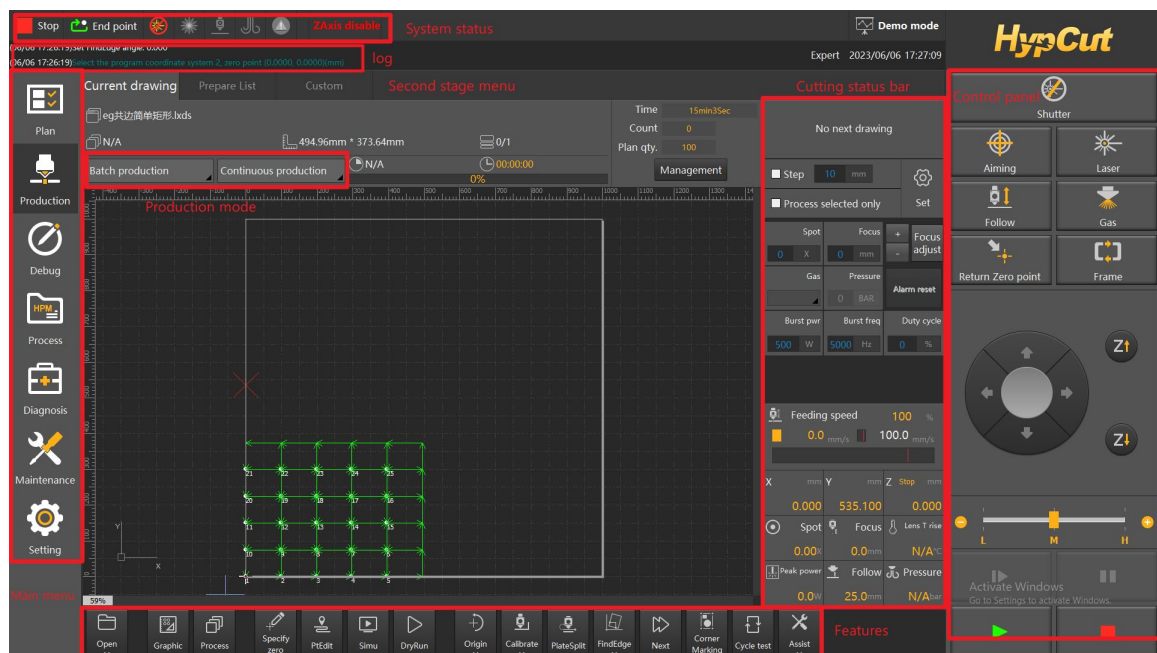


When the button lightens, go back to zero point, when in gray, go back to program zero.



Note: If other alarm makes system unable to go back to zero point when activated, dismiss the other alarm first, and then go back to zero point.

## 2.2.2 User Interface



The center zone in black is **display area**, the white frame is the machine working area.

The grid of drawing board and ruler will adjust when zoom the view.

**System status column:** Display the current machine status and activated automation functions by highlight icon. There are permanent icons and activated icons. The permanent icons from left to right are: working state, return position after task ends, shutter, laser, follow, blow, warning; Non-permanent icons are displayed only after the related function enabled.

**Information/ Alarm Bar:** Double click the message box to check the program log; the message highlighted in red or yellow means current in warning/ alarm status, double click the alarm box to





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check the detailed alarm message.

On the left side of the main page is "**Level 1 Menu**": You can switch between main function modules and the selected will be highlighted in black.

On the right side of the main page is "**Console**": The most frequently used operation buttons like laser, blow, follow, Jog, speed switch, frame, return origin/zero point, start/pause/continue etc., are displayed. If HyPanel mounted the console in software will be hidden and replaced by the physical button on HyPanel.

Beside the console is the "**Machining Information Bar**": It provides step, select, quick setting, technique, speed feeding and coordinates etc.

At the bottom of the interface is the "**Function Bar**": This bar integrates the main operation entrance under current module.

### 2.2.3 Select Mode

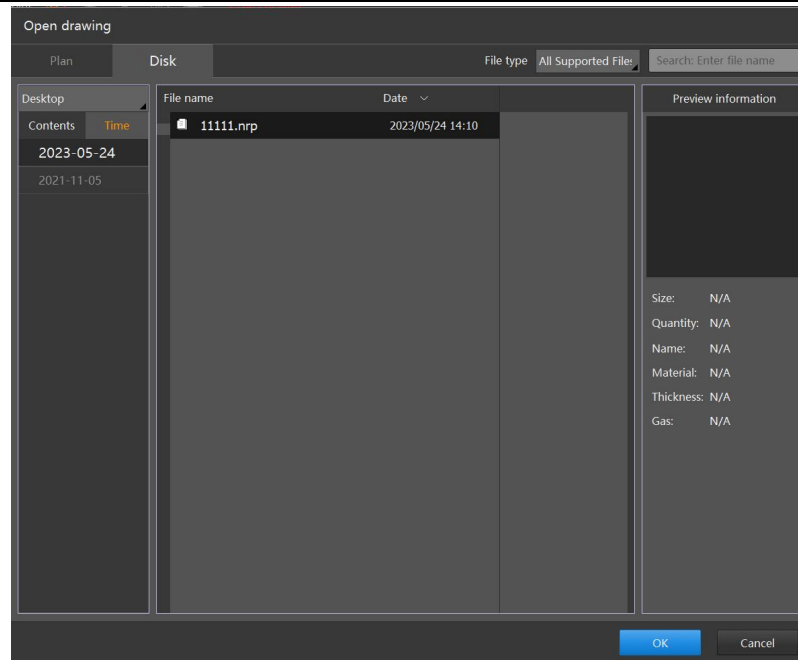
Enter in Production module from left side of main page, you can switch the production mode from top left: Volume production/Flexible production.

**Volume Production:** Use workpiece coordinate system, the zero point is fixed. Suitable for continuous production of large quantities of standard plates. You can specify a fixed position or use find edge function to get fixed zero point.

**Flexible Production:** Use floating coordinate system and the zero point is not fixed. Suitable for flexible production of small batch of special-shaped plates. Zero point under flexible mode is decided by "start from current position" or find edge result.

### 2.2.4 Import Task/File

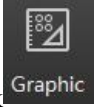
After select the production mode, click "Open" to import the task file.

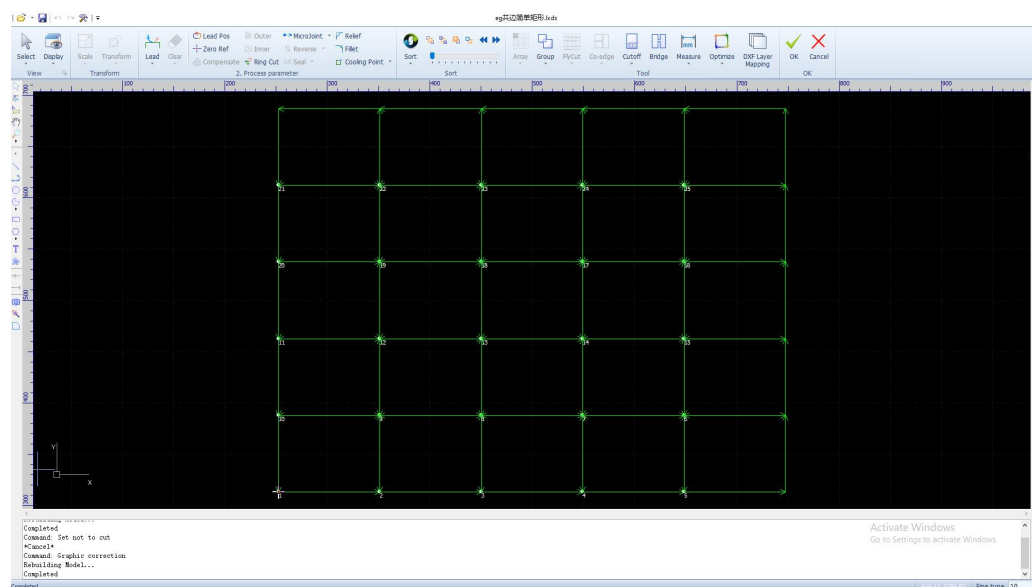


Note: ① Volume production only supports nrp, nrp2, lxd and lxds formats; Flexible production additionally supports dxf, nc file.

② Plan entrance stores all files imported in HypCut, new file imported from disk entrance.

## 2.2.5 Graphic Correction

You can adjust the dock position, lead line, compensation, micro-joint, size etc., click  at bottom to enter in graphic edit page:



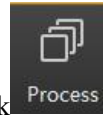
Graphic correction module provides comprehensive CAD editing functions. Details can refer to



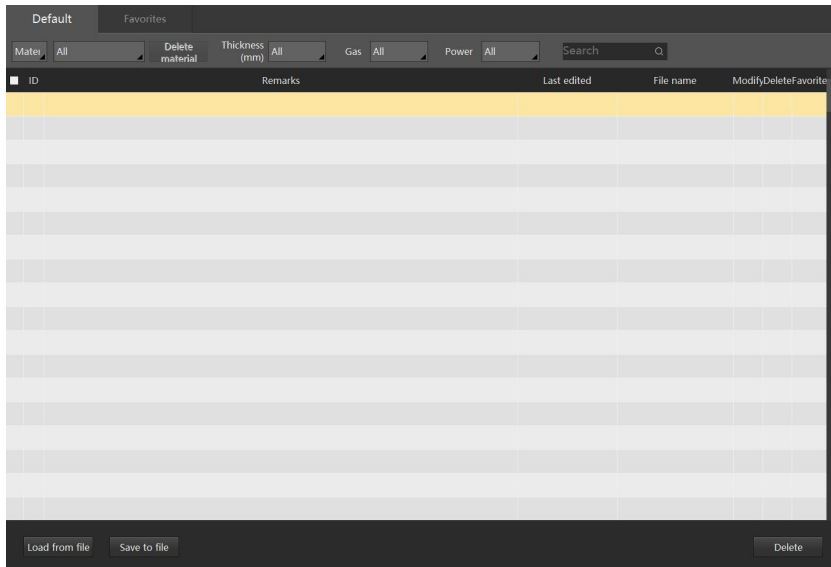
the related chapter.

## 2.2.6 Cutting technique

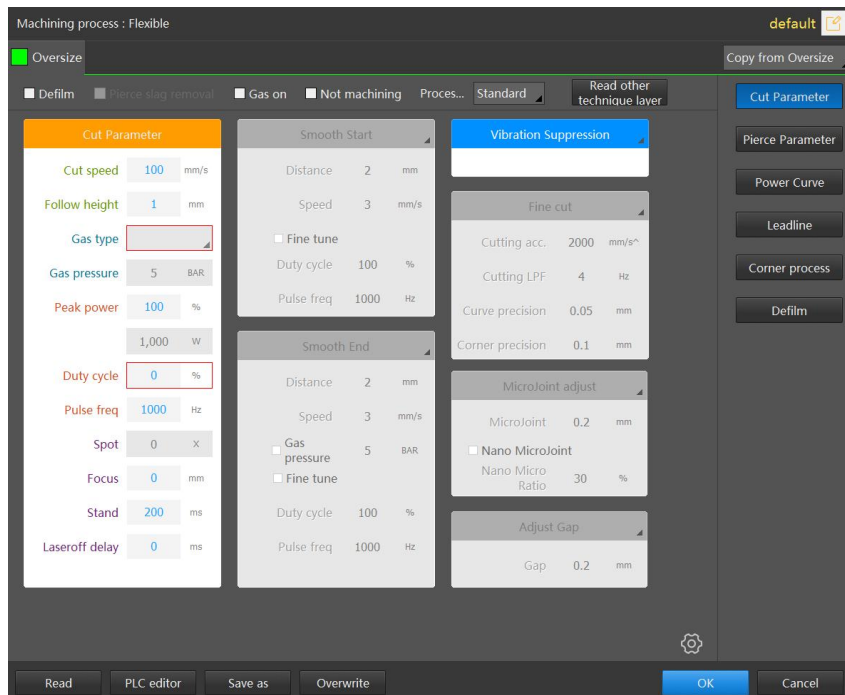
If there is no cutting technique in imported file, technique filter will prompt for matching cutting



technique; You can modify or select cutting technique by clicking **Process** at the bottom.



Click 'Ok' to match the cutting technique with task file:



You can check and modify cutting parameter by 'Technique' button. You can click 'Read' at bottom to replace technique parameter from the filter.

In HypCut, there are 7 layers and every one of which can be individually set with technique



parameters including cutting speed, laser power, air pressure, nozzle height, etc.

**Smooth Start:** cut with different speed, duty cycle, and power for a short distance in the beginning, minimum cutting speed is 0.1mm/s, select “fine tune” before set duty cycle and frequency.

**Smooth End:** cut with different speed, duty cycle, and power for a short distance in the ending, minimum cutting speed is 0.1mm/s, select “fine tune” before set duty cycle and frequency. When “laser off early” selected, the last short distance will not be cut as a gap for unloading. Besides, “Slag-free Cutting” is added on top of the interface.

**Fine Cut:** only take effect on corners, and intersection of lines and arcs when activated, the higher the accuracy, the better the cutting performance, but slower the speed. You could adjust parameter according to the needs.

**Vibration Suppression:** this function can largely suppress the vibration in processing when enabled. More parameters to be set by clicking gear icon at right bottom.

**MicroJoint Adjust:** check “enable MicroJoint/Gap in process, and you can set parameters, like adjusting MicroJoint size without changing figure, in the interface. This way you do not have to pause to adjust the MicroJoint size during the processing. Check “Smooth MicroJoint” to low the power when cutting MicroJoint. Smooth MicroJoint facilitates unloading to prevent tip-up collision.

**Gap Adjust:** you can pause to modify gap length in process when function enabled.

**Fast Cutting:** the cutter frog-leap to target position, keeps laser on as moving to cutting height and zooming to pierce focus. Machining starts once reach the cutting height.

**Nozzle Stepping:** after piercing in current stage, follow from current height to that of the next piercing stage in certain speed with laser on.

**Flash Pierce:** improved piercing way by fast changing the frequency and power to get thick plate quickly pierced.

**Segment Pierce:** use different power, frequency, duty cycle and other parameters in different piercing height, and piercing in preset time.

**Power Curve:** power curve is the ratio of duty cycle/frequency and speed, adjust the former according to the latter to avoid corner burned out or slag. The function only available for cutting, not for piercing.

Actual duty cycle = cutting duty cycle × duty cycle percentage of current speed in power curve

Actual laser power = laser power × cutting peak power × actual laser duty cycle

**Defilm:** It will execute filming parameters along the graphics then start cutting. Rusts or protective film can be removed this way.

**Pierce Deslag:** when piercing thick plate, slag may cause unstable following at starting or scratch nozzle, and hence stop the production. So it is necessary to remove slag after piercing. There are two ways of rotating, inside out(default), and outside in.

Inside out: first follow to cutting height, then lift to deslag height to remove slag inside out.

Outside in: first follow to cutting height, then lift to deslag height to remove slag outside in.

**Smart Techniques (only with BLT Cutter):**

Auto Recut :When real-time in-head sensor detect plasma, the cutter will automatically do recut.

Smart Piercing: Once the piercing gets down, it will be detected by Sensor in BLT cutter to instantly start next piercing or cutting. This feature must go together with BLT Cutter.

Slag-free Cutting: when enabled, closed graphics can be cut without slag. Once it is enabled, it will be applied on all path ending. This feature must go together with BLT Cutter.

**Unprocessed:** not to process the layer.



**Gas on:** keep gas on during traveling.

**Cutting Head Cooling:** equipped cooling gas, delay-off gas after laser off to cool cutting head. Find the feature in Configuration tool-Advanced config-Cool down cutting head by gas on -Enable cooling down by gas on. Set laser-off delay time in Process at the bottom of the interface.

**Leadline Parameters:** set for leadline path cutting.

**Slow Lead Down:** Lead Down is to open laser at preset leadline height, and then lower the height to cutting height gradually; Stable Distance is the distance from the point at cutting height to that at the start of cutting path.


**Scan Gap:** used to avoid overcut at the end of flycut arc.

**Lead Circle:** speed can be set here if Lead Circle is enabled.

**Lead Line Focus Shift:** change focus while cutting leadline.

**Corner Technique:** when cutting acute angle smaller than set one, use parameters set in this interface on given distance from corner.



Click  at right bottom to modify more parameters.

**Sheet Vibration Suppression:** can change follow speed of sheet. The longer the suppress time, the weaker the vibration, but the slower the speed.

**Thick Plate Vibration Suppression:** can change follow speed of thick plate. The higher the suppress degree, the weaker the vibration, but the allowed angle changing range smaller.


Note:

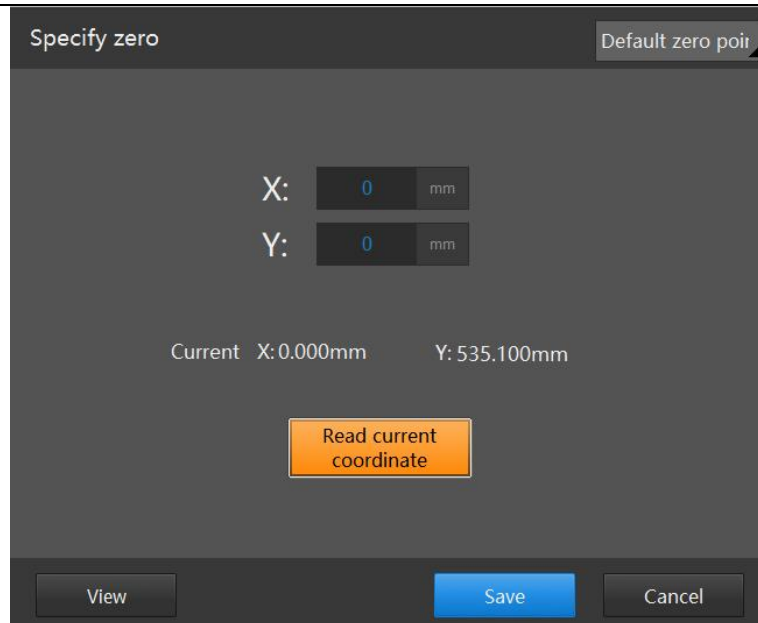
1. File imported from Plan entrance will relate with the technique from last machining.
2. You need to enter in technique module to modify parameters in technique library, click “modify” after file name, after modification, click OK to confirm.
3. Under Batch production mode, program will save the cutting technique of unfinished task file in cache to make sure users can resume the task file production successfully.
4. Check Smart Monitor in configuration tools, then Smart Piercing and Auto Recut will show on technique interface. Must use with BLT series cutter.

## 2.2.7 Zero Point

**Batch Production Mode:** the zero point is fixed under workpiece coordinate system, you must specify a zero point as a reference point before starting machining.



At the bottom of Hypcut interface, click  to open zero point specifying window.



You can either manually enter a point position or move to a position and copy the coordinate to specify.

Users can check the saved or deleted zero point through View button, and in the drop down menu of Default zero point you can check saved ones.

Frame in “specify zero” interface means to frame from current position of cutting head. After the interface closed, frame starts from previously saved fixed zero point.

**Note:**

1. It's recommended to specify the proper zero point by execute frame or find edge function in case of accident cause by wrong zero point.
2. Default direction of reference point is the same with that of Origin Point returning.

**Flexible Production Mode:** Use floating coordinate system and the zero point is not fixed. When start machining, automatically set current position of cutting head as zero point.

**Note:**

1. It's recommended to specify the proper zero point by execute frame or find edge function in case of accident cause by wrong zero point.

## 2.2.8 Accessibility

Besides standard production HypCut also provides extra functions to assist production and improve efficiency and automation.



Accessibility setting enter from  at the right top of Production module.



