Friendess, Inc.

Friendess CypCutE Laser Cutting Control Software

User Manual

Version: 1.0

Welcome

Thank you for using Friendess CypCutE laser cutting control software!

"Friendess CypCutE Laser Cutting Control Software" (hereinafter referred to as CypCutE) is a set of software tools for planar laser cutting, dealing with laser cutting techniques, simple nesting features and laser cutting control. The main functions include graphics processing, parameters setting, custom cutting process editing, nesting, cutting path planning, simulation, and cutting control.

CypCutE software must be used with dongle and control card in order to carry out machining control.

CypCutE will enter demo mode when running on a computer without a dongle, and you can use all functions except machining control. Therefore, CypCutE can be installed on a laptop for pre-machining design.

Please note that this user manual is only used as an operation instruction for the main program of CypCutE software. Please refer to other manuals or contact us directly for other program installed with CypCutE, including configuration tools.

This document is based on CypCutE version 7. 1.2210. Due to the continuous updating of software functions, the CypCutE software 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. CypCutE system has already provided multiple protections, meanwhile manufactures and users must follow the safety operation rules in case of any accidents and injuries.

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1. Quick Start

1.1 Features

- Support AI, DXF, PLT, Gerber, LXD file format, and standard G code created by Master Cam, Type3, ARTCUT etc.
- Support file optimization includes: remove duplicates, connect unclosed segments, remove minimal graphic and distinguish inner and outer contour and set machining sequence automatically. Above functions can be customized or executed manually.
- Support common editing and typesetting functions, including scaling, translation, mirroring, rotation, alignment, copying, combination and so on.
- Support setting lead line, kerf compensation, micro-joint, bridge, inner/outer cut, seal etc.
- Automatically distinguish the inner and outer contour to determine the compensation direction, and check the lead line.
- Support curve splitting, merging, and smoothing, text to curve, part combination and explode etc.
- Time-saving and labor-saving automatic nesting function can generate co-edges and remnant.
- Plates can be easily filled by various array modes.
- Flexible automatic and manual sorting functions. Users can group the graphics to lock the cutting sequence.
- Preview the cutting sequence.
- Quick set fly cut path.
- Support various piercing methods including segmented pierce, incremental pierce, pre-pierce, group pre-pierce. Users can also set separate parameters of pierce and cutting including laser power, frequency, gas, pressure, peak power, delay, cut height etc.
- Real-time frequency and power curve editing. Set slow start parameters.
- Powerful material library function allows all process parameters to be saved for reuse of the same material.
- Breakpoint memory when machining interrupted. And users can select resume position before or after breakpoint. Only machining selected graphic supportable.
- Users can locate to specified position in stop or pause status and resume machining.
- Support round tube and plane sheet cutting; Support intersected line cutting.

- Support cutting at fixed height and laser head follows in from outside plate[1].
- Support various find-edge methods with high precision.
- Powerful expansion capacity with more than 30 PLC, over 50 programmable processes.[2]
- Support programmable input and output port, and alarm input.
- Support remote control of the system through wireless keyboard and Ethernet[3].

1.2 Acquiring, Upgrading and Installing Software

You can contact the supplier or customer service staff to obtain the software, or directly download from Friendess official website www.fscut.com.

Before installing, check that your system meets the following configuration requirements:

- Win7 and above operating systems.
- CPUI3 and above.
- At least 4GB memory.
- VGA display over 15 inches, resolution over 1920*1080, 32-bit true color display is recommended.
- At least 2 USB ports.
- If you are using an operating system based on Vista(including Windows Vista, Windows 7, Windows 8, Windows 2008 Server), to avoid possible errors, try to run as administrator.

After checking the running environment, you can install and run the software directly. It"s required to run as administrator under Vista-based operating systems.

To avoid program files modified during installation and ensure all drivers installed properly, please close anti-virus software like 360 security guards. Notice: 360 security guard cannot ensure that there is no virus on the computer. If the computer has been infected by the virus, and 360 security guard is running, it may prompt CypCutE to be a virus, which may cause CypCutE cannot work properly.

[1]This function requires BCS100 controller.

[2]This function requires trained professionals and password credential given by manufacture.

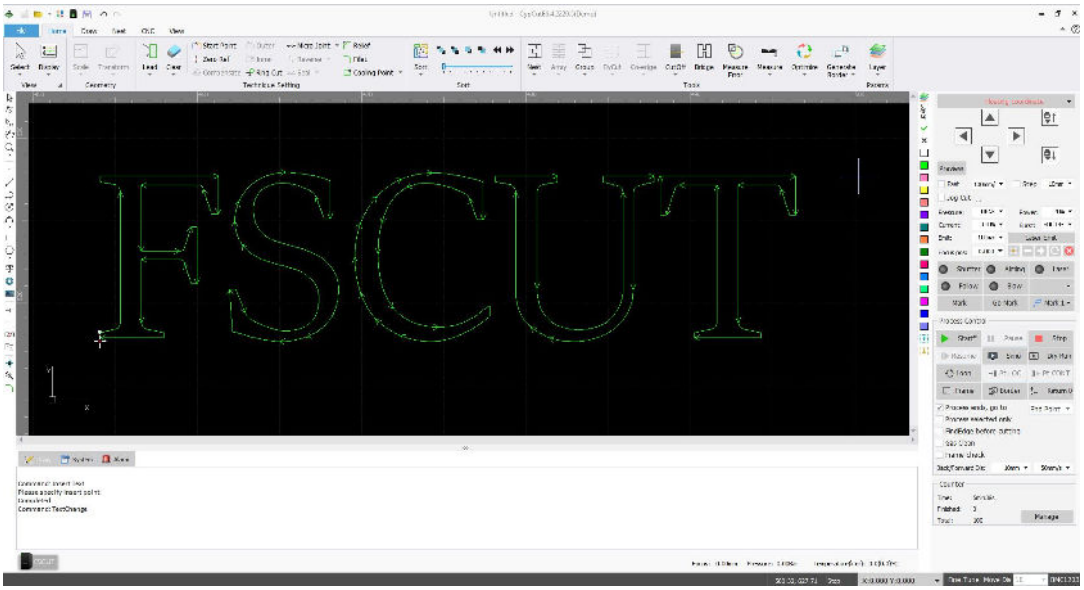
[3]Necessary hardware required.

1.3 Start Operation

1.3. 1 Desktop Shortcuts

After installation, the icon  will appear on the desktop. Double-click to run the CypCutE laser cutting control software.

1.3. 2 User Interface



The center zone in black is **drawing board**, the white frame is the machine working area. The grid of drawing board and ruler will adjust when zoom the view.

On the main screen from top to bottom is **title bar**, **menu bar** and **tool bar**. You can find most commonly used functions in tool bar where the function button group-displayed with clear icons. The menu bar includes "File"" menu and other 5 tool menus "Home", "Draw", "Nest", "CNC" and "View". Click the menu will display the related tool bar. At top left is "**Quick Access Bar**", which is used to create, open and save files. Also undo and redo the operation.

On left side is "**Drawing Tool Bar**"; the basic drawing functions are provided here. The first five buttons are used to switch the drawing mode, selection, node editing, and sequence editing, dragging and zooming. Other buttons below correspond to the graphic, click to insert new graphic on drawing board. There are three keyboard shortcuts at the bottom, which are align center, explode graphic and add fillet.

On the right side is the **"Technique Tool Bar"** including 1 "layer" button and other 19 buttons of different layer color. Click "Layer" button will open "Cutting

Technique" window where users can set most of the parameters related with material cutting; 15 buttons each corresponds with a layer, click a button will appoint a layer to selected graphic. If no graphics selected, click layer color button next time you drawing a graphic will use it as default layer. The "X" button can set the graphic to a non-machined layer, and the "√" buttons can re-set the non-machined layer to a machined layer. The white button represents the "background layer", and the last two layers are the first and last processed layers respectively.

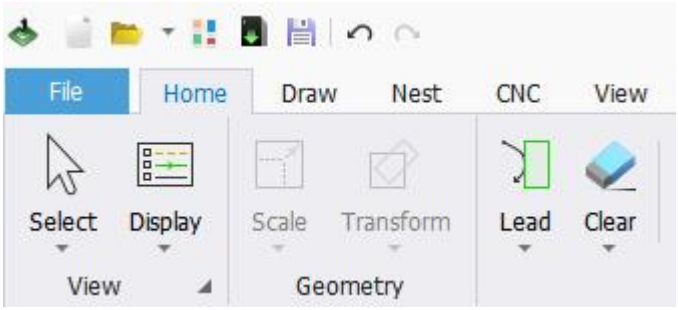
There are three scrolling text ribbon windows at bottom. On the "**Draw**" window will display all information related with drawing command; On the "**System**" window will display all system information except drawing, each message printed with time line and marked with different colors so users can recognize these messages as error, alarm or notice etc. On the "**Alarm**" window displays all alarm messages of red color.

At the bottom is **"Status"** bar showing message according different operation. The left status bar shows graphic message, on the right side displays cursor position, machining status, laser head position. The rightmost is to fine tune the graphic position with arrow keys, and display control card type.

On the right area of the main page is "**Control panel**", where users execute most commonly used machining operations. From top to bottom are coordinate system selection, manual control button, machining control, process setting and production counting.

1.3. 3 Toolbar

CypCutE tool bar displays as Ribbon style that partitions function buttons. The figure below will help you understand:



The tool bar is divided into five sub-menu "Home", "Draw", "Nest", "CNC", "View". Click sub-menu title will switch to the related page; in machining process will show "Working" page and cannot switch to other page until process stops.

In each sub-menu there are function buttons divided into different region; the first button in each sub-menu usually in large size for direct operation; The triangle under function button is drop-down menu provides more operation options. Click the

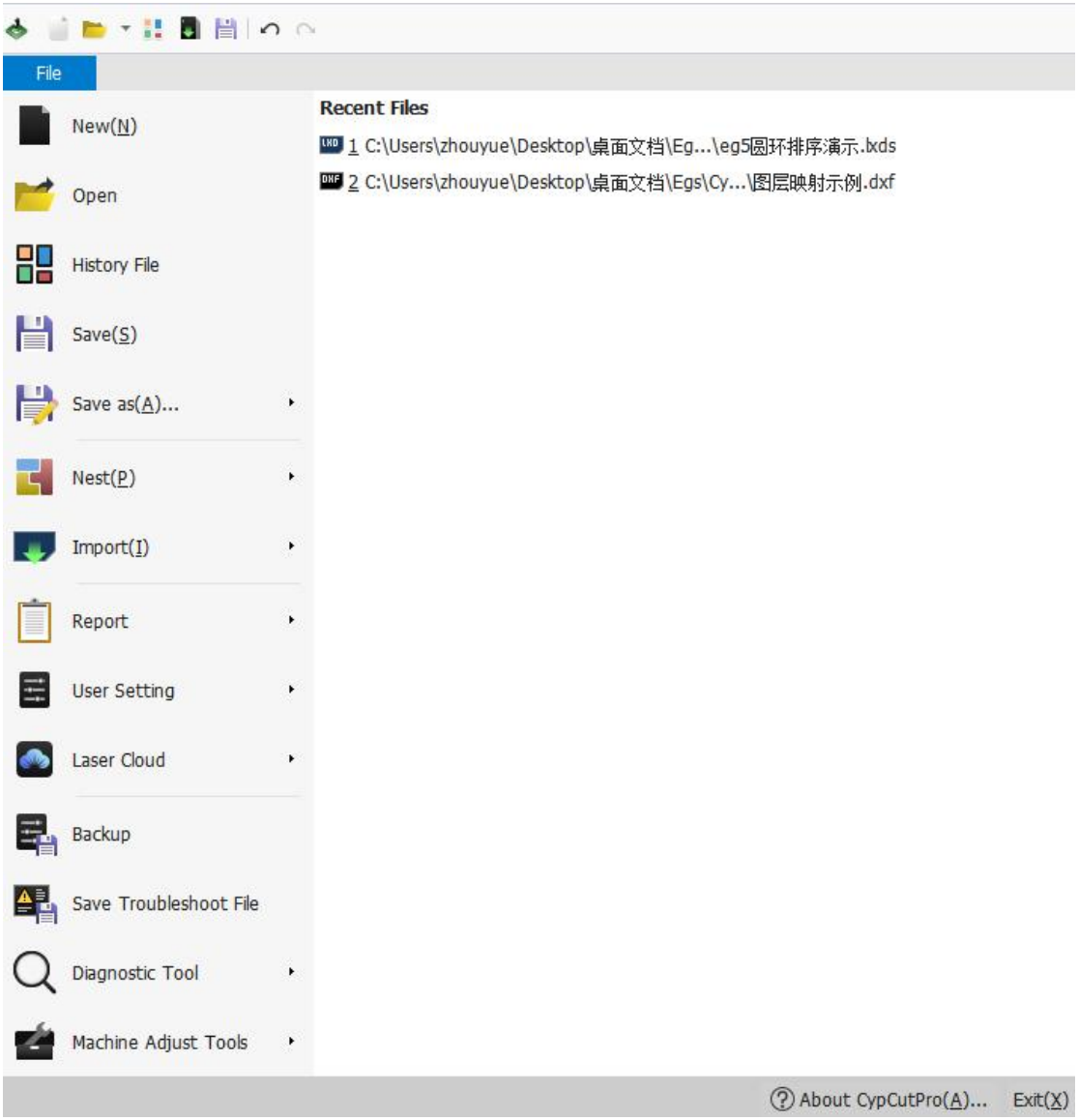
icon and in the drop-down menu will display different dialog boxes with different options. Click "[redacted]" will open a dialog box.

If you have used Office 2007, Windows 7, or other Ribbon-style programs before, you are probably already familiar with this arrangement. It does not matter even if you use it for the first time. We believe you will like it.

1.3. 4 File Menu

In the upper left corner of the tool bar is "File Menu", which contains options related with file operation. Click "

" to open the menu, as shown below:



Notice that the recently opened files are listed on the right column, where the file saved by CypCutE comes with a "LXD"Icon, this is for **you to conveniently find the files that have been designed last time**.

"History File" in the menu allows you to browse thumbnails of recently opened files, making it easy to quickly find and open files.

Click "save as" in the menu, you can choose to save the file in lxds or dxf format.

Add file from "File-Import" will not clear the existing graphics on the drawing board. If you just want to open an external file, just click "File-Open".

By "File-Report" users can export the processing report, nesting report and production report.

The "User Setting" is used to set some parameters to fit user habits.

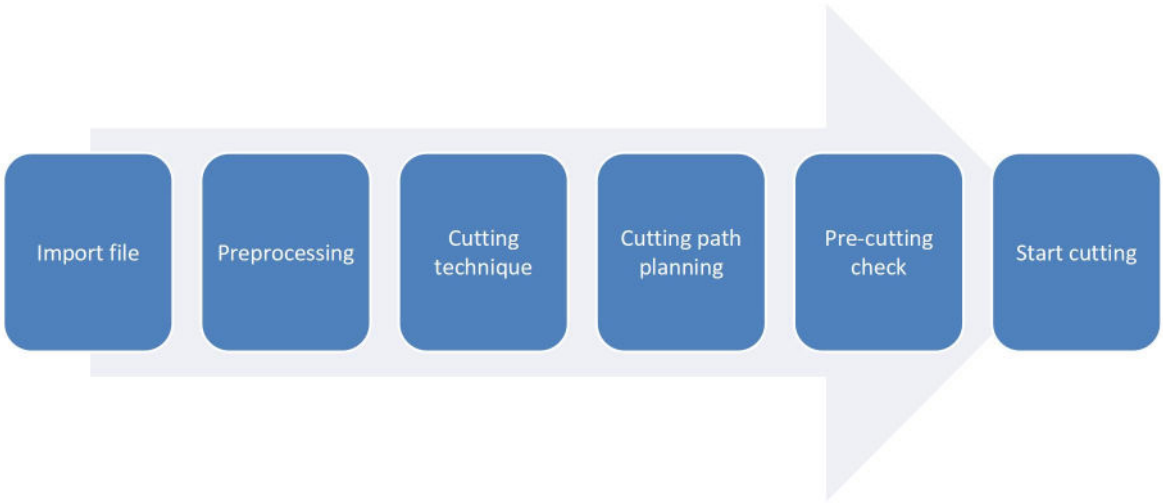
The "Backup" is used to back up all parameters to a compressed file for easy recovery.

The "Save Troubleshoot File" is used to back up abnormal situations to facilitate problem troubleshooting.

Click "Diagnostic Tools" can open axis monitor, IO monitor and BCS100E monitor, which are used to monitor the status of equipment and facilitate the troubleshooting of problems.

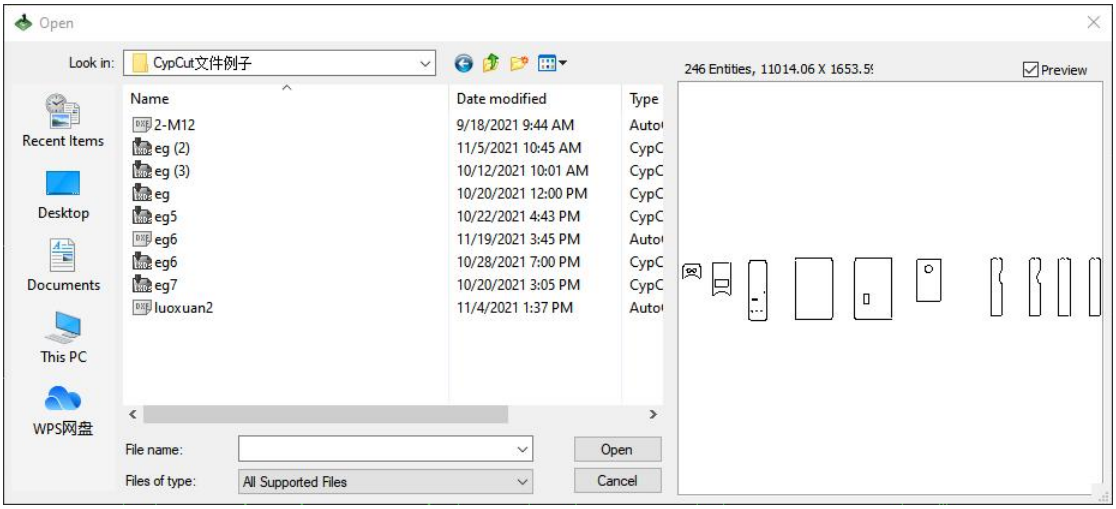
Click "About" in the lower right corner to see the detailed version information of CypCutE software.

1.4 Operation Process



1.4. 1 Importing Files

Click "" button in the upper left corner of the interface to open file. Preview window of open file dialog box will help you quickly locate the file you need.



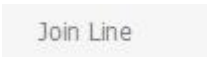
You can also draw figures with CypCutE software, click button "", and then use functions at left toolbar. See the relevant section for details.

1.4. 2 Preprocessing

While importing graphics, CypCutE automatically removes minimal graphics and duplicate lines, merges unclosed lines, automatic smoothing and sorting. Generally, you can start to set cutting parameters without other operations. If the automatic processing cannot meet your requirements, you can open the menu "file" - "user setting" to set the function options you need.

Generally, the software considers that all the graphics to be processed should be closed lines. If you open a file containing non-closed graphics, the software may prompt you message and display them in red color. But this function may be turned off. To view the unclosed graphics on the drawing board, you can click "" and "" under "View" button in Home menu to highlight the unclosed graphics; you can also select unclosed graphics by clicking "Select" and choose "Select Open Figure".

