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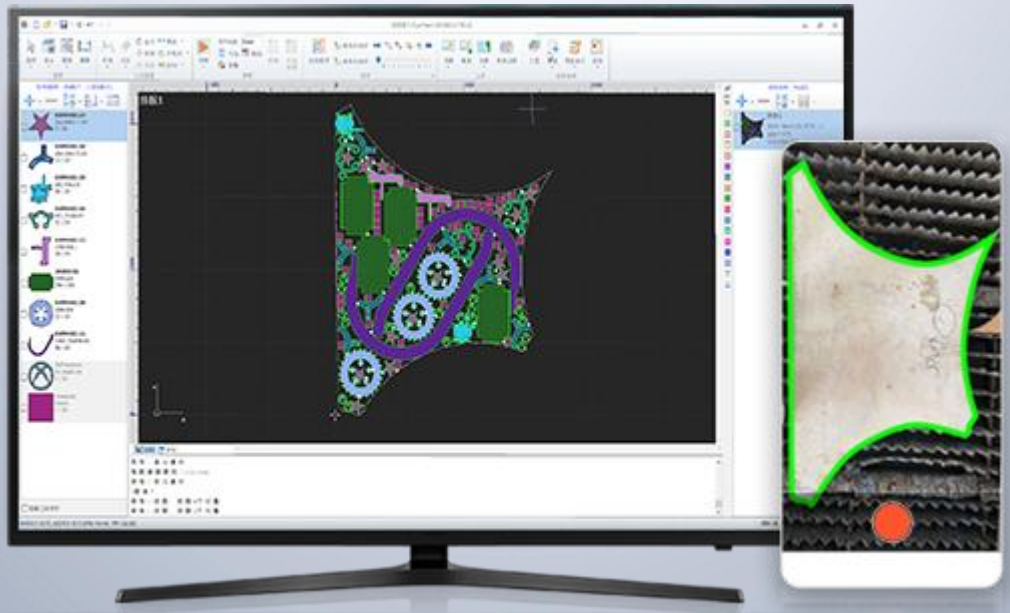


CypNest User Manual

Software Version: 2024V3

Document Version: V1.0.0

www.bochu.com

Foreword

Thank you for using BOCHU CypNest 2D Nesting Software (hereinafter referred as CypNest).

This document is based on CypNest 2024V3. Due to the continuous update of system functions, the CypNest you are using may differ in some aspects from the statements in this manual. We've tried our best to ensure that the content of the user manual is applicable, but reserves the right of final interpretation. Changes in the content of this manual will not be explicitly notified.

Any questions or suggestions during use, please contact us through the information provided.

Convention Symbol Explanation

Notice: Supplementary or explanatory information for the use of this product.

Caution: If not operated as specified, it may result in minor physical injury or equipment damage.

Warning: If not operated as specified, it may lead to death or serious physical injury.

Danger: If not operated as specified, it will cause death or serious physical injury.

Safety Statement

BOCHU shall not be liable for any direct or indirect losses arising from the following circumstances: damages caused by improper use of this manual or the product, failures to comply with safety operating procedures, or force majeure events such as natural disasters.

Additionally, operational equipment carries inherent risks. Users are obligated to implement robust fault-handling mechanisms and safety protections. BOCHU assumes no responsibility for any incidental or consequential losses resulting from such risks.

Revision History

Version No.	Date	Description
V1.0.0	2025/04/30	First English edition for CypNest usage.

Contents

CypNest Features

CypNest is a 2D nesting software developed for BOCHU CypCut/HypCut/FACut cutting software, featuring fast nesting, parts identification, cutting path editing, report generation, etc.

Here are the features of CypNest:

- Error Detection in Drawings: Automatically detects errors in imported drawings, such as incomplete geometry or abnormal dimensions, and provides alerts to prevent machining errors.
- Automatic Parameter Optimization: Intelligently processes invalid drawings and identifies them as valid parts.
- Powerful Nesting Capabilities: Supports up to 2,000 different parts, meeting large-scale nesting requirements.
- Diverse Nesting Strategies: Offers multiple nesting methods tailored to various part shapes, sizes, and processing requirements, optimizing material utilization.
- Bevel Nesting: Supports bevel parts recognition and configuration, automatically calculating part spacing to ensure sufficient safety clearance for efficient and material-saving bevel cutting.
- Vision-Based Remnant Nesting: Adds remnant plate from the picture and enables one-click calibration with an A4 paper, extracting the remnant contour to maximize material usage and minimize waste.
- Smart Sorting: Uses a fuzzy sorting algorithm aligned with user habits, supporting sorting by X/Y direction.
- Versatile Co-Edged Toolpaths: Supports various co-edged toolpath strategies for different machining scenarios, including ***Cutting by Part***, ***C-type Cutting***, ***Co-Edged First***, ***One-Path Cut***, ***Step Pattern***, and ***Wavy***, ensuring stability and efficiency.
- Comprehensive Remnant Handling: Allows ***Auto/Draw Remnant Path*** and ***Export Remnant Plates*** to improve material utilization.
- Customizable Reports: Enables users to customize reports based on the specific needs, facilitating the organization and tracking of nesting tasks and part details.

Chapter 1 Quick Start

1.1 Acquire and Install

Before acquiring and installing CypNest, please make sure that your hardware meets the software's specific requirements. Refer to the table below for the recommended system specifications.

Table 1-1 CypNest Recommended System Requirements

Name	Description
CPU	Intel i5 10th Gen or higher
Operating System	Windows 7 or later (64-bit)
Memory	8 GB or more (16 GB recommended)
Graphics Card	Intel UHD 630 or higher (dedicated graphics card supported)
Screen Resolution	1920*1080

Visit BOCHU, and click ***Download And Free Trial*** to enter the ***Software Download*** page.

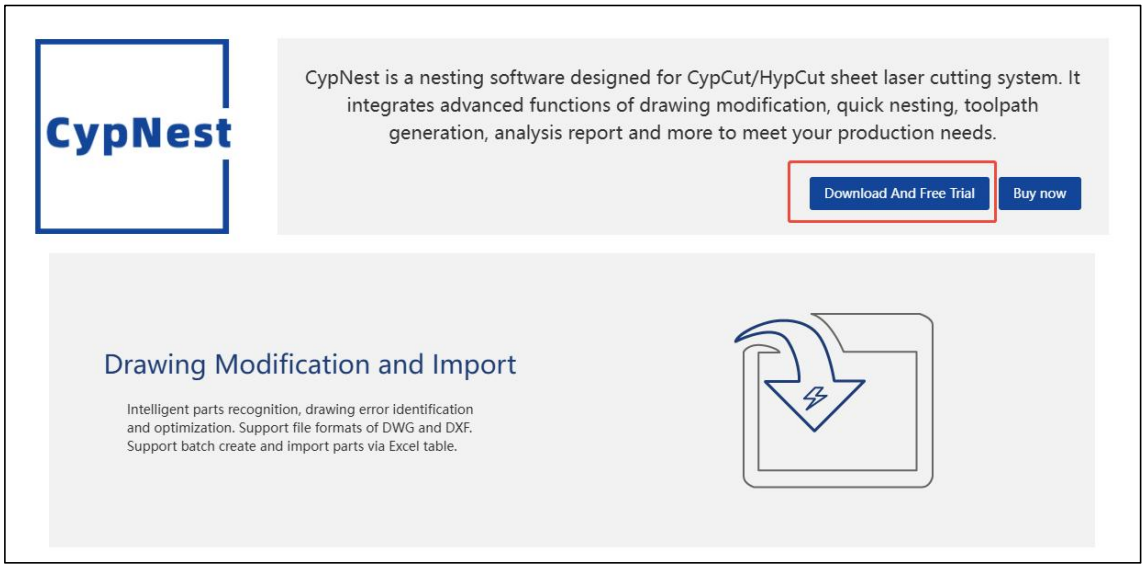


Figure 1-2 Download and free trial

1.1 Install and Login

Once you have purchased the software, download the CypNest installation package and install it. After the installation progress bar is completed, the installation completion page will appear. Click ***Finish*** to complete the installation.

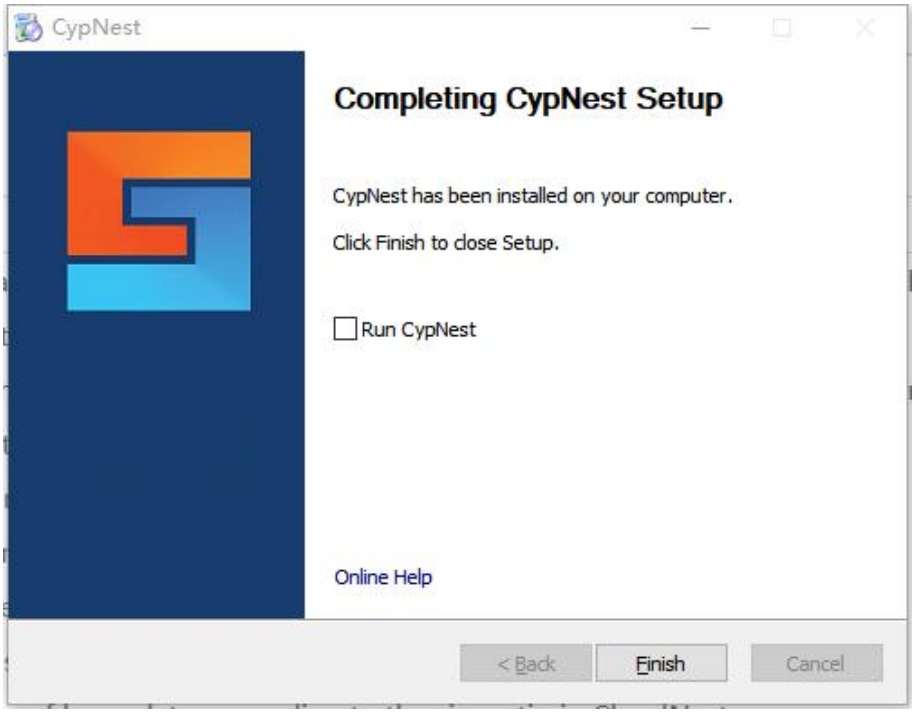


Figure 1-3 Installation completed

Subscribers can log in by either scanning the QR code with WeChat or entering their email and password.

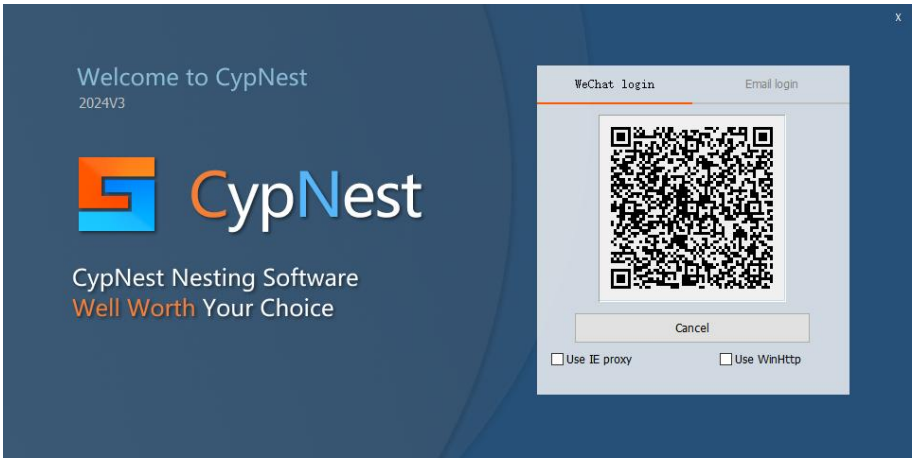


Figure 1-4 Wechat login or email login

Dongle users have a permanent license. Simply insert the dongle into the computer before launching CypNest. No login or registration is required.