**Quick setting**

Back/forward  mm  mm/s

Finished, return

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Auto calculate sheet size in FindEdge  Etch in sheet edge before production

FindEdge before cutting  Pierce at resume

Clear FindEdge data after production  Auto switch pallet after production

Auto clean nozzle in production

Pierce total:  pcs Pierce count:0

Auto Quick Calibrate (fixed) after cleaning

Switch to the next portion after the plan count reached  Prompt after reaching the preset cutting times

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Scan in file

Don't alarm when detect human on machine when execute Frame function

Display

**Forward/Backward:** After resume from pause position, cutting path will move backward or forward by this setting then start cutting;

**Return position after file end:** Laser head will return to this position after file ends.

**Auto calculate sheet size:** set sheet size range of edge finding according to drawing size or custom size. When enabled, Find Edge range will be set according to drawing size every time importing new file, when not enabled, it will take custom size.

**Find edge before cutting:** Enable this function program will execute find edge process automatically before start machining. Capacitance FindEdge is to find the vertex of the plate and calculates its deviation angle, then corrects the angle of to-be-processed patterns synchronously to ensure that the patterns is consistent to the plate. It is capable to improve the utilization rate of plate and reduce the workload of manual plate lifting and calibration to enhance automatic operation efficiency of equipment.

**Clear find edge result after process:** Clear the find edge result of last time after production ends



so that it won't affect the next production task.

**Pre-machining Vertex Marking:** mark vertex every time before machining. Vertex Marking means cutting head dryrun once along the sheet edge, and mark the four corner with “L”shape to make sure the figures included in sheet range.

**Re-pierce as resume:** pierce again when resume processing.

**Enable exchange pallet after process end:** if the machine mounted exchange pallet, you can set if switch working table automatically after file ends.

**Auto clean nozzle:** laser head will move to the preset position of brush automatically after reach the specified pierce times to clean the nozzle. Ensure the machining continuity. Mainly used for machining of material like stainless steel, aluminum, copper, etc., which are easy to cause slag in cutting.

**Auto Quick Calibrate After Cleaning (fixed point):** after cleaning the nozzle, the cutting head moves to the plate to automatically do quick calibration.

**Auto jump to next result:** auto jump to next nesting result when finish preset machining times.

**Hint after Machining:** for non-nesting drawings, the hint “machining task finished” will pop up when machining done; for nesting drawings, after the planed machining times of the last drawing completed, the hint twill pop up. The hint will pop up for every additional processing. When enable exchange pallet after process end, it will not immediately give hint after machining, but wait until pallet changed.

**Scan in:** scan the QR code on report generated by CypNest nesting program can quick import the task file.

**Auto Load Technique:** when importing new file without technique setting, the previous technique parameter will be auto reused.

**Allow Operating Drawing on Main Interface:** allow deleting, dragging, copying, pasting graphics.

**Don't Alarm if Human Detected in Doing Frame:** when it detects human in monitor area, it will give an alarm if Safe Operation Monitor is enabled in Machine Config Tool. When this option is enabled, HypCut will not give alarm during Frame process even though human is detected in Monitor area.

**Display type:**

- 1) “Graphic + CNC info”: display CAD View interface and CNC information;
- 2) “Monitor + CNC info”: CAD View interface replaced by monitor video, plus CNC information;
- 3) “Graphic + Monitor + CNC info”: display CAD View interface, monitor video on its right bottom, plus CNC information.

Note: the camera must enabled with vision monitor to display “Monitor + CNC info” or “Graphic + Monitor + CNC info”.

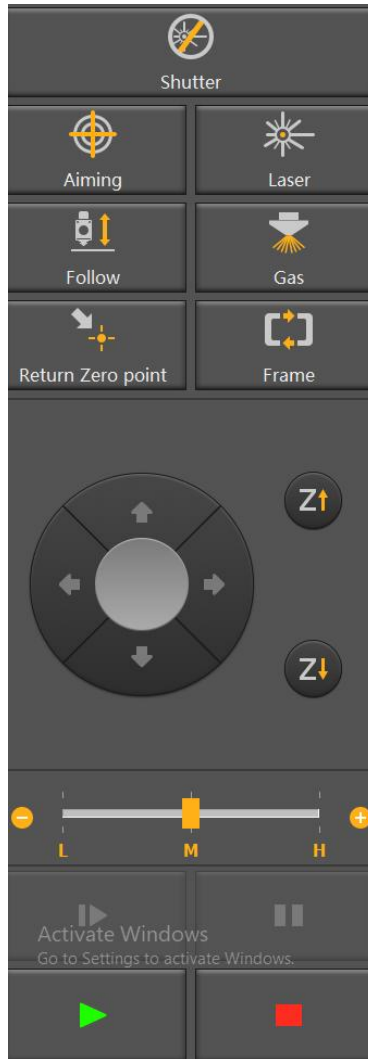
## 2.2.9 Start Machining



Before machining , please confirm that the equipment has no abnormal alarm, and whether the









drawings, processes, zero points and auxiliary functions to be processed are correct. You can execute Frame function to confirm the cutting area is within the plate.







Click " Shutter" to open the laser shutter and " Aiming" to open the guide laser.

Before machining click " Frame" laser head will move along the frame of the task area.

Finally click "" to start processing. Click "" pause processing, in pause status you

can manually control laser head up and down, open or close laser and gas, click " Back  Forward" to move forward or backward along the graphic path. Click "" to resume processing.

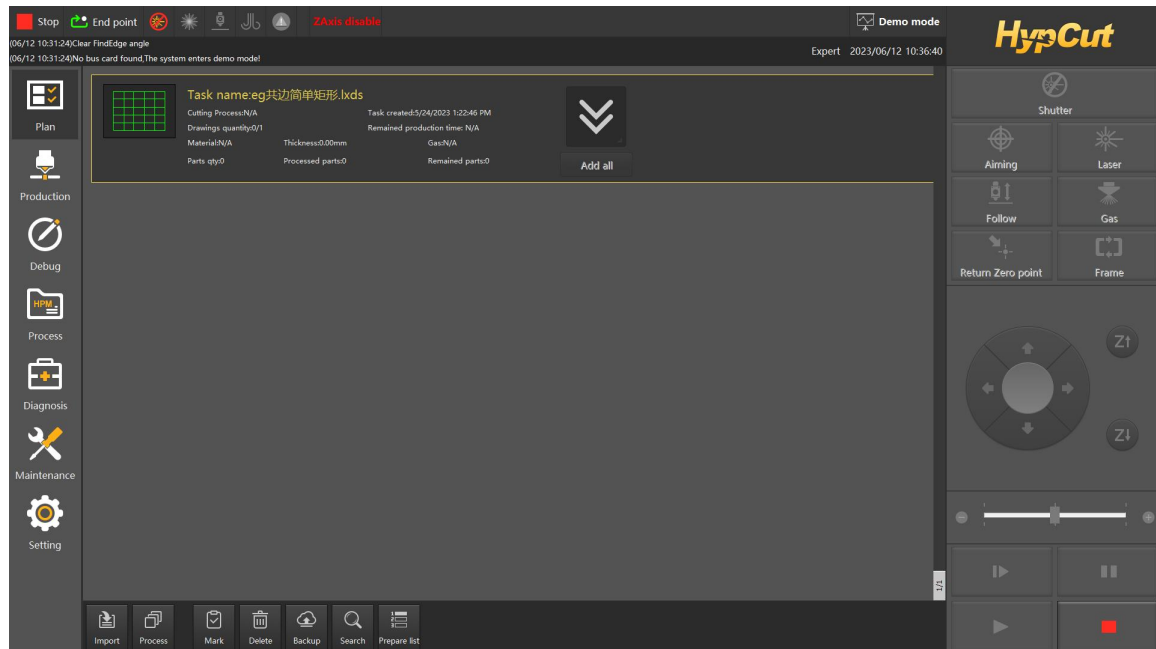
Rotate the knob "" to adjust the machining speed rate, the range is from 50~120%.

Click "" to stop machining and " PtLocate" to locate to the break position (if change the graphic and machining parameter it can't locate to the break point), click "" to resume the machining.



## 3. Plan

HypCut provides a dedicated access for CypNest program-- 《Plan》 :In this module you can manage the order and task file, check production progress, and backup the history data.



In Plan module displays the newly added, unfinished or history task status.

### 3.1 Brief Introduction

HypCut will save the history task into database for later use or production analysis. All file added will be saved in the Plan module database and listed by generate date.

**Import:** Import the task file from CypNest or external storage media to task list in Plan module.

**Graphic correction:** Edit the lead line, compensation, and start point etc., of the graphic.

**Process:** Set machining technique to the selected task file.

**Delete:** Delete the specified file from task list.

**Backup:** Backup the history data to the storage medium or network termination.

**Date:** Search the machining record in specified time range.

**Prepare list:** You can quick view the basic information of task file. The number at right bottom shows the file number in list.

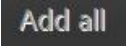
**Mark Finished:** No matter if nesting and processing of current task finished, click “mark finished” to manually set it as finished. The instruction will fail if current drawing of the chosen task is being batch produced.

**Note:** “Technique” in Plan can modify techniques in technique library.




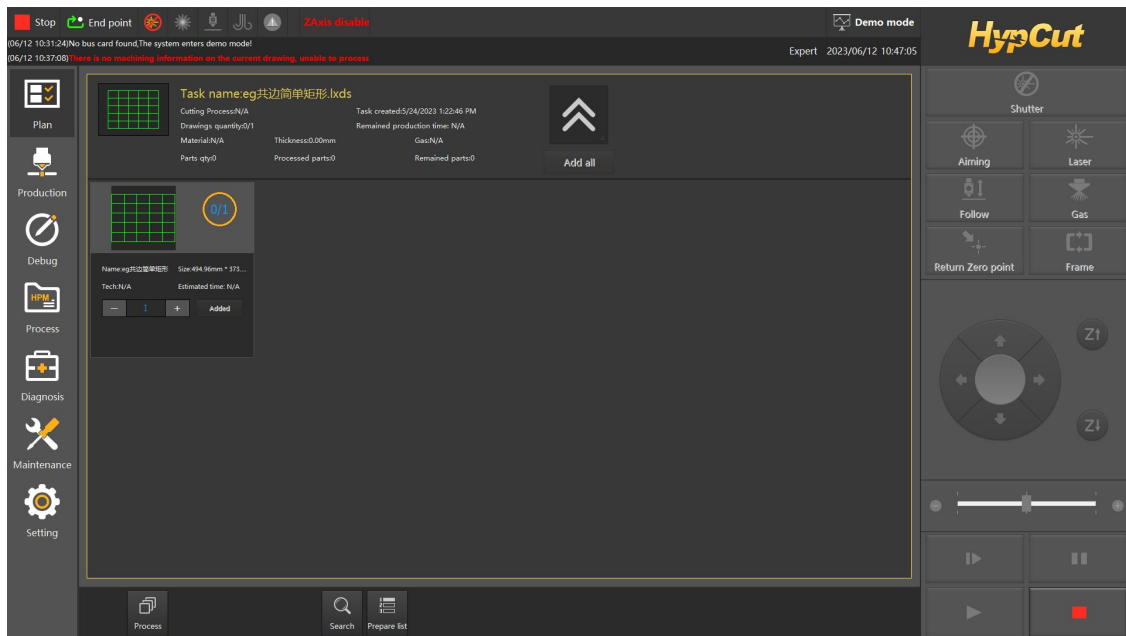
### 3.2 Task File & Drawing

Create the task file in CypNest and import into HypCut system by network or USB device. In HypCut you can check the task and history record in Plan module.


Click “” after selecting task to add all drawings in this task to prepare list in

production module ready for machining. Click “” to mark the task as finished status whether the task finished or not.

Click “” to check the drawing of the task:

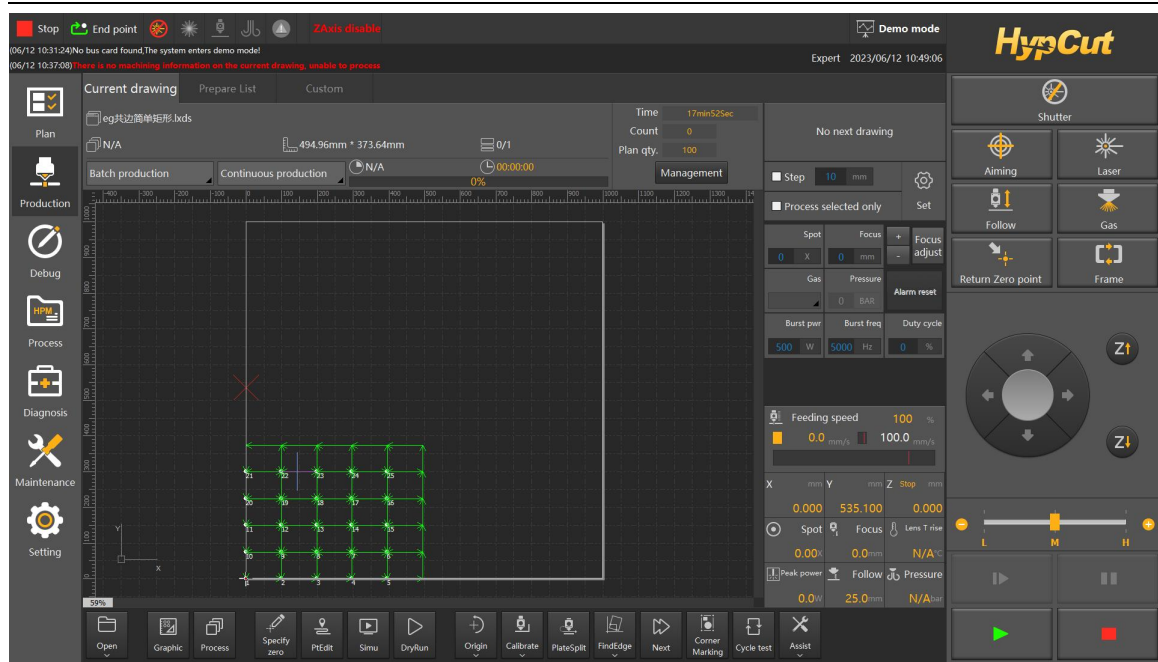


Unfold the task you can see the machining speed, status, parameter setting and add the drawing to the prepare list for machining. You can also edit the graphic or technique of the drawing.

Click “” to return to task list.

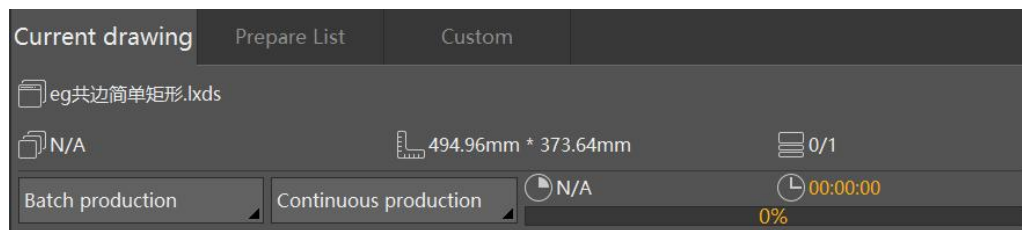
## 4. Production

This chapter introduces the core module of HypCut system-- 《Production》 which can meet different production scenario.

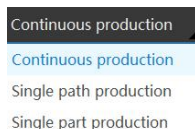


## 4.1 Batch Production/Flexible Production

### 4.1.1 Drawing Information Bar



At the top of 《Current Drawing》 is drawing information bar. The message from left to right is: drawing name, technique name, plate size, drawing number, Batch production production mode switch, estimated machining time, actual machining time, 26% machining progress bar.



Beside the progress bar is the mode switch of machining process: The default setting is continuous process, under this mode system will stop after whole drawing completed; Under 'single path' mode, system will stop after one single path completed, single path completed, press continue process next single path, until all parts processed; Under 'single part' mode, system will stop after one



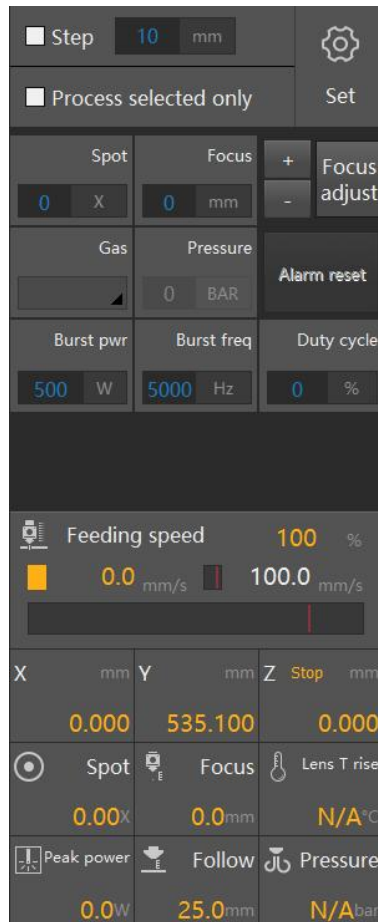
single part completed, press continue process next part, until all parts processed.

When there are multiple drawing in prepare list, you can see the preview of the next drawing at



the top right area in the page “”. Click preview to unfold the detailed information of the next drawing.

## 4.1.2 Machining Information Bar



**Step:** servo move a fixed distance.

**Selected Graphics Only:** use this feature when there is only part of graphics need processing, so that unselected graphics will not be processed.

**Spot Focus:** input spot size and focus position, click shift and the cutter will automatically change focus. Every click on “+” or “-”, the focus position move 0.1mm, see the specific change at parameter display area.

**Gas Type and Pressure:** choose a gas type, set pressure, click “blow” to make gas on, and the blow button will turn green; click again to off the gas, and the button will turn gray.

**Burst Power, Burst Frequency, Duty Cycle:** separately input burst power, burst frequency and duty cycle, click “laser” to turn on laser, the button will turn green, unclick to immediately turn off the laser, and the button turn gray.



**Feeding Speed:** used to show the speed rate, target speed, and real speed.

- 1) During the process, change cutting speed in real time to help technician debug,
- 2) Freely adjust speed rate at range of 50%~120%, with 100% as default setting.
- 3) Users has control panel can twist knob to adjust speed rate in the processing, CCW to lower, CW to higher.
- 4) Users without panel can drag speed rate bar to adjust in the processing.

**Coordinate:** x axis, y axis, z axis and motion status movement of z axis are displayed.

**Cutter:** current spot size and focus position are displayed. In the processing, the parameter will update if the focus changes.

**Lens T-rise:** some BLT cutters can show lens temperature rise to see if lens are too warm or there is other abnormal situation.

**Laser Power:** average of actual power. Calculation Formula: display value = laser power × peak power × duty cycle percentage (Note: set correct laser power in configuration tool to enable the feature.

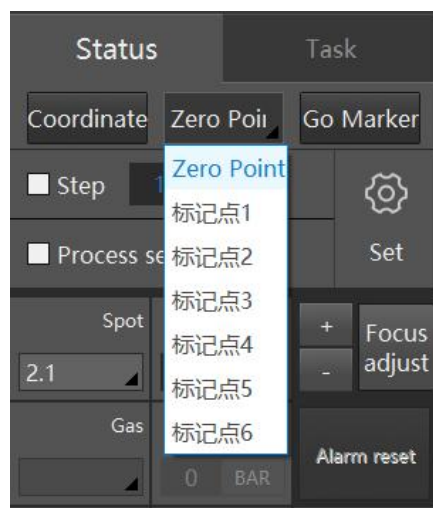
**Nozzle Height:** give the distance between plate and nozzle in real time. When the distance is too long to make plate detected, a fixed value will be displayed.