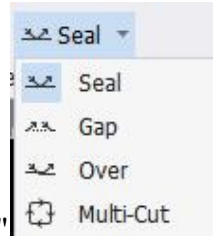
If you need to split graphics manually, click "

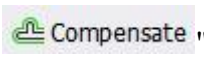
" under "Optimize" drop down menu and click graphic where you want to split. To merge graphics, select the graphics you want to merge, and then click "

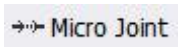
" under "Optimize" drop down menu.

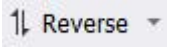
1.4. 3 Cutting Technique

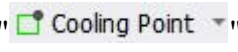
You may use most of the functions under "**Technical Setting**" column in the Home menu bar, including setting lead lines and compensation, etc. The Large button "

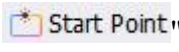
" can be used to set lead lines, buttons "

" used to set over-cut, gap, seal, or multi-Cut parameters; button "

" for compensation; button "

" used to insert uncut microjoints in graphics; button"

" you can reverse the machining direction of a single figure selected; button "

" used to set cooling points. Click "

" button, then point

on the graphic where you want the cutting to start at will set a start point. If you point outside graphic then point to the graphic will set a lead line.

You can press Ctrl+A select all graphic, click "Lead" set parameters then program will set lead line on graphics automatically. Click "Lead" drop-down menu select "Check Leadline", program will check if lead line cross with graphic or in wrong direction and get them optimized.

On the right toolbar, click the " 

" button, you can set detailed cutting parameters. The "Layer Parameter Settings" dialog box contains almost all the parameters related to the cutting performance.

1.4. 4 Cutting path planning

Set the cutting sequence of graphic as needed. Click " 

" in Home or Nest column will automatically set the cutting sequence of all graphic. Open drop-down menu you can choose sorting pattern, decide whether to allow automatically sorting changing machining direction, and recognize inner and outer contour of the parts graphic.

If automatic sorting does not meet the requirements, you can click "  " button to enter the manual sorting mode, click the graphics with the mouse in turn to set the processing order. Or press and hold the mouse to draw a line from one graphic to the other, and you can specify the order between the two diagrams.

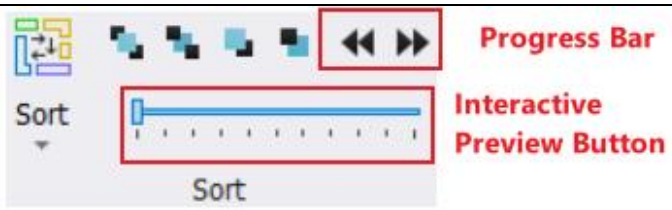
Select several graphics that have been sorted (set sequence), and then click under the Home or Nest bar **Group** " 

" button to fix their order. After that, neither automatic sorting nor manual sorting will change the sequences inside the group, and the group will always be a whole.

Right click a group and select Group Sort you can modify the sequence of the graphics within a group.

1.4. 5 Pre-cutting Check

Check the machining track before cutting,. Drag the **Progress Bar** to quickly view the graphics processing order, click **interactive preview buttons** you can view the graphics processing order one by one.

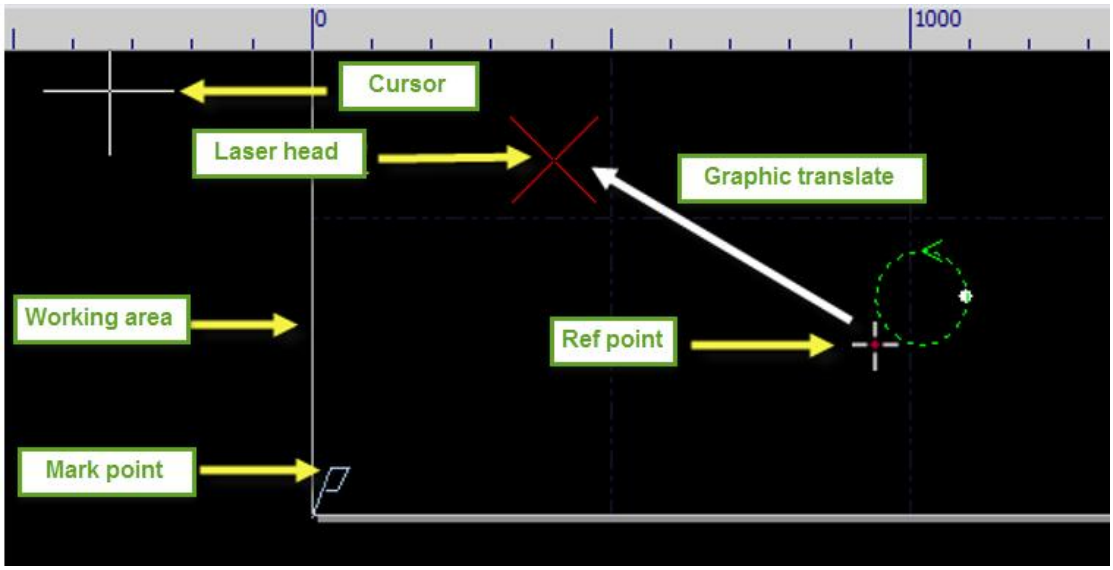


Click " Simu " on the console can simulate processing, through simulate speed function on the " CNC " page allows you to adjust the simulation speed.

1.4. 6 Start Cutting

Please note that it requires compatible control card and dongle to actually realize machining.

Before start processing, you have to match the position of graphic and machine bed. Click " Preview " button on the left side of the control panel will show the corresponding position of graphic on the screen and machine bed. This position is calculated by the reference mark location on the screen and the laser head position at machine. There are some symbols on the screen, click "Preview" the "Reference" mark will move to the laser head position.



If the Red Cross does not match the real position of laser head, please check the mechanic origin and correct the origin by CNC-Return origin. If click "Preview" and graphic is partly or fully outside the white frame, it means machine will exceed the travel range.

Click " Zero Ref " in Home menu can modify the reference position of the graphic. For example, if laser head is at left bottom of the graphic then set the reference as left bottom.

After checking the position, click "

on control panel, laser head will move along the rectangular frame of the graphic, you can check if the machining area on machine bed is right. Click "Generate Border" drop-down menu in Home and then click "

" to check position of parts with irregular remnant contour. You can click "

" to further check by making cutter travel along the whole cutting path with laser off.

Finally click "

" to start processing. Click "

" pause processing, in pause status you can manual control laser head up and down, open or close laser and gas, click "

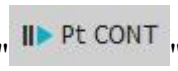
" to move forward or backward along the graphic path. Click "

" to resume processing; Click "

" fast start cutting without piercing.

Click "

" to stop processing. Laser head will return to the pre-set position. If you didn"t change graphic or start new machining process, click "

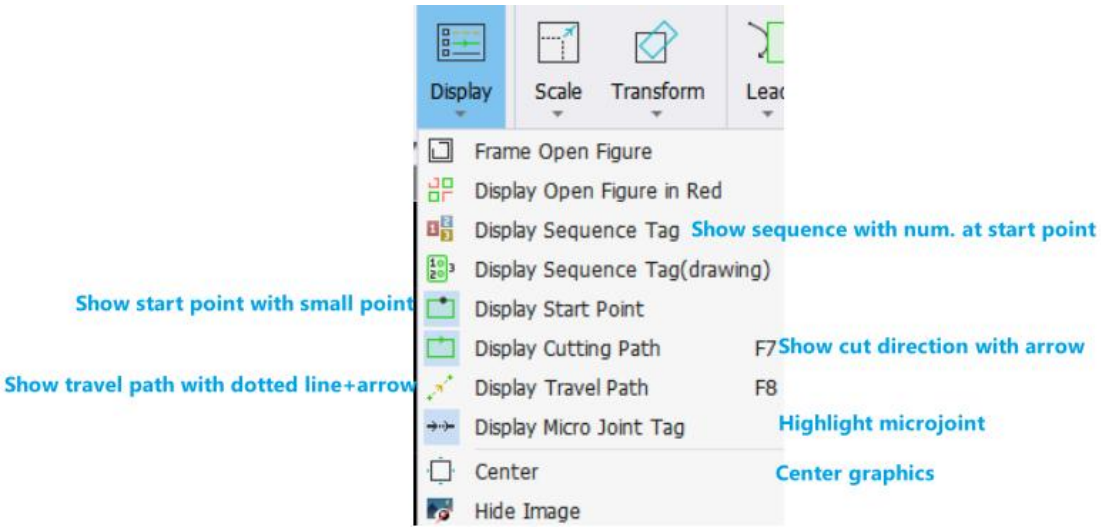
" will locate to the break position where last machining was end and click "

" will start processing from breakpoint.

2. Graphic Edit

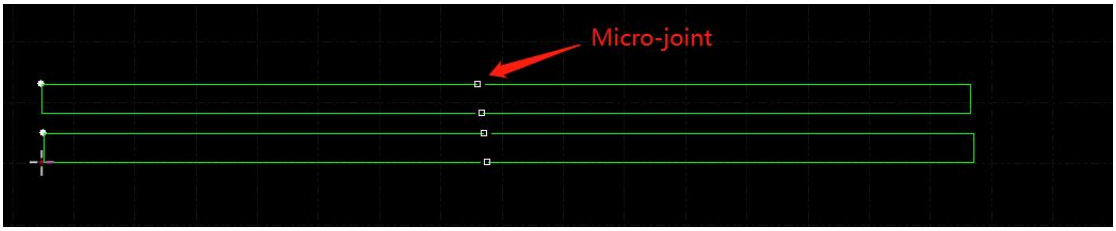
2.1 Graphic Display

In Home menu -"View" column provides various options of graphic display.



Click the button in the above picture, and the display will take effect immediately. You can see the change of the display in the drawing board. When the option button in dark gray, it is enabled, otherwise, it is not. For example, the on state "", the drawing board with arrows to show the graphics processing path, closed state"", the arrow on the graph disappears.

When "Display Micro Joint Tag" is turned on, you can clearly see the position of the micro joints (white rectangular mark) on the graph, as shown in the following figure:



When the graphic is selected, click "

", the selected graphics will be displayed in the center of the white frame, and if you click directly without selecting any graphics, the overall graphics will be displayed in the center.

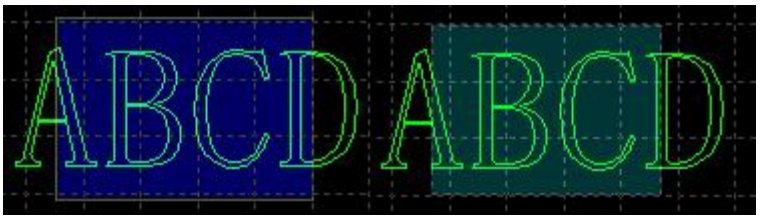
Click "" in the lower right corner of "View", you can open a dialog box for more detailed control over the drawing board, including **Auto Attach, Display ruler on and off,** change Pick Precision etc.

Scroll the mouse on the screen will zoom the view. Click F3 will center all graphic on the screen, click F4 will center the machine frame on the screen. Right click mouse will prompt option box, select zoom you can also execute same operations above.

2.2 Selection

CypCutE provides various ways to select graphics. The basic operation is "**Click**", click the graphic will select it. Another commonly used operation is "**Frame**", drag the cursor on the screen will create a frame box. There are 2 patterns of "Frame": Press and hold from left to right will create a blue box, only when a whole part was framed in the box will be selected. From right to left will create a green box, as long as part of the graphic was framed in the box, the whole graphic will be selected.

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.



Press Shift when select graphic you can select or deselect graphic without changing the select result of other graphics.

Click "Select" will open a drop-down menu providing advanced options:

- Basic operations: Select all (Ctrl + A), invert selection, copy (Ctrl + C), paste (Ctrl + V), cut (Ctrl + X), delete, deselect (click on the blank area), copy with base point (select a point, the relative position between graphics and mouse is the same as that between base point and original graphics when pasting).
- Graphic operations: select open figure, select similar figure, select all outer or inner contours, select graphics smaller than specified size (enter the size in the drawing information bar at the bottom of the interface).
- Layer operation: Select a layer (used to select all graphics in a layer) and lock the background.
- "Disable Fast Drag-Copy" will disable the operation that press Ctrl and drag the graphics to duplicate graphics. This will prevent the malposition of nested graphics.

"**Select similar figure**" allows you to select all shapes of the same size on the drawing board, for example, select a 5mm circle first, and then click this option to select all 5mm circles.

2.3 Geometric Transformation

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

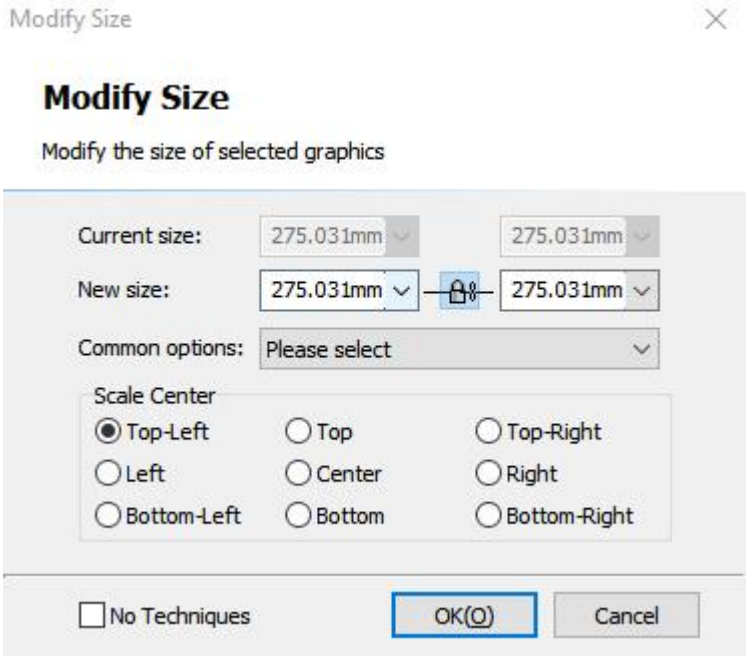
2.3. 1 Size Modification

CypCutE provides 11 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.

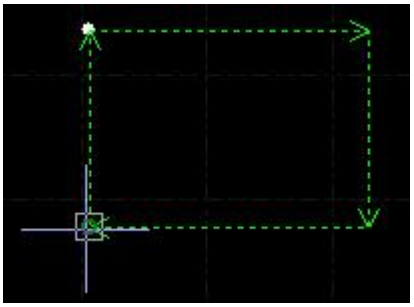
Notice: The lead lines and seam compensation etc., will not change with the size modification.

2.3. 2 Dynamic Transformation

CypCutE provides 3 patterns of dynamic transform including zooming, rotate and flip. First select the graphic and click transform button then follow operation tips at screen bottom.

For example, a rectangle, rotated 45 degrees based on its lower left corner, can be done as follows:

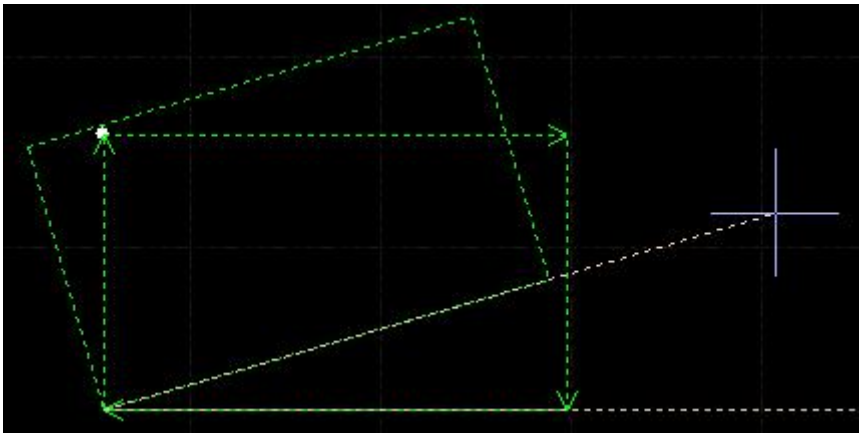
1) First, select the rectangle.
2) Then click the small triangle below "Transform" to open the drop-down menu, select "Rotate", and it will prompt "Please specify base point:" at the bottom of the screen.
3) Move cursor to the left corner, cursor will absorbed to the rectangle corner automatically, as shown in the following figure:



4) Click the corner, bottom window will prompt "Please specify the start point or rotation angle"
5) Input 45 and click Enter will finish the operation.

If you want to rotate the rectangle and align with another graphic, first step same with above, then follow the below steps:

6) Click the right corner of rectangle will create a base line.
7) Bottom window prompts" Please specify end point of rotation" meanwhile move cursor graphic will rotate and click mouse at target position. As shown below:



Zoom and Flip operations are the same with the rotate.

2.3. 3 Fast Translation and Copying

CypCutE software supports quickly translate graphics with arrow keys. First, click the "Fine Tune" 

button in the lower right corner of the interface to enable the function 

, then the number box on the right can be edited. Select a graphic and click the direction button, it will move at this direction and in fine tune distance. This function is used to move away a graphic temporarily and move it back exactly where it was. Press Ctrl button and direction key in the same time will duplicate the graphic. For example, press "Ctrl+right→" buttons will duplicate the selected graphic at the 100mm right side of the original one.

2.4 Coordinate and Parameter Input

In some cases, we want to draw in precise coordinates. CypCutE allows you to enter coordinates directly. The format of coordinate input is < X coordinate > < English comma, > < Y coordinate >, for example, enter coordinates (100, 100) and enter "100, 100". The entered coordinates and parameters are displayed in blue.

Most of the drawing operations allow both mouse-click position and coordinate input. The following steps show you how to draw a rounded rectangle of length 300mm, width 200, fillet radius 50mm.

1) Click " RoundRect " button at left toolbar, meanwhile bottom window will prompt "Please specify start point".
2) Input "0, 0" and press enter, then prompt "please specify cross point".
3) Input "300,200" press enter, prompt "please specify radius or [chamfer (F)]:"
4) Input 50 press enter. All operations completed. As shown below.

```
Command: New RoundRectangle
please specify start point:
0,0
Please specify cross point:
300,200
Please specify corner radius or[Fillet (F)]:
50
Completed
```

2.5 Automatic Attach

CypCutE provides automatic attach function, including attach to grid, key points of graph, boundary of graph and etc,.

You can disable the auto-attach function by clicking " File , select User Setting, find the Drawing in the dialog box, and uncheck the " Auto attach ". The precision of automatic adsorption is also set in the above dialog box.

2.6 Graphic Drawing

CypCutE provides graphic drawing function. On the left toolbar from top to bottom is: Isolated point, straight line, poly line, circle, arc, rectangle, polygon, text, standard parts. The first 5 functions are standard drawing functions similar with those in CAD.

2.6. 1 Standard Graphic Drawing

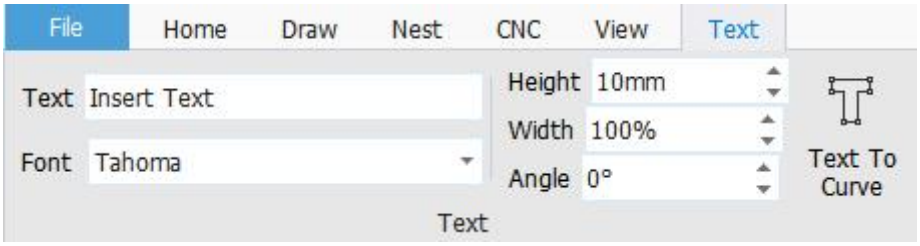
Drawing isolated point, line, poly line, circle, rectangle are easy to operate, and will not be detailed here. There are two options under Draw - Circle drop down menu, "Replace Circle with Point" and "Replace Selected with Circle". The two functions can replace a circle with an isolated point or replace a graphic with a circle, so as to facilitate flycutting.