1.2 Workflow Overview

The main workflow of CypNest consists of the following steps: log in, create a new nest, add parts, nest, sort, draw remnant path, export reports, and export cutting files.

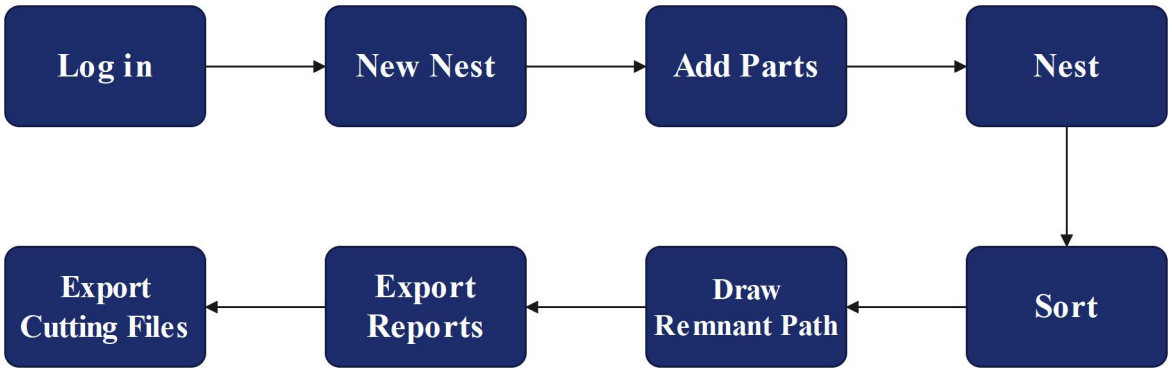


Figure 1-5 CypNest workflow

1.3 Open File & Parts Library

1.3.1 Open File

After successfully logging in, you will enter the workstation. Click ***Open File*** to access the file list. Supported file formats are shown in the figure below.

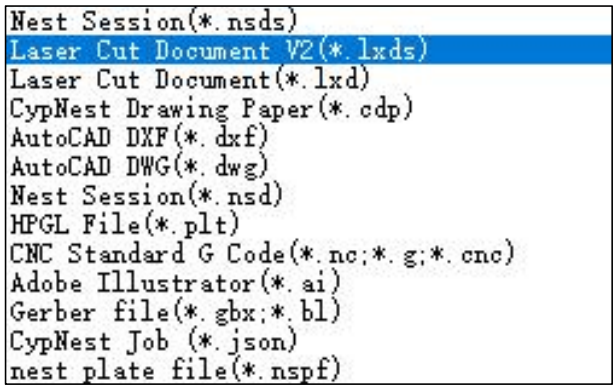


Figure 1-6 Supported formats

Once you select a file from the saved file directory, the ***Preview*** pane on the right allows you to preview the selected file and optimize drawing if needed.

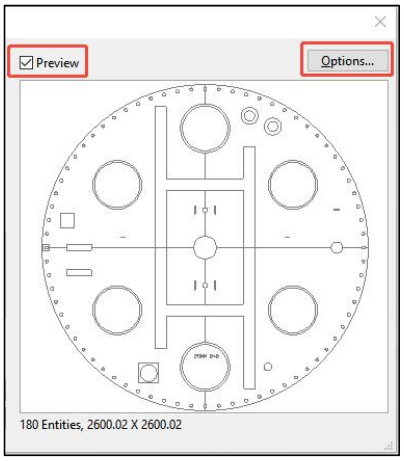


Figure 1-7 Preview

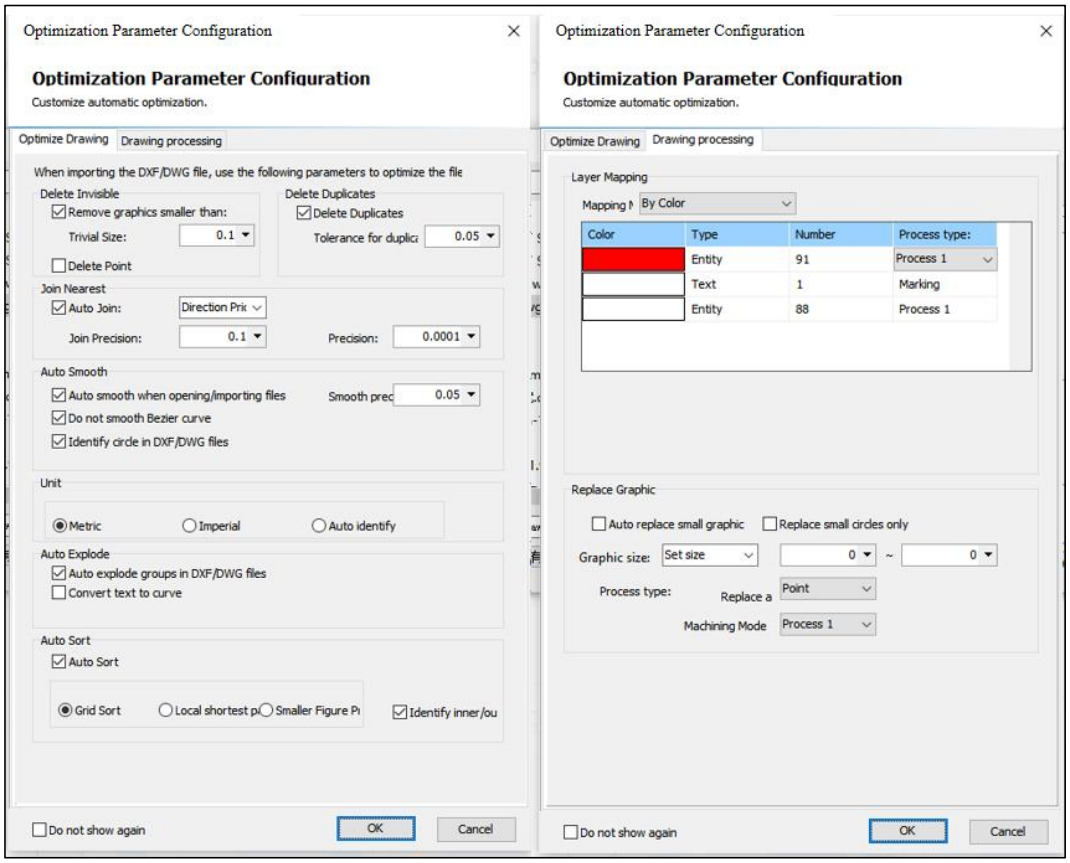


Figure 1-8 Optimization parameter configuration

Before proceeding, you can customize automatic optimization parameters based on your usage preferences. Click ***OK*** to confirm the settings. Depending on the selected file type, you may enter either the drawing interface or directly proceed to the nesting interface.

1.3.2 Parts Library

From the Home Page, click ***Parts Library*** to switch to the parts library interface, where you can see a list of parts identified from previous nesting tasks. Click on any of the parts to open the ***New Nest Task*** interface, then follow the guided workflow in New Nest to complete the nesting task setup.

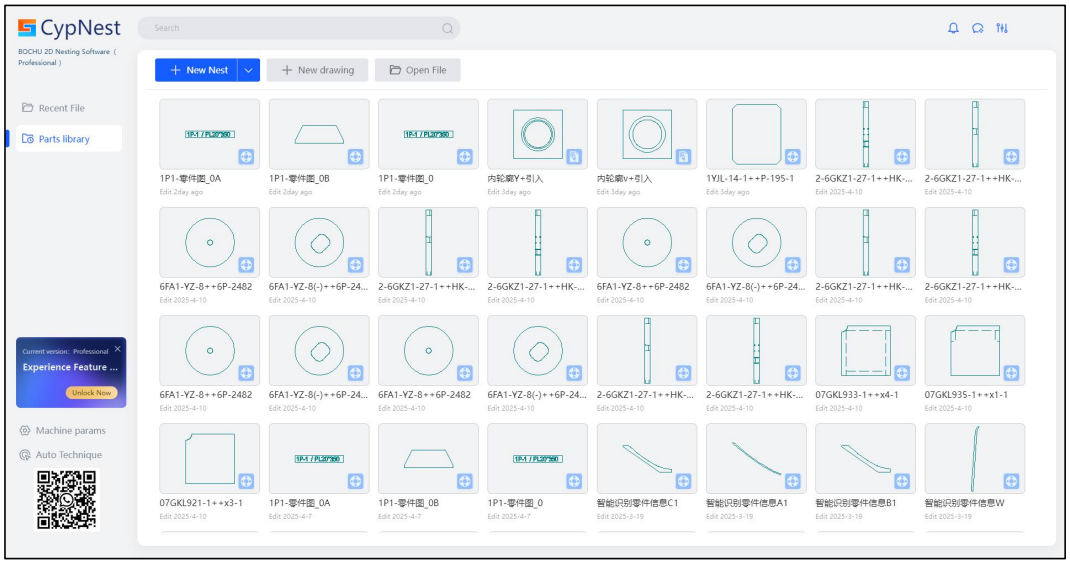


Figure 1-9 Parts library

Chapter 2 Create Nest Task

Nesting is the core function of CypNest, and creating a nesting task is an essential step in the process. CypNest supports multiple ways to create nesting tasks, including ***New Nest***, ***Multiple Materials***, and ***Import Bevel***. This chapter provides a detailed explanation of different methods for creating nesting tasks.

2.1 New Nest

New Nest is the most fundamental and commonly used method for creating a nesting task. There are two ways to initiate this process.

Click ***New Nest***, or select ***New Nest*** from its drop-down menu. This will open the ***New Nest Task*** window, where you can enter key processing details such as ***Nest Name***, ***Material***, ***Thickness***, ***Cut Gas***, and ***Part Gap***.