**Focus Centering Diagram:** for BLT series cutter, click white button at the left of burst power and its focus centering diagram will pop up, click again to switch to CAD View interface.

For non-BLT series cutter, you need to manually import focus centering diagram from local in cutter interface of configuration tool. After importing, click white button on the left of burst power, the manually imported centering diagram will pop up, click again to switch to CAD View interface.

Note: For non-BLT cutter, there will not be the white button on the left if not manually import diagram.

### 4.1.3 Mark Point



Users can set any coordinate in machine area as mark point to fast move cutter to specified position.

Click “**Coordinate**” to pop up window as shown below, set coordinate by two ways:



**Set mark point**

Make sure machine returned origin and built correct coordinate before set mark point.

Position	System name	Custom name	X coordinate(mm)	Y coordinate(mm)
1	MarkPoint1	标记点1	0.000	0.000
2	MarkPoint2	标记点2	0.000	0.000
3	MarkPoint3	标记点3	0.000	0.000
4	MarkPoint4	标记点4	0.000	0.000
5	MarkPoint5	标记点5	0.000	0.000
6	MarkPoint6	标记点6	0.000	0.000

Read current coordinate    **OK**    Cancel

1. Select the position, click “read current coordinate” to set it as mark point.

2. Select the position, click coordinate and manually input x and y value.

Click “go marker” in Production interface, the cutter will automatically move to where the mark point is.

**Note:**

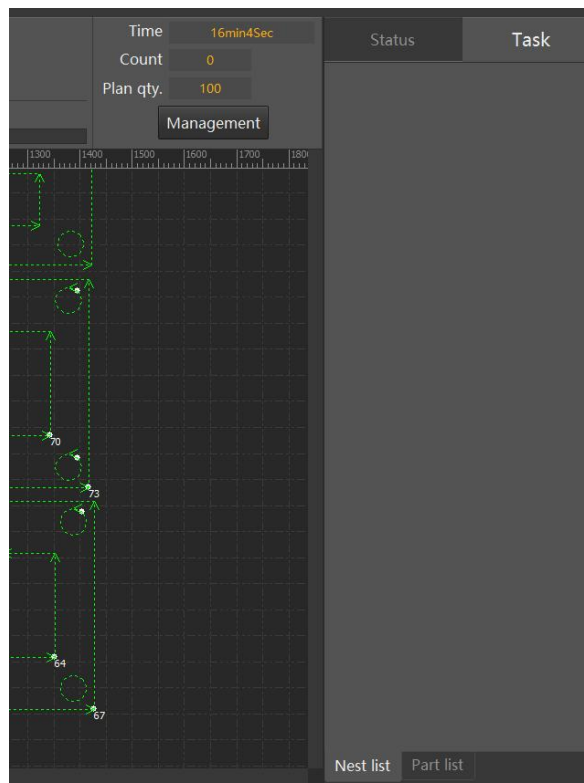
1. When go back to marker, z axis will first lift to the top.

2. There can be 6 markers at most.

3. Every marker can be named by users, but system name cannot.



## 4.2 Task

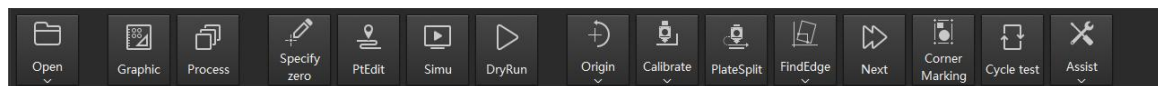


Task display details of current drawing to facilitate machining.

When open nrp/nrp2 file or CypNest nesting file under “flexible production” mode, machining information bar will switch to task page.

## 4.3 Function

At the bottom of Hypcut interface are the main functions.



**Open:** Open file from Plan or Disk to quick process single drawing. When a newly opened sheet does not have processes or they does not match those in the library, a process filter will automatically pop up to assist the user in selecting the corresponding processes.

**Graphic:** Enter drawing editing mode. Allows simple editing of graphics within the selected current sheet, such as adding leadlines, compensating, changing start position, when there are minor defects in the drawing exported by CypNest software that affect the process quality.

**Process:** Set machining technique to the selected task file. Management and below only can read and use the original techniques, save as a copy if need editing. Modification of the drawing process in a stopped state may result in loss of breakpoint information, be careful; modification of parameter





values and piercing steps are not allowed in the processing.

**Specify Zero:** The "Production" module uses the workpiece coordinate system to process each drawing according to the preset zero point. Changing the zero point requires selection by <Specify zero> or manual input of a coordinate value as the zero point for the drawing processing. The <Specify zero> can store up to 9 custom coordinate system zero points, allowing users to quickly switch according to the production needs of different batches. The Frame operation in the <Specify zero> interface is performed with the current stop of the cutting head as the reference point, while the Frame in other interface is performed with the preset zero point as the reference point.

**Point Editing:** Quickly record breakpoint information or manually locate to a specific location on the graph while in a stopped state.

**Simulation:** Simulate processing along the paper track, without any actual machine movement, easy for the user to check the processing sequence. The simulation rate can be adjusted by means of the knob.

**DryRun:** Laser off, gas off, no following, only X, Y-axis movement for easy checking of machining effects or mechanical motion. This feature is only available with Expert level privileges and above.

**Back to Origin:** Click the button to synchronize all axes back to origin to calibrate, or in drop-down menu to select a specific axis to perform a separate back to origin operation.

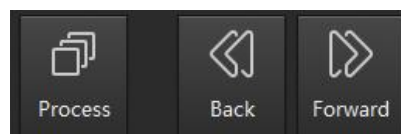
**Capacitance Calibration:** Manual capacitance calibration or automated quick capacitance calibration can be performed at any location.

**Plate Split:** retrieve the current drawing process to quickly cut off the plate.

**Partition processing:** Multi-sheet processing of different drawings.

**Next:** Under stop status, to switch in the next drawing for production.

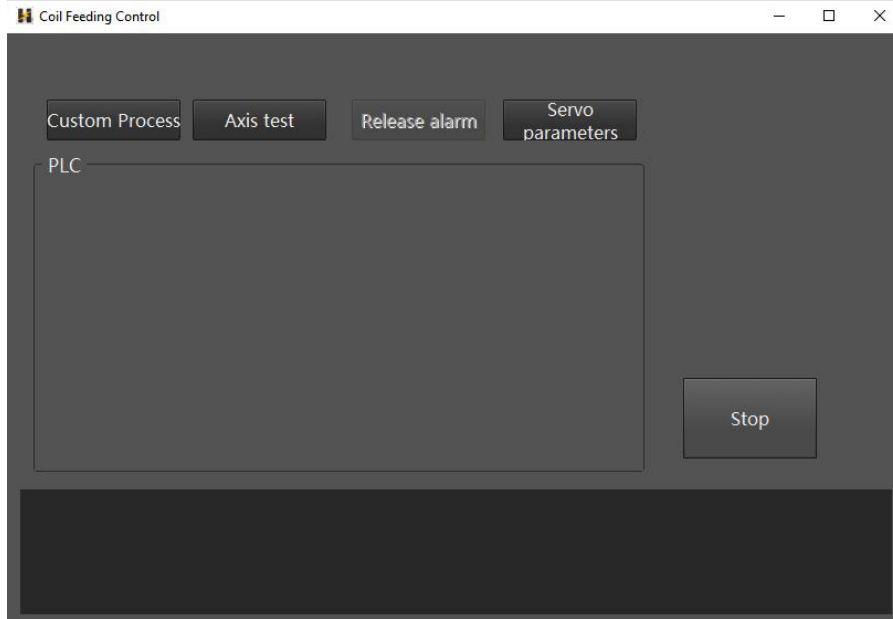
When pause the machining process, you can modify the cutting parameters and resume the process by specified position.




**Back:** When pause the machining, click the button to move back along the cutting path.

**Forward:** When pause the machining process, click the button to move forward the cutting path.

Note: The extended axis needs to be enabled in the Configuration Tool - Advanced - Axis parameter first.

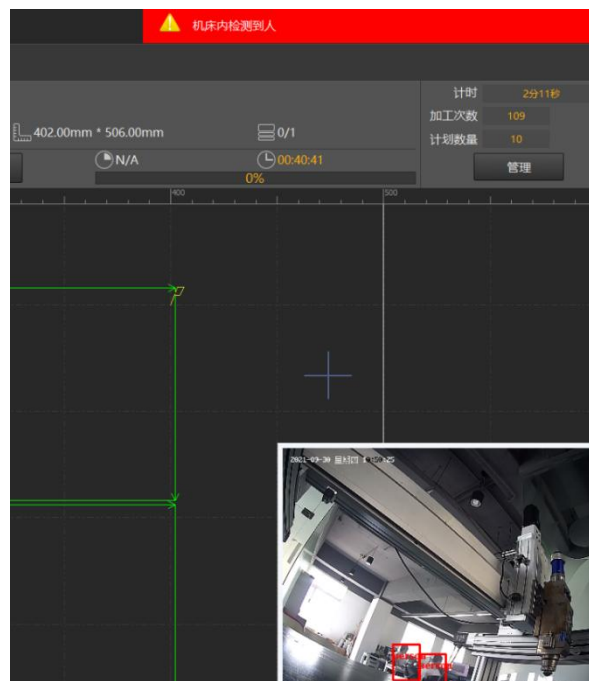


**Record Z Locate Position:** record the z-axis reference coordinates in locate and not follow mode.

You need to enable the locate and not follow mode in Settings .

**Monitor:** After saving the parameters in the Configuration Tool, go to the Production module in the software (monitoring will automatically on), right click on the monitoring area, the parameter settings window will pop up. On the parameter settings interface, select Pedestrian check, configure the correct camera account number, password, IP, click OK to display the monitor screen.

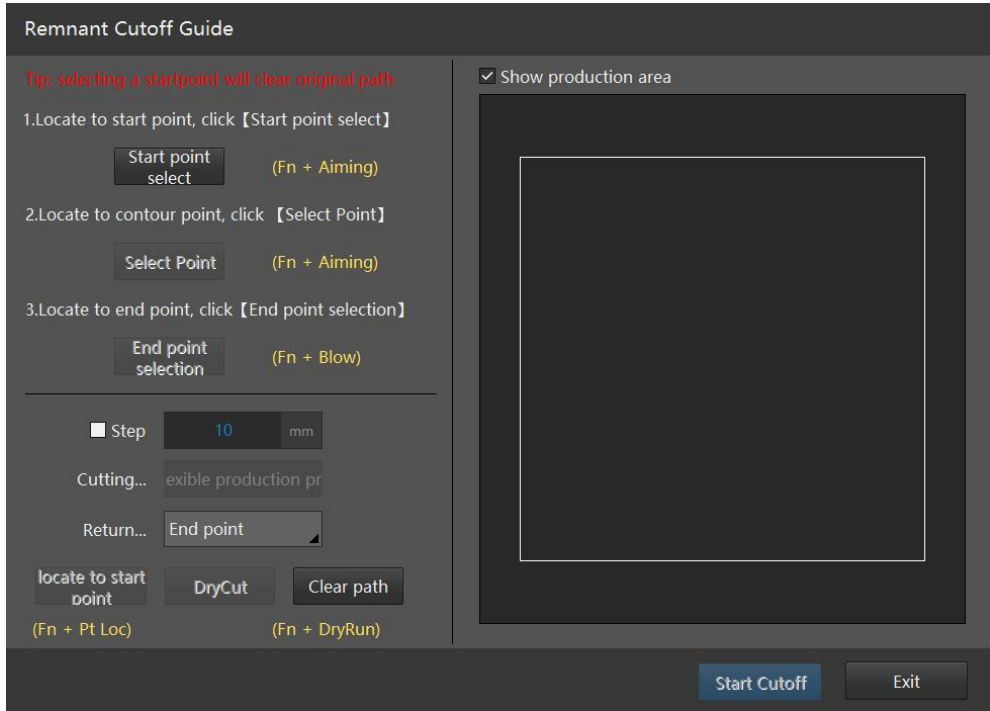
When a person is detected in the monitoring area, the software has a "Man detected in the machine" alarm.



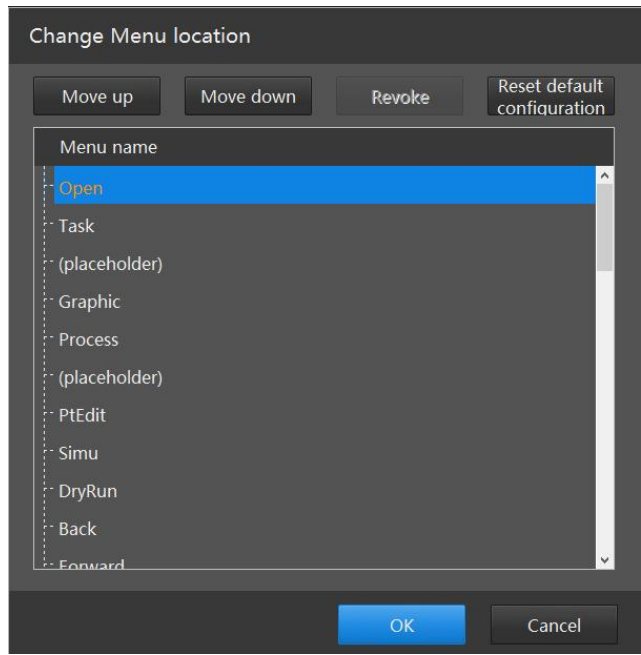


**Remnant Cut-Off Guide:** when the system is stopped, the Remnant Cut-Off Guide interface can be accessed via the assist function drop-down option in Flexible Production. Create a remnant line by guiding point-picking and cut it.

The process used for remnant cut-off is always a large-profile process for flexible production processing, and "start-off" requires no warning from the system to be carried out correctly.



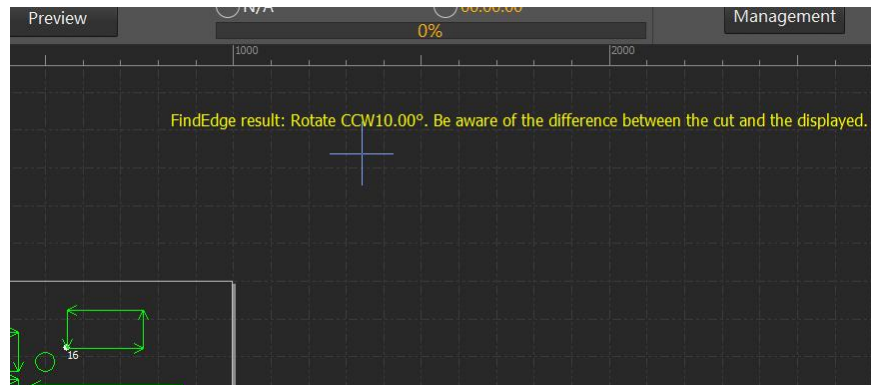
**Menu adjustment:** mouse drag or click to move up or down, can change the display position of the corresponding function in the main screen, to customize the function position.



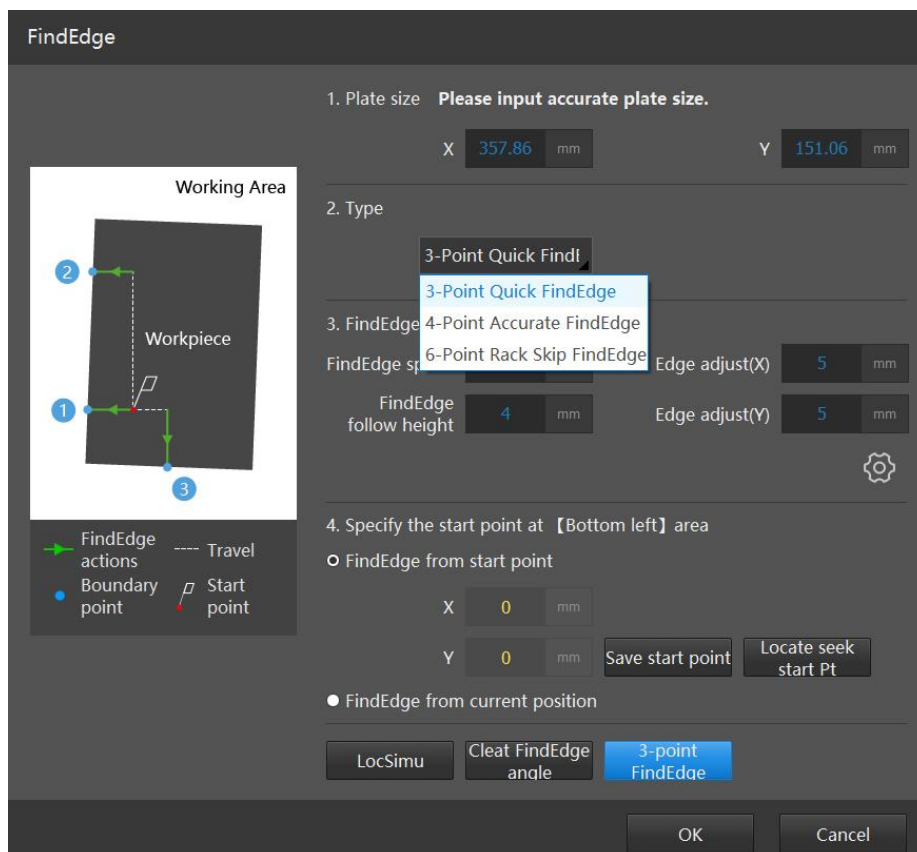


### 4.3.1 Find Edge

Hypcut support various find-edge methods with high precision. Click the drop down arrow of "Find Edge", and you can choose the most suitable method to determine the plate placing position according as needed. Edge finding results will be displayed at the top right of the drawing area, as shown in the following figure: The deflection angle of the panel is obtained by edge finding and the processing direction is automatically calibrated during processing.



#### 4.3.1.1 Capacitance Find Edge





**Plate size:** Plate size X is the plate length in machine X direction; plate size Y is the plate length in machine Y direction.

**Precautions**

- 1) The two point coordinates after three-point FindEdge are auto-calculated according to plate size, please make sure the parameter value is the same with the actual size. It is recommended to set the value little smaller than the actual. Wrong value will cause cutting head collision.
- 2) By default, this parameter reads the maximum size on the drawing, which you can manually modify if the actual sheet size does not match the one on the drawing.
- 3) When you use "Batch production" mode, you want the sheet size to be a fixed value and do not need to read the drawing size information automatically, you can uncheck the option "Auto calculate sheet size in FindEdge" in [Set].

**FindEdge speed:** The speed of edge finding.

**FindEdge Follow Height:** Give the distance between plate and nozzle in real time.

**Margin:** Find edge result will determine a 0 point of plate. This margin can adjust the 0 point inward or outward the plate. If you have set plate margin in nesting plate then you can set it smaller here.

**Backslash:** This value is set according to the actual clearance between rack and pinion of the machine.

**Four-point FindEdge:** Improves the accuracy of three-point edge tracing. Four-point FindEdge ensures that the two points selected on the long edge are as far away as possible.

**Six-point FindEdge:** Recommended for thin sheet. Laser head will execute 6 times find edge actions to reduce the interference caused by rack.

**Start from Preset Position:** To start every FindEdge from a fixed point. You can move the cutting head to the appropriate starting position by the console on the right and then click Save as Startpoint. Be sure to move the cutting head inside the plate and set it as the starting position of FindEdge.

**Start from Current Position:** To start every FindEdge from current position, please ensure the cutting head is moved inside the plate to get it started.