In Polygon drop down menu there are rectangle, rounded rectangle, polygon and star shape. To draw a rounded rectangle you have to draw a rectangle first, then specify the fillet radius by moving cursor or directly input fillet radius in bottom window; To draw a polygon or star shape, you have to specify the number of edges (from 3 to 100); The number of edges for star shape equals to the point angle number. Besides, in Draw menu, under Rectangle drop down menu, there is Obround shape option, draw a rectangle first, and then add a semicircle to both ends of the it.

2.6. 2 Text Input

In CypCutE users can input Text and transfer text into curves. Click the , in left toolbar and point at screen to insert text. Text are selected as they are input.

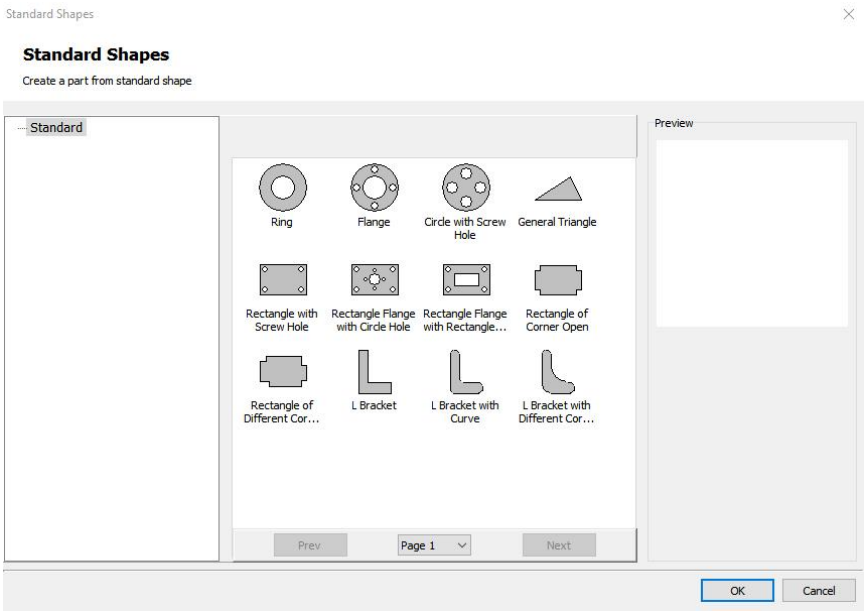
Select text there will be a "Text" column at the top toolbar, users can modify the text, type and size etc., as shown below:



Please take notice that after turning text into curve, above functions will not be available. You would better finish all design and settings of the text before turning it into curve.

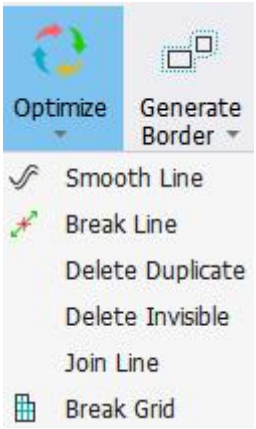
2.6. 3 Standard Parts

CypCutE provides standard parts library. On the left drawing toolbar, click "" you can draw commonly used parts. Select the part shape then set the parameters as shown below:



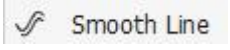
2.7 Graphic Optimization

CypCutE will automatically optimize the graphics when importing external graphics. Under Home- Optimize drop down menu users can manually select optimize options.



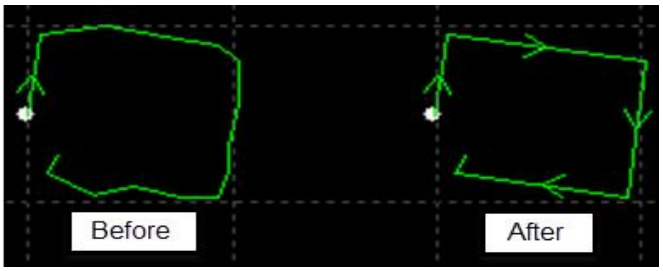
Select the graphics, click the corresponding buttons, and then follow the hint finish the operation.

2.7. 1 Smooth Line

Select the polylines need to be optimized then click "

", the dialog box prompts for inputting smoothing precision, input and click to take effect.

The smooth result is shown below. In order to observe the effect conveniently, the value input here is large. Users can set the smooth precision as needed.



2.7. 2 Break Line

This function is to break the closed curve graphic into separate graphic for editing. Click " Break Line " at the split position. The split function will be activated until press ESC to disable the function or switch to other command.

2.7. 3 Delete Duplicate

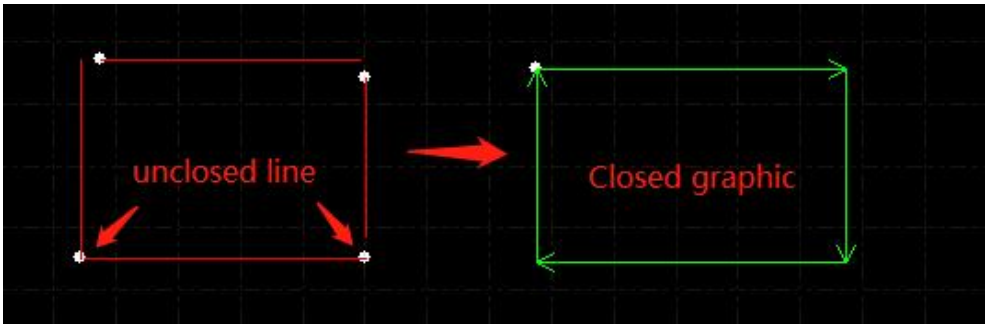
This function is used to remove all the overlapped line on the closed contour.

2.7. 4 Delete Invisible

Sometimes the imported files may contain graphics that visually imperceptible, resulting in an abnormal position in machining. This function enable users to remove these minimal graphics after setting parameters to define their dimension range. Graphics smaller than the range will be removed.

2.7. 5 Join Line

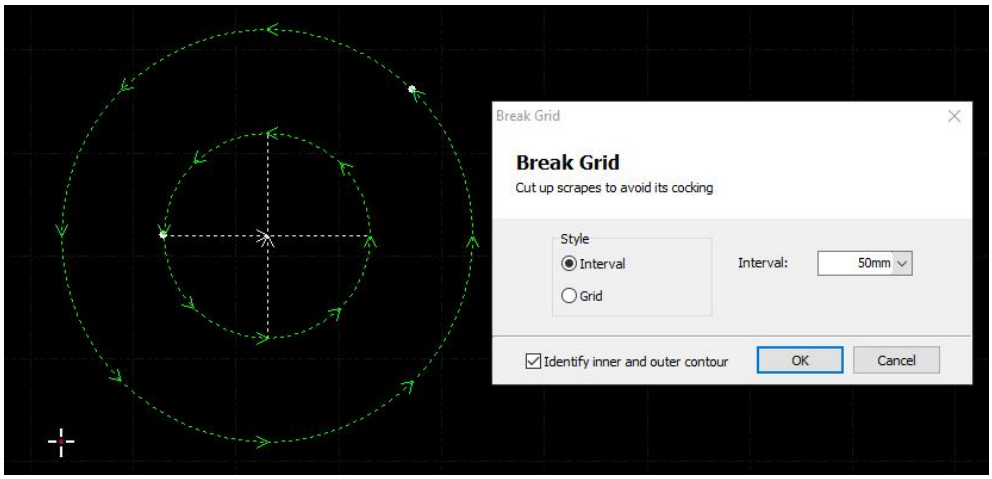
The graphic created by AutoCAD might be visually closed contour but actually not. Users can use this function to combine unclosed contour. Select the unclosed contour and click " Join Line ", enter the join precision to take effect.



Please take notice that there might be excess line at geometry end, split and remove the excess line then combine the contour.

2.7. 6 Break Grid

This function is to add cut lines at in part holes to prevent tip-up collision. Cut lines are displayed in white to distinguish part graphic.



2.8 View

Users can zoom, display, and edit graphics, adjust graphic position and sequence in view module. It can be found on the left of the toolbar or and the last item "View" in the menu bar. In the "View", you can make custom choices on system language, shortcut bar options, unit selection, etc.

3. Graphic Technique and Tools

This chapter introduces the cutting techniques related functions provided by CypCutE. 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.

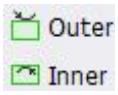
Warning! Improper or wrong parameters may lead to poor cutting performance and even damage the machine tool, please set it carefully.

3.1 Lead Line

3.1. 1 Distinguish Inner and Outer Contour

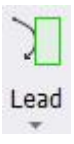
CypCutE will distinguish the inner and outer contour automatically when import external file like DXF. Inner and outer contour will reverse in graphic editing. If you need to distinguish inner and outer contour again, click the "Sort" button, in drop down menu there is "identify inner/outer contour"; or find it in "Lead" drop down menu.

CypCutE distinguish the inner and outer contour by the boundary relations. It will define the outmost contour as outer contour, the second is the inner contour, the next outer contour again, and unclosed graphic will not be defined as a contour. If you want to set one contour as outer, select the contour and contour within as a group. Then right click to use group sort to distinguish the inner and outer contour.

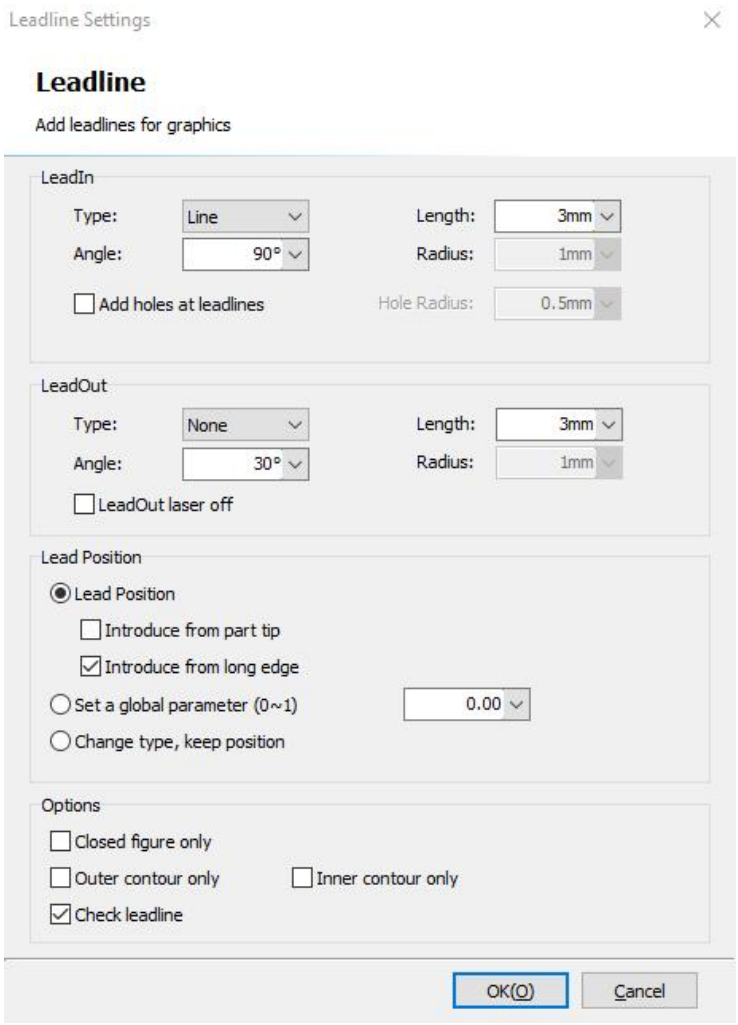
When adding lead lines, lead line on outer contour cut from outside, that add to inner contour will start from inside. Click " 

" in Home menu you can manually set inner or outer contour.

3.1. 2 Automatic Lead Line

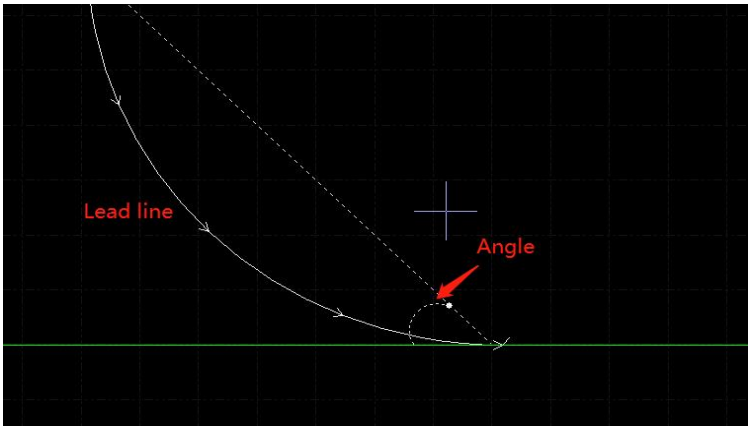
Select the graphic you want to set the lead line, and then click " 

" under Home menu, set the parameters in the pop-up window, as shown below:



Users can add different type of lead line including straight line, arc, straight line plus arc, and other settings including lead angle, length and radius. You can also add little circle at lead line start point.

When select lead line as arc type, the end of arc will be tangent with graphic. The line connects two ends of arc form the angle with graphic boundary. It is the same with the lead out line.



Please take notice that executing auto-add lead line will change the previous setting such as lead position, lead type and the like. You can check "change type, keep position" to fix the lead line position.

3.1. 3 Manual-Set Lead Line

To change the lead-in line manually, you first click "

", then click on graphic. The lead-in line position will be changed, the lead length and angle remain the same.

Click outside the graphic (yellow point), then click back on graphic (red point) will create a new lead line.

3.1. 4 Check the Lead Line

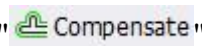
Click "Lead", and then select"check lead line" to check the legality of the lead lines that have been set. This function will shorten the lead line that is too long, thus avoiding crossing with other graphics.Click "identify inner/outer contour" to determine the specific position of the lead according to the set contour.

3.1. 5 Seal, Over, Gap, and Multi-Cut

There are 4 options "

" in technical setting-seal drop down menu. Select graphic and click function button will take effect. The "gap/over" setting will not take effect to the graphic already set gap or over.

3.2 Seam Compensation

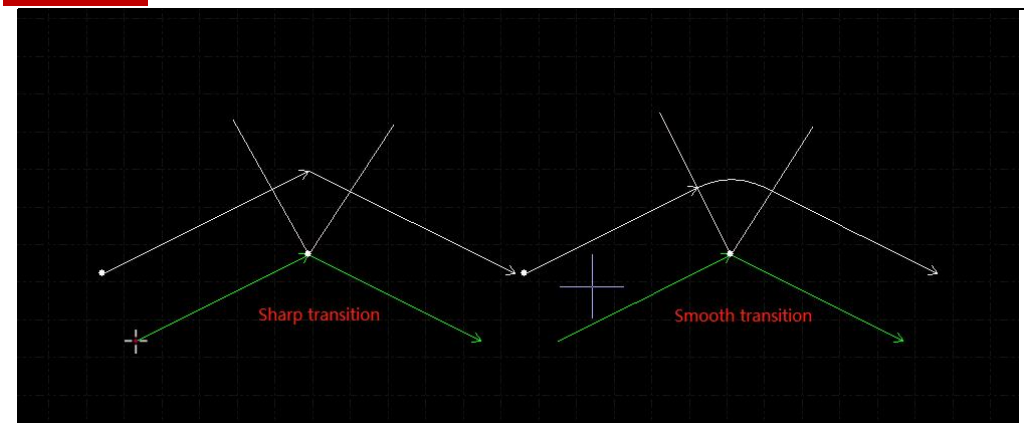
Select the graphic and then click "

"for seam compensation.

Seam compensation width should be got by measuring real cutting result. The compensation displayed in white on drawing board. Machining will refer compensation line as tool path. Original graphic still display on drawing board but not as actual tool path.

The compensation"s inner/outter contour can be set manually or automatically by follow the rules of "inner shrink, outer expand".

Users can also add fillet on compensation line at corner as shown below:



In the photo, the line of green is original graphic, white line is compensated path. It requires smoothing at corner. Usually round corner will smooth the machining path and assure the consistency of graphic and cutting result.

Users can edit compensation parameter and build a library in compensate configuration.

To cancel the compensation, select the graphic and click "clear compensation" at the lower left, or click "Clear" button, choose "clear kerf compensation".

3.3 Micro Joint

Micro joint is to add a small distance joint on the graphic. Laser will not fire on micro joints. By doing this the parts will not fall from the plate skeleton, also tip-up collision can be prevented. Micro joint displayed as a breach on the drawing board:



Click" Micro Joint " in technical parameter column to activate the function, then click on the graphic where need to add micro joint. You can click multiple times to add more than one micro-joint until press ESC or switch to other command. You can also click on the compensated line to add micro-joint.

Micro-joint length settingis in the drawing window at the bottom of the software. New parameters will not change theprevious set micro joints.

CypCutE also has automatic micro joints function. Click "Micro Joint"drop down menu and select" Auto MicroJoint " will prompt a dialog box for parameter setting. You can add by micro-joint count, for example, if set 10, each graphic will add 10 micro-joints; or by distance, set 100 it will add a micro-joint every 100mm interval.

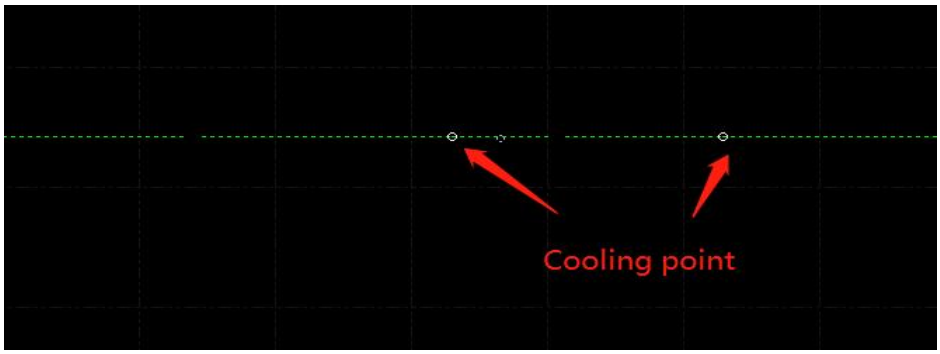
Micro-joint will divide the graphic into separate segments. If you want to edit each segment separately, select "Explode Micro Joint" in drop down menu, so that each segment is an individual object to edit. You can add lead line on each segment.

To delete a micro joint, select the graphic then click "Clear micro joint" under "Clear" drop down menu.

When the "Flycut at Micro Joint" in Layer Parameter Settings-Global Parameters are checked with pierce techniques disabled, the laser head will not lift up and pass the micro-joint segment without slowing down, which will increase the machining efficiency.

3.4 Cooling Point

Click " Cooling Point "button then click on the graphic will add a cooling point. When the machining executes cooling point, it will turn off laser and open gas maintaining a preset delay, then open laser turn off gas and resume normal machining again. The cooling point is shown as a solid point white dot in the drawing board as follows:



Like micro-joint, the cooling point can be clicked continuously to insert more than one. After you finish setting micro joint and compensation you can still add cooling point.