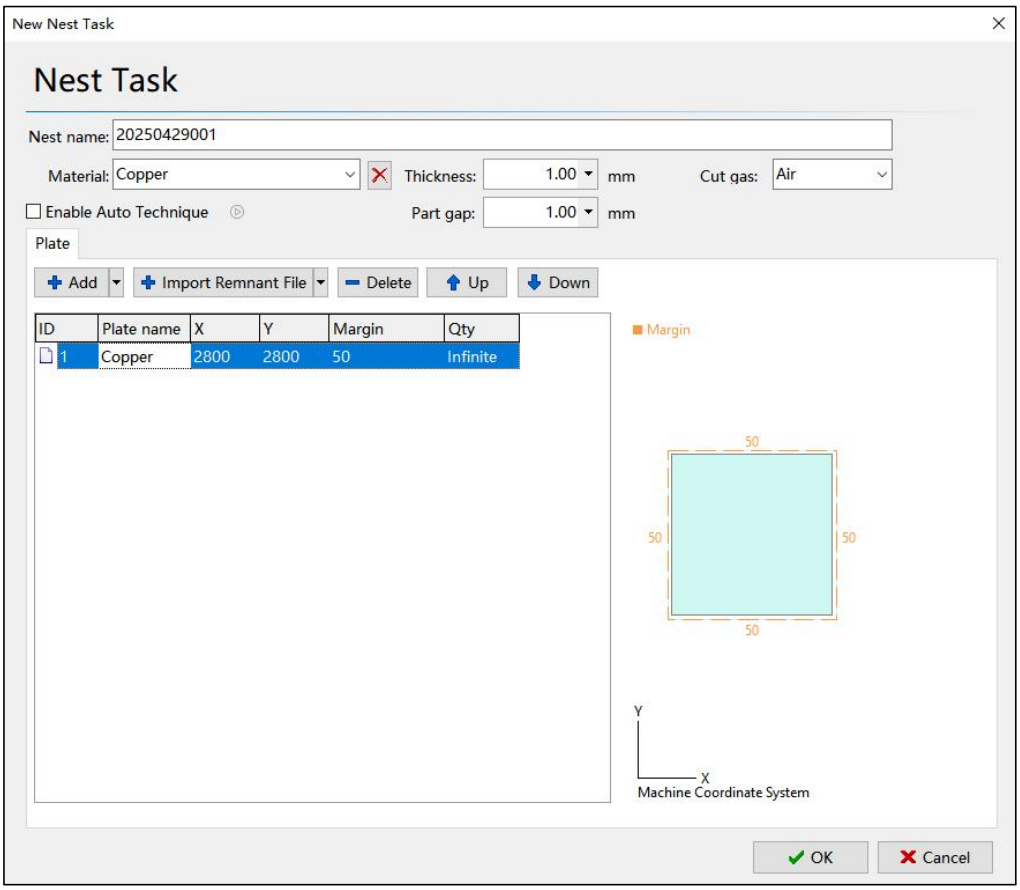


Figure 2-1 New nest task

In the ***Plate*** section of the interface, you can add new plates, edit plate size, and set the margins. Some of the parameters are described below:

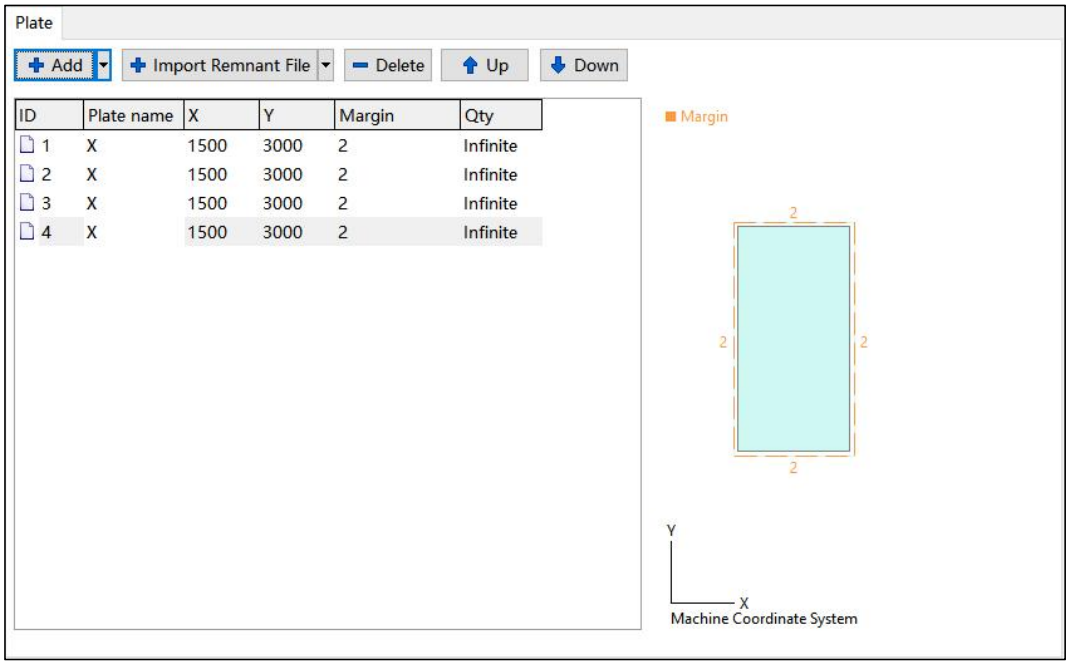


Figure 2-2 Add plate

- Import Remnant File: If you want to use remnant plates for nesting, you can select ***Import Remnant and Edit*** or ***Create Remnant Plate*** in the drop-down menu.
- X, Y: Defines the plate's side length in the X and Y directions based on the machine coordinate system.
- Margin: Specifies the unusable margin width around the plate's edges.

In addition to basic parameter settings, if parts require compensation, lead, or other techniques, check ***Enable Auto Technique*** and configure the auto technique parameters accordingly. Once new nest tasks with the same material, thickness, and gas parameters are set subsequently, the software will automatically apply the corresponding auto technique parameters.

For details on auto technique settings, please refer to Auto Technique. When the settings are done, click ***OK*** to enter the ***Nest Interface***.

2.2 Bevel Nesting

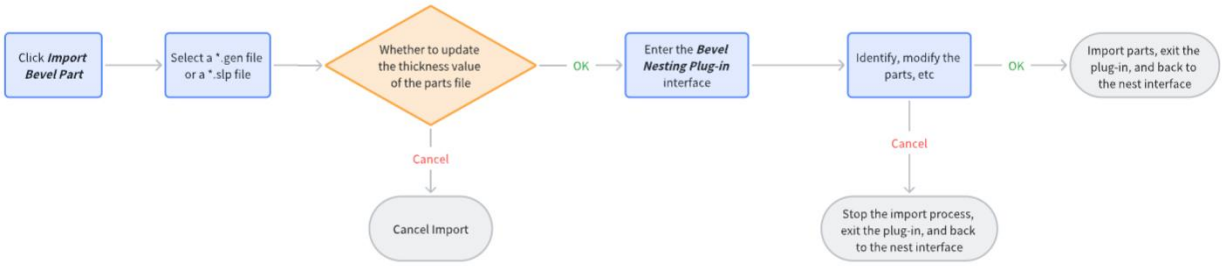
A bevel refers to a groove with a specific geometric shape created at the welding joint for proper assembly and welding.

CypNest allows you to add bevels for parts, perform bevel nesting and sorting, and export the results. To use the bevel nesting feature, you must install the ***Bevel Nesting Plug-in*** and purchase the ***Bevel Nesting Pack***.

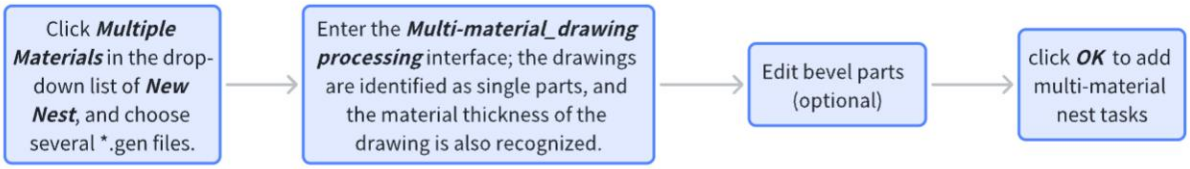
With the bevel plugin, you can ***Draw Parts***, ***Import Parts***, or ***Import Standard Parts***. It also supports ***Technique Settings*** and ***Add Bevel*** to the parts.

Methods to import bevel parts are as follows:

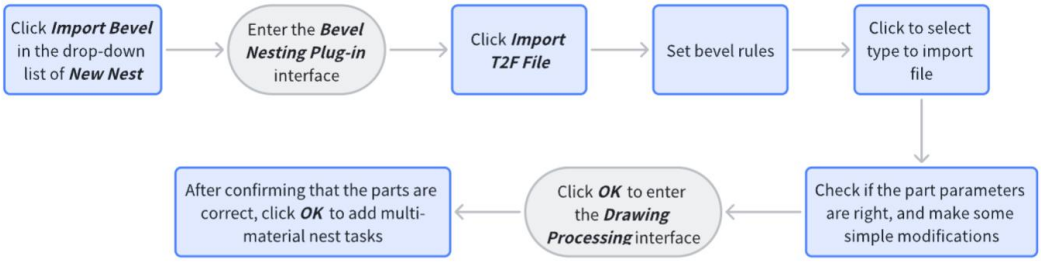
- Import bevel parts in the nesting interface



- Generate bevel nesting tasks using multiple materials mode



- T2F bevel import



Ways to open the bevel plugin from the part list are as follows:

- Right-click an unprocessed straight-cut part and select ***Set up Bevel Parts***.
- Right-click an unprocessed bevel part and select ***Edit Bevel Part***.
- Double-click an unprocessed bevel part.

When right-clicking a bevel part, the ***Bevel Co-Edged Array*** option is available. This allows parallelogram bevel parts to be arranged in a co-edge array. Rectangular parts also support flipped co-edge nesting, improving material utilization during bevel nesting.

For a detailed bevel nesting workflow, please refer to Bevel Nesting.

2.3 New Drawing

After successfully logging in, click ***New Drawing*** to enter the CypDraw interface.