**Clear FindEdge Result:** You can clear the FindEdge angle by clicking this button when you no longer need it.

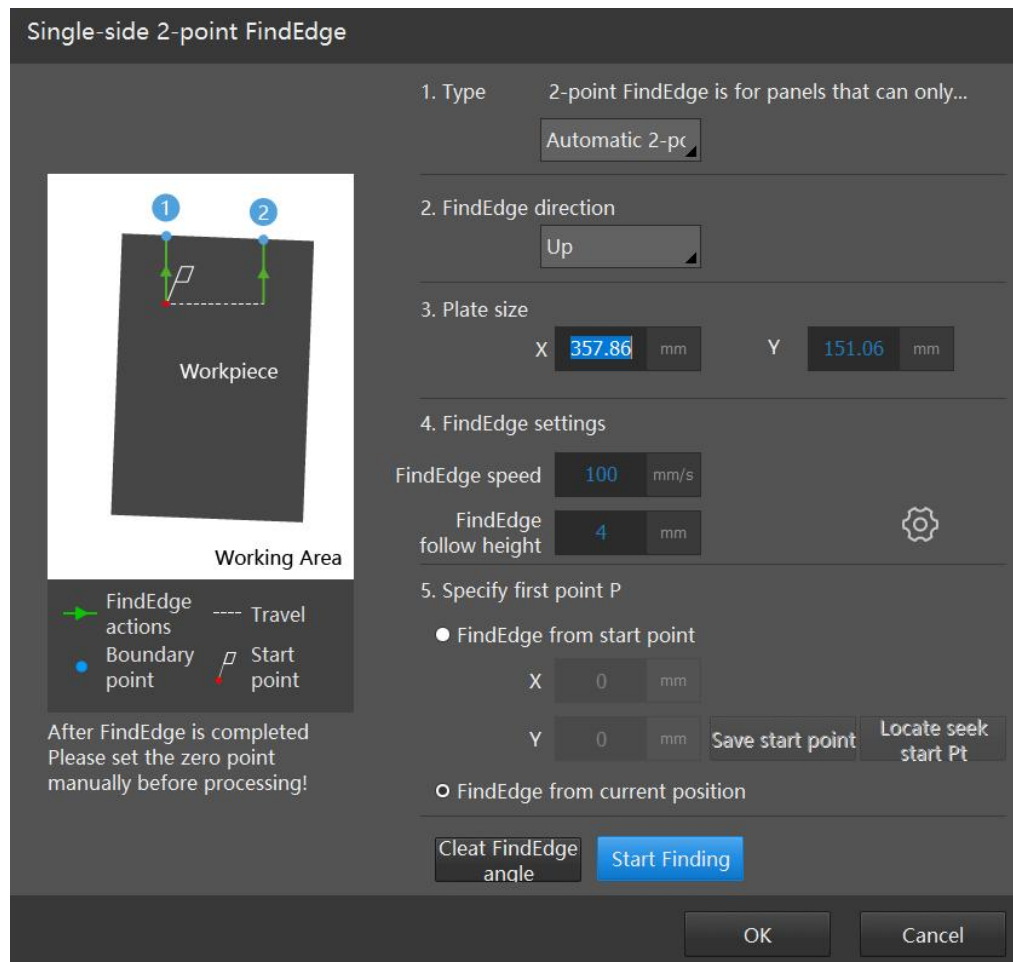
If "FindEdge before Cutting" is enabled, HypCut will execute FindEdge before DryRun or actual machining according to the Zero Reference position of graphics. At this time, please select "Start from Preset Position" and set a reasonable FindEdge starting position.

**Note:**

1. Please Return Origin to correct the machine coordinate system make sure that the cutting head can follow normally before FindEdge;
2. The tilt angle of the plate should not exceed 10°.



### 4.3.1.2 Single-side 2-Point FindEdge

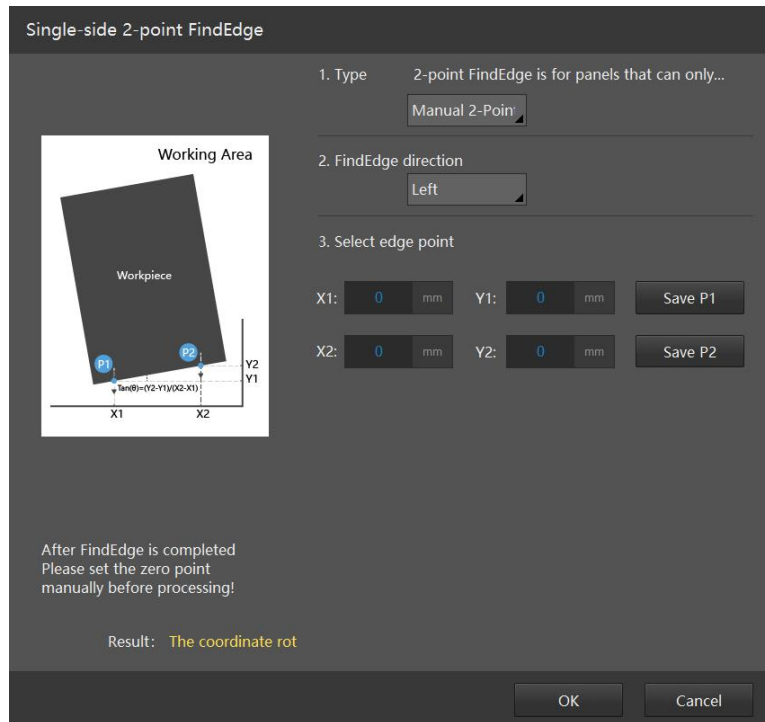


**Two-point FindEdge** is available for irregular panels with one straight edge. With respect to three-point FindEdge, two-point FindEdge can only get the deflection angle of the board, the processing zero point cannot be found, so after two-point FindEdge, it is also necessary to manually jog the cutting head for machining.

**FindEdge direction:** the direction needs to be selected manually according to the position of the straight edge of the panel. For example, when the right side of the panel has a straight edge, you want to use it to find the deflection angle, you need to select [right].

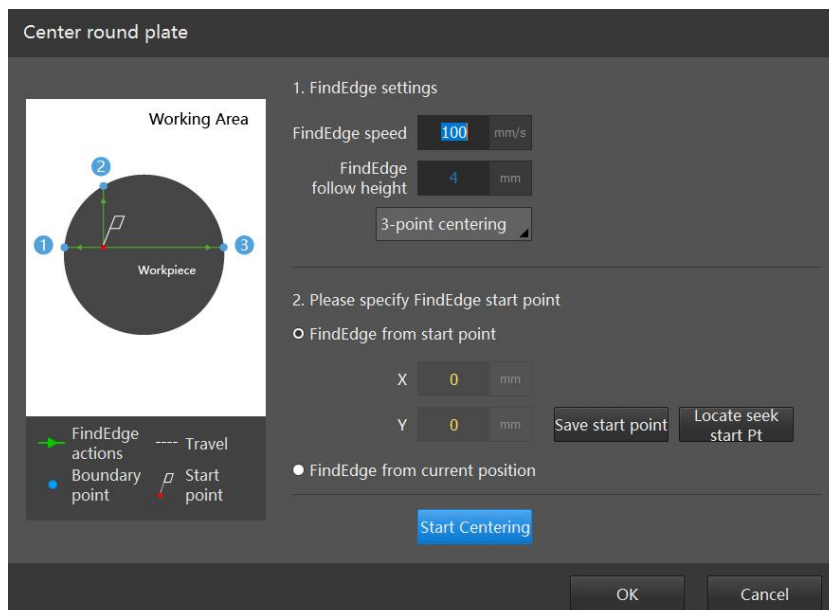


### 4.3.1.3 Single-side 2-Point FindEdge: Manual Find Edge



Manually move the cutting head to the edge of the plate, and record the coordinates of two different points on each edge of the plate respectively, and the system will automatically calculate the tilt angle of the plate. The longer the distance between two points is, the more precise the angle calculated is.

### 4.3.1.4 Disk Centering





Disk Centering is only available to circular plates, and the Zero Point will be positioned at the center of the circular plate after centering, so it is necessary to set the Zero Reference to "Center"] when processing with Disk Centering.

**Note:** Please ensure that there is circular plate under the cutting head before Disk Centering.

### 4.3.1.5 Sets the FindEdge Angle

When the panel processing is not finished but the angle is lost abnormally, you can set the angle manually without re-seeking. To set the angle manually, both the rotation direction and the angle need to be set.

You can find a historical FindEdge angle from the log. Note that the positive angle in the log is counterclockwise and the negative angle clockwise.

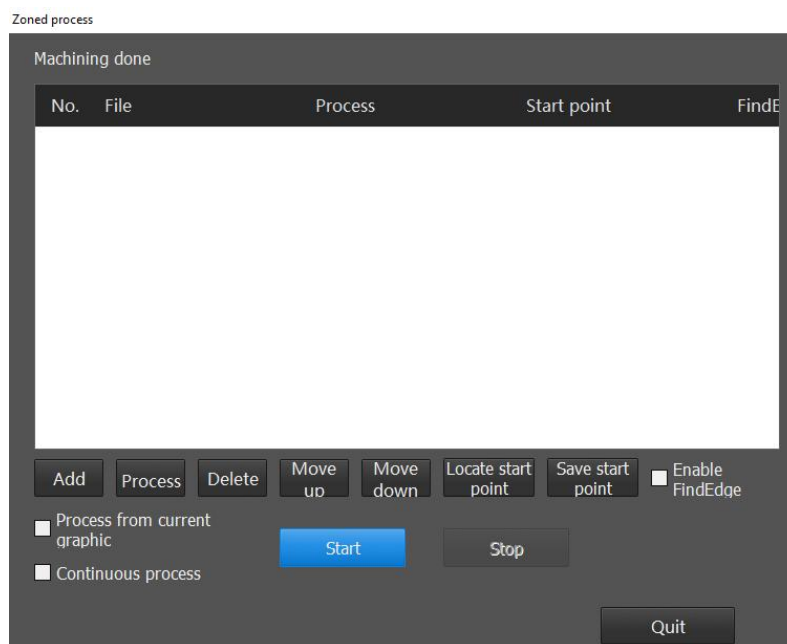
**Clear FindEdge Result:** Angle cannot be set as 0, you can clear the FindEdge angle by clicking this button when you no longer need it.

### 4.3.1.6 Restore the FindEdge Angle

[Restore the FindEdge Angle] is to restore the result after it is automatically cleared. Restored angle will cover the current one, use it with caution.

## 4.3.2 Partition Machining

### Partition Machining







**Add:** Add the file.

**Process:** Set machining technique to the selected task file.

**Delete:** Delete the currently selected sheet.

**Locate Start Point:** Locates to the processing zero point or FindEdge start point of the selected drawing.

**Save Start Point:** Set the processing zero point or FindEdge start point for the selected drawing.

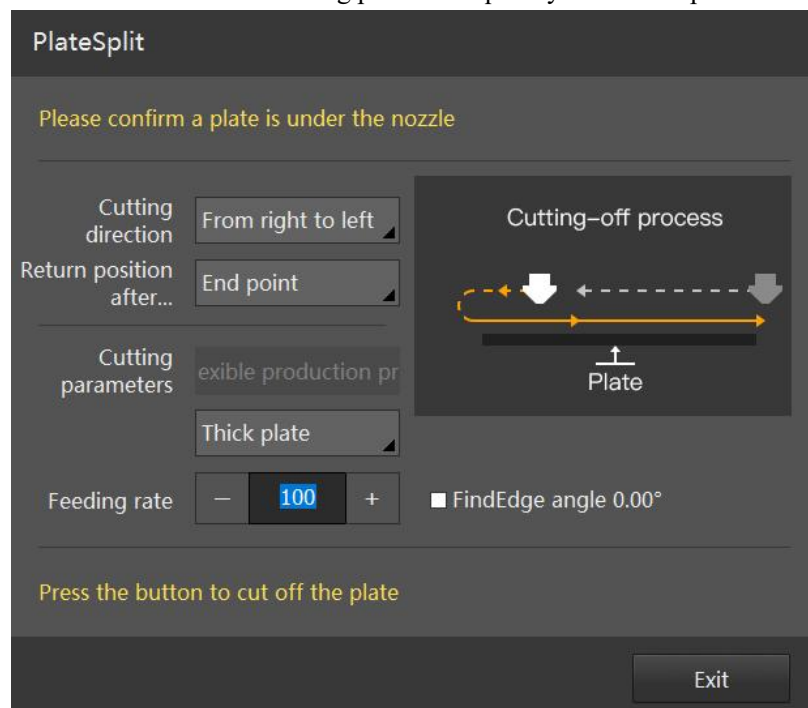
**Enable FindEdge:** Select to find edge for current drawing.

**Process from Current Graphic:** Start processing from the current drawing.

**Continuous Process:** Start from the first drawing in the list and process all of them.

### 4.3.3 Plate Split (Quick CutOff)

**Plate Split:** retrieve the current drawing process to quickly cut off the plate.



**Cut-off Process:** The process used when performing "Quick Cut-Off". The "Quick Cut-Off" process in Batch Production by default read that of large-profile machining, or you can select any process from the process library to perform the cut-off. Flexible Production and Debug by default read the large-profile machining processes of the respective modules.

Batch production confirms whether it is a sheet or a slab by the thickness in the selected process. A thickness of 4mm or less is a sheet, over 4mm is a slab. Flexible Production requires manual selection of sheet or slab.

Since the edge of the sheet is easier to lift, "Quick Cut-Off" function of sheet has some special treatment (the first 10mm cut in fixed height, the fixed height is the cutting height).

**Feeding Rate:** adjust cutting speed of Quick Cut-Off by modifying the parameter during the process. Rate range: 50% to 120%.



### 4.3.4 Gas Calibration (This feature must go together with BLT Cutter)

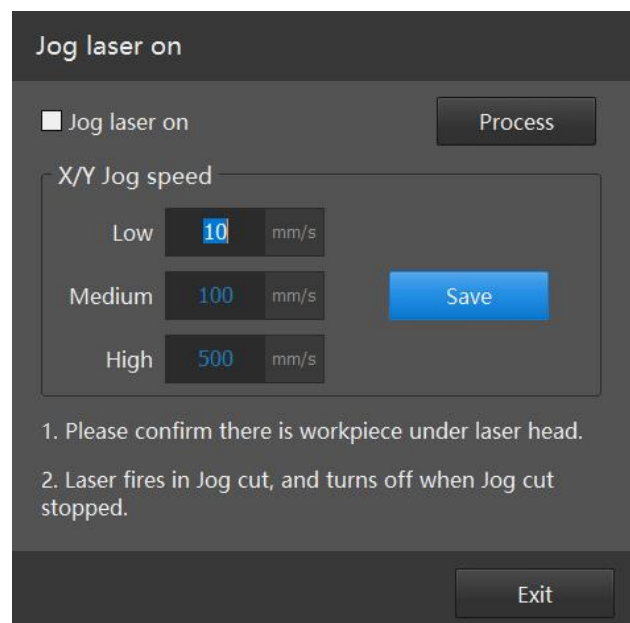
**Gas Calibration:** Adjust DA voltage range and pressure to give more accurate gas pressure during process.

The results will be stored automatically after calibration, it can be obtained via the “**Read Calibration**” function, no need to recalibrate after nozzle replacement.

Note:

- 1) Ensure that the gas configuration is correct and that the gas to be adjusted already configured with a DA proportional valve;
- 2) Select the type and diameter of calibrated nozzle;
- 3) Select the gas to be adjusted;
- 4) Click the button [Start Calibrate] and the results will be displayed on the right after the calibration.

### 4.3.5 Jog laser on



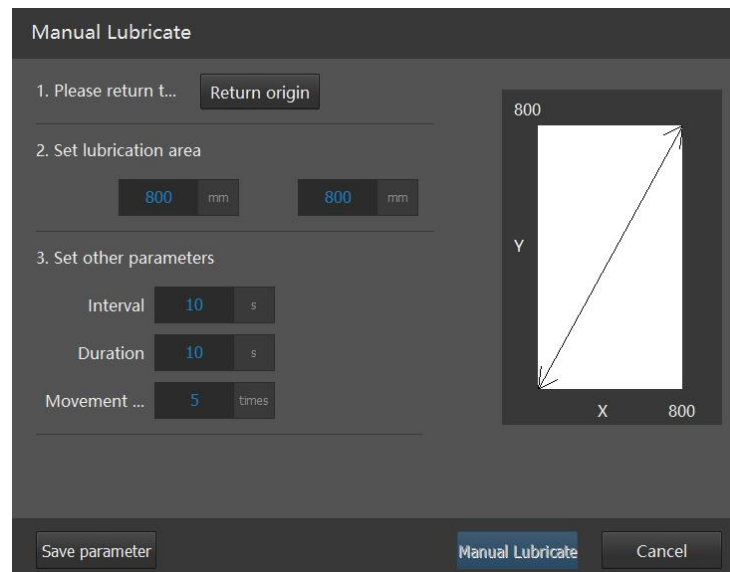
When the jog laser on is activated, the cutting head will follow over the panel, cutting with gas on as jogging.

Note:

- Make sure there is a panel underneath to follow when enable the function;
- This process does not perform piercing.



### 4.3.6 Manual Lubricate



In Flexible Production and Batch Production modes, when the processing system is paused or stopped without warning, the manual lubrication button can be found in the drop-down menu of the Assist, and click to enter the manual lubrication screen.

This function is suitable for lubrication in specific areas.

**Lubrication area X, Y:** The area range of the machine when lubricating the oil, default to 80% of the travel range.

**Interval:** The interval between the end of each outlet and the next outlet.

**Duration:** The time between the start and the end of the outlet.

**Movement Times:** The number of round trips within the lubrication range, one time for one round trip.

**Note:**

- After manual lubrication, the accumulated lubrication time and accumulated lubrication distance for automatic lubrication will be reset;
- The return origin is to move at the travel velocity to the mechanical coordinates (0, 0);
- The laser, shutter, and gas will be off as you enter the interface, it is not allowed to quit during motion.



### 4.3.7 Clean Nozzle

#### Clean nozzle

Precautions : Make sure set correct clean position

1. Clean position

Brush centerX  mm

Brush centerY  mm Read current coordinate

Brush top su...  mm

Brush height  mm

---

2. Clean gas

Gas on when clean nozzle

Clean gas

Gas

Clean pressu...  BAR

---

3. Clean path

Clean path  Wave direction

Running spe...  mm/s Wave line len...  mm

Clean actions  times Wave line wid...  mm

Clean proce...

Check "Enable auto clean nozzle" function in The Configuration Tool - Advanced Configuration, it will be displayed in the Batch/Flexible Production - Assist.

This function needs nozzle to work with brush and open gas to to clean up the metal slag inside the nozzle.

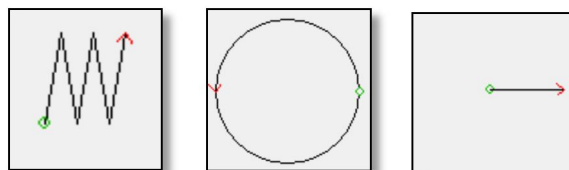
You must first **Locate to Clean zone** to do nozzle cleaning, otherwise it will indicate "Not at the specified position".

When the nozzle is automatically cleaned, the nozzle goes down from **the position "Brush top surface Z"+20** to **the position "Brush top surface Z" - Brush length /2**, so configure the relevant parameters as accurately as possible.

In this interface, the panel and WKB only respond to blow, stop and jog buttons. The cutting head can jog into the maintenance area when the cleaning nozzle screen is opened or during cleaning nozzle operation.

All parameters of the Clean Nozzle screen will be saved by clicking **any one of "Save Parameters", "Locate to clean zone" and "Start"** buttons.