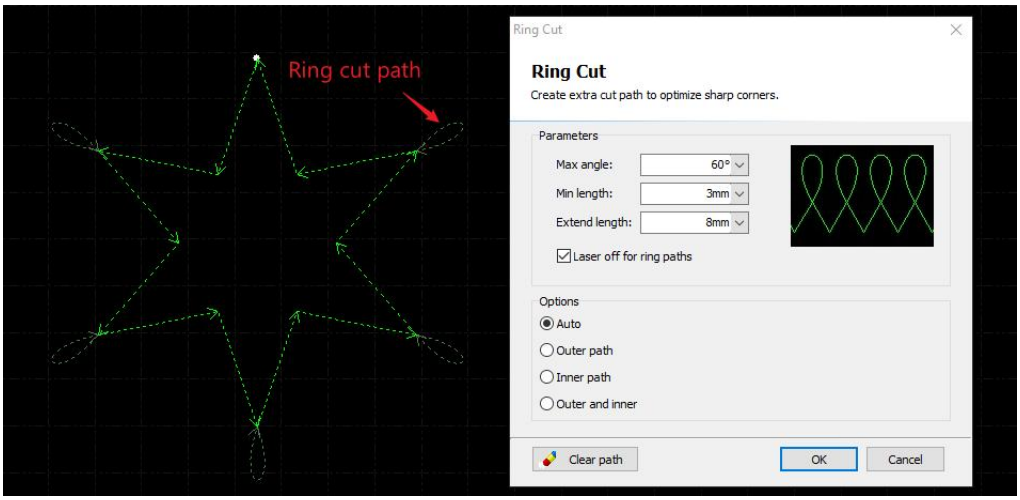
CypCutE can also add cooling point automatically. Click "Cooling Point", in drop down menu select "Auto cooling point" and set parameters in dialog box. There are two positions users can select to add cooling point automatically: sharp corner and lead line. The cooling point add on lead line will integrate with lead line. For example, if click "Clear cooling point" will not delete the cooling point on lead line. Only delete lead line can remove the cooling point add on lead line.

Press shift and click cooling point you can delete it. If you want to delete cooling point, click drop down menu of cooling point and select "clear cooling point".

Cooling point is often used in processing workpiece corner, it will pause at cooling point, turn off laser and gassing to lower the corner temperature to avoid corner burned.

3.5 Ring Cut

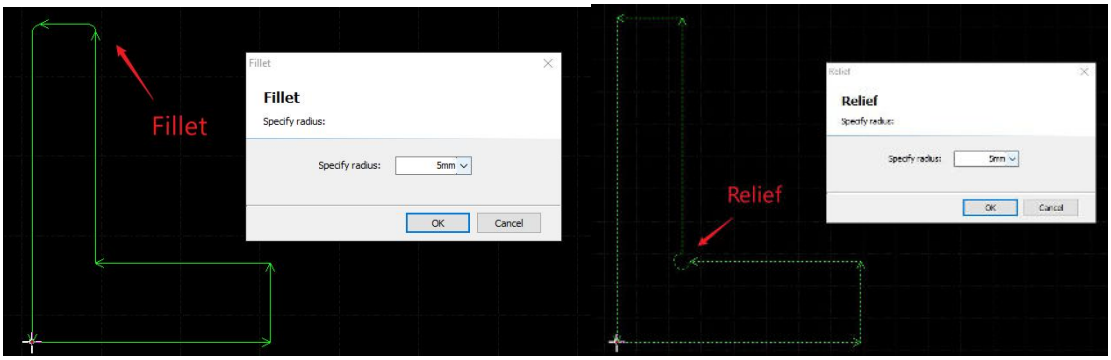
After selecting the graphic, click "Ring Cut" to create an extra path to improve sharp corner cutting performance.



3.6 Fillet/Relief

Click "Fillet" to transfer sharp corner into rounded corner.

Click "Relief" to create a release notch for bending process.



3.7 Group

Group function in CypCutE means to integrate multiple graphics as a group, or even multiple groups as a new group. A group will be recognized as an independent object. The sequence and position of the graphics within a group are all fixed and will not change by operations on other graphics.

Select the graphics and click "

" to create a group. If you need to disperse a group, select the group and click "

". To disperse all groups click drop down menu of group and select "Ungroup All".

"Ungroup" will not disperse the graphics but the group. "Explode" will disperse the graphics as line segments.

"Joint Path" will create a path connect the group which will reduce the piercing times and improve the efficiency. Click "Explode Joint Path" will clear the connecting path.

For a group, if there is one graphic contour contains all other graphics, this graphic will be defined as outline. The group with outline will be defined as a "part".

It is recommended that CypCutE users create "Group" to integrate a part rather than grouping graphics randomly. we might use the term "group" with the same concept as "part".

Please notice that to ensure the integrity of graphics, CypCutE will integrate co-edge graphics as a group. In addition, use "Bridge" function to connect a group with other group the result will be a group.

3.7. 1 Group Sorting

The group will be defined as an independent object in sorting. The sequence of the graphics within a group won"t change in sorting.

If you need to edit sequence of graphics within a group, select a group and right click, select "group sort".

"Group sort" operation will not change the sequence of graphics in sub-group. It will distinguish inner and outer contour of graphics within a group by geometrical relations.

3.7. 2 Group Processing

Group will be defined as an independent object despite whether it contains multiple layers inside, until a group is fully processed it will not move on to the next graphic. Piercing of group follows the same rule.

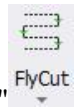
Please take notice that the outmost contour of a part/group will always be processed at last.

3.8 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.

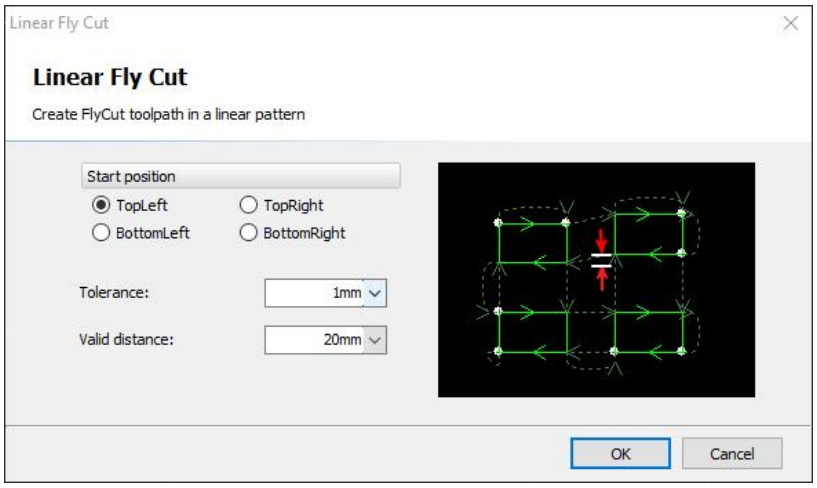
Before use flying cut, execute sorting first, this will optimize the cutting path.

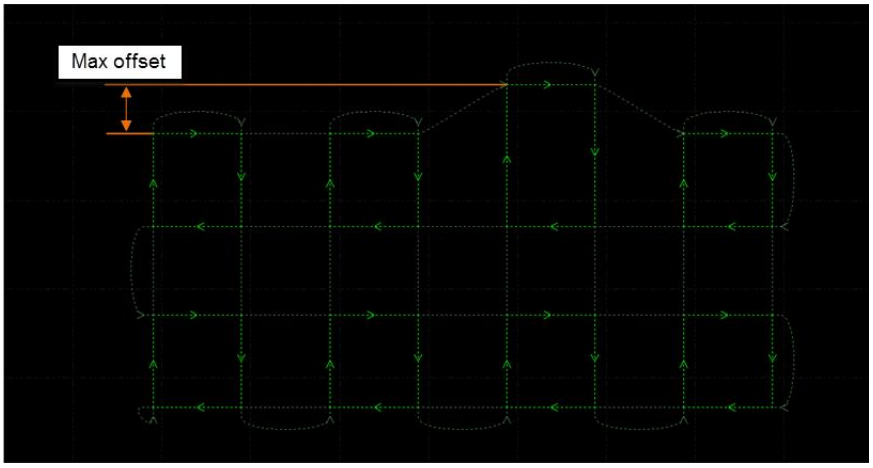
3.8. 1 Linear FlyCut

Click drop down menu of "

" to select flying cut patterns and set parameters.

Start position defines where to start fly cut. Valid distance: fly cut path to turn around can be created if the distance is shorter than the set value. Tolerance: fly cut path to turn around can be created if longitudinal distance between two lines shorter than the set value



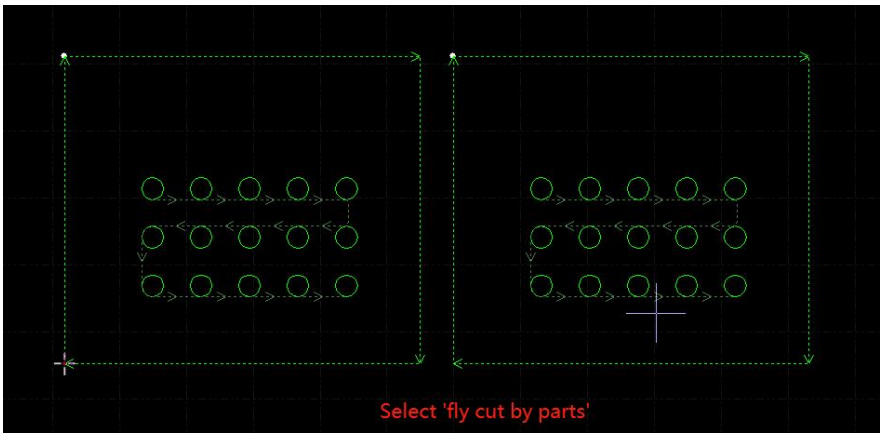


3.8. 2 Circular FlyCut

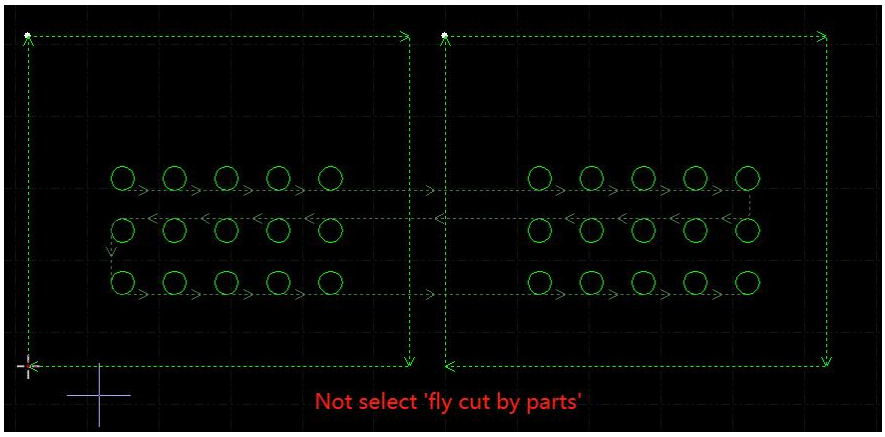
When the graphics in a layout are all circles, directly click "FlyCut" button, or select "Circle FlyCut" pattern in the drop down menu.

Max distance between two circles means only the distance between two circles shorter than this value can create fly cut path.

Select "Sort circles" will execute sorting before flycutting; if select with "Flycut by part", it will process the graphics within a group then process next group.

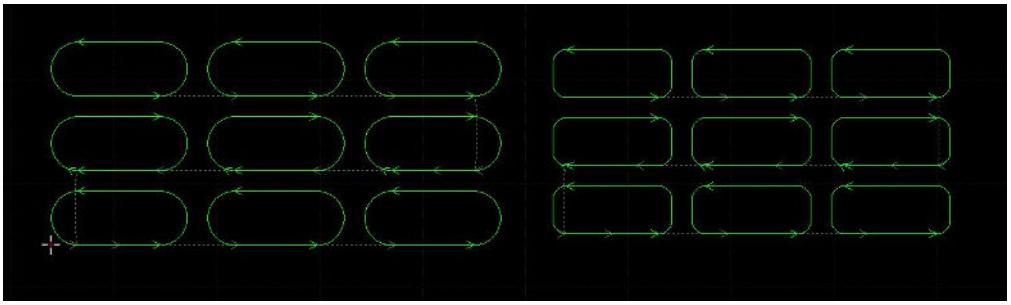


Select "Sort circles" only, it will execute sorting then create fly cut path.



3.8. 3 Obround FlyCut

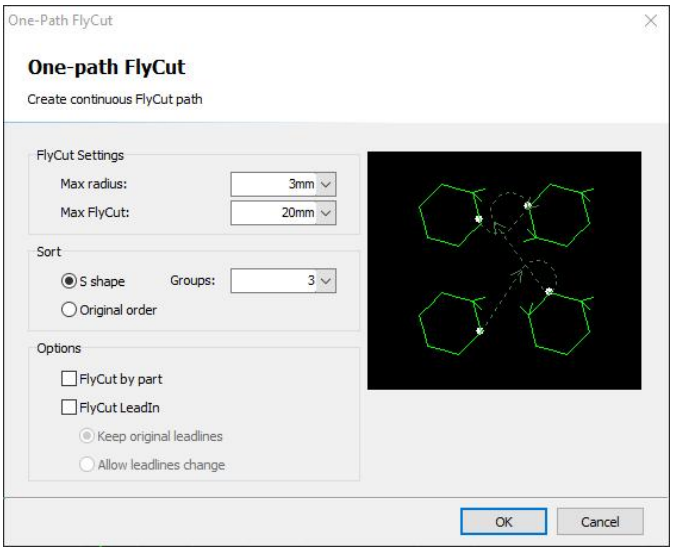
Obround flycut is for generating flycut path for rounded rectangle and obround-shaped graphics.



Select "Keep Micro Joint" when using Circular FlyCut and Obround FlyCut, the micro joints added before will not be cleared.

3.8. 4 One Path Fly Cut

One Path Fly Cut is for generating fly cut path for irregular graphics.



"Max radius": the radius of direction-changing circle, 3mm recommended.

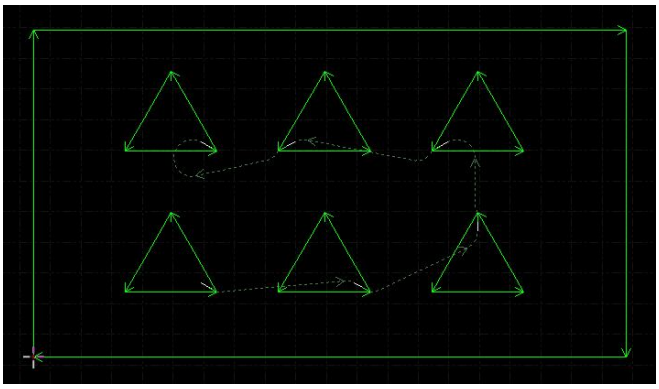
"Groups": auto grid group when sorting intense inner holes.

"Max FlyCut": the fly cut path can be generated when the distance between two graphics shorter than set value.

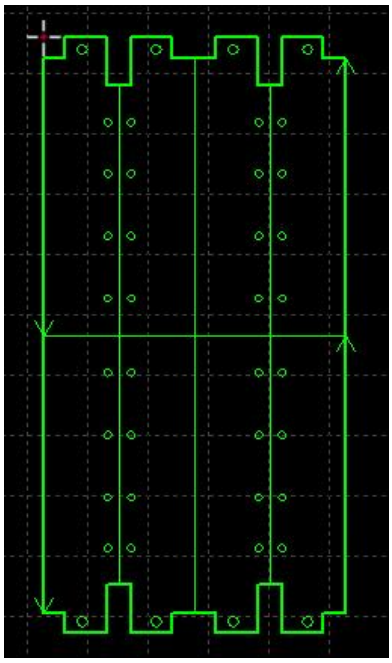
"FlyCut by part": only generate fly cut path inside graphics when select the option.

"FlyCut LeadIn": it is supportable to set lead line before generating fly cut path in one path fly cut mode. Select "Allow leadlines change" to allow change the start point position to generate more fly cut path.

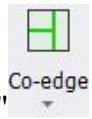
"Original order": select the option so it will not sort automatically when generating fly cut path. Only selected when you need to keep inner contour order.



3.9 Co-edge



Merge the shared line of two parts as one will reduce the cutting length. In CypCutE, the distance of parts smaller than 1mm can use co-edge function. CypCutE provides graphic snap function to snap two graphics and merge the shared lines.

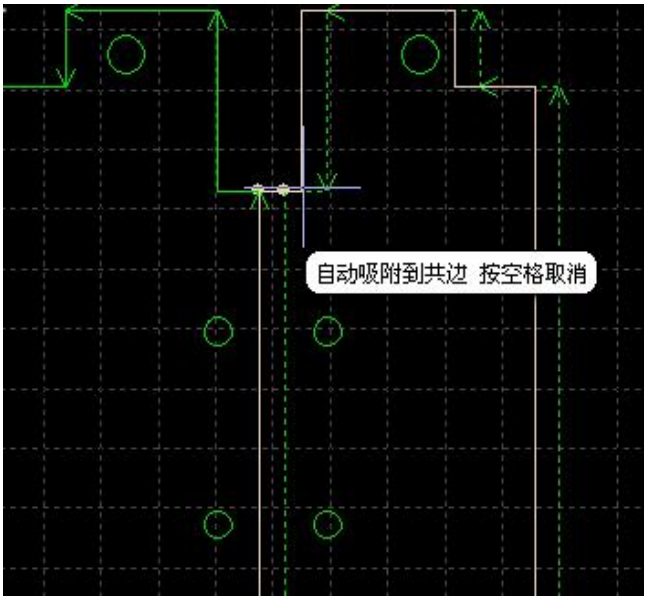
Select the graphics and click "

", CypCutE will merge the shared lines of the selected graphics. The Draw bar down below will give hint when the graphics selected cannot be co-edged.

CypCutE cannot merge the inward concave lines of the graphics.

The graphics merged shared lines will be integrated as a group. If the graphics which are going to merge the shared lines contains other graphics inside like circles, you have to group the graphics first.

3.9. 1 Automatic Snap

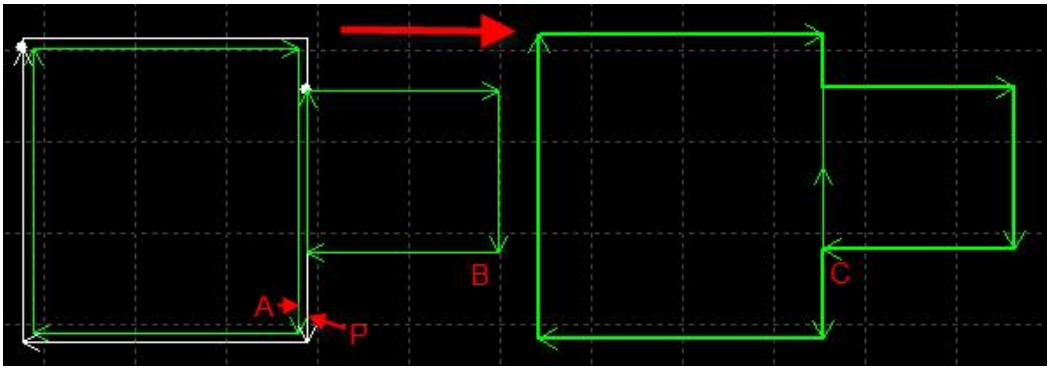


When you drag the graphic, it will snap to another graphic automatically as the graphic dragged into the position fit for co-edge. Snap function will help you quick adjust the position of graphics fit for co-edge.

Once graphics attach with each other with shared lines, click "Co-edge" will create the co-edge line. If you want to disperse the graphics with co-edge, or sort them, click "DeGroup"", and recombine them after editing by "Group".

3.9. 2 Co-edge with Compensation

If you want to add cutting seam compensation to the graphics, you have to add compensation first then execute co-edge. Otherwise, the co-edge line will not remain.