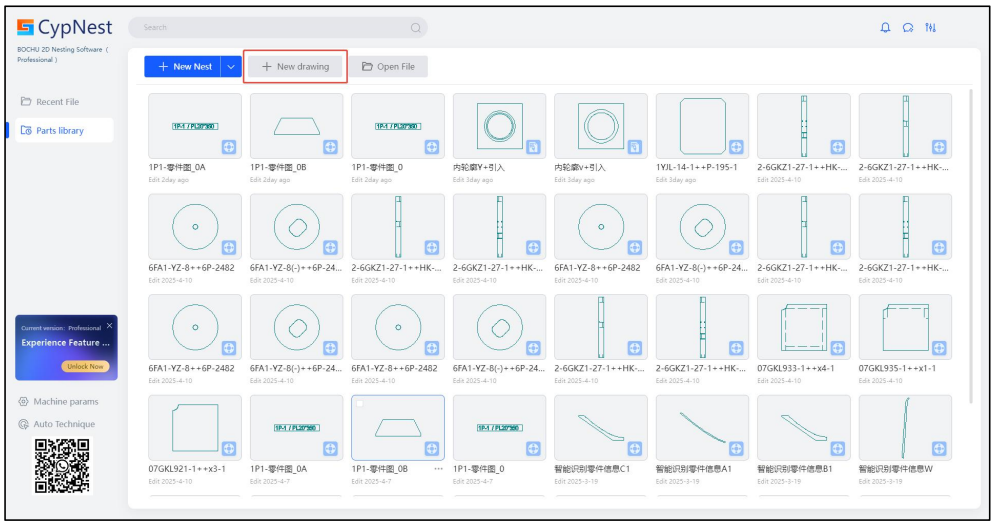


Figure 2-3 New drawing

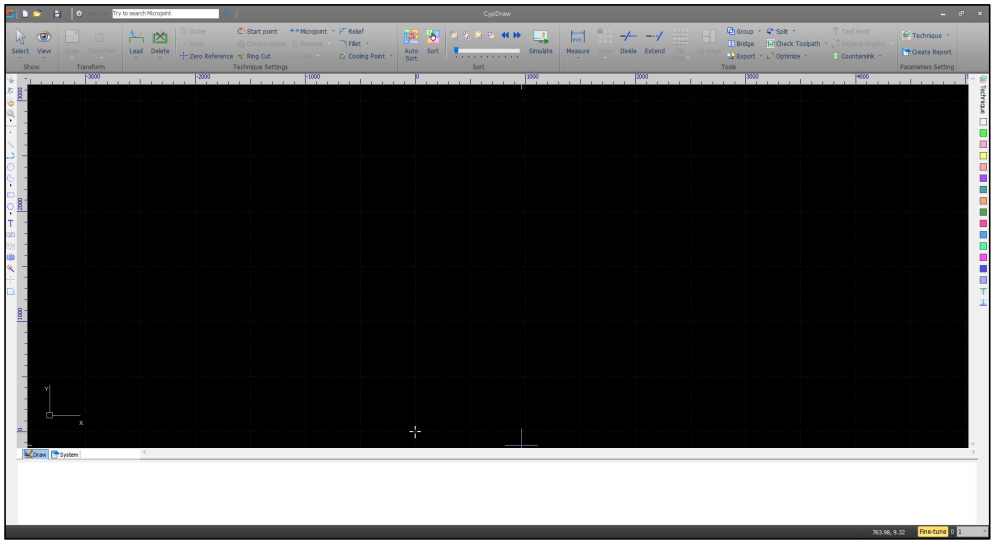


Figure 2-4 CypDraw

The drawing interface is dedicated to geometry creation, allowing you to design part outlines based on processing requirements. Once the drawing is complete, you can choose to ***Save*** or ***Export*** the drawing. Then, proceed with the creating the nest task workflow as described in New Nest.

Chapter 3 Add and Edit Parts

Parts are the objects for nesting and sorting in CypNest. During the creation of a nesting task, ***Part Recognition and Pre-process*** and ***Drawing Processing*** are required. Importing and drawing parts also involve certain preprocessing steps.

3.1 Add Parts

If no drawings are imported, when entering the nesting interface through ***New Nest Task***, a prompt will appear on the left indicating ***No parts have been added yet***. A list of options for adding parts is displayed on the left panel, and users can select as needed.

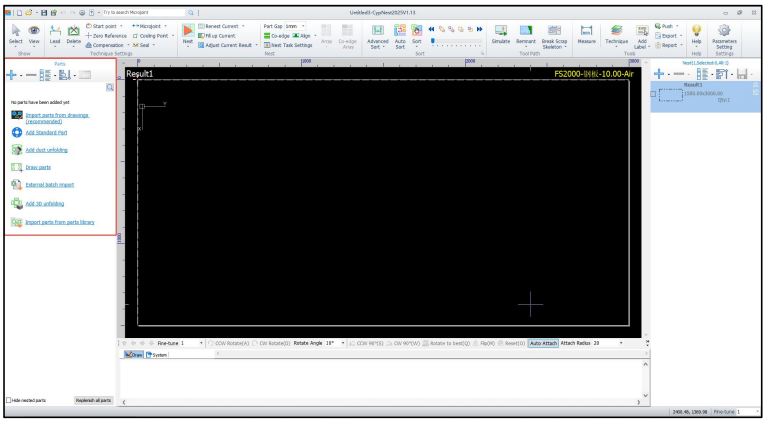


Figure 3-1 Nest interface without parts

Additionally, new parts can be added at any time by clicking + in the upper left of the part list, whose drop-down menu will also show a series of ways to add parts, which can be selected as needed.

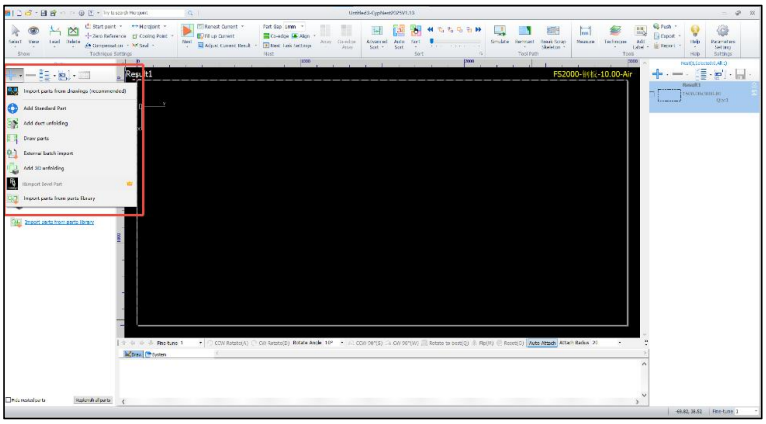


Figure 3-2 Add parts

Right-clicking within the part list can also ***Import Parts from Drawings*** or ***Add Standard Part***.

3.1.1 Import Parts from Drawings

It is recommended to use ***Import Parts from Drawings***.

Click the import option, and a dialog will pop up, where drawing previews are supported. Choose the drawings needed and click ***Open***, you will enter the default ***Part Recognition and Pre-process*** interface, or enter other interfaces by adjusting the upper right corner checkbox.

Figure 3-3 Import parts

Upon clicking ***Open***, one of the following three interfaces may appear:

- Uncheck ***Direct Access*** to enter the ***Part Recognition and Pre-process*** interface by default. For details of recognizing and preprocessing parts, please refer to Part Recognition and Pre-process.
- Check ***Direct Access*** and select ***Drawing Processing*** to directly enter the ***Drawing Processing*** interface. For details on processing drawings, please refer to Drawing Processing.
- Check ***Direct Access*** and select ***Nest Interface*** to directly enter the ***Nest Interface***. For details of nesting, please refer to Auto Nest and Manual Nest.

3.1.2 Add Standard Parts

Add Standard Part is also a common way of adding parts. CypNest supports adding ***Standard Parts*** and ***User-Defined Parts*** with custom dimensions. There is also an ***Online Part Library***. When using, all you need is to select a standard part or online part based on your actual needs and modify their dimensions accordingly.

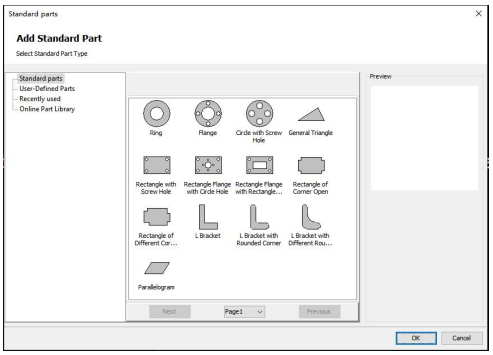


Figure 3-4 Add standard parts

3.1.3 Draw Parts

Draw Parts allows you to create parts freely according to processing requirements, sort the parts, set ***Inner*** or ***Outer*** cut, and add techniques. The drawing process is similar to other CAD software interfaces.

After the drawing is complete, you can either ***Export*** the drawn parts as *.lxds and later select ***Import Parts from Drawings***, or click ***OK*** in the upper right corner to enter the nesting interface, where the drawn parts will be displayed directly in the part list.

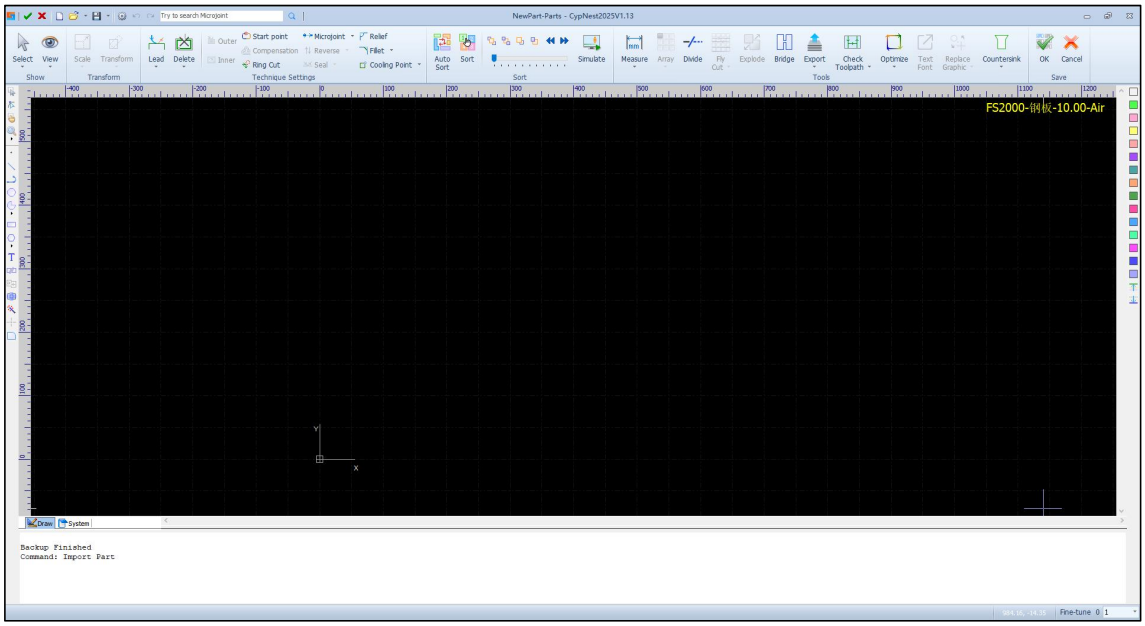


Figure 3-5 Draw parts

3.1.4 External Batch Import

When importing a large number of parts, manual importing is time-consuming. To address this, CypNest supports ***External Batch Import***, enabling one-click import of multiple part drawings. Besides parts, the software also supports batch import of plates and rectangular parts with holes.

Right-click the CypNest icon, select ***Open File Location***, and locate the ***BatchImport*** folder.

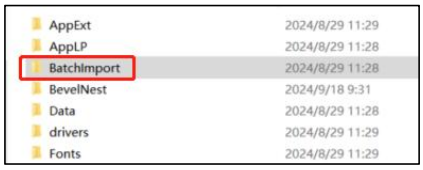
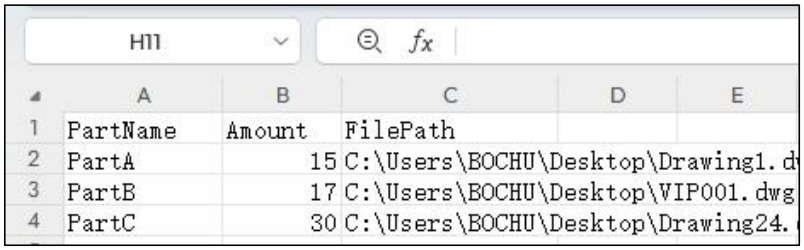


Figure 3-6 Locate BatchImport folder

To use this function, copy the required template and add data to the copied file.