Note:



There are three kinds of Clean Path inside: Line, Circle and Wavy Line respectively. In the schematic diagram, the green dot represents the starting point of cleaning movement, while the red



dot represents the ending point. And it should be ensured that the maintenance area does not exceed the travel range when setting Clean Path and Direction of Line,

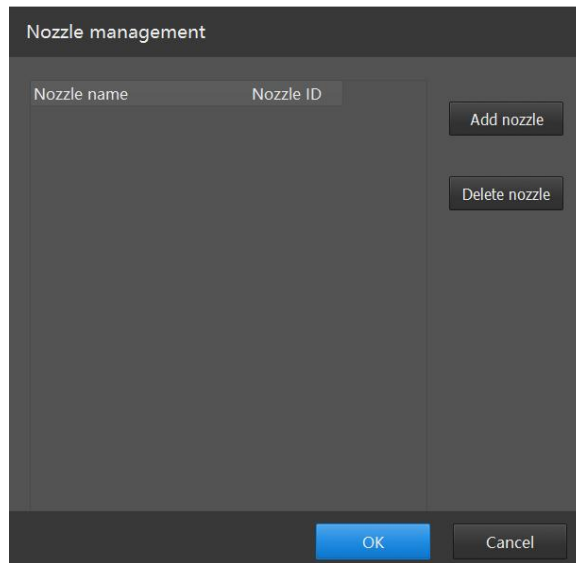
### 4.3.8 Nozzle Auto-Change

Check [Enable nozzle auto-change] and configure the parameters via the Configuration Tool - Advanced Configuration - Replace Nozzle screen.

Instruction: when the system is stopped, the nozzle replace interface can be accessed via the Assist drop-down option in Flexible/Batch Production.

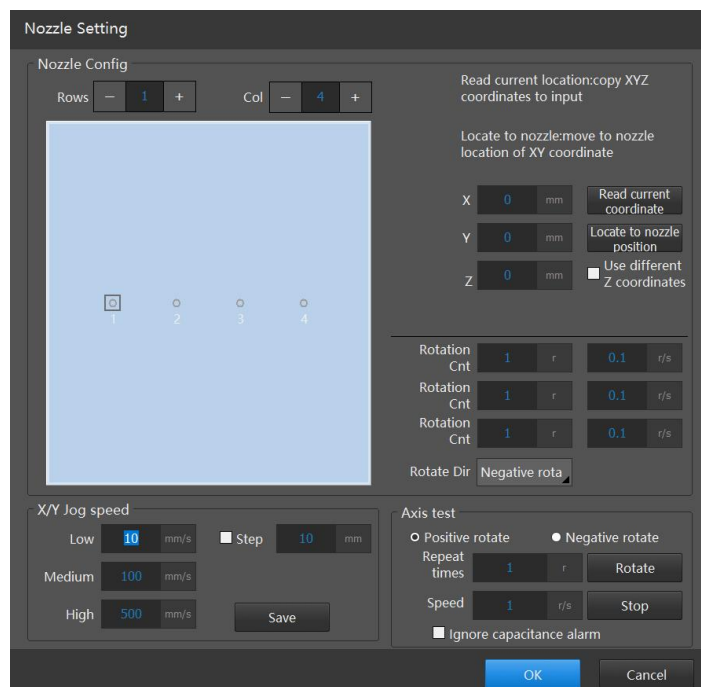


In the change nozzle screen, click “**Nozzle Management**” to enter the nozzle management screen.



Name the corresponding nozzle and select the slot ID, then click OK to return to the Replace nozzle screen, click **Nozzle Setting** to configure the nozzle slot according to the actual situation. For example, if the actual nozzle replace stage is in a  $1 \times 8$  configuration as shown, set the number of rows to 1 and the number of columns to 8.

Click on the nozzle in the nozzle setting screen diagram, move the cutting head to the corresponding nozzle position after each click, click on the [Read Current Coordinate] button to read the nozzle coordinates to save the position of the target nozzle.



**Use different Z coordinates:** Use the corresponding Z coordinates for unloading and mounting to avoid height conflicts between mounting and unloading nozzles.

**Rotate Direction:** The direction of rotation of the nozzle replacement shaft motor axis when install nozzle.

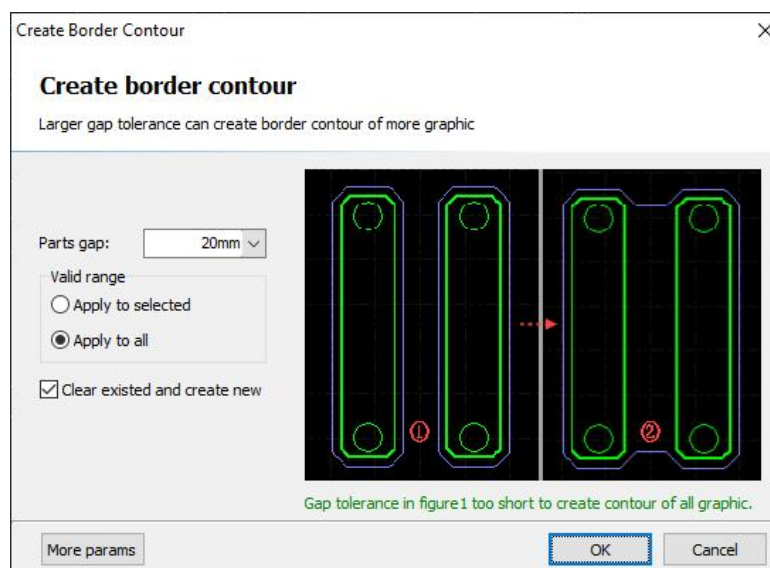


**Load rotation count:** This is the number of rotation of the motor when install nozzle.

**Unload rotation count:** This is the number of rotation of the motor when unload nozzle, in the opposite motor direction of that when install.

**Align rotation count:** When nozzle installation is carried out, it will rotate according to the unloading direction [Align rotation count] and then rotate [Load rotation count]; when nozzle unloading, it will rotate according to the mounting direction [Align rotation count]. Then rotate [Unload rotation count].

### 4.3.9 Create Border Contour



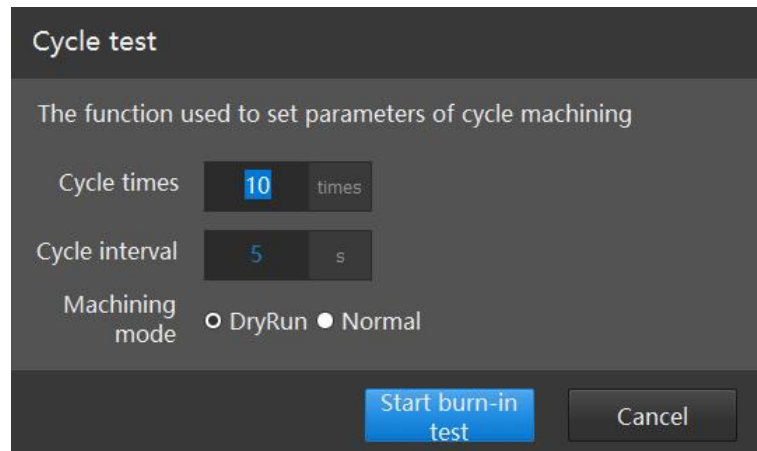
The function is to create and clear the border contour.

**Create Border Contour:** The outer contour can be created from the part, and the larger the part gap, the larger range the border contour contains.

**Clear Border Contour:** To clear existing border contour on the current drawing.



### 4.3.10 Burn-in Test

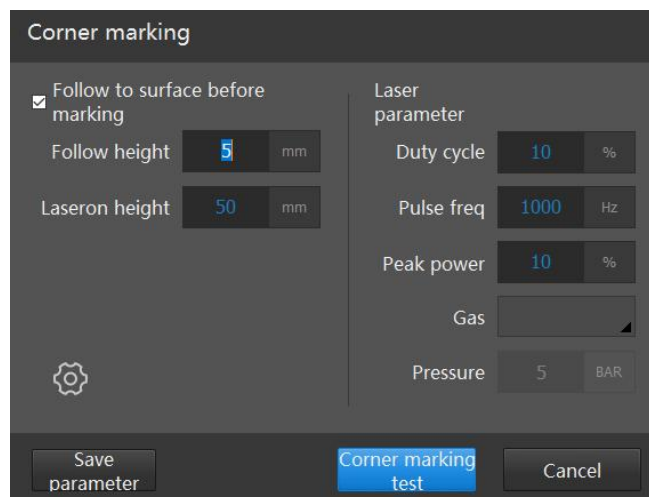


Applied for cycle machining with exchange pallet.

To enable Always FindEdge before cutting on the right requests first enabling Find Edge before cutting and FindEdge from current position.

When enable exchange pallet after process end, it will immediately change pallet every time cutting finished. To enable exchange pallet after process end requires pallet AB, hydraulic table, or dual motor drive.

### 4.3.11 Vertex Marking



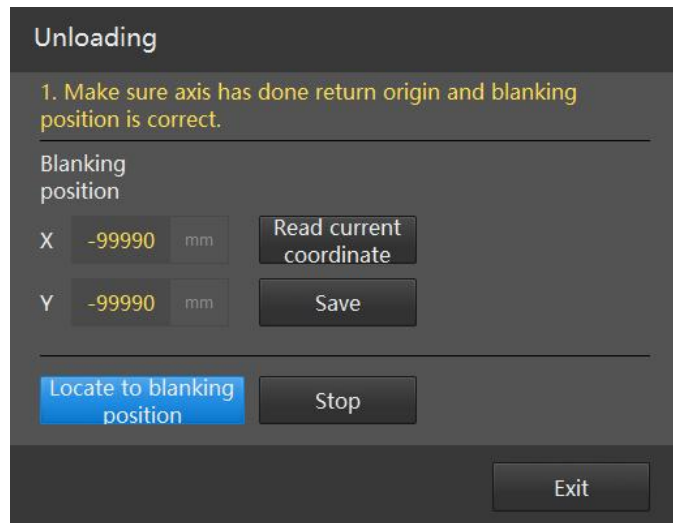
Vertex Marking, similar to Frame, both can be used to determine whether the to-be-machined figure is within the plate. It can only be used when machining stop. Especially when processing large panels, there is no need to look at the red light to ensure graphic is on the panel, just to see if vertex marks on the panel when laser on.

Vertex marking is located at the bottom of the "Batch production" and "Flexible production" interface, click Vertex marking will laser shortly on in the four corners of the graphic border, with 4 L-shaped marking.



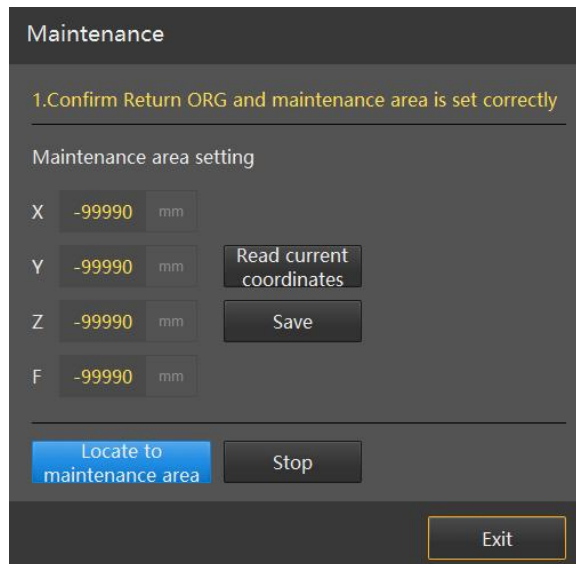


### 4.3.12 Unloading



Unloading feature needs to be used with exchange pallet, the cutting head will first go back to set unloading coordinate in front of pallet. Enable Unloading in Configuration tool-Advanced-unloading position, then it will show under Batch Production/Flexible Production - Assist.

### 4.3.13 Maintenance



Generally, the maintenance position is in front of the machine, near to the cutter, for laser centering, nozzle changing. Enable the feature in Configuration tool-Advanced-unloading position, then it will show under Batch Production/Flexible Production - Assist.



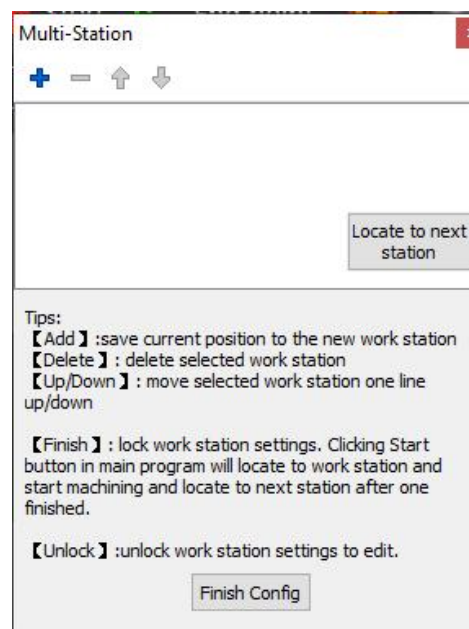
### 4.3.14 Mark out-plate height

#### Mark out-plate height

is to record Z coordinate, which is used when selecting Out-plate follow in the Process-process type. Then in the following, the lower Z coordinate is the value recorded here.

**Note:** The recorded out-plate height will be affected by cut-off line, when the cut-off line feature is performed, the recorded out-plate height will be modified to that recorded by the cut-off line.

### 4.3.15 Multi-Station Machining

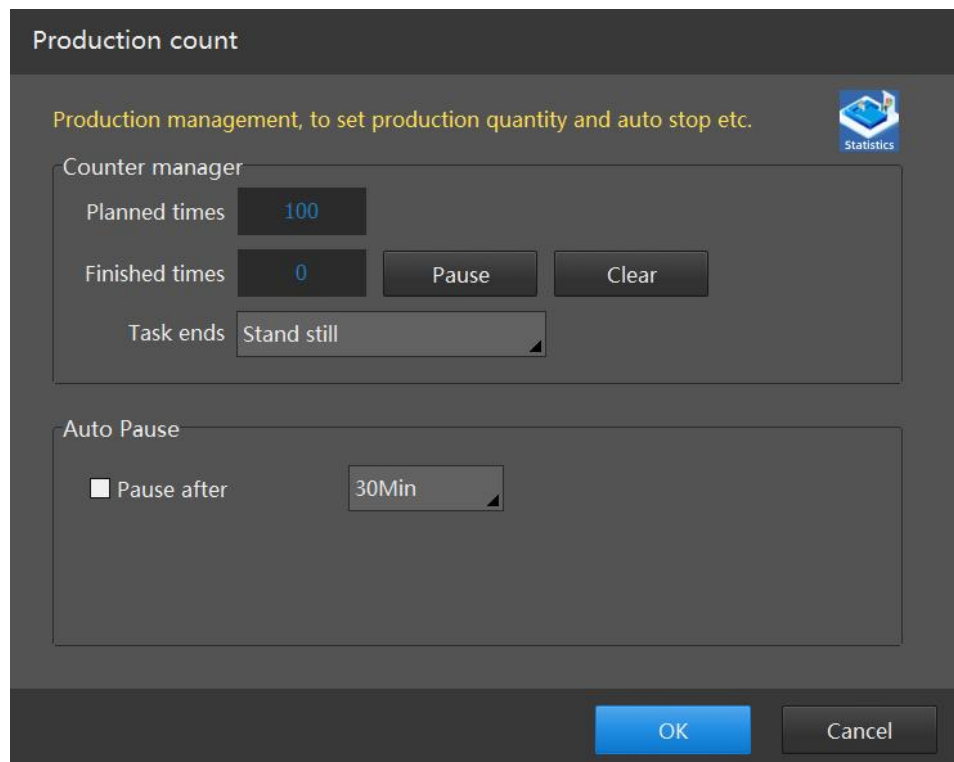


Check "Enable Multi-Station" function in The Configuration Tool - Advanced Configuration, it will be displayed in the Batch/Flexible Production - Assist.

This function is suitable for large-format machines, dividing it into  $n \times m$  stages, with a zero point set for each station. Program zero point setting: jog the cutting head to the target position, click "+" to set the current cutting head position as current program zero point.



## 4.4 Production Count

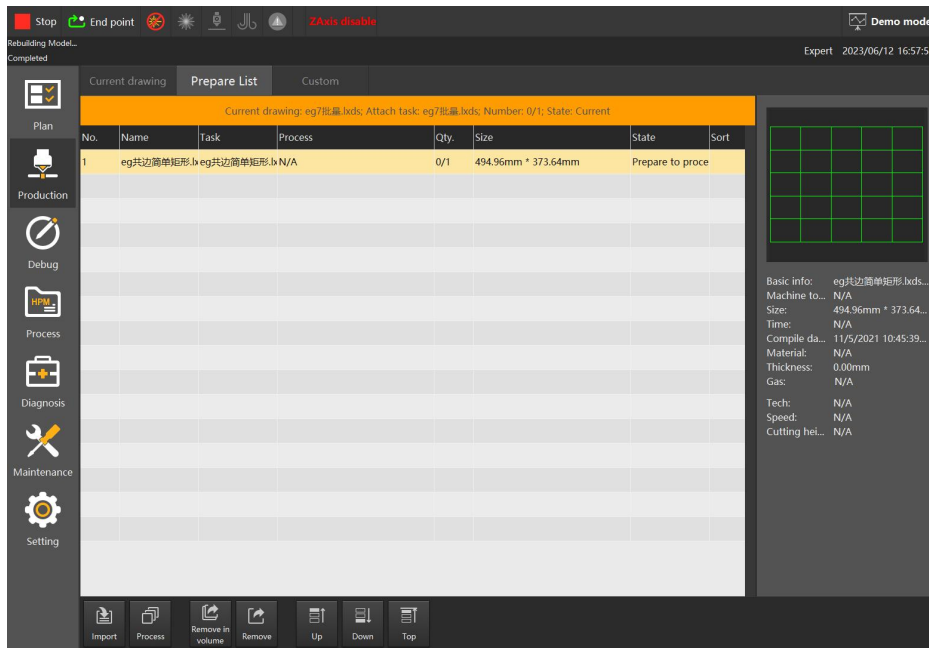


In Production Count you can planned machining times, set pause or resume machining after finishing planned times. Production Count supports the automatic pause, tick "Pause after" to select the time period, processing will be suspended when reach the set time.

## 4.5 Prepare List

The HypCut system allows the user to simultaneously import or configure subsequent drawing information in parallel while machining. This can greatly reduce the time wasting on stopping processing to work on drawings, improve utilization, and automatically switch to the next drawing to be processed after the current task is completed with the Automatic Drawing Switch function, further improving productivity.

After sorting, the drawings will be processed in the order preset. When the "current drawing" has not finished processing but needs to switch to the next drawing, the unfinished drawing is automatically put into the prepare list and placed on top, making it easier to switch. When the 'Current drawing' has finished processing and the preset processing quantity has been reached, the drawing is automatically deleted from the list and entered in the processing history.



**Import:** You can import a drawing from within Plan or external. or all drawings from a task package into the Prepare List, opening only drawings in nrp or LXD format.

**Process:** Set machining technique to the selected task file. The same with Process in Current drawing.

**Graphic:** Edit the lead line, compensation, and start point etc., of the graphic. The same with that in current drawing.