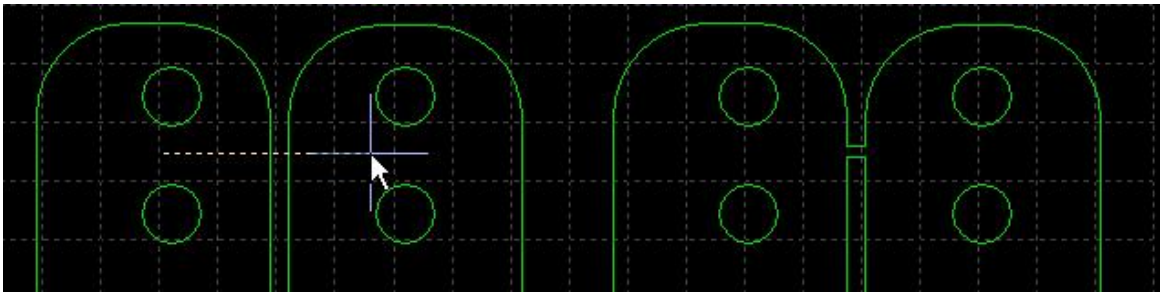


For example, in the above picture, graphic P is the compensation line of the graphic A, only graphic P can co-edge with graphic B because graphic A is not real cutting path.

3.10 Bridge

When a workpiece contains several parts and you want to keep them connected after processed, you can add bridge between graphics. And graphics with bridge also reduce the pierce times. Several bridge line can realize "one-path" cutting.

To bridge two graphics, click "Bridge" and drag a line segment on the drawing board, the graphics crossed with the line segment will be bridged like below.



Bridging requires specifying the bridge width.

After adding bridge the graphics will be recognized as group, a single graphic may not be completed until the whole group is done, so please be careful that the continuous cutting will cause heat affect to cutting quality.

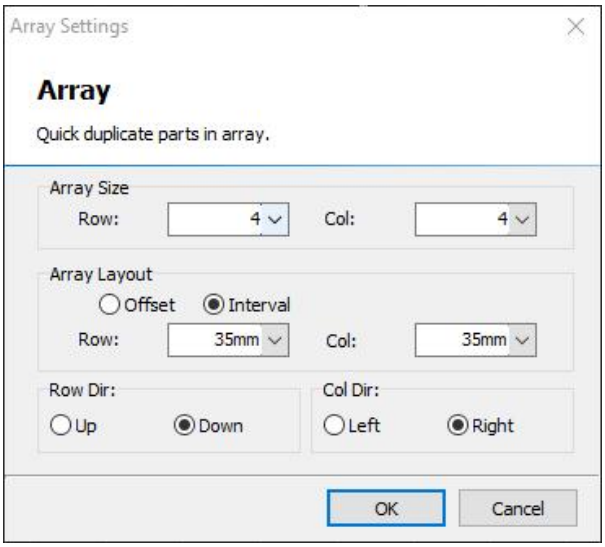
3.11 Array

The "Array" function is used to quickly duplicate a graphic. There are 4 patterns of Array in CypCutE.

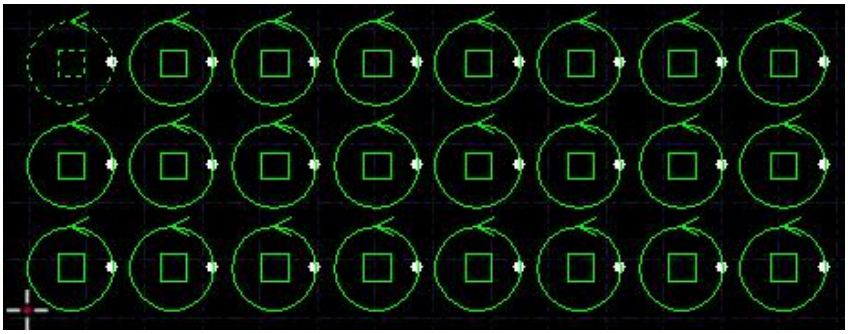
3.11. 1 Rectangular Array

Click " 

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

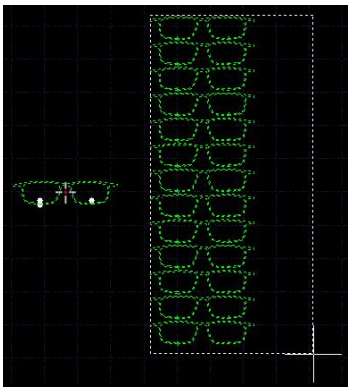


Set the rows, columns array layout and row direction of the array to duplicate the selected graphic:



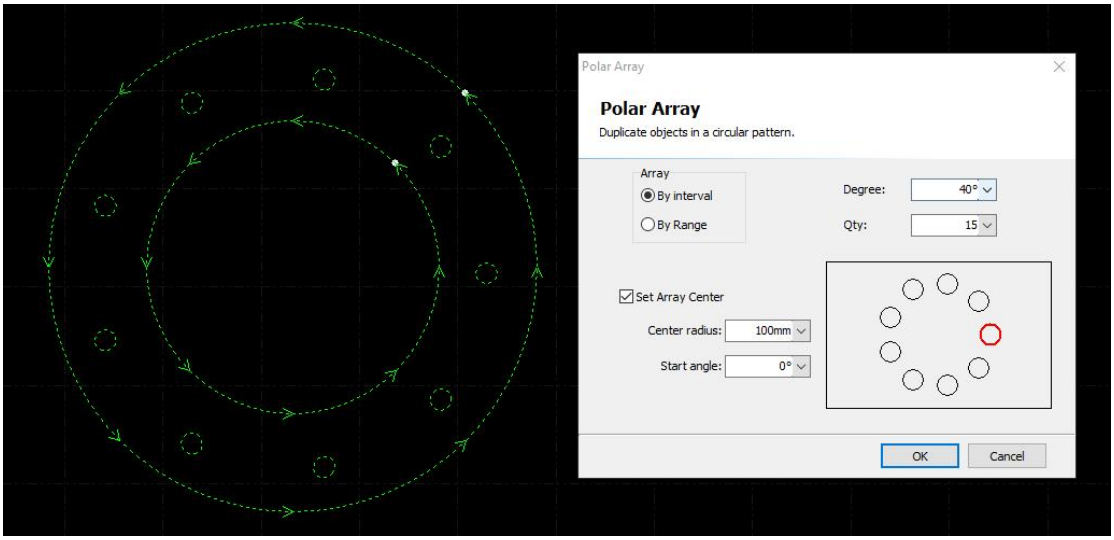
3.11. 2 Dynamic Array

Select the graphic and click "Dynamic Array", set the row space and the column space, drag the cursor will have the selected graphic duplicated.



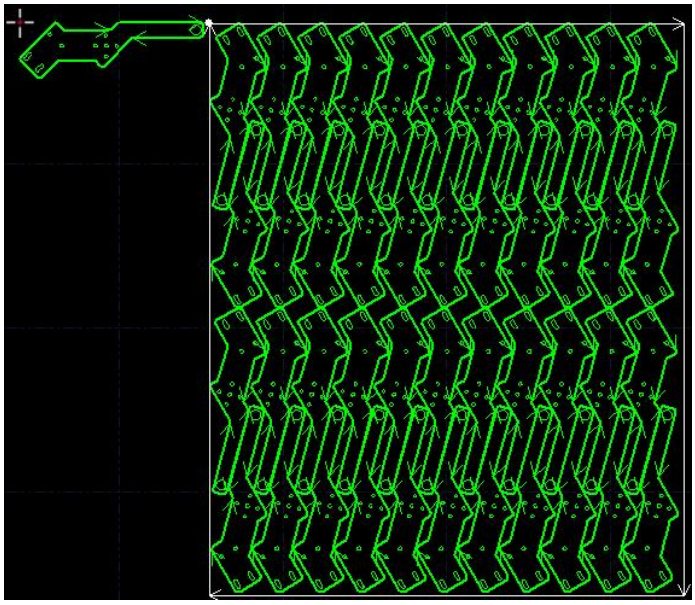
3.11. 3 Polar Array

Select the graphic and click "Polar Array" to set the parameters, then click at a position where would be the center of the array circle, the graphic will be duplicated as you click.



3.11. 4 Fill

This pattern is used to duplicate the graphic to cover the whole plate by pre-set plate dimension and nest parameters.

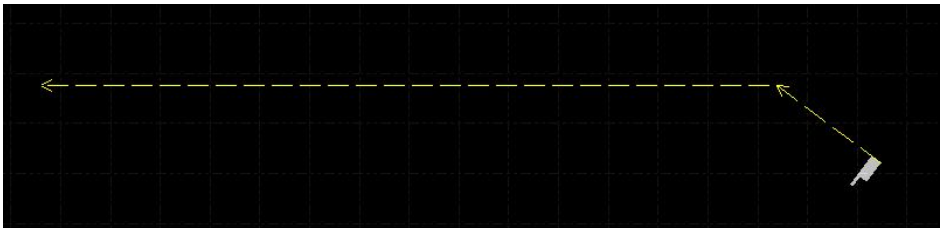


3.12 CutOff Line

CutOff line can completely identify irregular remnant when jog cut or quick cutoff cannot.

Selecting the curve, click "

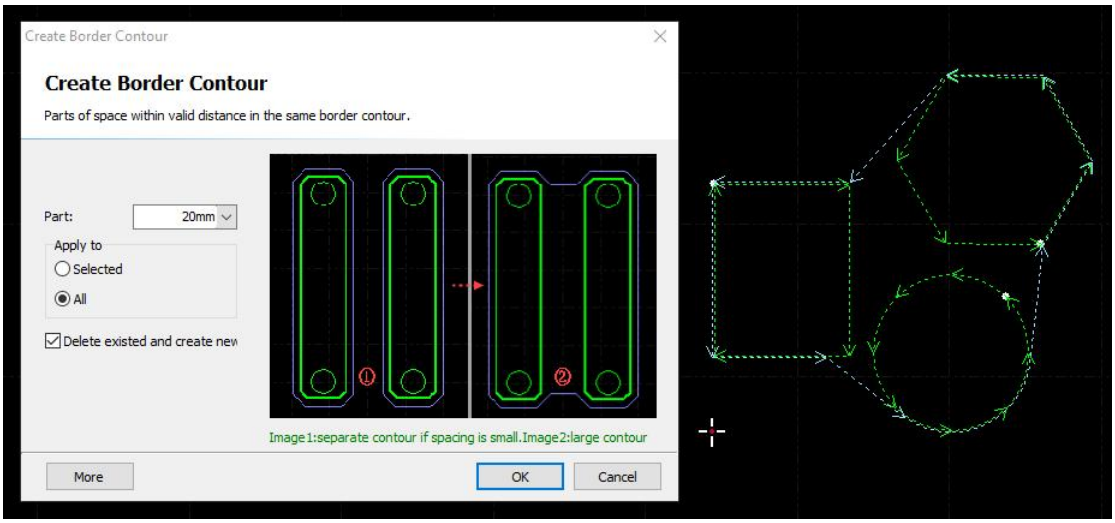
" to set it as a cutoff line, which will be cut at last by default. When using the cutoff function, check whether the technical parameters are set correctly. The remnant path in CypNest will be automatically set as cutoff line as imported into CypCutE. As shown below, the cutoff line shown in yellow and marked with a "knife".



In CutOff drop-down menu, you can cancel cut-off line setting.

3.13 Generate Border Contour

To generate border line along the contour of graphics (purple line below). The function is for checking whether the graphics to be cut on irregular plate was out of range.



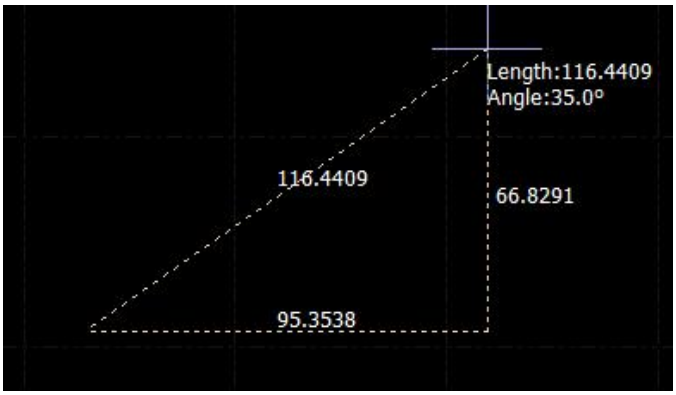
Parts distance: Parts of space within valid distance will be in the same border contour. The smaller the value is, the less parts will be contoured. It is recommended to set the distance longer than the actual one.

Expand border: the smaller the value, the less border line expand.
Smooth border: the smaller the value, the closer border line to the graphic.
Clear border contour in the drop-down menu.

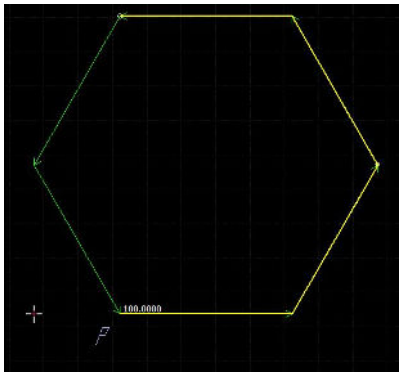
3.14 Measure

CypCutE provides two types of measurement: line measure and curve length measure.

Line measure is for measure the distance between two points, giving the details of length, angle, position on x and y axis.



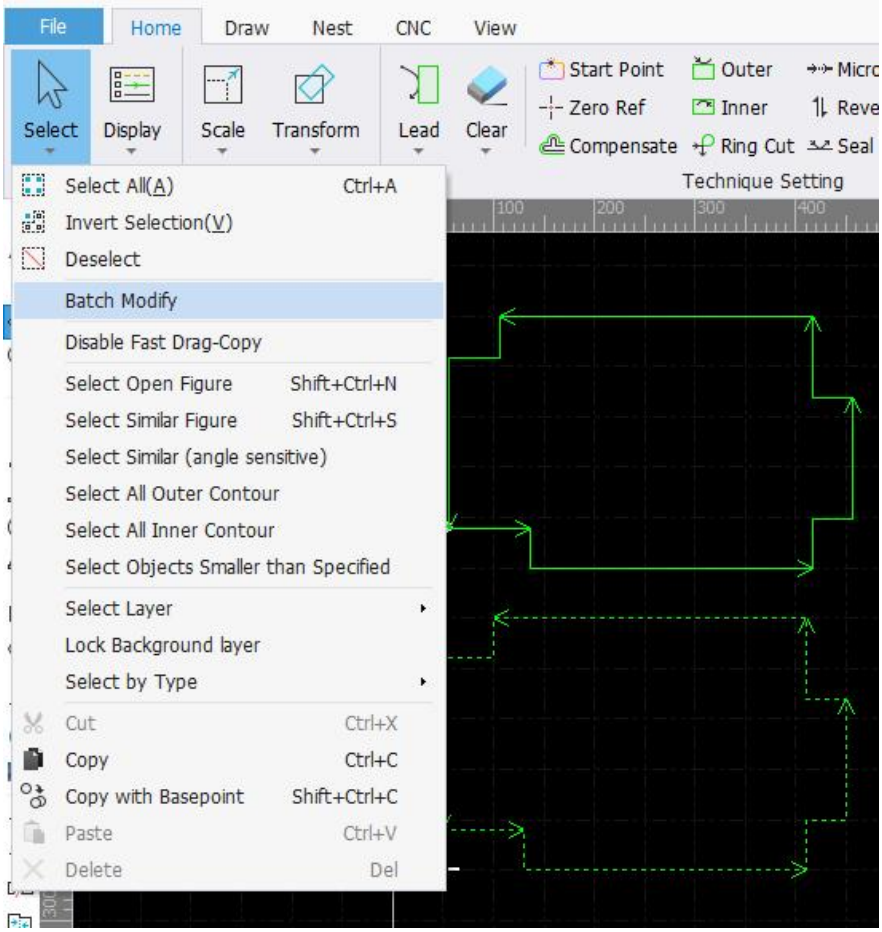
Curve length measure is for measure length of poly line, shown as the yellow line below.



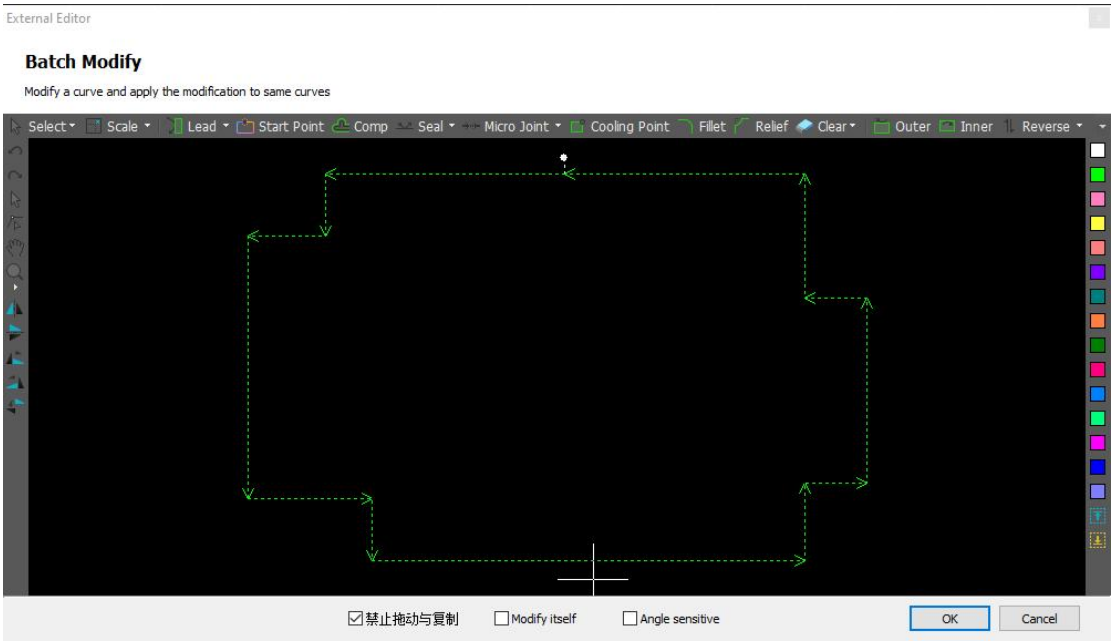
3.15 Batch Modify

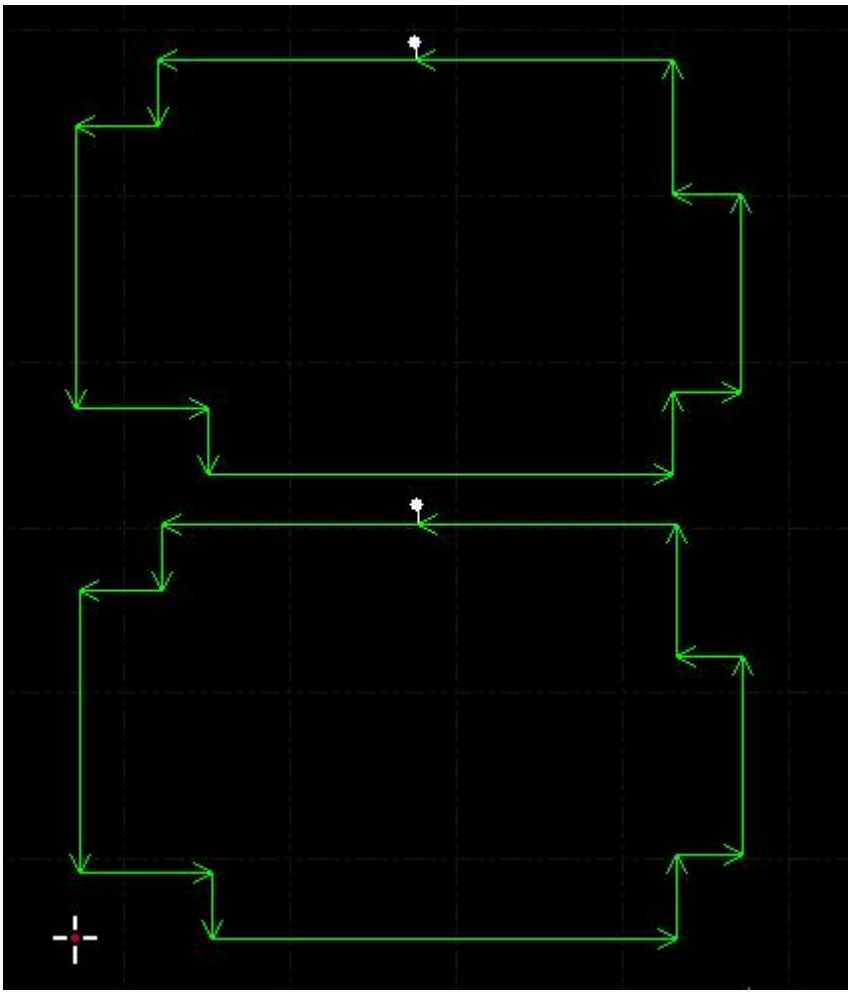
To edit a graphic and apply the result to all graphics of the same shape, you can use quantity modify.