File Import is to batch import parts; ***Import Sheet*** is to batch import plates; ***Import Sheet(diff Gap)*** is to import plates while setting different edge gaps; ***RectWithHoles*** is to batch import rectangular parts with circular holes.

In the ***File Import*** template: ***PartName*** refers to the part name, ***Amount*** refers to the part quantity, and ***FilePath*** specifies the file location. If an enterprise uses an ERP system to batch-generate *.dxf drawings along with an Excel spreadsheet, the required information can be directly imported. Otherwise, parameters can be manually entered into the template.



	A	B	C	D	E
1	PartName	Amount	FilePath		
2	PartA	15	C:\Users\BOCHU\Desktop\Drawing1.d		
3	PartB	17	C:\Users\BOCHU\Desktop\VIP001.dwg		
4	PartC	30	C:\Users\BOCHU\Desktop\Drawing24.		

Figure 3-7 Batch import part template

After filling out the template, open the CypNest nesting interface and select ***External Batch Import*** in the ***Add to*** list. After selecting and opening the template file, the ***Optimization Parameter Configuration*** window will appear. Fill in the required parameters according to actual processing needs and click ***OK***. The batch-imported parts will then be displayed in the part list.

- The procedure for ***Batch Import of Rectangular Parts with Holes*** is similar to batch part import, with differences in the template and required parameters.

- The ***Batch Import of Sheets*** differs from part import not only in parameters but also in the import method. To import sheets, you can:
  - Click ***New Nest*** from the Home Page;
  - Click ***Nesting Task Settings*** in the nesting interface
  - Click the plus sign in the right-side sheet list, open the drop-down list, select ***Plates Management***, and then choose ***Import from Excel*** in the drop-down list of ***Add***.

  For detailed batch import procedures, refer to External Batch Import.

3.2 Part Recognition and Pre-process

When importing drawings, if the option to ***Direct Access*** a certain page is not selected, the process will usually default to the part recognition preprocessing flow. When importing parts in batches, the ***Optimization Parameter Configuration*** window will pop up, which serves the same purpose as ***Part Recognition and Pre-process***.

The interface mainly consists of the follo wing sections: drawing(s), part(s), drawing details, file comparison, and pre-process options.

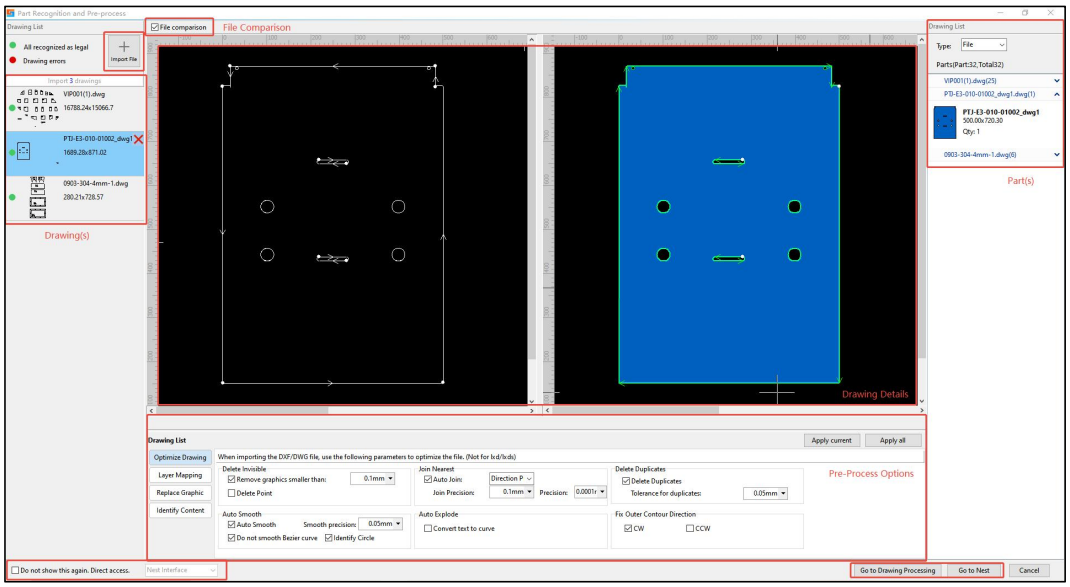


Figure 3-8 Part recognition and pre-process

- Drawing(s): The left side of the interface is the drawing area, displaying the list of currently imported drawings. When the circular marker in front of a drawing is green, it indicates that all parts in the drawing have been successfully recognized as valid parts. When the circular marker is red, it indicates there are errors in the drawing. Clicking ***Import File*** at the top right corner of the drawing area allows you to import additional drawings.
- Part(s): The right side of the interface is the part area, which displays successfully recognized parts.
- Drawing Details: The center of the interface displays drawing details. You can switch drawings by clicking the drawing list on the left, and the drawing details will automatically switch accordingly.
- File Comparison: When ***File Comparison*** is selected, the drawing details area will simultaneously display two windows. The left shows the original drawing and the right shows the drawing as recognized by the software. It supports zooming in, zooming out, and moving the drawing. Both

windows will move and zoom proportionally.

- Pre-Process Options: Including ***Optimize Drawing***, ***Layer Mapping***, ***Replace Graphic***, and ***Identify Content***.

- Bottom Navigation Bar: Select ***Do not show this again. Direct access***, and choose the corresponding interface to directly enter either ***Nest Interface*** or ***Drawing Processing*** The next time a drawing is imported, it will skip ***Part Recognition and Pre-process*** and directly enter the selected interface. After completing the preprocessing settings, you can choose the next interface to enter at the bottom right corner.

3.2.1 Optimize Drawing

CypNest supports preprocessing imported drawings according to automatic optimization parameter configuration (not for *.lxd and *.lxds files).

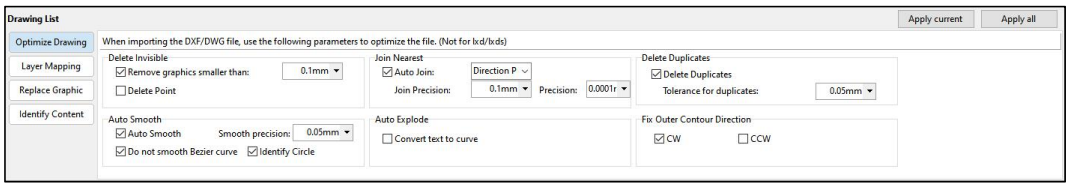


Figure 3-9 Optimize drawing

- Delete Invisible: Automatically deletes certain tiny graphics in the drawing caused by accidental mouse clicks or similar errors. Supports setting ***Remove graphics smaller than [user-defined value]***, where all graphics shorter than the specified length will be deleted.

- Join Nearest: Automatically merges line segments in the drawing to form a complete contour. Options include ***Outer First***, ***Direction Prior***, ***Length Prior***, and ***Distance Prior***. Supports setting ***Join Precision*** and ***Precision***. Breakpoints within the specified precision range can be recognized and merged.

- Delete Duplicates: Deletes duplicate line segments in the drawing. Supports setting ***Tolerance for duplicates***, where duplicate lines within the specified accuracy range will be deleted.

- Auto Smooth: Processes unsmooth curves formed by multiple line segments in the drawing. Options include: ***Auto Smooth***, ***Do not smooth Bezier curve***, and ***Identify Circle***. You can also set the ***Smooth Precision*** for accuracy.

- Auto Explode: Breaks apart text in the drawing and automatically converts it to curves, i.e., lines for processing.
- Fix Outer Contour Direction: Allows setting the outer contour direction of parts to ***CW*** (Clockwise) or ***CCW*** (Counterclockwise). This is reflected by the direction of the contour arrow in the drawing details.

After completing the settings, click ***Apply Current*** to apply the settings to the current drawing. Click ***Apply All*** to apply the settings to all drawings listed in the drawing area.

3.2.2 Layer Mapping

Through ***Layer Mapping***, you can batch set the line segments in the drawing that need to be processed differently, such as ***Marking***, ***Not Cut***, etc. You can check ***File Comparison*** to see the colors corresponding to the contour to be set in the drawing.

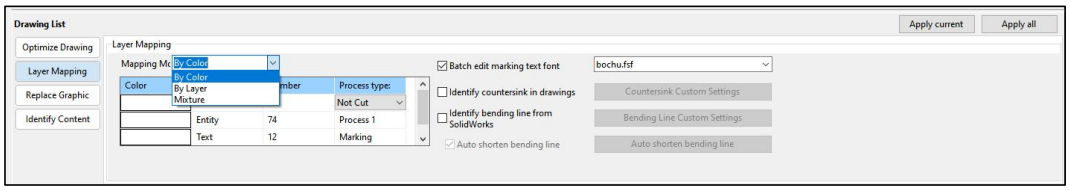


Figure 3-10 Graph mapping method

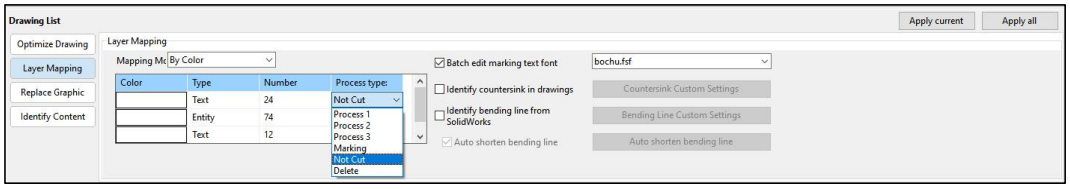


Figure 3-11 Process type

- By Color: When drawing in CAD, you can assign different colors for parts with different processing needs, and then use mapping ***By Color*** to set different processing methods for each color after importing.
- By Layer: When drawing in CAD, you can assign different layers for parts with different processing needs, and then use mapping ***By Layer*** to set different processing methods for different colors after importing.
- Mixture: When drawing in CAD, you can assign different colors and layers for parts with different processing needs, and then use ***Mixture*** mapping to set different processing methods for different colors after importing.

When setting up the map drawing, the software supports ***Batch edit marking text font***, ***Identify countersink in drawings*** and ***Identify bending line from SolidWorks***. You can manually configure the countersunk holes and the bending line and also check the ***Automatic shorten bending line***. All of the above checkboxes are configured according to actual processing needs.

After completing the settings, click ***Apply Current*** to apply the settings to the current drawing. Click ***Apply All*** to apply the settings to all drawings listed in the drawing area.

3.2.3 Replace Graphic

Through ***Replace Graphic***, you can replace small shapes in the drawing with ***Point*** or ***Cross*** based on processing needs and set the ***Machining Mode*** for small shapes.

Figure 3-12 Replace as

Figure 3-13 Machining mode

- Auto replace small graphic: When this option is enabled, you can set the size range for small drawings to be replaced. All small drawings within the specified range will be replaced with points or crosses. It is also possible to set a size range within which shapes will not be replaced.
- Replace small circles only: When this option is enabled, you can set the size range for small circles to be replaced. All small circles within the specified range will be replaced with points or crosses. When selecting ***Do not replace***, only the machining mode will be modified.

After completing the settings, click ***Apply Current*** to apply the settings to the current drawing. Click ***Apply All*** to apply the settings to all drawings listed in the drawing area.