**Remove:** Remove the selected drawing from the Prepare List but not deleting them.

**Up:** Move up the ranking of selected drawing in the list.

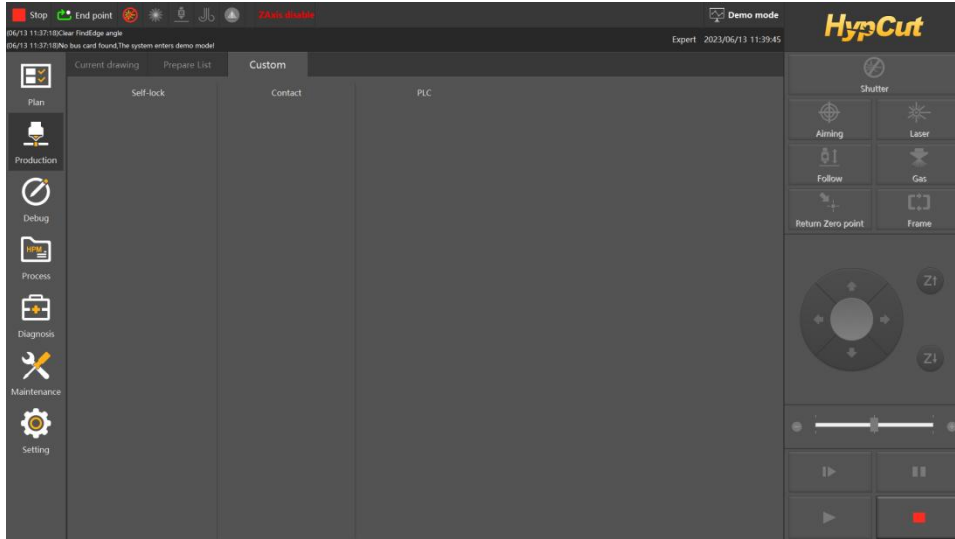
**Down:** Move down the ranking of selected drawing in the list.

**Top:** Move the selected drawing to the top of the list.



## 4.6 Custom

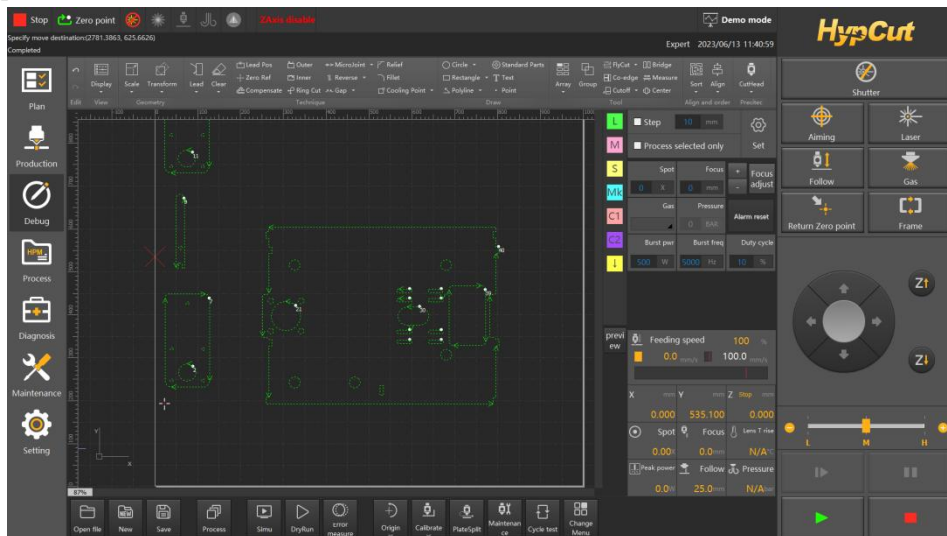
Manual switch for the custom output signal and a manual start-stop control interface for the specified PLC program.



## 5. Debug

The "Debug" module supports rich graphical operation and flexible positioning machining, allowing equipment manufacturers to quickly perform process testing and verify machine tool processing performance.

This module can also do processing, operating in almost the same way as HypCut, using only floating coordinate system, including necessary drawing features and parameters of graphs optimization process.



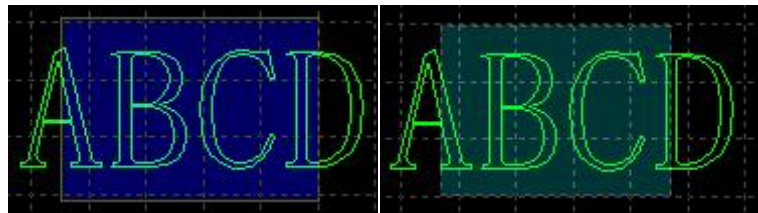


## 5.1 Introduction of Graphics Editing

### 5.1.1 Select Graphics

HypCut provides various operations for selecting graphics. You can select specific graphic by clicking it, which is the simplest way to realize graphics selection. Another more common operation is to drag the mouse to form a semitransparent frame on the screen to select the graphics in it, named “Frame Selection”. It is possible to realize different selection results by “Frame Selection” with different operations. When dragging the mouse from left to right, only the graphics completely covered by the rectangular frame will be selected; When from right to left, the graphics will be selected as long as any part of them lies inside the rectangle.

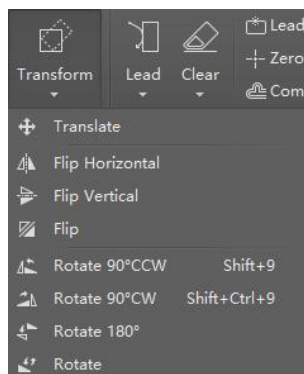
The “frame” effect of these 2 patterns are shown below. Left image is effect framing from left to right, “BC” will be selected; right image is effect framing from right to left, “ABCD” all selected. It’s flexible to select graphic by these two patterns.



No matter which method you're using, you can press Shift key while selecting to add or deselect graphics without clearing the original selection results.

### 5.1.2 Geometric Transformation

“Geometry-Transform” under Home page provides abundant functions of transforming geometry including flip, rotate, align and zoom etc.



### 5.1.3 Size Modification

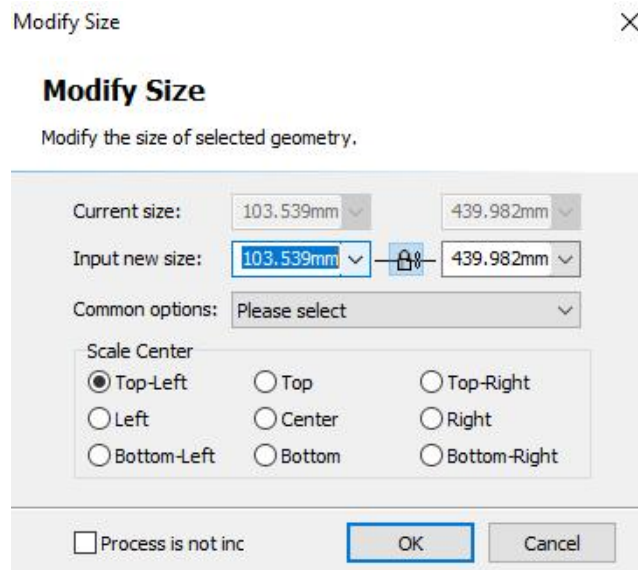
HypCut provides 7 options under “Scale” drop down menu to quick modify the graphic size. As shown on the right:






For example, "100mm" scales the graphic to a width of 100mm, and "2 times" scales it twice.



If you want to input an accurate dimension, click Scale button will prompt the below dialog box. Input new size and click OK to finish the size modification.



When the state of the lock is , the length and width are locked according to the size ratio of the original drawing. If you want to modify the length and width separately, click "" to unlock, and the button becomes "".

"Scale Center" can specify the position between the new graphic and the original one. For example, selecting "Top Left" indicate the graph in new scale at the top left of the original one.

Notice: The lead lines and seam compensation etc., will not change with the size modification.

## 5.1.4 Automatic Snap

During the drawing process, HypCut will provide Auto Snap function as required, including Snap to grid, key points or edges of graphics and so on.


## 5.1.5 Cutting Technique

This chapter introduces the cutting techniques related functions provided by HypCut. Users need to set the parameter according the material, laser, gas etc., which are directly involved in the cutting technique. All parameters here should be considered as reference not a guide value.



**Warning! Improper or wrong parameters may lead to poor cutting performance and even damage the machine tool, please set it carefully.**

## 5.1.6 Cooling Point

Click  Cooling Point on common tool bar and then select specific points on the graphic to set Cooling Points. When cutting to Cooling Point, the machine will turn off laser and open gas for some time pre-set in Global Parameters, then it will turn on the laser to start normal cutting again. The Cooling Point is displayed as a white Point in the drawing board, as shown in the following figure:




As MicroJoint, It is possible to insert multiple Cooling Points by continuous clicking. Cooling points can still be added after MicroJoint and Compensation.

Besides, you can apply Auto Cooling Point in HypCut. Steps: Click "Auto Cooling Point" in the drop-down menu, set the parameters in the pop-up dialog box, and then click OK to get it started. Cooling Point can be added at Leadin and Sharp Corner position automatically, and the ones added at the end of Leadlines will be considered as part of Leadlines instead of a single single Cooling Point, which can be moved deleted according to Start Pos., and Clear Cooling Point will not be validated for them.

## 5.1.7 Fly Cut

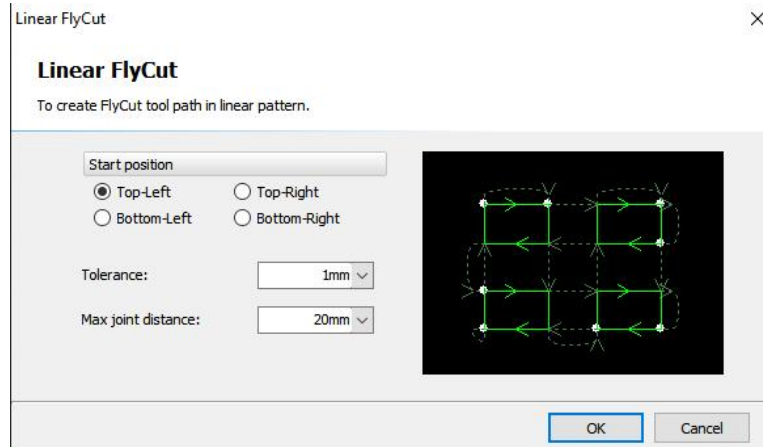
When the graphics are standard shapes like rectangle, circle or polygon and layout in principles, you can use fly cut function to improve the machining efficiency.

Before FlyCut, it is recommended that operators sort the graphics first, which can optimize the path of FlyCut and save travel time.

Click drop down menu of " FlyCut" to select flying cut patterns and set parameters.

"Starting position" is used to set the Start Point position of FlyCut; "Tolerance" means the maximum permissible irregular offset in the array pattern; "Max Joint Distance" means that the arrayed graphics whose steering distance less than this set value can be applied by Smooth Connection.

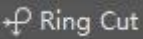


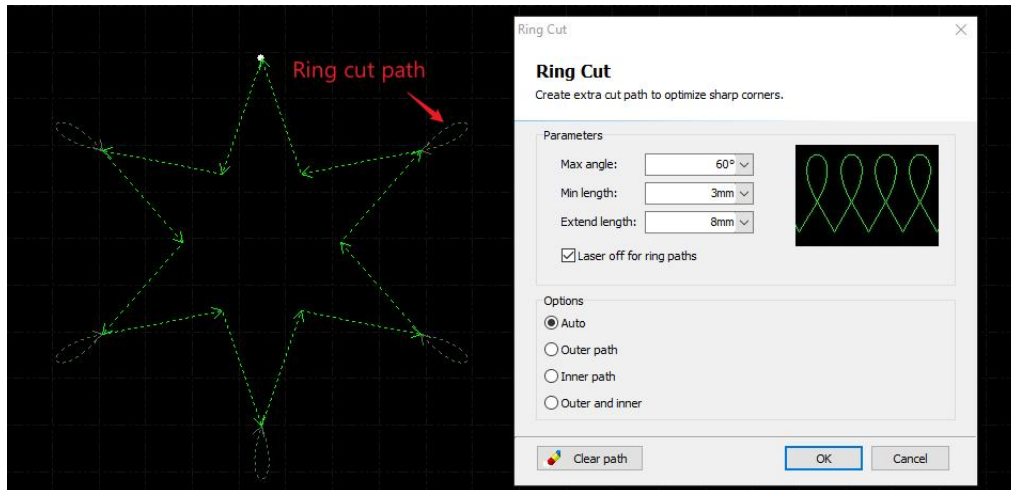


When the graphics in a layout are all circles, directly click “FlyCut” button, or select “Circle FlyCut” pattern in the drop down menu.


"Valid Distance" refers to the maximum distance between two circles. If the distance between two circles is greater than this set value, FlyCut cannot be enabled.

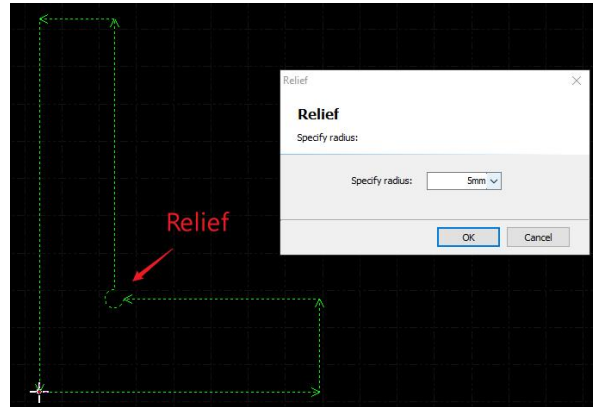
### 5.1.8 Ring Cut

It is capable to realize better cutting effect for sharp corners when you enable the option  on the tool bar after selecting the graphic.



### 5.1.9 Relief

Click  on the tool bar to generate a Relief corner, which facilitates the bending process in the next.



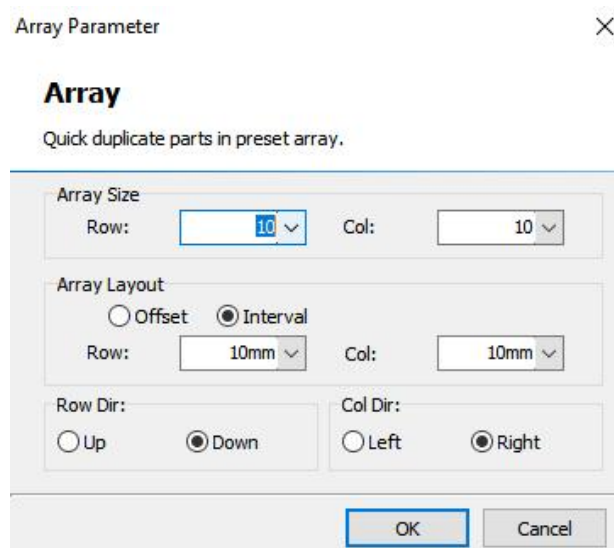
## 5.1.10 Array

The “Array” function is used to quickly duplicate a graphic. There are 4 patterns of Array in HypCut.

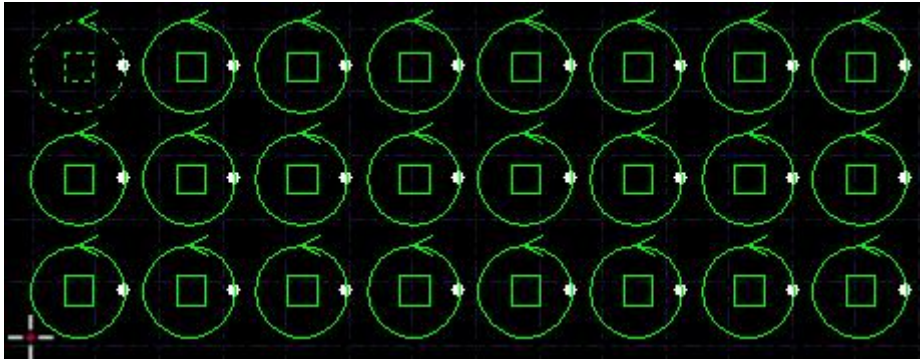
### 5.1.10.1 Array



Click "Array" or "Rectangular Array" in the "Array" drop-down menu will prompt the parameter interface below:

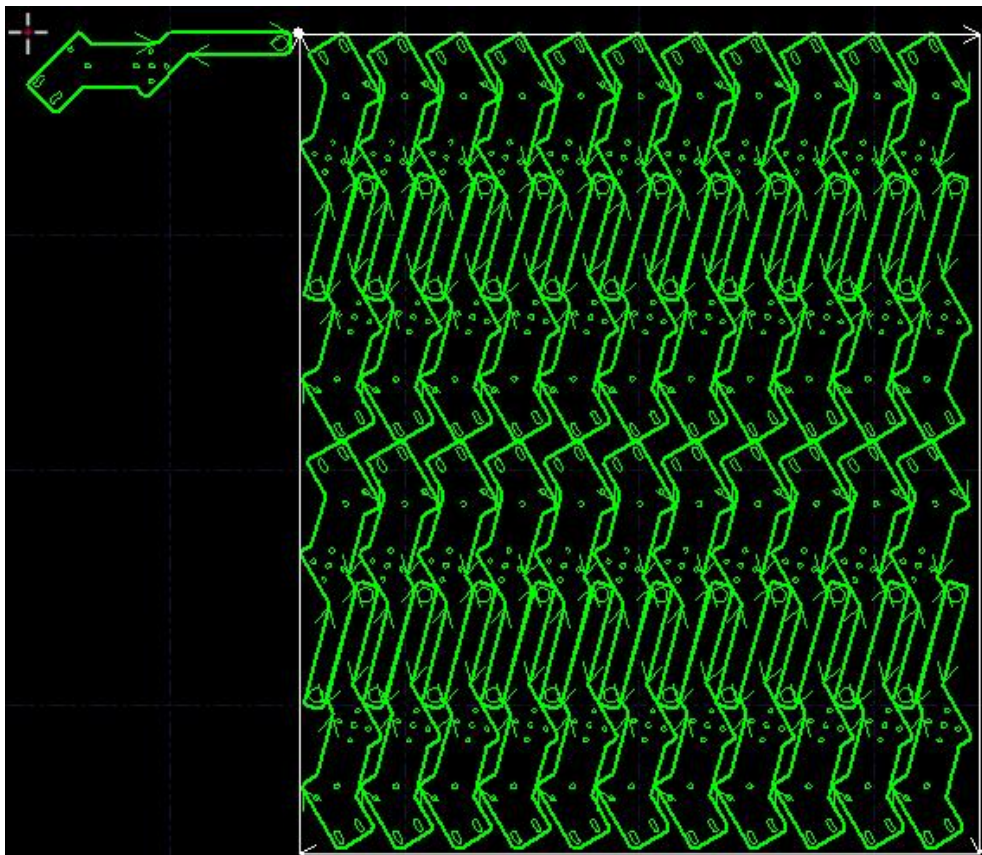


Set the rows, columns array layout and row direction of the array to duplicate the selected graphic:

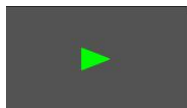


### 5.1.10.2 Fill

This pattern is used to duplicate the graphic to cover the whole plate by preset plate dimension and nest parameters. The plate settings are described in the section 'Nest'. Fill shown as below.



## 5.2 Start and Dry Run



Click “ ” start machining, there will be monitor of machining process like



coordinates, speed, time count and following height etc.



When in above status you cannot switch to other pages except File menu, for preventing graphics modified by mistake when machining. You can pause the machining to modify parameters, and it will take effect once machining resumed.



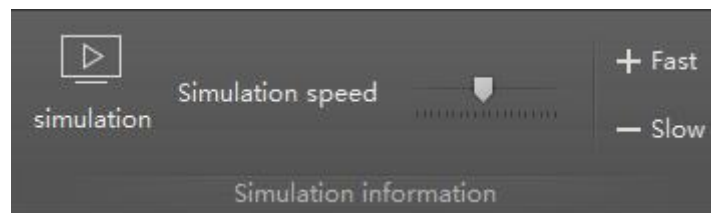
Click the “DryRun” laser head will move along the actual cutting path with same speed and acceleration but laser, gas and follow function turning off. Meanwhile other functions like pause, resume, forward, backward and break point information all same with the actual cutting. Dry run can used to check the machining process without cutting the plate.