Select the graphic and click "Batch Modify" in Home, drop-down menu of Select. For instance, you set lead line to the graphic, it will apply to those the same



with this one.


External Editor
Batch Modify
Modify a curve and apply the modification to same curves
Select
Scale
Lead
Start Point
Comp
Seal
Micro Joint
Cooling Point
Fillet
Relief
Clear
Outer
Inner
Reverse
禁止拖动与复制
Modify itself
Angle sensitive
OK
Cancel

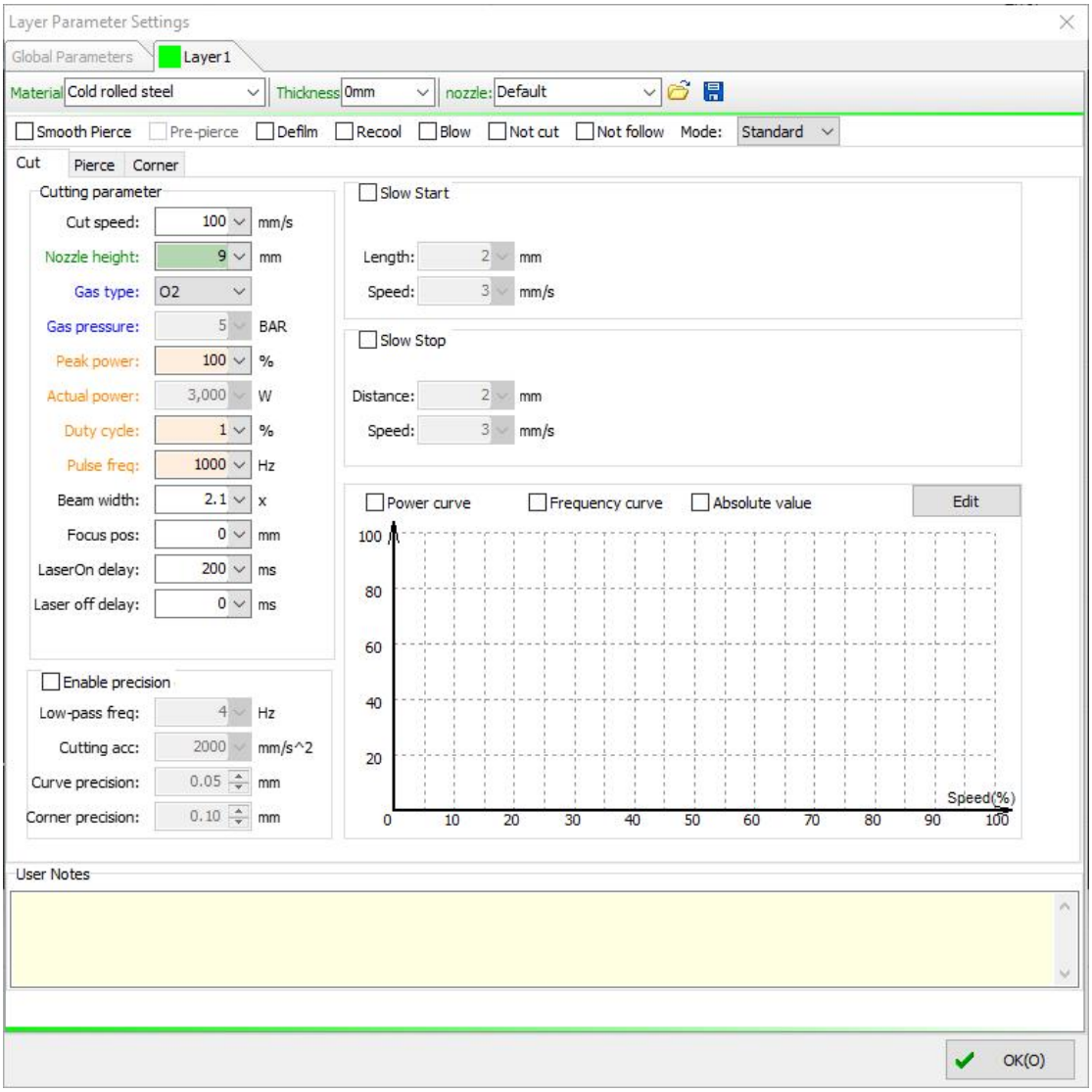


3.16 Technical Parameters

There are 17 layers in CypCutE, every layer can be set parameters separately including cutting speed, laser power, gas pressure and nozzle height etc. The last two layers are "process at first" and "process at last"

Click "Layer" 

, in Home menu will open layer parameter setting window containing almost all parameters related with machining. The first page is "Global parameters", for setting default parameters used universally in machining. The other pages list all the layers applied. Click the layer page to set the parameter of this layer.



Notice: The parameter options may differ among different laser sources, gas configuration, and height controller. The parameter in image above is for reference only, users must set the parameters according to actual machine condition.

3.16. 1 Parametric Description

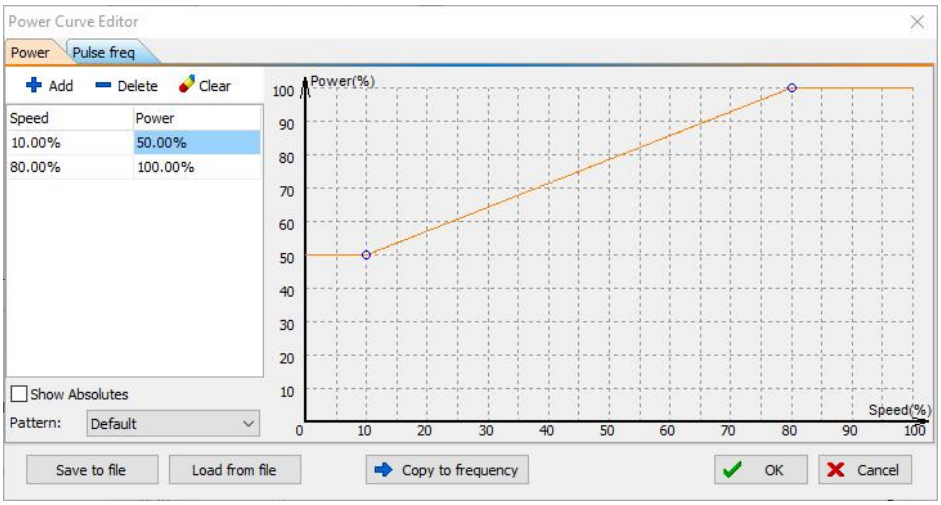
The following table gives a brief description of some parameters in the layer.

① Basic Parameters	
Cutting speed	Set the target speed of actual cutting. Because of the acceleration and deceleration in machining workpiece corner, the actual cutting speed is usually slower than the set value.
② Machining mode	
Standard	Machining will follow the preset parameters.
Fixed height cutting	Laser head will be at a fixed height in whole cutting process.
Out-plate following	Select this mode, the laser head will start outside from the plate at the reference height, and follow to cut height once move into the plate. Set "Reference height" by locating the head to proper height, and then through CNC- BCS100-Save out-plate reference height to save parameter.
③ Machining parameters	
Nozzle height	Set the following distance between nozzle and plate.
Gas type	Set the type of auxiliary gas used in cutting.
Gas pressure	Set the gas pressure of auxiliary gas in cutting, this requires proportional valve.
Peak power	Set the peak power of the fiber laser. Peak power determines the maximum cutting power that the machine can achieve. For a 3000W cutting machine, if the peak current is set to 80%, the maximum cutting power is 3000W * 80% = 2400W.
Duty cycle	Set the PWM duty cycle used in machining.
Pulse frequency	The frequency of the PWM modulation signal which is the times of laser fires within 1 second.
Focus position	The distance between the focus and the nozzle tip of the cutting head is used to define the focus position.
Laser ON delay	The duration of laser firing to ensure the workpiece pierced through.
Laser OFF delay	A delay used to ensure complete cutting before turning off the laser.
Gas blow	After finish piercing, turn off laser and turn on gas to cool down the material.
④ Other parameters	
Not cut	This layer will not be cut.
Not follow	This layer will be cut without BCS100 following.
Blow	Keep the gas on during cutting.
Pre-pierce	It will pierce at all graphics start point or lead line then start cutting.

	In "Global parameters" window there is "group pre-piercing", enable this function it will execute pierce of one group and complete machining of this group then move to next one. Notice: pre-pierce cannot be selected with Defilm.
Defilm	It will execute filming parameters along the graphics then start cutting. After you select this option there will show a Defilm layer page.
Recool	After finishing machining a graphic, turn off laser but blowing gas along the graphic to cool down the material to reduce the heat effect on the workpiece precision. After you select this option it will show a Recool layer page.
⑤ Slow Start	
Start Length	Set the cutting distance after the starting point of the contour.
Start Speed	Set the cutting speed of the start length.
⑥ Slow Stop	
Stop Distance	Set the cutting distance before the end point of the contour.
Stop Speed	Set the cutting speed of the stop distance.
⑦ Power curve	
Real-time power/frequency regulate	You can customize the power/frequency curve. The software will regulate the laser power (duty cycle of PWM signal) and frequency in real time according to the curve, which is of great help to optimize the cutting quality of corners. Note: frequency curve cannot be selected alone.
⑧ Enable precision	
Enable precision	When precision mode is enabled, low-pass frequency, cutting acceleration, curve precision and corner precision can be set for individual layers.The smaller the low-pass frequency value is, the smaller the impact on the machine tool will be.The smaller the values of curve precision and corner precision are, the higher the machining precision will be.
⑨ Smooth Pierce	
Smooth Pierce	Smooth pierce is suitable for medium and thin plate cutting, ensuring high efficiency while extending lifespan of protective lens.
⑩ Vibration suppression	
Vibration suppression	Self mode vibration suppression is recommended,the system will automatically execute suppression according to cutting technical parameters.

3.16. 2 Real-time Power/Frequency Curve Regulate

If you select " ☑ Power curve ☑ Frequency curve ", the laser duty cycle and frequency will regulate with speed in real time. You can click the" Edit "to edit the power/frequency curve.



As shown in the photo above, horizontal axis is speed, vertical axis is power/frequency, unit is percentage. You can select the curve pattern and set the power level when machine reaches a specified speed. Or you can click " Copy to frequency "copy the power curve to frequency curve. Notice: Only when "Power curve" is enabled, "Frequency curve" can take effect.

For example, laser power 500W, cutting speed 100mm/s, peak power 90%, cut power 80%, when the actual speed slow down to 45mm/s, the laser power is:

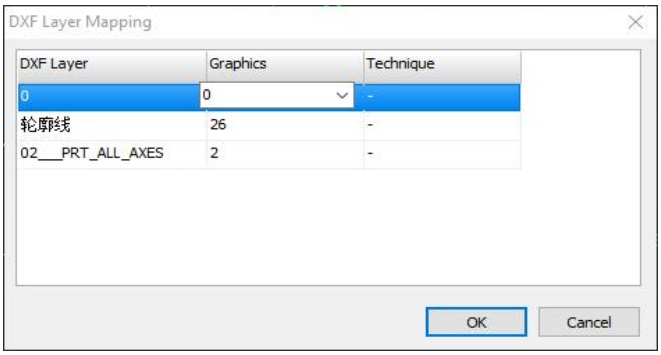
500W X 90% X 80% X 75.00% = 284.4W

The power will not be lower than the preset value, which often is 10% of the laser power, for example 500W laser will not lower than 500*10%=50W.

If is "☐ Power curve ☐ Frequency curve "not selected, the cut power will remain not change in cutting process. In the above example, if not select these two options, the power in the cutting process is 500 W X 90% X 80% = 360W.

3.16. 3 Layer Mapping

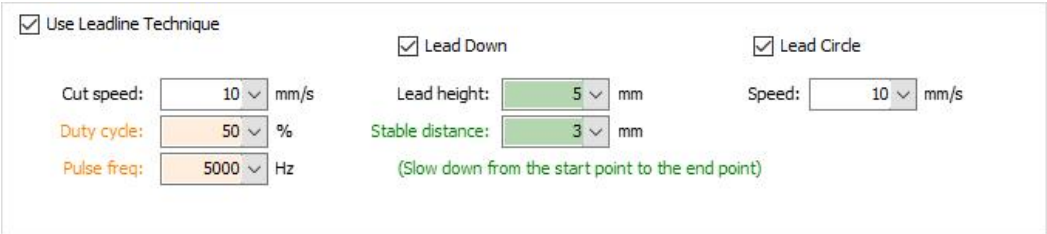
Click "Layer" drop down menu users can lock or display a specified layer by selecting options. When there are more than one layers as importing DXF file, click "layer mapping" it will distinguish layers. Shown as below:



3.16. 4 Lead Line Technique

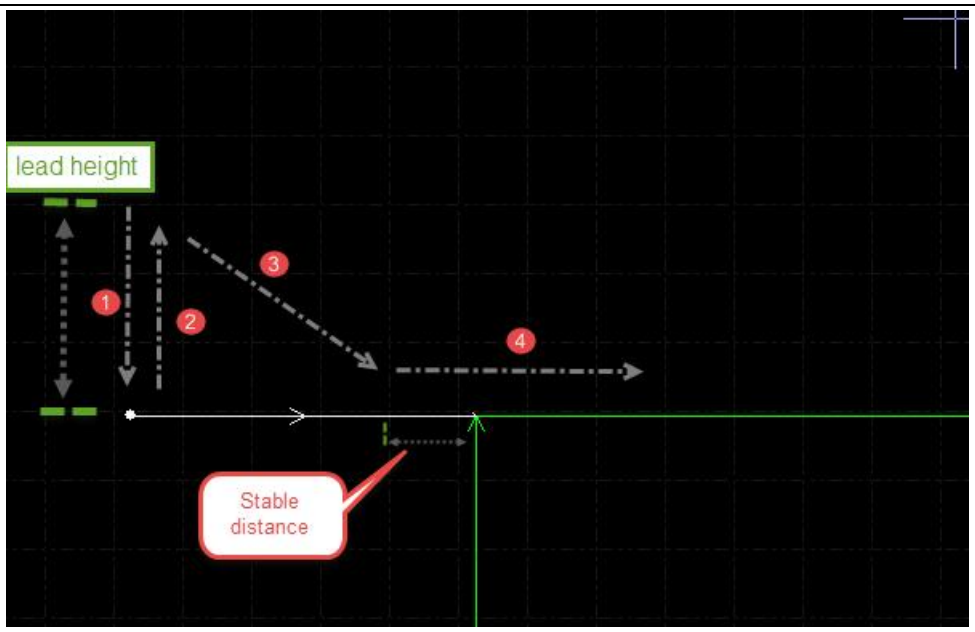
When cutting thick plate of stainless steel will generate plasma cloud which will absorb laser energy and reduce cutting energy, gas can hardly blow off the plasma cloud at cut height. Lead line technique is applied to solve this issue. After execute pierce, laser head will stay at a higher position and blow off the plasma cloud, then slow the speed in horizontal direction to make up the pressure loss, and to ensure plate cut through.

When cutting thick plate you can set lead line technique including speed, power, lead height and stable distance.



The lead line operational description:

1. Pierce at start point of lead line;
2. Laser head lifts to the lead height to blow off plasma cloud;
3. Laser head descent to the cut height and cut at "lead speed" in the length of "stable distance";
4. After cutting out of the stable distance it will start normal cutting.



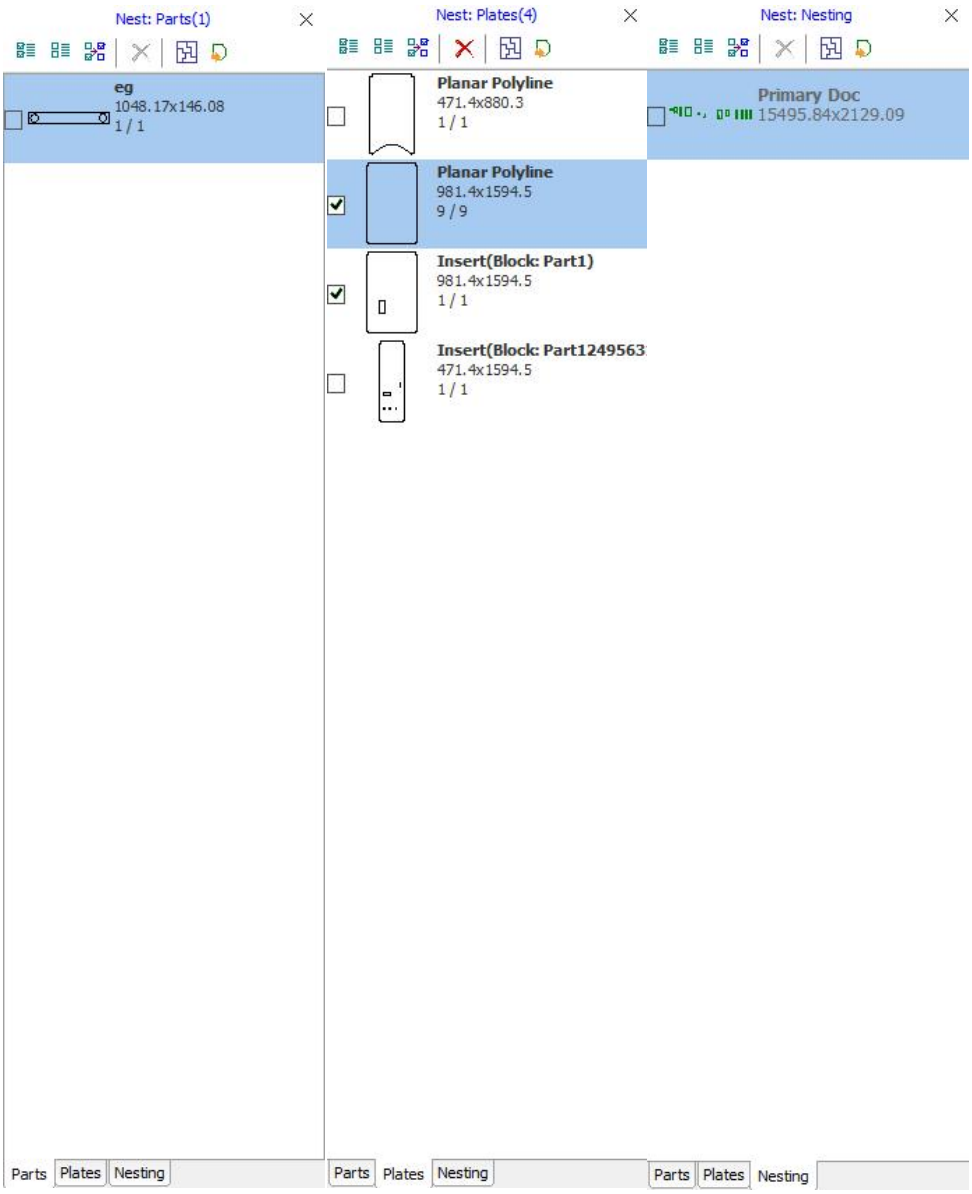
3.17 Nest

Nest function is used to layout the parts in a plate with highest utilization. Users can click nest button to finish nesting. CypCutE also provides options to customize the nesting like: Parts gap, plate margin, rotation angle, co-edge etc. You can find nest function button 

" in Home menu-Nest drop down menu.