3.2.4 Identify Content

After setting relevant information inside parts during the drawing process, you can make the parts ***Named by text inside***, or ***Auto set part parameter by tag***. The software can also automatically recognize the outer frame of the drawing.

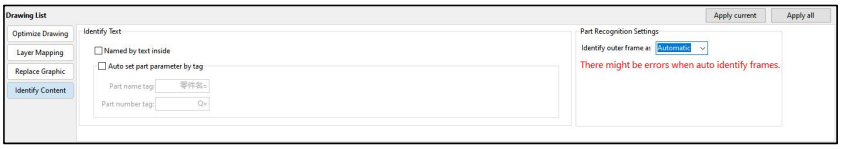


Figure 3-14 Identify content

- Named by text inside: When enabled, the software will recognize the text inside as the part's name.
- Auto set part parameter by marks: You need to mark the part name and quantity during the drawing process. After the drawing is imported into CypNest, the marker information can be entered into the corresponding fields, and the software will automatically read the part name and quantity.

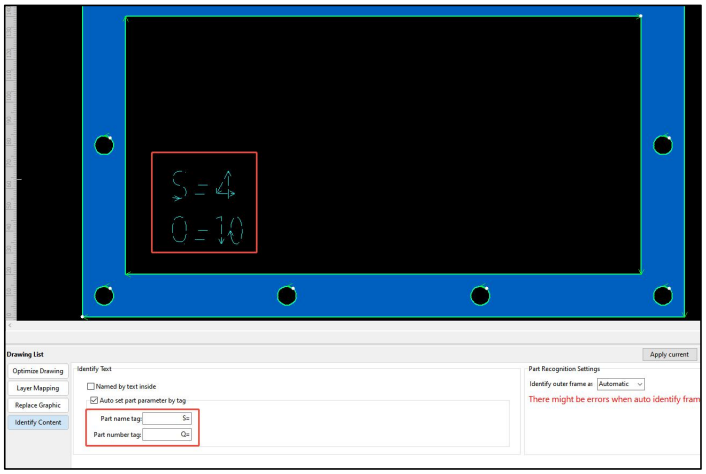


Figure 3-15 Auto-identify part name and number

- Part Recognition Settings: Some drawings have an outermost rectangle. This setting allows you to identify the outermost rectangle as either ***Not Cut*** or as ***Parts***. Reference images are provided. If selecting ***Automatic***, please carefully verify the part information to ensure that the software's judgment aligns with the actual processing requirements.

After completing the settings, click ***Apply Current*** to apply the settings to the current drawing. Click ***Apply All*** to apply the settings to all drawings listed in the drawing area.

For detailed operation procedures of part recognition preprocessing, please refer to Part Recognition and Pre-Process.

3.3 Drawing Processing

If part recognition fails after importing a drawing, it indicates there is an issue with the drawing itself. In this case, enter the ***Drawing Processing*** interface to fix the problems using the software's editing tools and recognize the parts.

The ***Drawing Processing*** interface mainly consists of the following sections: issue description, drawing editing tools, generate/cancel part, and part list.

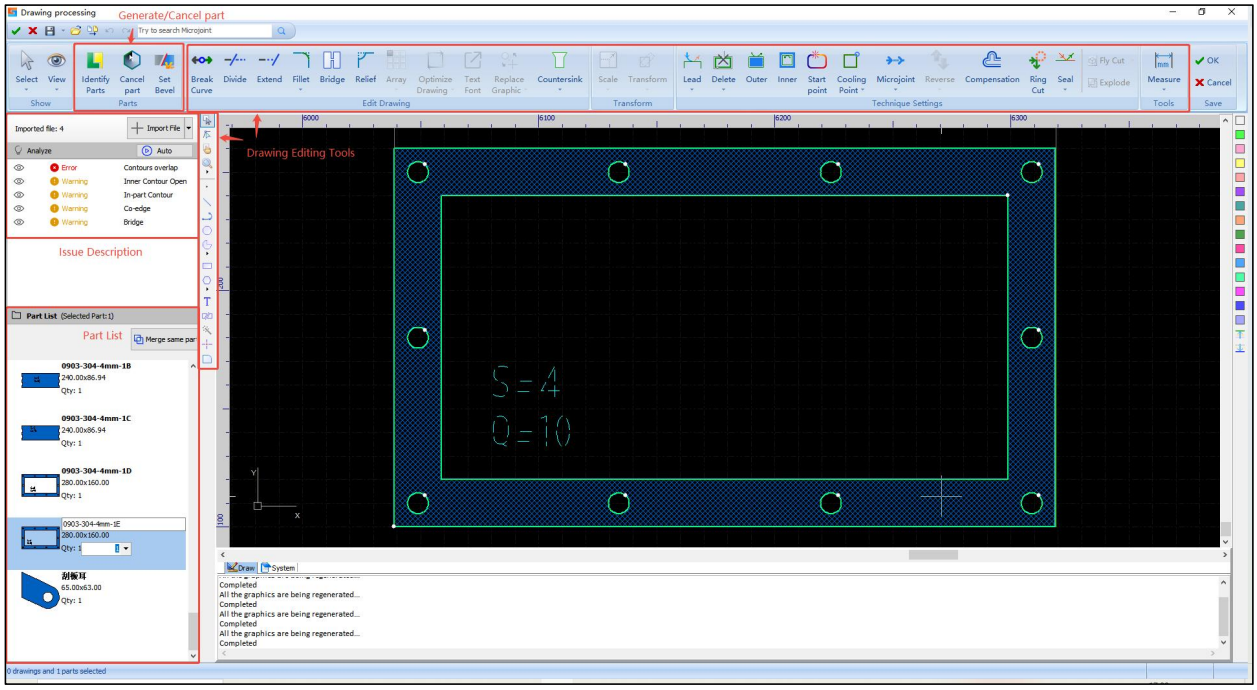


Figure 3-16 Drawing processing

When there is an issue with the drawing, move the cursor over the problematic graphic and manually handle it according to the prompt information.

- Parts with the ***Error*** prompt: Modify manually based on the issue description. If this drawing is confirmed as needed for actual processing, select the part and click ***Force to set as part*** in the drop-down list. Make sure to check the toolpath before cutting to avoid losses caused by repeated or incorrect toolpaths.
- Parts with the ***Warning*** prompt: Modify manually based on the issue description. If this drawing is confirmed as needed for actual processing, select the part and click ***Set as Part***.

During ***Drawing Processing***, note the distinction between ***Identify Parts*** and ***Set as Part***:

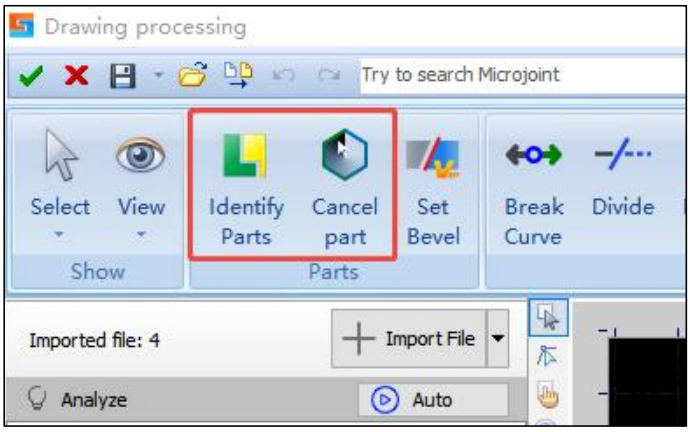


Figure 3-17 Identify Parts and Set as Part

- Regroup: Applies to all objects in the drawing. Drawings with errors are marked in red, and those with warnings are marked in orange. Only valid shapes are automatically recognized as parts; invalid ones are not set as parts automatically.
- Set as Part: Applies only to selected graphics. Shapes with warnings can be ***Set as part***, and shapes with errors can be ***Force to set as part*** via the drop-down menu.

The following introduces several drawing editing tools.

⚠ Notice: These tools only apply to the drawing and do not affect parts.

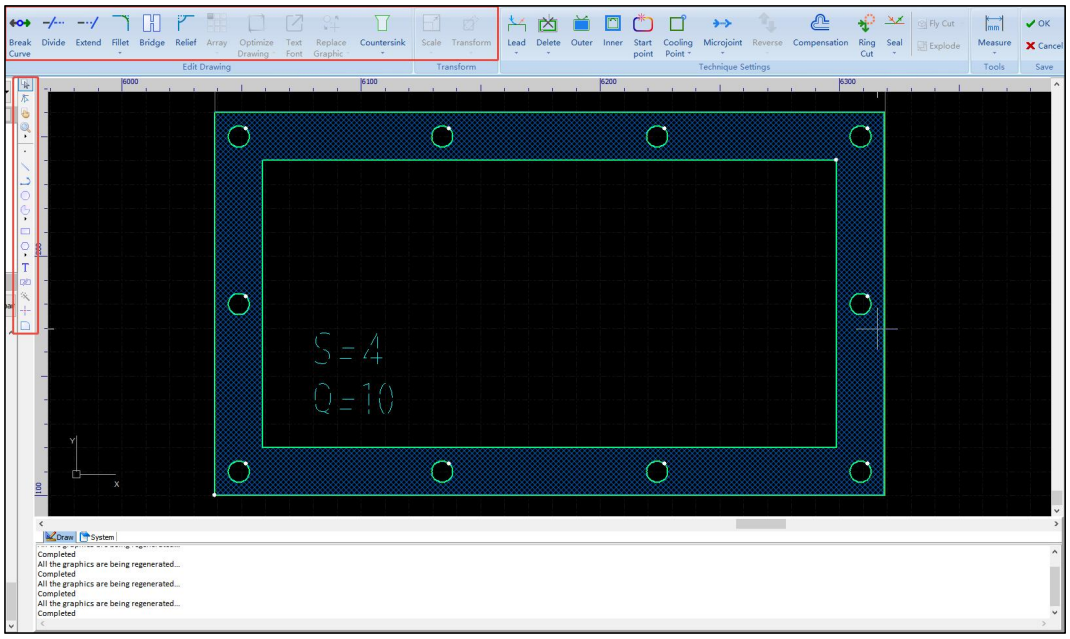


Figure 3-18 Drawing editing tools

- Edit Node: Used to drag endpoints of polylines in the drawing. Click ***Edit Node***, then click an endpoint (blue square) on the graphic, and hold and drag it. Release at the target position to change the contour shape.