## 5.3 Simulation

Users can simulate the cutting process check the cutting sequence in program. This process executed only in software, not sending any commands to the machine. By simulating the machining, users can check the sequence between parts and in parts.



Click the “Simu” in control panel, it will switch to “CNC” menu automatically, you can adjust simulating speed in:



## 5.4 Measure Error



Click “Error measure”, the cutting head will run through the graphic to be machined, and at the end it will show a trace of servo motor feedback with a blue dotted line that allows you to adjust the process parameters required for the actual cut.

**Enable command data access:** When enabled, perform Error Measurement, which saves the command information and feedback information.

**Enable production process data access:** When enabled, the feedback of the processing track is



saved during processing. If Enable command data access is also checked, the command information and feedback information will both be stored during processing.

**Locate to Folder:** Locate to the folder where the information is saved.

Note: If nothing is ticked, the feedback will be saved after error measuring.

### 5.5 Cutter Information (Only with BLT Cutter)

Protective lens monitor			Pressure monitor		Cavity monitor			Sensor monitor	
Temperature	temperature	Temp rise	Pressure	Gas temp	temperature	Humidity	temperature	Capacitance	r head temp
N/A °C	N/A °C	N/A °C	N/A Bar	N/A °C	N/A °C	N/A %	N/A °C	N/A	N/A °C

Focus lens check		
Temperature	temperature	Temp rise
N/A °C	N/A °C	N/A °C

1. Protective lens monitoring: Displays temperature, environment and temperature rise information of protective lens.
2. Cutting gas pressure monitoring: Displays the gas pressure and temperature information of the cutting gas.
3. Main chamber monitoring: Shows the temperature, humidity and dew temperature of the cutting head chamber.
4. Focus lens monitoring: Displays the temperature, the ambient temperature, and temperature rise information of focus lens.

### 5.6 Laser on a while

Laser on a while: Used to test the effect of different peaks, duty cycles, and frequencies on the focus shift.

**Laser on a while**

Notice: you have to manually close laser!

1. Parameter setting

- Peak power: 10 %
- Duty cycle: 10 %
- Pulse freq: 1000 Hz

2. Laser on a while

Actual power: 10W

Laser on at a fixed time

1 h

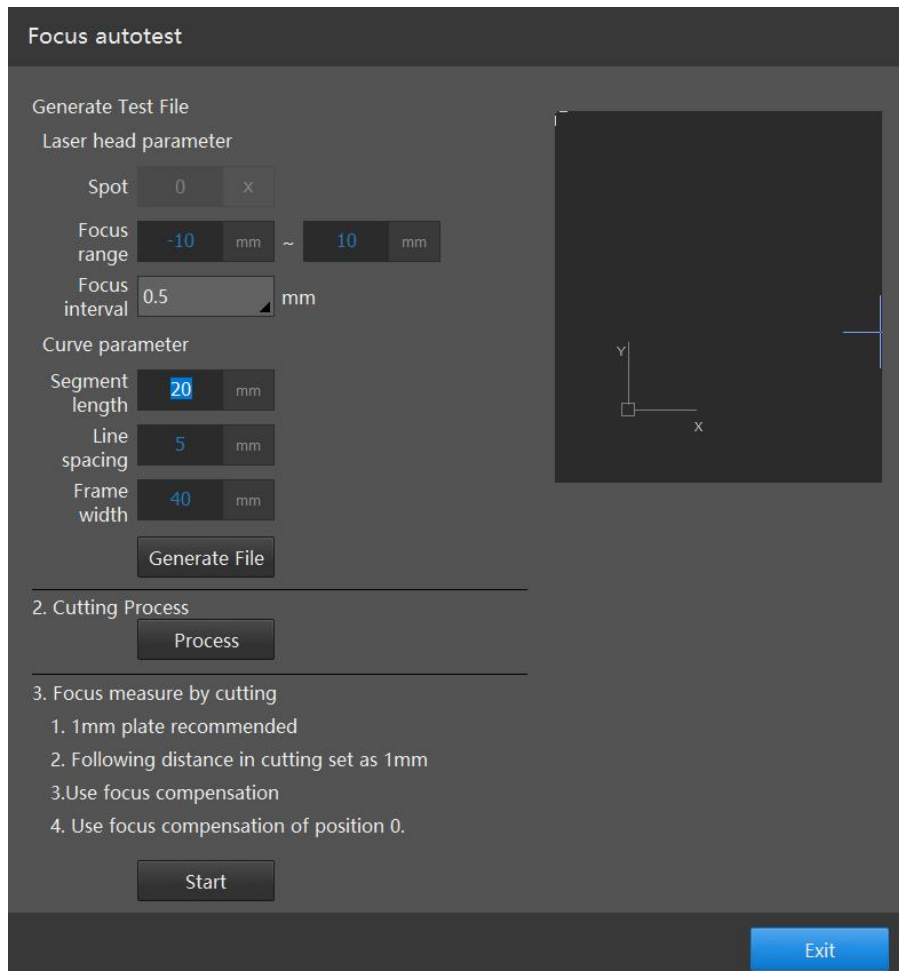
Laser Stop

Exit

Note: This feature is only available with Develop or Expert rights.



## 5.7 Focus auto-test



**Focus auto-test:** For measuring the actual focal spot position for zero focus of the cutting head.

How to measure:

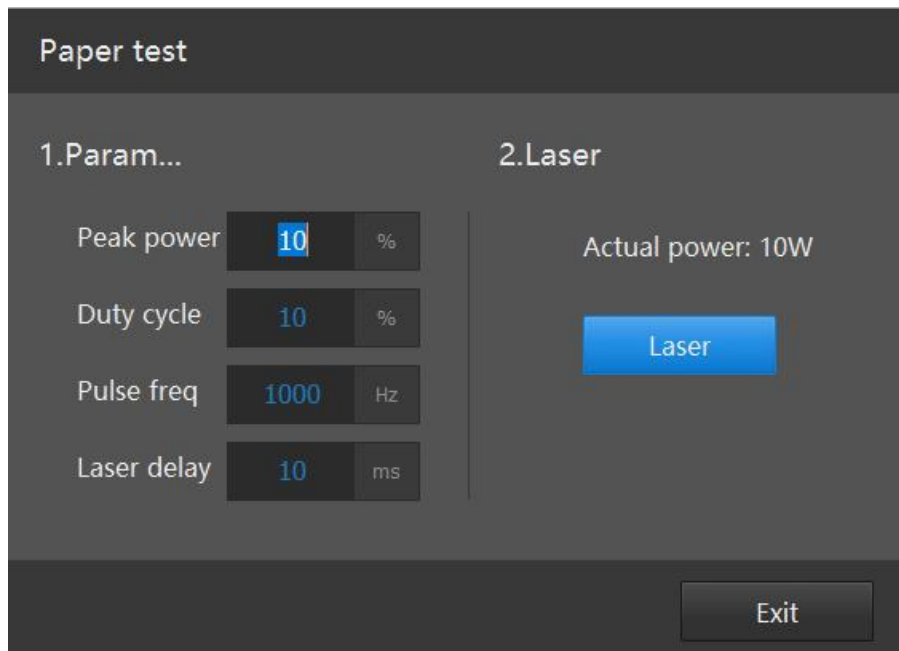
1. Select the spot to be tested, modify the focal range and spacing, set the processing line parameters, click [Generate File] to generate the processing graphic on the right.
2. Modify gas and processing Process interface.
3. Click [Start] to start cutting.

According to the processing results, analyze the cutting effect of different focal spot, find the one with narrowest cutting seams, fill the corresponding focus value into [Focus offset]. Click [Write in offset data] to input into the system.

For example, if the focus 3 is the narrowest gap, write the 3 into the "Focus offset".



## 5.8 Paper test



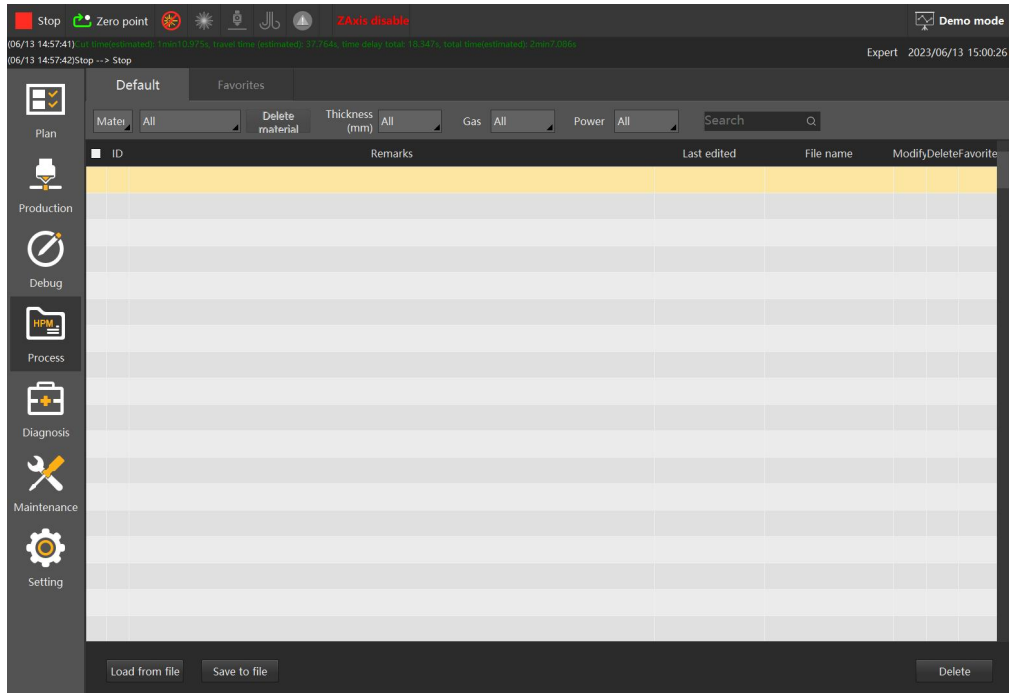
**Paper test:** Used to test the optical path for lens contamination.

How to:



1. Place the photo paper in a suitable position under the cutting head;
2. Adjust the laser parameters and the laser-on time;
3. Press the [Laser] button to start;
4. Check the photo paper spot to see if the lens is contaminated. If contaminated, additional testing is required to find out the source of the contamination.


## 6. Process

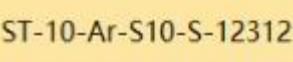
The HypCut system provides a process database management module within which processes user created and saved can be centrally managed.




## 6.1 Process Library

The user can manually unlock or lock the specified process by clicking the  or  button on the process bar. Locked processes can only be read and used but not edited.

The  button allows the user to view or edit the specific data for the selected process.

Processes marked with a "" require expert level or above to edit.

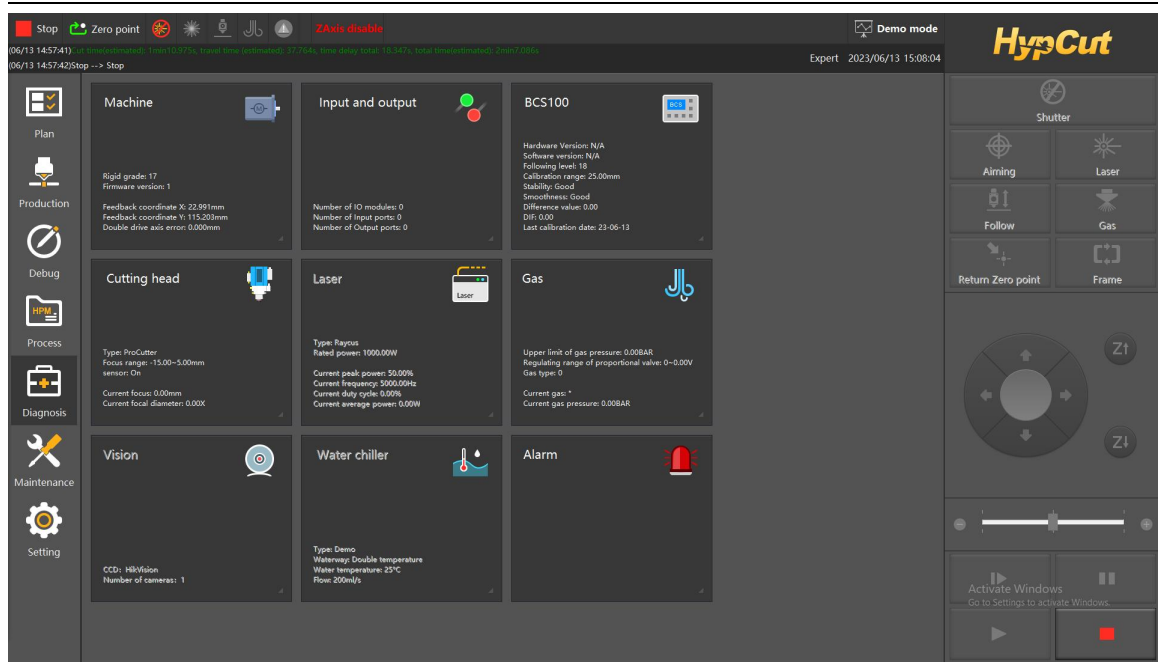
The process named after its "material-thickness-gas-nozzle-type-custom".

Frequently used processes can be stored in the Frequently Used tab via the button  and quickly found when configuring process.

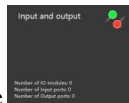
## 7. Diagnosis

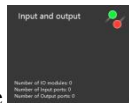
The "Diagnosis" module unified the nine modules commonly used in laser processing equipment and managed by big data analysis, and provide diagnostic function for each module, so that users can quickly find out errors to test and solve it.

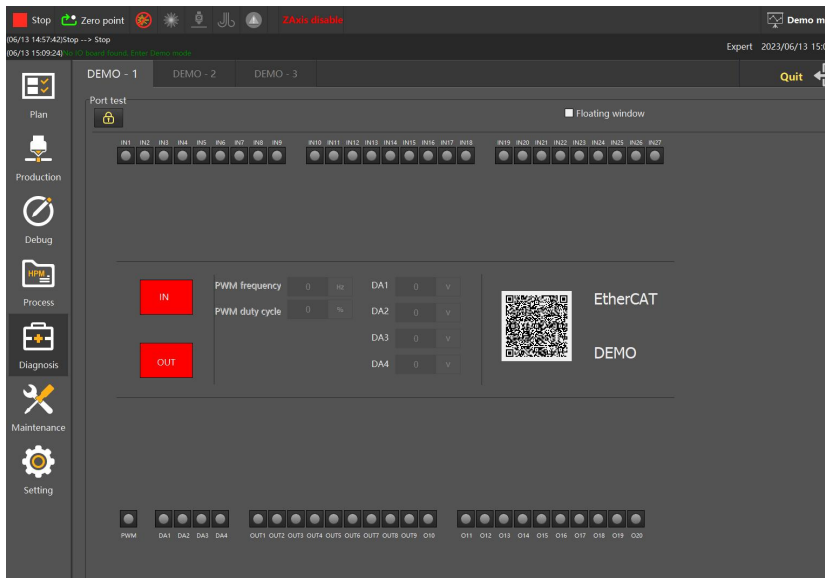




## 7.1 Input and Output



Click the  button during processing, you can get the status of the input and output during cutting to determine if there is a problem.



The "Limit signal" is used to show if the cutting head has reach the limit, the 'PWM' is used to show if the laser is on or off, and also shows if the other 20 inputs and 27 outputs valid.



## 7.2 Alarm

HypCut monitors all components when machine running. Once an alarm was monitored, it will stop the machining and display the alarm message in red title. Motion function will be disabled until the alarm removed. Check the alarm source and remove the alarm then resume the machining. The alarm title shown as below:



You can quickly locate to the alarm module in Diagnosis by double-clicking the alarm area to see the cause and resolution.

Besides alarm HypCut will display the warning, notice and important message in different color once monitored abnormal process. These message will not stop the machining but still suggest noticing these information and taking precautions.

## 7.3 Machine Bed

**Status monitoring:** Acquire the system monitoring information and generate a self-adaptive curve for current window, date you need to monitor can be configured in the monitoring configuration.

Monitoring information types: Motion axis monitoring, BCS monitoring, IO board monitoring, BLT cutting head.

**Motion control:** Check the axis motion status, the condition of origin and limit signals, provides an inertia measurement, servo parameter writing, drive optimization.

**Stroke measurement:** The physical position of the positive and negative hard limits in the X and Y axes relative to the mechanical origin is automatically measured and a reasonable soft limit range is calculated.

Procedure:

1. Check if the machine can sense the origin and limits of each axis;
2. Click to return origin point;
3. Click on the stroke measurement, the machine will automatically move to contact the positive and negative limits;
4. Save measure result of travel range;

**Interferometer:** Measuring by the interference phenomenon of a wave. Two beams of light (usually divide one into two beams of light) can form an interference plot when they are superimposed. Because the wavelength of visible light is very short, even the light path (travel distance) of the two beams is slightly different, it can be detected (for these differences can produce a significant change on the interference plot).

**Ballbar :**The two ends of the ballbar are mounted on the cutting head and the work table, the cutting head drives the ballbar to do circular motion, and the round track formed by the interpolation motion of the X and Y axes is measured. This track is compared with the standard circular track to evaluate the type and magnitude of the machine error.

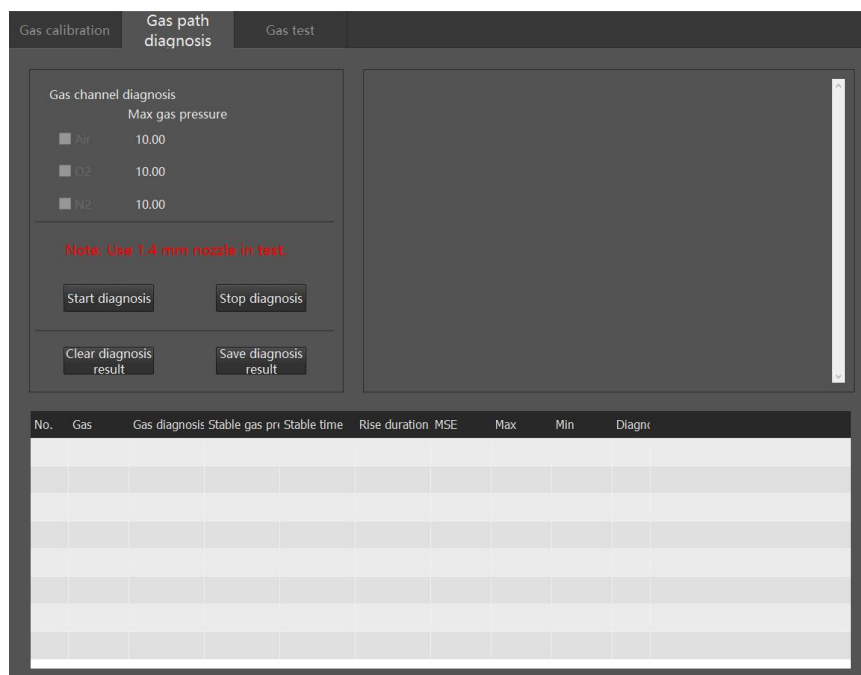


## 7.4 Cutting head

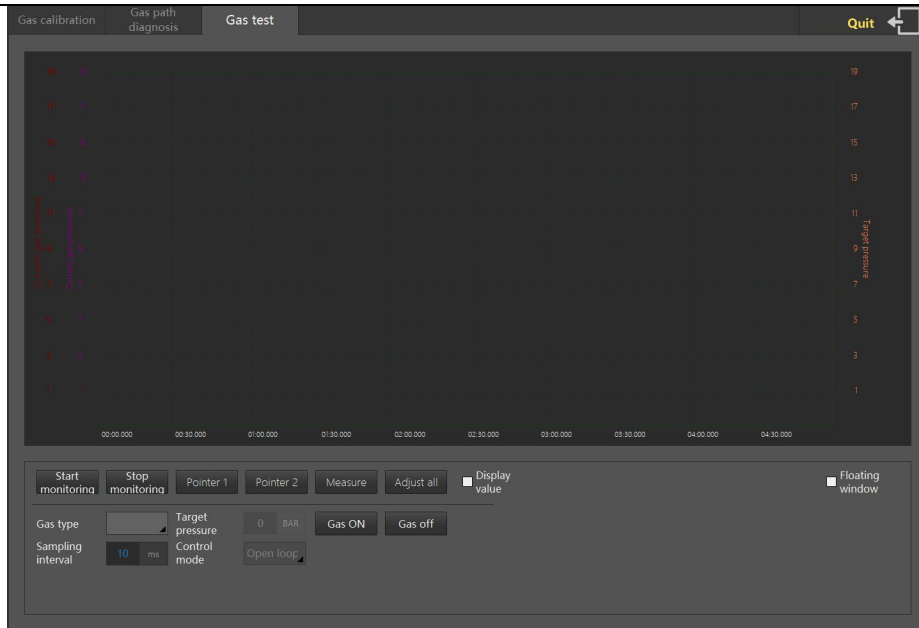
The cutting head can monitor inner sensor, record in-cavity temperature changes.  
Focus Correction (varies between BLT and non-BLT): Configures focus of the DA output.