3.17. 1 Nesting Details

In nesting operation there will be a side bar at left screen to display the parts, plate and nested plate.

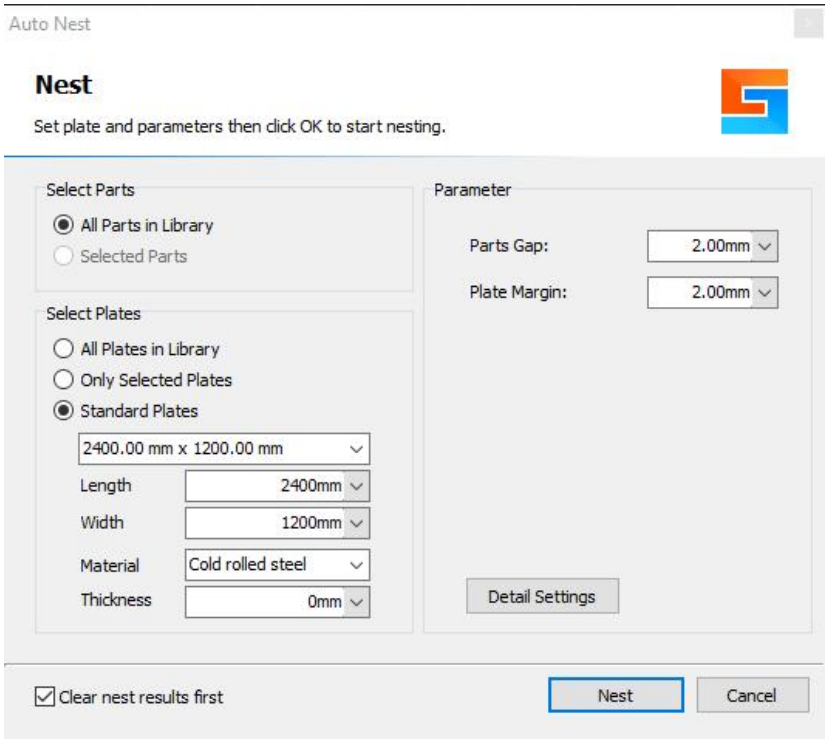


Parts library will list all parts, you can add new parts by right click at parts lib and select "load parts", or you can select parts at drawing board right click the part select "add to parts lib". The parts type limits is 50. Right click at side bar you can choose to import standard part, delete part or save un-nested parts.

Plate library lists the plate type and plate quantity, you can add new plate using the same operation with adding parts. Right click side bar you can choose to delete plate or save as file.

Nest plate lists all nested plates and already processed plates. CypCutE now only supports 20 plates nesting at one time.

Users need to set basic parameters for nesting. "Part gap" is the minimum space between parts; "Plate margin" is the plate margin left when nesting; "Nest strategy" only supports array in CypCutE.



In "detail settings" you can set parts rotation angle, nest direction, and co-edge etc,.

Gap and Margin	
Parts Gap:	2mm
Plate Margin	2mm
Nest strategy	
Rotation Angle	90
Nest Direction	From bottom to top
Auto Co-edge	
Co-edge All	☐
Auto Co-edge	☑
Min Co-edge Le	20mm
Max Co-edge N	2
Co-edge with di	☐

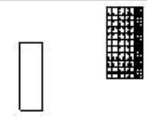
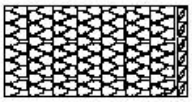
3.17. 2 Nesting Report

In "Nest plate" list right click the plate select "Nesting information" and finish the setting about pricing then click "generate report", it will prompt layer window, the layer parameters used to estimate the cost. After set up will shown as below:

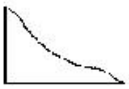
Nest Total Info

2019/07/04 11:12:29

Plate Info

Order	Thumbnail	Size(mm*mm)	Parts Count	Cut Total Length	Move Total Length	Plan Process Time	Count
1		5096.02 x 4299.97	141	117435.80mm	112763.86mm	1hours25min5.5s	1
2		1500.00 x 3000.00	102	118390.51mm	87751.95mm	1hours26min41.2s	1
3		1500.00 x 3000.00	111	93583.88mm	82637.95mm	1hours3min25.6s	1
4		1500.00 x 3000.00	93	110592.14mm	98070.19mm	1hours21min30.7s	1

Part Info

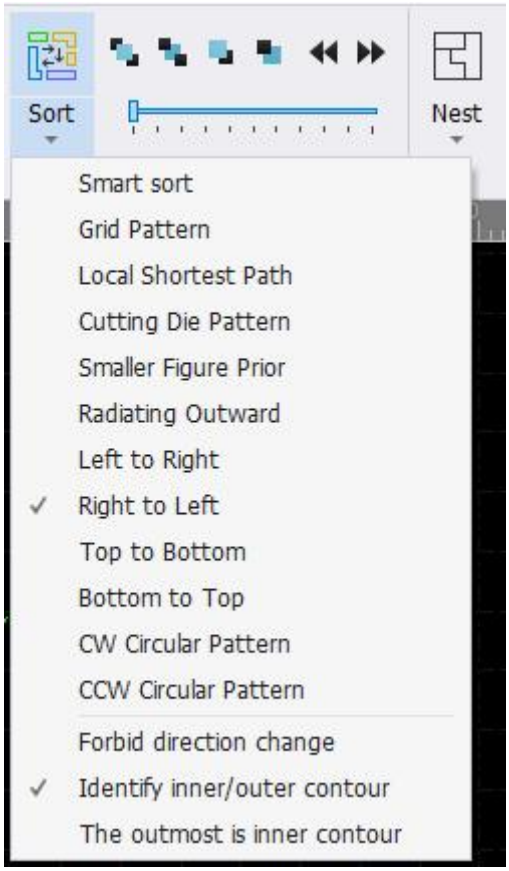
Order	Part Name	Thumbnail	Size(mm*mm)	Parts Count	Nest Count	Remain Count	Processed
1	F600-0305-6-3T		87.10 x 71.35	6	6	0	0
2	TB63-0110-100-3T		30.00 x 30.00	198	198	0	0
3	TB86-0604-57-3T		230.00 x 150.00	57	54	3	0

3.17. 3 Automatic File Switch

Open nrp or nrp2 (file package generated by CypNest nesting software), it will list all nested plates, also processed times and planned process times. The processed times will add up after the current plate task machining finished. When the processed times reach to the planned times it will automatically switch to the next file.

3.18 Sorting and Path Planning

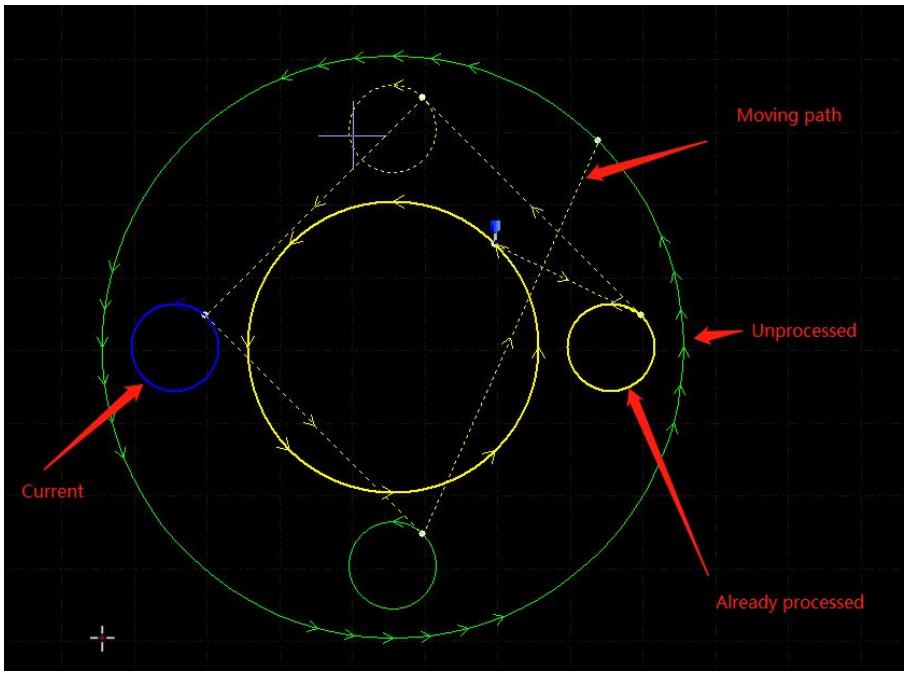
The below function column is in the "Draw" menu which list all sort patterns and align tools.



You can find details on group function in "Group". If no special requirement to the sorting result, "grid sort" is recommended.

3.18. 1 Sequence Preview

Drag the progress bar or click""you can preview the machining sequence of the graphic. Below picture shows graphic status when preview sequence:



Sequence preview is completely interactive, making it easier to control the progress forward or backward,or zooming the graphics. You can view the move path to check the overall sequence by opening "View" drop down menu and select .

3.18. 2 Manual Sorting

If you want to adjust sorting result, you can manually edit the graphic sequence. Select graphics then click" ",the buttons from left to right are:

Move Front		The selected graphic will be the first to process.
Move Last		The selected graphic will be the last to process.
Move Prior		Adjust the sequence of the selected graphic one step forward.
Move Next		Adjust the sequence of the selected graphic one step backward.

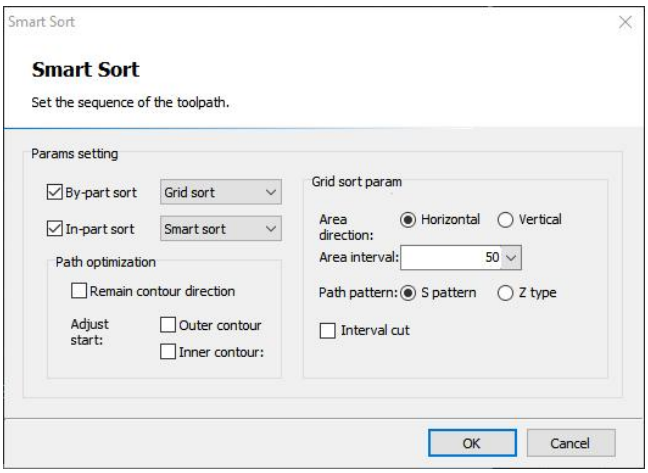
Notice: all sequence types only take effect inside the graphic. Sequences among layers can be changed in Layer Parameter Settings.

After sorting, click " "to check the sequence one by one.

You can also open "Manual sort mode" to edit the sequence. Click " " on left bar of main screen will enter "manual sort" mode. It will display the graphic sequence and path. Click graphic one by one as you required. If one graphic was clicked accidentally, click this graphic again or right click to cancel the operation. If you just want to edit the sequence between two graphics, just click on one graphic drag a red line to the other will set the new sequence of these two.

3.18. 3 Smart Sorting

When the smart sorting is enabled, it will automatically set grid pattern on the graphic, and generate cutting sequence with shortest travel distance. As shown below, the white area is the automatically set grid area, and the green line is the sequence path.

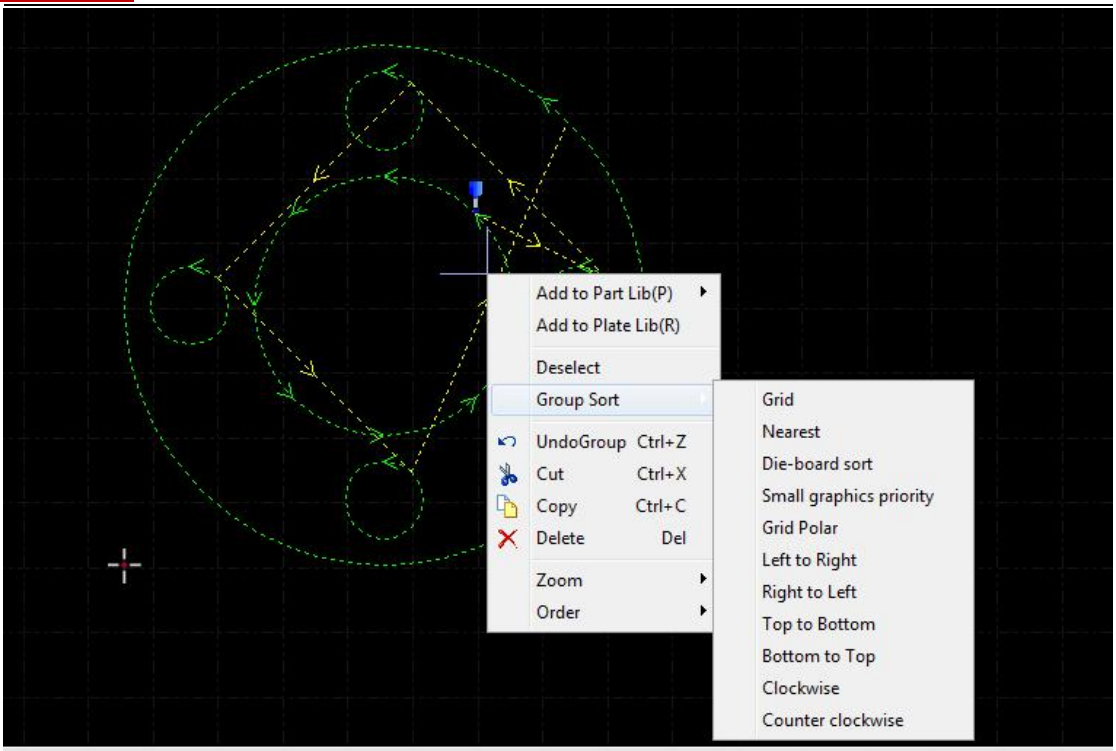




3.18. 4 Group Sorting

If you want to fix the sequence of certain graphics, you can group these graphics. The sequence of the graphic within a group will not change in other sort operation. When process the graphics within a group, it will not process other graphics doesn"t belong this group till the group is finished.

If you only want to sort certain graphics, group these graphics and use "group sort" function. Select graphics and click "group", then right click on the group - select "group sort".

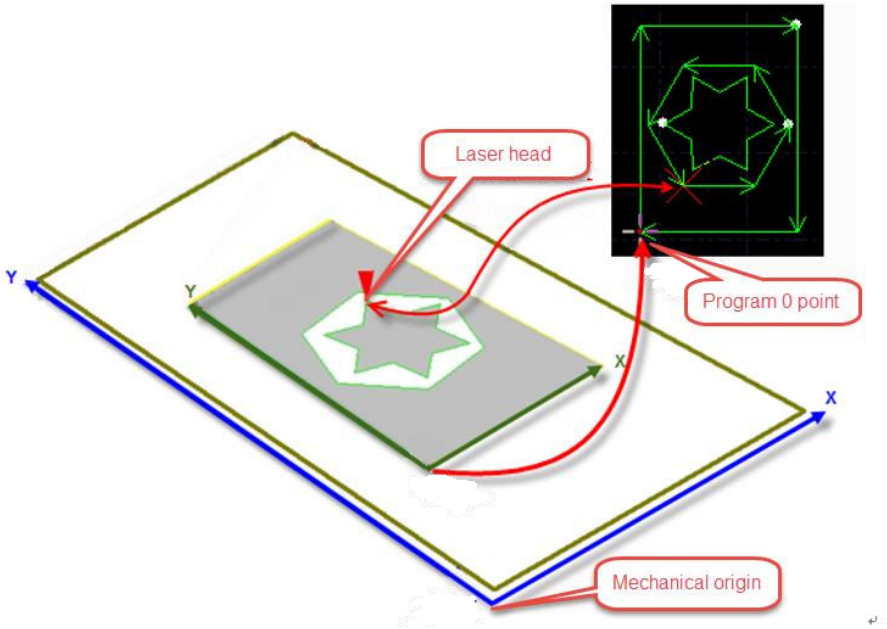

Add to Part Lib(P)
Add to Plate Lib(R)
Deselect
Group Sort
UndoGroup Ctrl+Z
Cut Ctrl+X
Copy Ctrl+C
Delete Del
Zoom
Order
Grid
Nearest
Die-board sort
Small graphics priority
Grid Polar
Left to Right
Right to Left
Top to Bottom
Bottom to Top
Clockwise
Counter clockwise

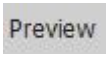
4. Machining Control

CypCutE integrates CAD and CAM functions, all operations including edit file and set cutting parameters can be done in the office or on your own computer. Then you can open the file on machine for processing directly.

4.1 Coordinate System

Modeling coordinate designing graphic not relevant with the machine, zero point marked by "". The coordinate referred in machining process and machine position are shown below:



Click the 

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

4.1. 1 Mechanical Coordinate System

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.

CypCutE 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.

4.1. 2 Program Coordinate System

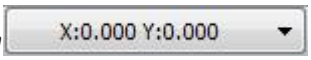
Mechanical coordinate is consistent, CypCutE also adopts workpiece coordinate. Workpiece coordinate X/Y direction are the same with the mechanical coordinate system, only 0 point is different and is called **program 0 point.** Program coordinate system is divided into floating coordinate system and workpiece coordinate system.



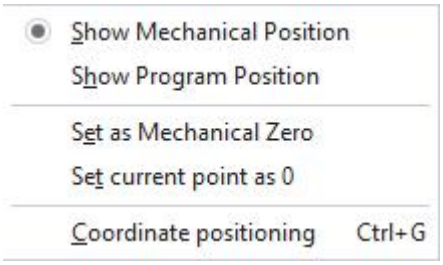
Click the button above the console panel you can select "Floating coordinate", 9 "Workpiece coordinate" or "external coordinate".

Floating coordinates used in cutting samples or small quantity parts. Laser head will start machining from current position. The current position of the cutting head is automatically set as 0 point when user executes "Frame", "Dry run", or "Start".

If select **workpiece coordinate 1-9**, the zero point is manually set by users, and will only be changed by manual reset. Workpiece coordinate applied for large quantity production. This will assure the next time machining starts from same position on the machine every time.

Click the bottom status bar "

You can select to display mechanical coordinate or program coordinate and specify the zero point of the coordinate. Select "coordinate positioning" will locate the cutting head to the specified coordinate position.



4.1. 3 Find Zero Point after Interruption

Situation 1

If machining process stopped by the accident but not affect coordinates, you can click "Return 0", return to zero point.