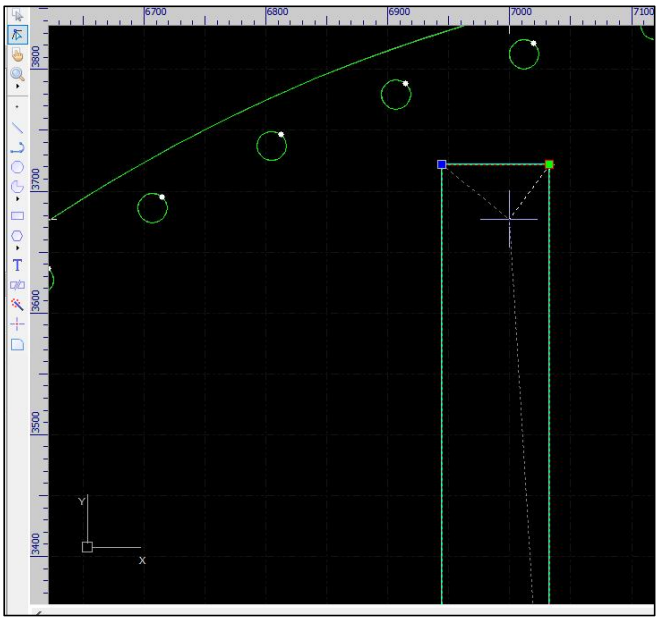


Figure 3-19 Edit vertex

- Cutoff: When the part size exceeds the plate size, use ***Cutoff*** to cut the part. This only applies to drawing contours, not to recognized parts. To use this function, first click the part, then right-click and select ***Break parts to drawing***.
- Explode: Converts a polyline into multiple individual segments. This also only applies to drawing editing. To merge them again, go to ***Optimize Drawing → Join Nearest***.
- Auto Split: Used to split two intersecting curves at the intersection point.
- Break Curve: Click ***Break Curve***, move the cursor over the curve, and click at the position to break.
- Countersink: Supports ***Add Countersink***, ***Countersink to Circle***, and setting ***Countersink Params***. Configure as needed based on actual machining.

In addition to the graphic tools mentioned above, the ***Drawing Processing*** interface also supports adding techniques. For more information about the technique setting, please refer to the relevant documentation. The ***Part List*** also supports setting part quantities.

After completing the modification of problematic drawings, click ***OK*** in the top right to import the parts into the nest interface.

3.4 Part Editing

The part editing interface differs from the drawing processing interface in that it processes drawings already successfully recognized as parts. In the ***Nest Interface***'s part list, right-click on a part and select ***Edit this part*** to open the part editing interface.

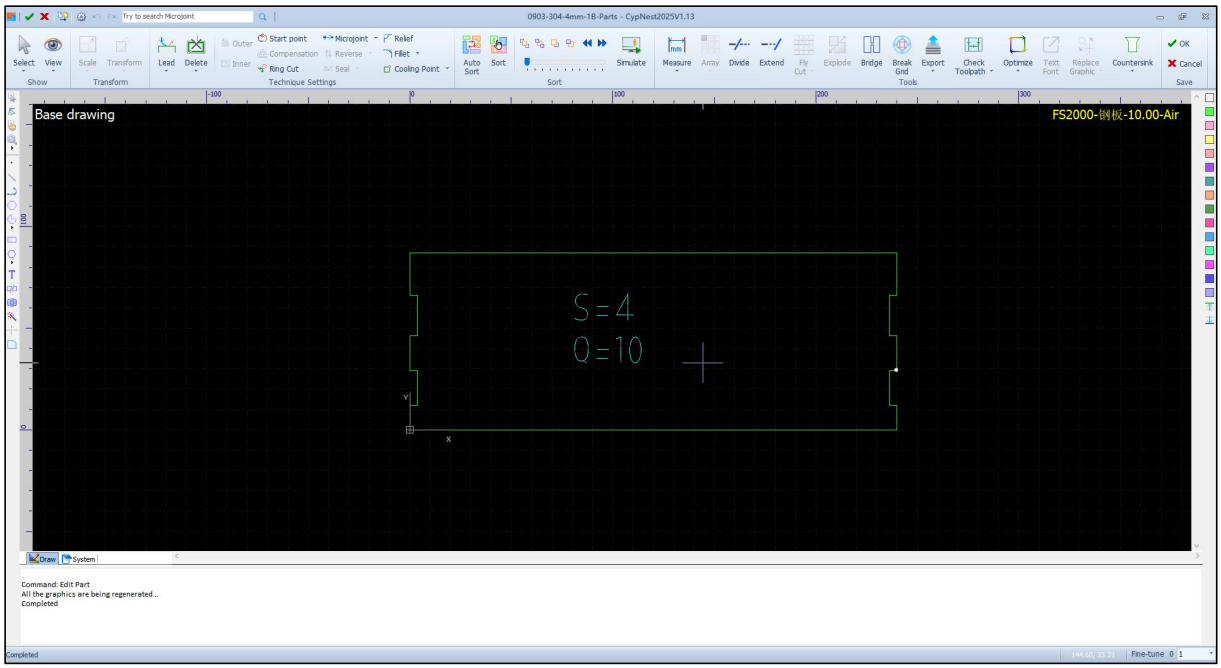


Figure 3-20 Part editing

The part editing interface includes a top toolbar, bottom log bar, left drawing toolbar, and right layer bar. The top toolbar is divided into six sections. For details on the left drawing toolbar, please refer to Drawing Processing. For technique settings and tools, please refer to the corresponding sections: Technique Setting and Tools.

This section focuses on the ***View*** and ***Transform*** tabs.

In the top toolbar, ***View*** offers multiple options for controlling visual effects, as shown below:

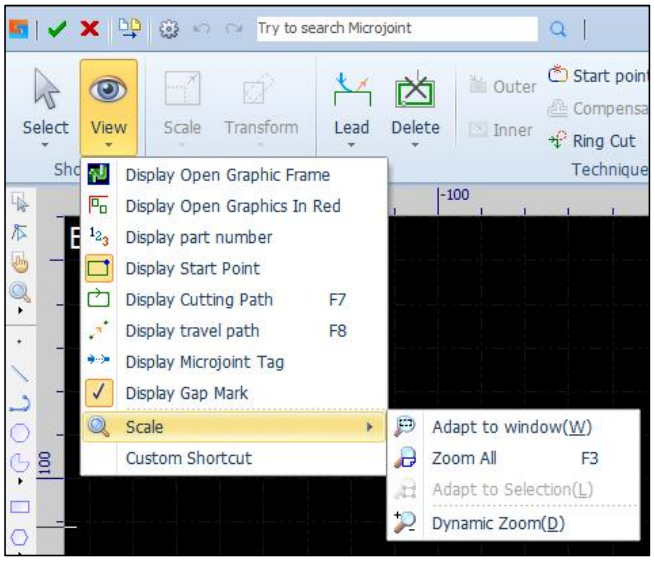


Figure 3-21 View setting

Click any icon to immediately apply the corresponding display effect, which is visible in the drawing panel. A yellow background on the icon indicates it is enabled; otherwise, it is disabled.

CypNest offers a variety of selection methods. The basic method is ***Click to Select*** — clicking on a graphic to select it. Another common method is ***Box Select*** — dragging left to right selects only shapes entirely within the rectangle; dragging right to left selects all shapes intersecting the rectangle.

Click ***Select*** to open the drop-down menu for advanced selection, as shown below.

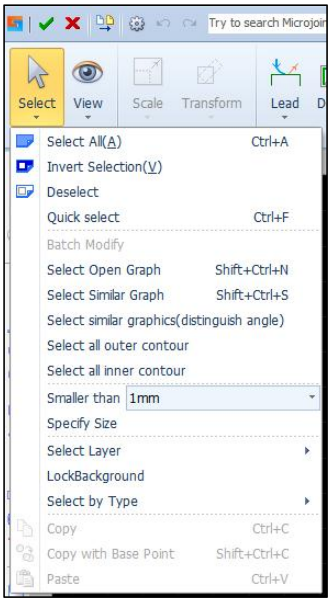


Figure 3-22 Advanced selection

- Quick Select: Press ***Ctrl+F*** to open the ***Quick Selector*** window. Choose the ***Graphic Type***, ***Layer***, ***Graphic Width***, ***Graphic Height***, ***Inner/Outer***, ***Closed or Not***, ***Machining Mode***, etc., then click ***OK*** to select all matching objects.

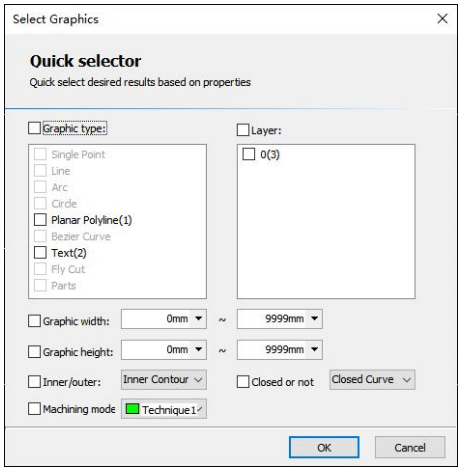


Figure 3-23 Quick selector

- Batch Modify: After selecting a graphic, you can modify all similar graphics in bulk.
- Select Open Graph: In the drawing state, clicking this selects all unclosed shapes.
- Select Similar Graph: Select a closed contour first, then click to select all similar contours in bulk.
- Select by Type: Quickly select all graphics of the same type, such as polylines, circles, Bezier curves, points, and text.

Transform provides a rich set of transformation tools. Select the graphic first, then choose the drop-down options to perform common transformations like ***Flip***, ***Rotate***, ***Align***, ***Dynamic Scale***, etc.

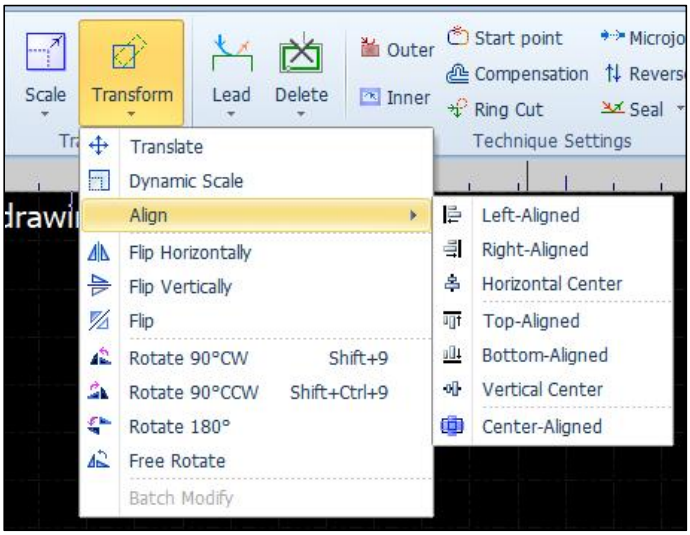


Figure 3-24 Geometric transformation

CypNest also offers 10 quick size transformations under the ***Transform*** drop-down menu for adjusting the size of selected graphics.

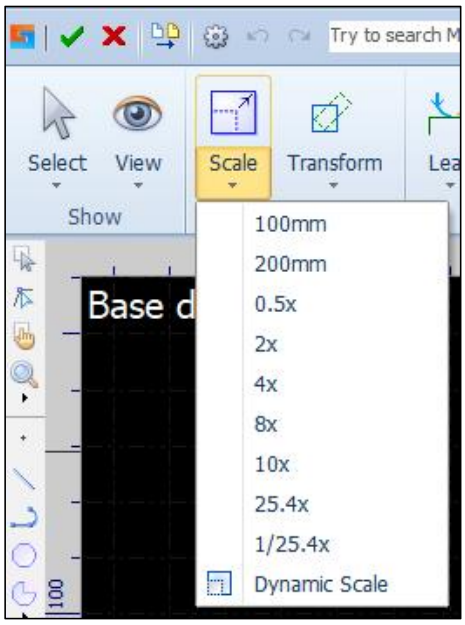


Figure 3-25 Graphic scale transformation

Click ***Scale*** to modify detailed sizes. If the lock icon between width and height is enabled, the aspect ratio is preserved. To enter width and height independently, click the lock icon to disable it.