## 7.5 Assist Pressure

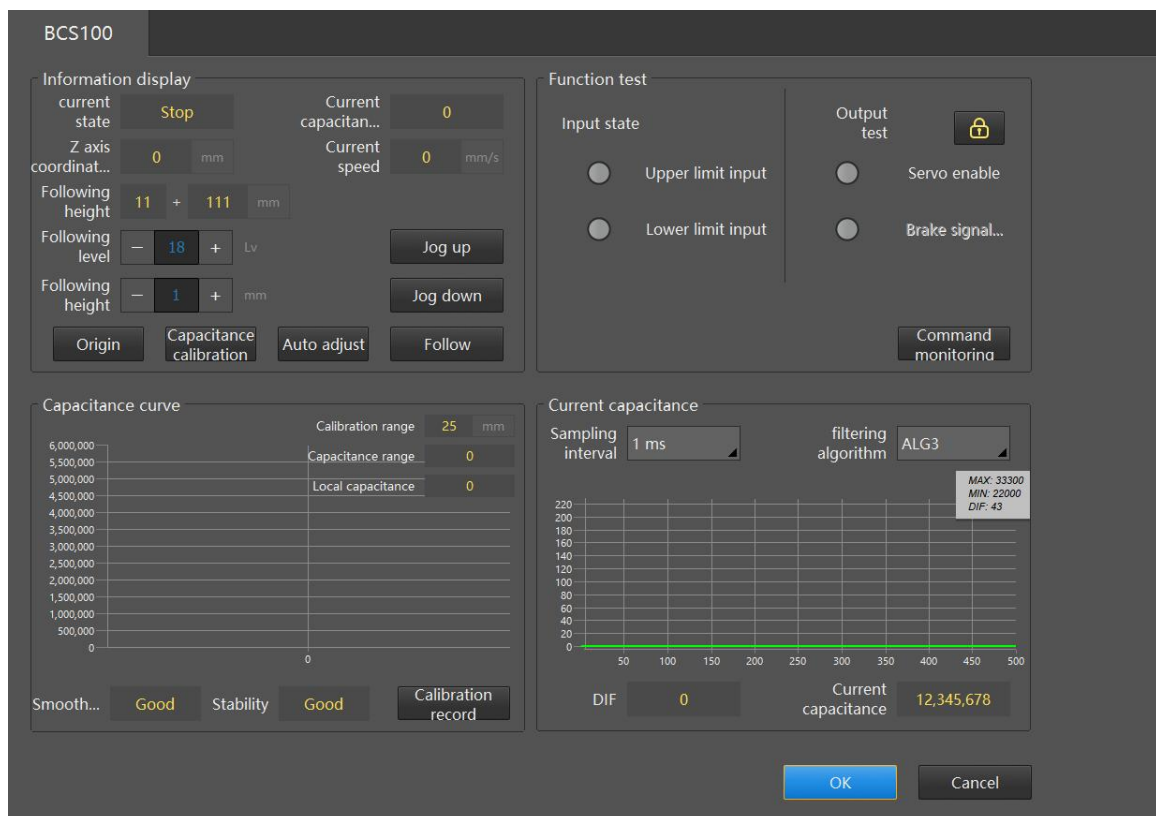
**Gas Way Diagnosis:** to determine whether a gas way is good from its pressure deviation, rise duration, stable time of gas, and gas fluctuation.



**Gas pressure test:** to monitor target pressure and current pressure of selected gas type, and then to check if the gas is not enough.



## 7.6 BCS100



**Information display:** shows current z-axis motion status, do z-axis origin returning, capacitance calibration, set follow level and follow height. Click "Auto Adjust" to fine tune the follow position and internal parameters will be automatically optimized;

**Capacitance curve:** record the curve of the capacitance value and height after capacitance calibration, and can also view the past calibration record;



**Functional test:** divided into input status and output test, upper and lower limit input can be used to check whether the upper and lower limits are valid, output test can be unlocked to open or close the z-axis brake signal output, and can open or close the z-axis drive;

**Current Capacitance:** contains information of BCS, such as DIF (the change amount of the current capacitance value).

## 7.7 Water Chiller

Industrial chilling equipment designed for laser cutting, laser welding and other laser processing equipment. It provides a temperature-stable, precise cooling medium for these applications.

## 7.8 Visual

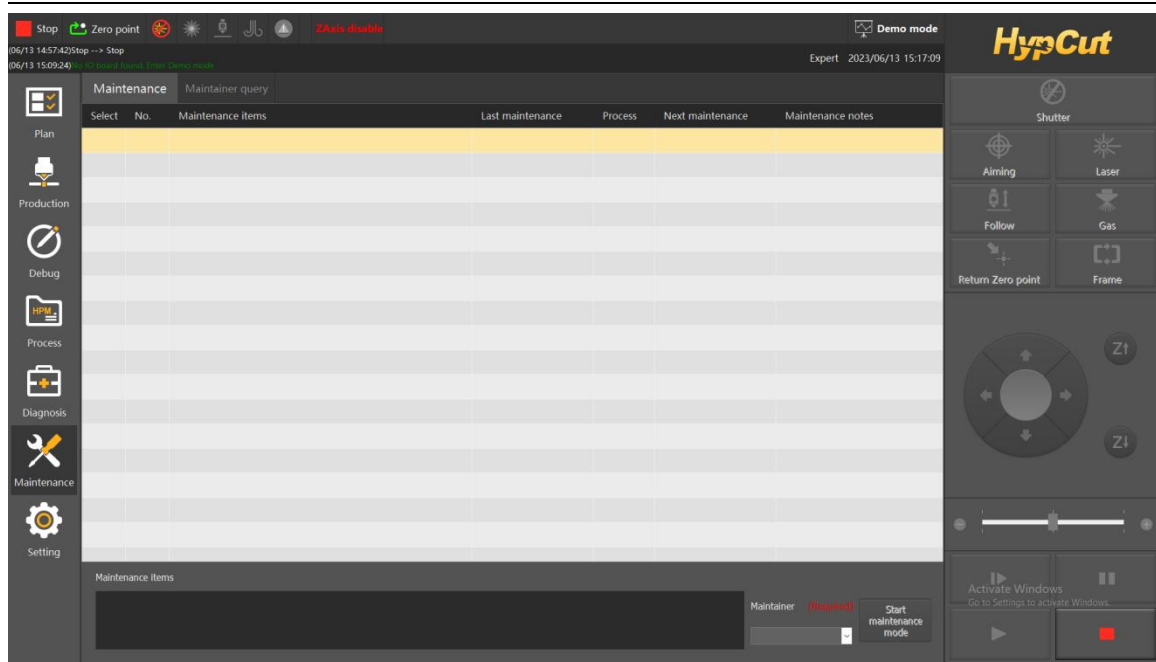
The vision module shows the basic information of the system camera, supporting calibrate the camera, together with the camera can monitor the machining area, such as when a operator appears in the monitor screen can pop up an alarm.

## 7.9 Laser

The module displays the current status of the laser, such as shutter activation, laser preparation, laser related warnings and alarms, and laser working hours.

# 8. Maintenance

Maintenance module record using time and travel distance of equipment accessories (e.g. lasers, gear rack, reduction drive, motors, filter, water cooler, air valve) during operation, give reasonable warning and advice according to the preset values, guide the user to properly maintain the equipment to extend the life cycle and reduce the failure rate.

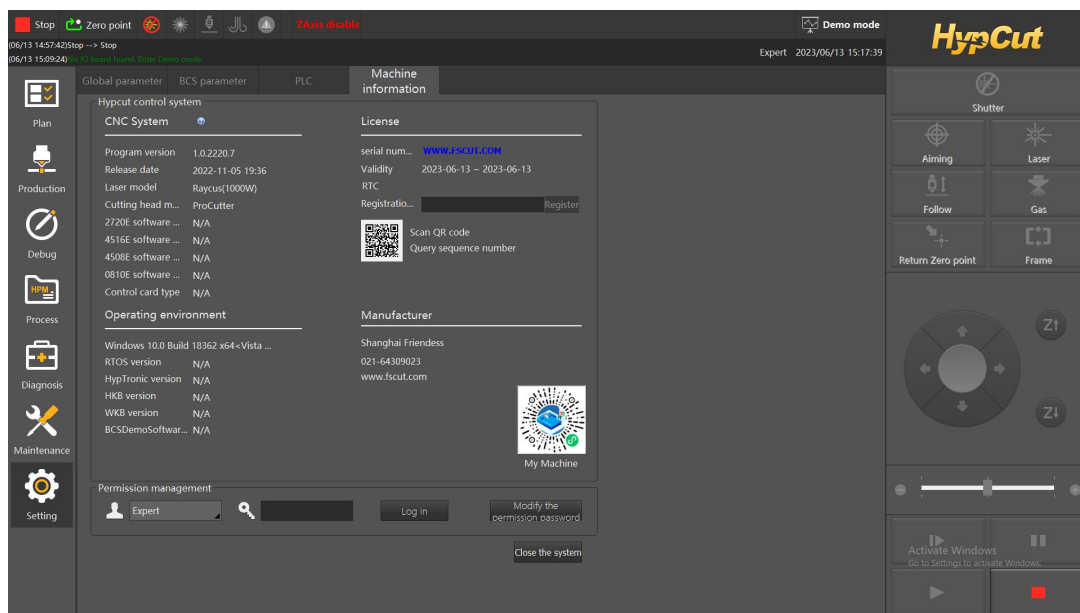


## 9. Settings

The user can access the configuring right of underlying parameters like Basic Parameters, Setup, PLC Programming of HypCut through the privilege login in Settings.

**Incorrect configuration of the underlying state parameters can lead to serious safety hazards and even personal injury. So it is recommended to be used by trained experts with care.**

The normal users can configure the system parameters of operating habits and encryption/decryption through the "Settings" module.



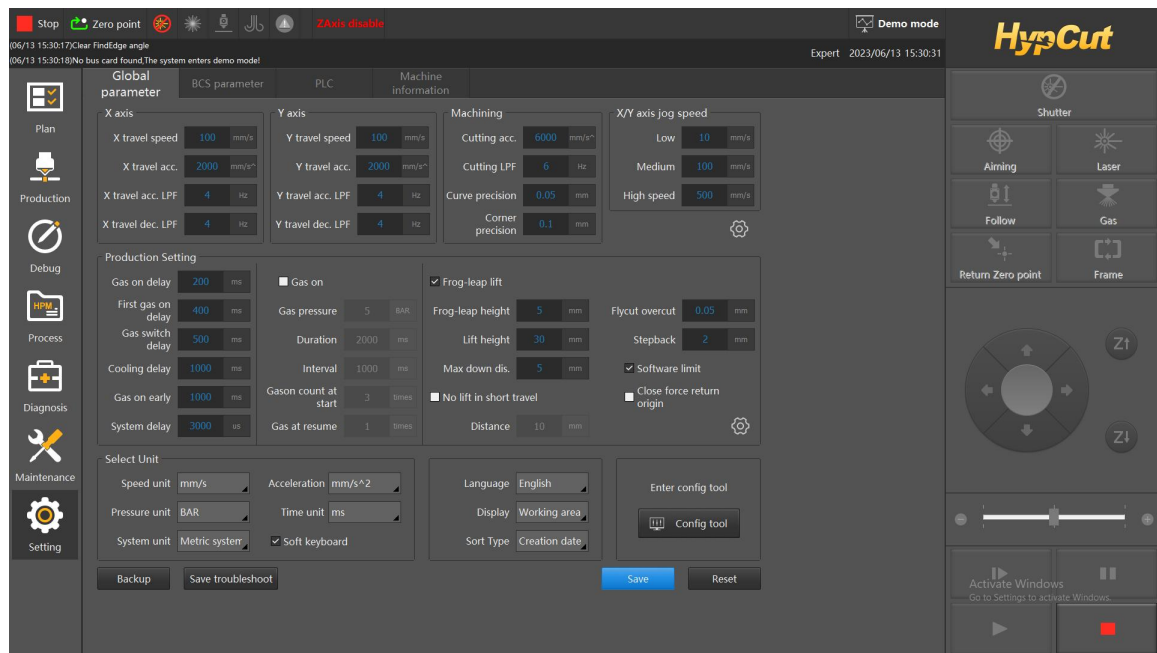


## 9.1 PLC Process

Click “PLC” button, users can edit and execute PLC process.

**Notice: Inappropriate PLC settings can lead to serious consequences! Please contact our technicians if you have any doubt.**

## 9.2 Global Parameters



**Gas on:** gas on for a while before starting cutting to wash off dust on laser lens to extend its lifespan.

**Gas pressure:** pressure of the gas

**Duration:** duration every time gas on.

**Interval:** The interval between two gas-on.

**Gason count at start:** blowing times before processing.

**Gas at resume:** blowing times when resume cutting (pause-and-resume in processing needs blowing).

**Frog-leap:** differ from basic travel way, frog-leap lifting have x and y axis move together as an arc line, save much travel time.

**Frog leap lift:** enable frog-leap lifting.

**Frog-leap height:** the z-axis height before executing x and y-axis movement.

**Lift height:** lift height of the cutting head.

**Max down distance:** the distance to the end point in x and y direction when the cutter start to down in z direction. The down distance cannot be longer than set Max down distance. Travel distance of x and y shorter than max down distance means z axis starts to follow.

**No lift in short travel:** Within a certain distance, the cutting head can travel to the next part starting point without lifting. This function reduces the head lift up, improves cutting efficiency and saves



time.

**Note:** Max. travel distance of No lift length in short travel: the cutting head does not lift up within this max travel distance, once outrange, it will lift up.

**Pierce after alarm reset:** for pause caused by collision alarm when cutting low-quality material. With this function, the cutter will resume piercing right after the collision alarm dismissed. It enables the production process smoother, more consistent and reduces unnecessary downtime.

**Scan MicroJoint:** to FlyCut at MicroJoints, improve cutting efficiency.

**Note:**This feature will not work if there is a perforation setting when using this feature.

**Smart frog-leap:** Provides a smarter frog-leap algorithm based on the set-up of it.

**Note:** prerequisite: Frog-leap needs to be enabled.

**Default process check:** Use this function to help the user check that the process parameters are the default process before processing, to avoid burning the protective lens after using the default process, and to avoid unnecessary losses.

**Special FindEdge:** when checked, all edge search methods become directly followed by edge out, the FindEdge method is more simple and fast.

**Auto match process:**With this function, the drawings exported from CypNest are automatically matched in the process library with the material - thickness - gas parameters after being imported into the HypCut software. Reduced set-up process operations and increased productivity.

**Short distance no follow:** Within a certain distance, the cutting head no longer does the probe motion, improve the cutting head movement efficiency, save time.

**Enable Locate and no follow:** also known as pure Z mode, the Z axis moves to the specified coordinate and is processed, which can be cut non-metal.

## 9.3 BCS parameter

**Real-time calibration:** It is capable to avoid cutting quality problem caused by capacitance fluctuation due to variable heat.


**Note:** Real Time Calibration Interval: Time interval since the last real time calibration exceeds this parameter and the real time calibration is repeated.

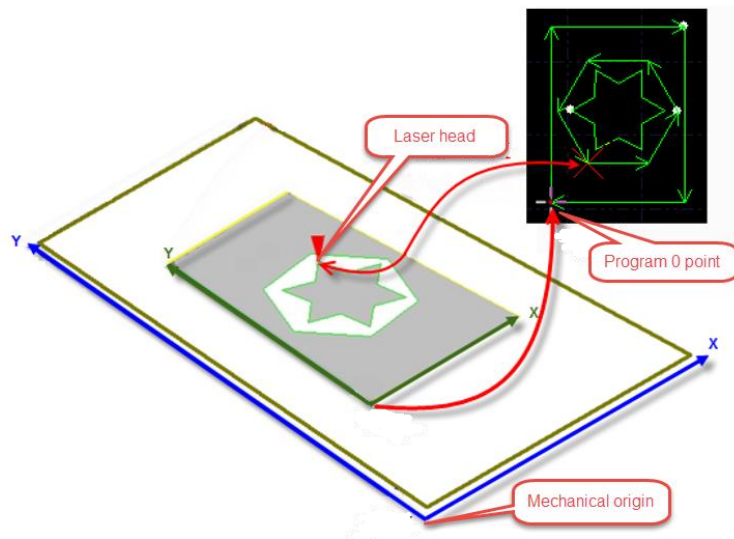
**Quick follow:** Turn on this function to help improve the efficiency of the leapfrog and thus the efficiency of the cut.





## 10. Coordinate System

The "Model Coordinate System" used in graphic design process is independent of the machine, and its Zero Point is on the screen marked by . While the coordinate system used in cutting process is related to machine running, and the correspondence between these two coordinate systems is as follows:




Click the "previ ew" in console will display the laser head position correspond with graphic.

### 10.1 Machine Coordinates

Mechanical coordinate of the machine is defined by the mechanism. Coordinate system is



consistent every time execute return origin "  ". Misalignment appeared after installation or caused by exception can also be reset by clicking it.

No matter what mechanical structure is used, HypCut defines the coordinate system in the same way. HypCut defines coordinates with same rules no matter applied on what mechanism . Stand in front of the laser head, laser head towards right is X+ direction, towards back is Y+ direction which means the left bottom is the minimum coordinate.

#### 10.1.1 Program Coordinates

In order to facilitate actual production, it is necessary to introduce the Workpiece Coordinate System because the Machine Coordinate System is fixed. All Program Systems in HypCut share same coordinate direction with Machine Coordinate System, which differ in coordinate Zero Point, called



Program Zero. Program Coordinate System is divided into Floating Coordinate System and Workpiece Coordinate System. The Debug module uses a floating coordinate system.

Floating Coordinate System is generally used for flexible production, and it start machining at the place that currently the cutting head is. The Zero Point of the coordinate system is automatically set to the current position of the laser head when you click "Frame", "Dry Run" or "Start".

## 10.1.2 Return Zero under Abnormal Situations

### 10.1.2.1 Situation 1

If machining process stopped by the accident but not affect coordinates, you can click



"Return Zero point", return to zero point.

### 10.1.2.2 Situation 2

If accidents like power down or servo alarm stop the machining process and deviate the



coordinates, must execute return origin then click "Return Zero point" locate to zero,