Situation 2

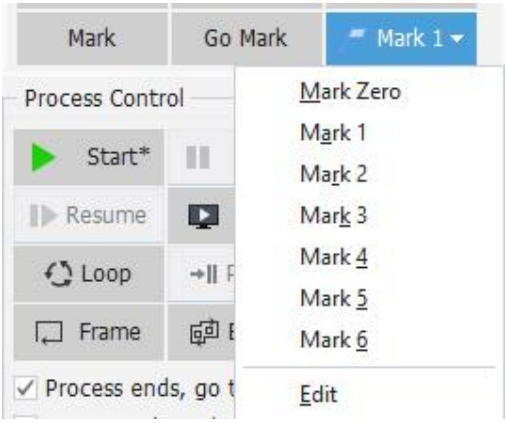
If accidents like power down or servo alarm stop the machining process and deviate the coordinates, must execute return origin then click "" locate to zero point.

If accidents like power down or servo alarm stop the machining process and deviate the coordinates, must execute return origin then click "Return 0" locate to zero point.

Situation 3

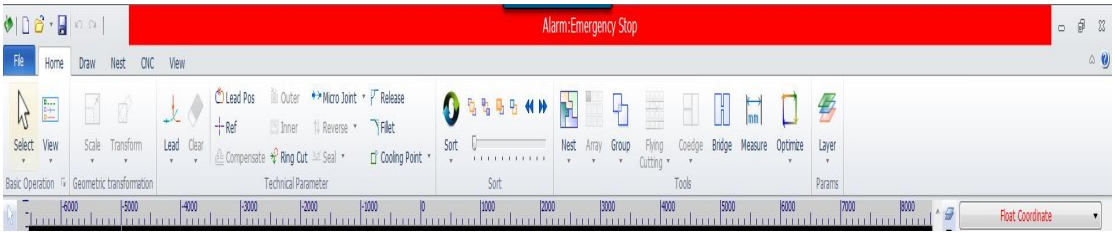
If the machining process interrupted by the accident or misoperation, you can still locate to the zero point of last machining process.

Select "Mark zero" from the drop-down menu of Mark in the console, and then click "Go Mark".



4.2 Alarm

CypCutE 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:



The "Alarm" window at the screen bottom also display the alarm message. After remove the alarm source the alarm title will disappear but alarm message in alarm

window is recorded. Double click "System" window can check all history records and software events.

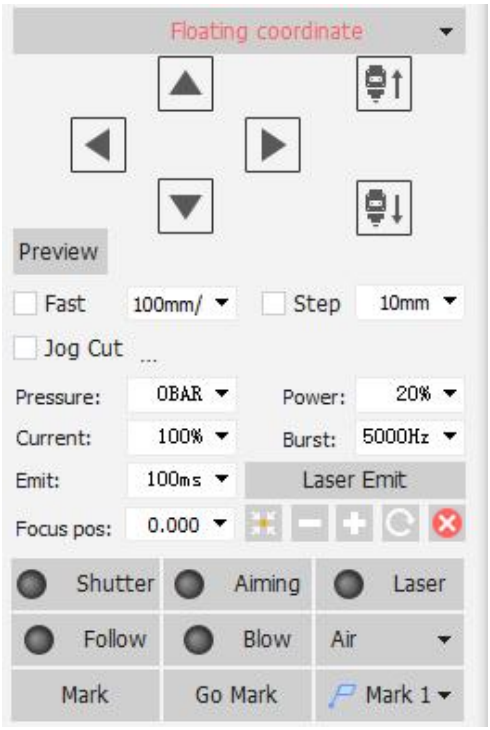
Besides alarm CypCutE will display the warning, notice and important message in different color once monitored abnormal process. These message will not stop the machining but still suggest noticing these information and taking precautions.

Below are restrictions once alarm activated:

- Disable servo when emergency stop alarm activated (prevent accident motion)
- Disable X/Y motion functions when BCS100 alarm detected (under this status, Z axis condition unknown, there might be collision if X/Y move)
- Disable XYZ motion function when emergency stop alarm activated (in complete stop status)
- Z limit- alarm, disable dry run and jog.

4.3 Manual Test

The function buttons in console panel as shown below:



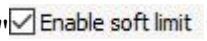
The button "" will be in"" once the function activated. Press "" will emit laser, release button will close laser; for other buttons, click the button activate the function, click again close the function. For example, click "" open the gas, click again close gas. For different laser model, there will be a delay

when click "" before it turns to "". This status is accessed from laser unit. Click "" will open guide/pilot laser.

Please take notice that function can only be realized with related machine components on place. No hardware detected or settings not correct in configuration tool, the function button might not work.

Click "" to mark the current position, click ""if you need to locate to the mark position. Users can record 6 marks in total select in "".

4.4 Soft Limit Protection

CypCutE provides software limit function. You can enable this function "" in Global parameters. The feature is default on.

When the system detect motion area will exceed the preset limit, it will prompt message box to warn users and stop sending motion command to prevent collision. Check the graphic on the drawing board to make sure it"s within the white frame.

System will monitor the current position in real time and stop the motor function once detected exceed the soft limit.

Notice: Soft limit protection relies on correct coordinates. Therefore, every time after change the machine configuration or system abnormal shut down happens, users must execute return origin to correct coordinates.

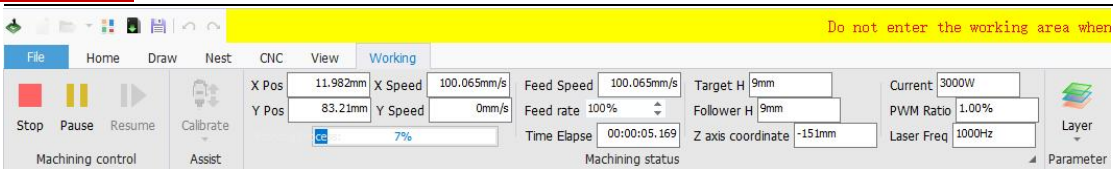
4.5 Frame

Click "" laser head will move along the outline of the workpiece in a rectangle frame to help users identify the machining position and workpiece dimension on the plate. Frame speed is set in "Layer-global parameters-frame speed".

Notice: If the plate not up-right put on the machine bed and executed seek-edge operation, frame direction is also not up-right.

4.6 Start and Dry Run

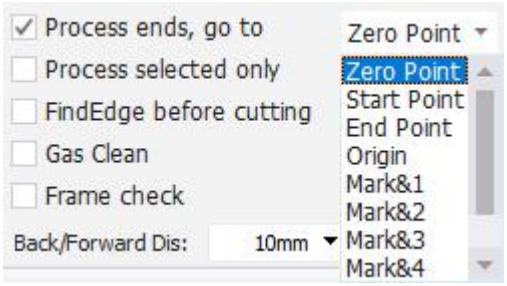
Click "" start machining, there will be monitor of machining process like coordinates, speed, time count and following height etc.



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. If you modify without pausing the machining, the setting will take effect on the next one.

Click the "Dry Run" 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.

By default setting, laser head will return to zero point after finish machining. If you want laser head return to a specified position you can set on console panel including zero point, start point, end point, origin and mark point.



If "Process ends, go to "not selected, laser head will stand still at where finish the machining. If you want laser head return to a mark point, select "process ends, go to"+position you want.

After a machining process completed it will add up 1 on "Finished" at console panel. When the "Finished" reach the "Total" times it will prompt message to remind users. You can set target machining times and laser head actions in "Manage" after machining process completed. If you need to cycle the machining, click "Loop" and finish the setting.

4.7 Stop, Pause and Continue

To stop machining, click "Stop" or "Stop" button on the console.

Click 

" or "


" on console panel can pause the machining process. Meanwhile you can modify the parameters in layer window, or execute the functions in console panel like burst laser, gas, turn on/off follow function etc.

Click "


" or "


" button on the console to resume the machining process from interrupted position. Click "


" will resume the machining process directly without piercing.

Click "


" or "


"to locate laser head backward or forward on the machining path. The distance and speed of one step set on "

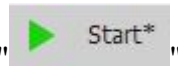

" at control panel.

4.8 Breakpoint

When the machining process interrupted by accident like power down, as long as graphics and parameters related with machining process and sequence not been changed you can click "


" to locate to the break point. Click "

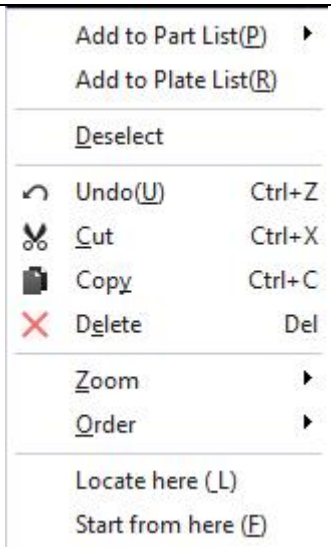

", program will resume machining from break point.

If you change the machining parameters, the "Start" button will turn into "


", under this status break point function will be not available.

4.9 Start at Specified Position

CypCutE allow users start machining from any position of the graphic. Right click on the graphic where you want to start machining and select "Start from here". As shown below:



For safety concern, select "Start from here", program will prompt dialog box to ask users to confirm operation. Then laser head will locate to the specified position, and start machining. The path before specified position will not be machined.

If you select "Locate here", laser head will locate to specified position then come in pause status.

You can execute "Locate here" multiple times. until you are sure. Or you can adjust start position by "

" and "

".

4.10 Global Parameters

The parameters setting in "Global Parameters" window will affect the machine running condition, cutting performance and efficiency.

Below table lists part of the parameters.

Motion Control Parameters	
Travel speed	Dry run speed (different from cutting speed).
Travel acceleration	The max acceleration axis can reach in dry run.
Travel low-pass frequency	The acceleration jerk of travel acceleration.
Frame speed	Speed of frame-walk the workpiece outline.
Cutting acceleration	The max speed axis can reach in cutting.
Cutting low-pass frequency	The acceleration jerk of cutting acceleration.
Jog acceleration	The max speed axis can reach in jogging.
Jog low-pass frequency	The acceleration jerk of jogging acceleration.
Corner acceleration	The acceleration of corner commutation.
Curve precision	The smaller the value, the higher the machining accuracy of curve.
Corner precision	The smaller the value, the higher the machining accuracy of corners.

Default Settings	
Gas on delay	Blowing delay before cutting.
First gas-on delay	Extra delay when first time open gas after start-up the machine.
Pre gas on	Time of opening gas when travel
Gas switch delay	The time required to make sure old gas totally discharged and new gas comes in when switch the gas.
Cooling delay	The time of blowing gas at cooling point.
System delay	Delay of servo response.
Resume, stepback	When resume the machining process from pause status, laser head will move back a distance.
Gas parameters	
Gas pressure	Gas pressure when performing blowing.
Gas on	Lasting time of a single blowing.
Interval	Gas-off time in the whole gas operation.
Start, Gas On	Blowing times at the beginning of processing.
Resume, Gas On	Blowing times when resuming processing.
Follow Control Parameters	
Lift height	Maximum height of Z axis frog jumping.
Max follow height	There is limit of follow distance between nozzle and plate surface. If the follow height larger than this value, Z axis will follow to this height then lift up to the target height. This parameter is used to set the maximum follow distance between nozzle and plate surface.
Frog leap lift	Z axis moves in time-saving frog-jump style.
Smart Frog leap	Automatically adjust the leap height according to the tip-up angle of parts.
Frog-leap start height	Lift to the set height before execute frog leap.
Max Frog leap down	Y axis value of Frog leap parabola vertex.
Short distance no lift	If in layer setting select "Short distance no lift", when the dry run distance shorter than this value, Z axis will not lift and stay at cut height.
Hold fixed height	Applied in nun-metal material cutting, select this option it will disable follow function in machining.
Smart follow	Short-distance travel does not perform plate detection.
Advanced	
Hide crucial settings	Hide some parameters which will affect the machine service life if set improperly.
FlyCut at MicroJoint	No pause at micro joint with fly cutting, invalid when pierce techniques enabled.

Technique check	Check whether the default machining parameters are valid.
Thickness check	Check whether the material thickness information is set in the layer parameter setting.
Quick Find Edge	Shorten the process of finding edge.
Edit PLC Process	PLC process editing.
Pierce Defilm	Set the sequence of defilm and pierce.
FlyCut overcut	Over fly cut distance to ensure part entirely cut.
Extended cutoff length	Overcut distance on cutting cutoff Line.
GasOn protection	Select "Blow" in layer settings, and set gas pressure here.
Unit	Select the unit of the parameter according to your habits.

5. CNC Assistant Function

5.1 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 " 

"in control panel, it will switch to "CNC" menu automatically, you can adjust simulating speed in tool bar.



5.2 Find Edge

CypCutE supports two patterns to find plate edge: BCS100 find edge and manual locate edge. Click "Find Edge" drop down menu you can select the find-edge pattern to locate plate position and edge. Find edge result will be displayed on the top right area of drawing board.



Click "

" under CNC or click" Capacitive Find Edge"to open BCS100 find edge parameter window.

Plate size X is the plate length in machine X direction; plate size Y is the plate length in machine Y direction. The 2nd and 3rd point position to locate the plate edge is calculated by the plate dimension,**it"s suggested that input value little smaller than actual dimension to avoid laser head crash in machine teeth.**

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 input 0 here.

Identify sheet dimension: automatically set plate dimension according to the border of graphic.

6-point find edge: This recommended to use on thin plate. Laser head will execute 6 times find edge actions to reduce the interference of machine teeth.

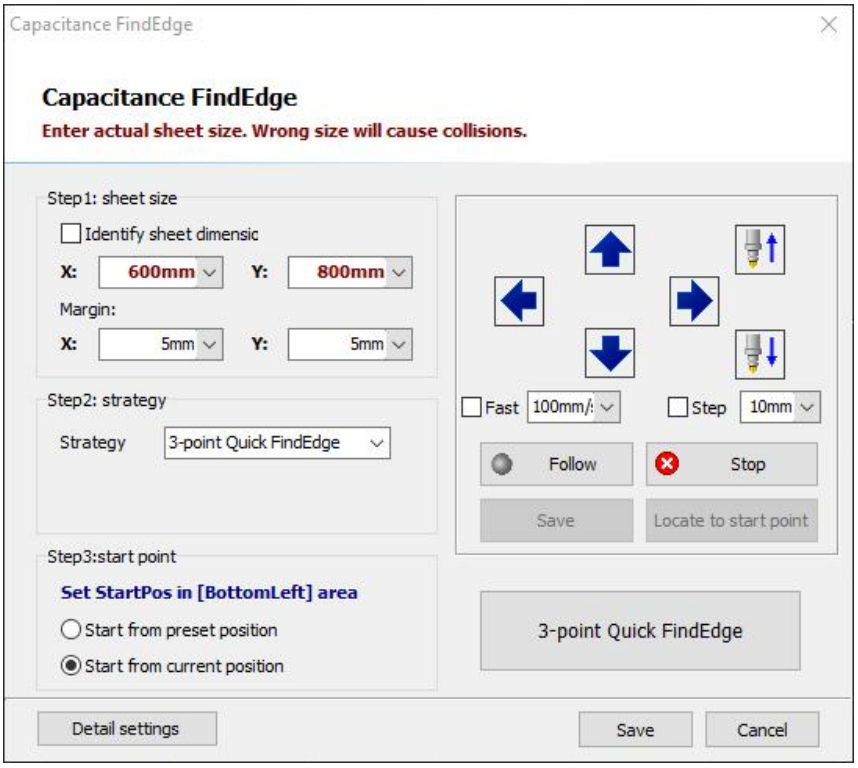
Start from preset position-you can set a fixed position then find edge will start from this position every time. You can locate the laser head at a fit position as start point to find edge. **This position must be within the plate.**

Start from current position-laser head will start to find edge from current position. **Please make sure laser head is within the plate.**

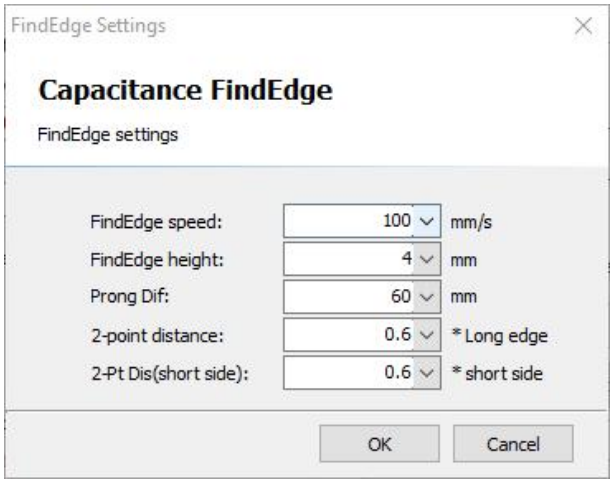
If select "find edge before machining", it will execute find edge before start machining.

Notice: Before execute find edge function, make sure laser head can follow to the material properly. The inclination angle of the plate should not exceed 10 degrees.

Find edge parameter window shown as below.



You can also set more detailed actions by clicking "Detail settings" at the left bottom.



Find edge speed affects the accuracy of result, recommended 100mm/s;

Find edge height is distance between nozzle and plate in find edge process, recommended 4mm;

Prong Dif is the gab between machine teeth tip;

2-point distance and 2-Pt Dis(short side) decide position of the other two points.

5.3 Quick CutOff

Quick CutOff is used to quick cut the remnant off.

Thin sheet CutOff: When checked, CutOff safe distance will take effect.

CutOff safe distance: Laser head starts from outside plate in a fixed height after pass this distance will follow to plate.

X CutOff (Left to Right): Select this option when execute split-plate function, laser head will follow out of the plate then cut in from left side, then follow out of the plate cut in from right side.

Notice: When split plate it should use parameter of green layer.

5.4 PLC Process

Click "

"in "CNC" menu 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.

5.5 Task

If an urgent task cuts in line while the current task unfinished, use Task function to save the progress including program zero point, find edge angle, breakpoint, and file. After finishing the urgent one, you can re-import the last task, then go the breakpoint and resume the machining.

5.6 Return Origin Point

You can click "

" in CNC menu to return axes to mechanical origin and rebuild coordinate. See details in section "coordinates". Select "X Only" or "Y Only"axis will return origin separately. If you select "Z axis first" or "Auto-focus included"program will execute the actions when return axes to origin.

5.7 Path

In the machining, if you need to position the cutting head to a certain point, you can click "

" in CNC menu, enter the specific coordinates you want in box shown on the right "

".

You can also set the laser interferometer parameters in this interface to test the error between the position in software and the actual position on machine, so as to compensate the mechanical error, also known as pitch compensation.

5.8 Calibrate

Support manual and one-click calibration.

5.9 Shortcut key

The following table lists the shortcuts commonly used in CypCutE, some of which need to be used in specific circumstances.

Shortcut key	Effect	Using conditions
Ctrl + A	Select all graphics	None
Ctrl + C	Copy graphics to the clipboard	Select the graphics to operate on
Ctrl + Shift + C	Specify baseline copy command	Select the graphics to operate on
Ctrl + O	Open a file	None
Ctrl + P	Show/hide graphic direction and move path	None
Ctrl + V	Paste clipboard graphics to drawing board	There are copied graphics in the clipboard
Ctrl + W	Adapt the window	None
Ctrl + X	Cut graphics to Windows Clipboard	Select the graphics to operate on
Ctrl + Y	Redo the command you just revoked	There are revoked orders
Ctrl + Z	Revoke the order just completed	There are completed commands
F2	Open the Layer Parameter Settings window	None
F3	View all graphics	None
F4	View the whole machine tool range	None
F7	Show/hide machining path	None
F8	Show/Hide move path	None
DEL (Delete)	Delete selected graphics	Select the graphics to operate on
SPACE (space)	Repeat the previous command	The previous command is repeatable