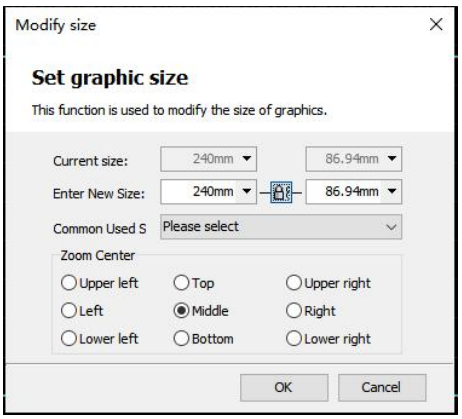


Figure 3-26 Modify graphic sizes

⚠ Notice: Lead-ins, lead-outs, and kerf compensation will not be resized along with the graphic. Their values remain unchanged after size adjustments.

Chapter 4 Nest and Sort

After importing parts, you can begin using the core functions of CypNest: nesting, sorting, and toolpath generation, in preparation for part machining via the cutting software.

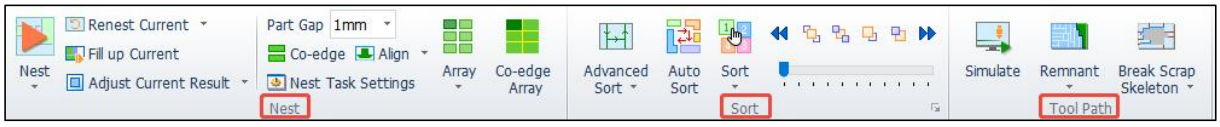


Figure 4-1 Machining Settings

4.1 Nest Pre-Process

Before nesting officially begins, the software provides several preprocessing options for parts, such as quantity modification and rotation. This section details the operations available in the ***Part List*** panel.

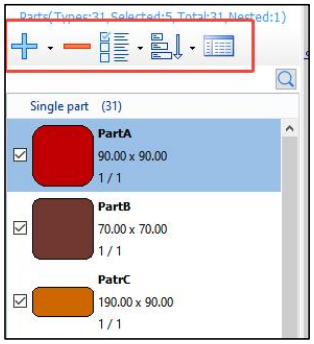


Figure 4-2 Part list

As shown in the figure above, the options within the red box (from left to right) are: ***Add to***, ***Delete Selected Parts***, ***Select Parts***, ***Sort by Adding Sequence***, and ***View Parts Info***.

- Add to: Allows adding parts to the current nesting interface. For detailed instructions, refer to Add Parts.

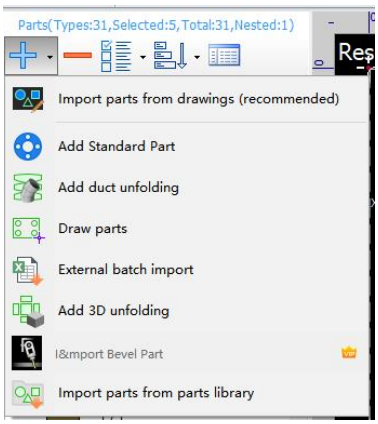


Figure 4-3 Add parts

- Delete Selected Parts: Check the target part and click the minus icon to remove unnested parts directly from the list. If the part has already been used in nesting, after selecting it and clicking the minus icon, the following options are provided:
  - Delete unnested parts: Removes all parts that are not nested.
  - Remove this part: Removes the selected part from the current or all nests. The part will be returned to the list.
  - Remove checked parts: Removes multiple selected parts from the current or all nests.
  - Remove and delete parts from all nested results: Removes the part from the layout and deletes it from the part list.
- Select Parts: Enables efficient part selection based on specific criteria, helping to improve nesting efficiency.

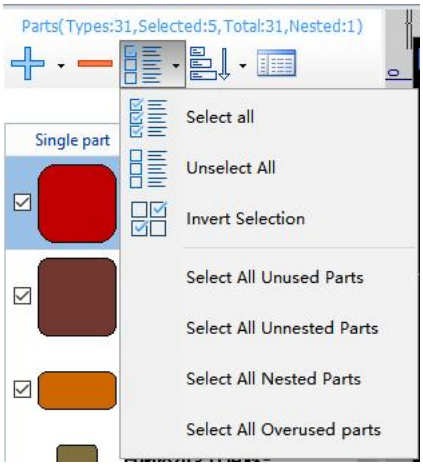


Figure 4-4 Select parts

- Sort by addition order: Sorts the parts in the list as needed, helping to improve selection efficiency. The default order is based on the import sequence. This sorting only affects the list display order and is unrelated to the machining order.

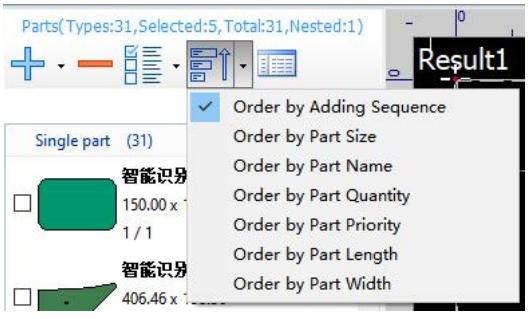


Figure 4-5 Parts sorting

➢ View Parts Information: Opens a secondary window with detailed information for all imported parts. You can configure various part parameters and batch-edit part information, as shown in the figure below.

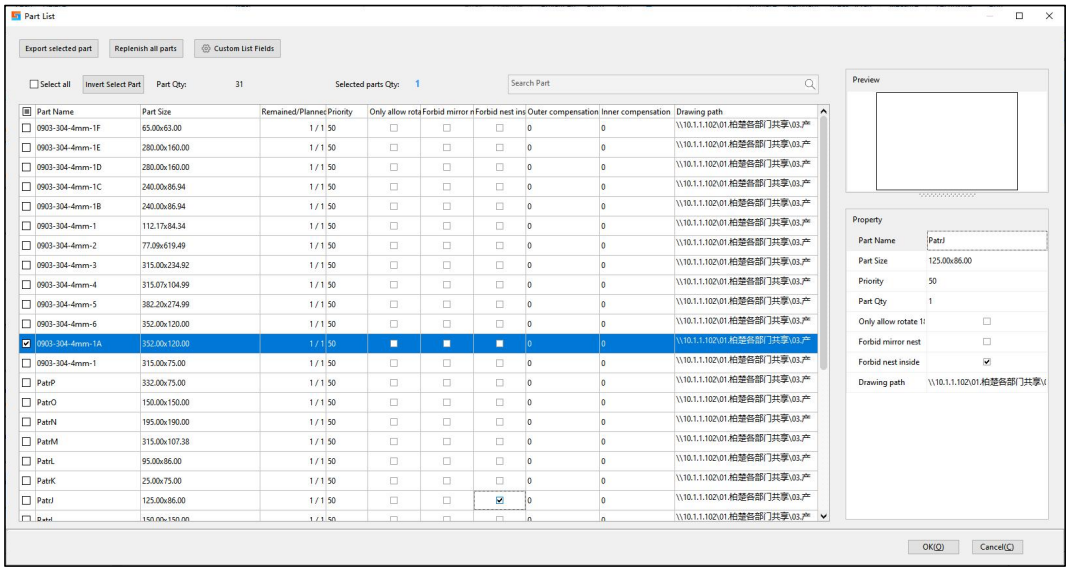


Figure 4-6 Part information

- Export selected part: Exports selected parts individually. Support formats include *.lxds, *.prts, and *.dxf.
- Replenish all parts: Supplements the number of parts that exceeded the originally defined number during nesting.
- Custom List Fields: Customizes the display items and order in the part list, or restores the default display settings.
- Select all/Invert Select Part: Select all parts or all the unchecked ones.
- Priority: Sets the nesting priority of a part. Range: 0 ~ 999 (0 being the highest priority).
- Search Part: Allows part search by ***Part Name***.
- Remained/Planned: ***Planned*** refers to the number of parts specified during import or set manually in the list. ***Remained*** refers to the number of parts left after nesting is completed. You can click the number field to edit the planned quantity.
- Only allow rotate 180°: Limits rotation to 180° only for plates with grain direction (e.g., brushed metals), as these parts may need to retain the grain orientation.
- Forbid mirror nest: Prevents mirrored placement for parts that have front/back side

requirements.

- Forbid nest inside: Prevents parts from being nested inside holes of other parts. This is useful when you want to preserve scrap material inside inner contours.
- Outer/Inner compensation: Refers to the compensation applied to part geometry. These values cannot be edited directly here; they must be configured during part or drawing editing.
- Drawing path: Displays the local path of the part drawing.
- Property & Preview: Displays the preview of the selected part on the right and editable properties on the left. You can modify the part's quantity, name, and priority directly in the property panel, as shown in the figure below.

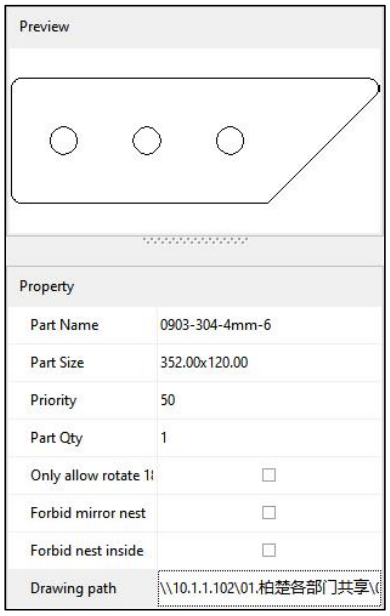


Figure 4-7 Property&preview

- Hide Arranged Part: Hides parts that have already been nested. Available at the bottom-left corner of the ***Part List***.
- Replenish All Parts: Supplements the number of parts that exceeded the originally defined number during nesting. Available at the bottom-right corner of the ***Part List***.

Right-clicking any part brings up a menu of part-specific operations, as shown below.

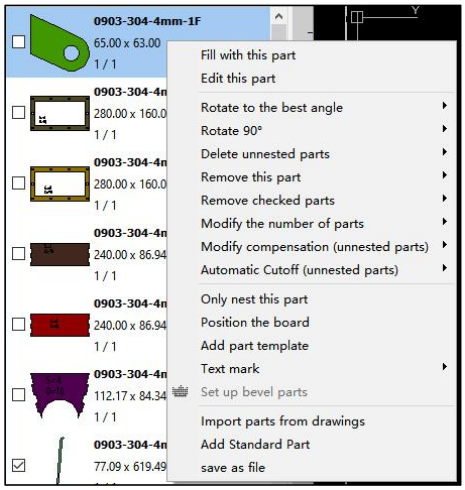


Figure 4-8 Part operation

- Fill with this part: Removes the quantity limit of the part and fills the current plate with the selected part. For detailed parameter settings related to nesting, see Auto Nest.

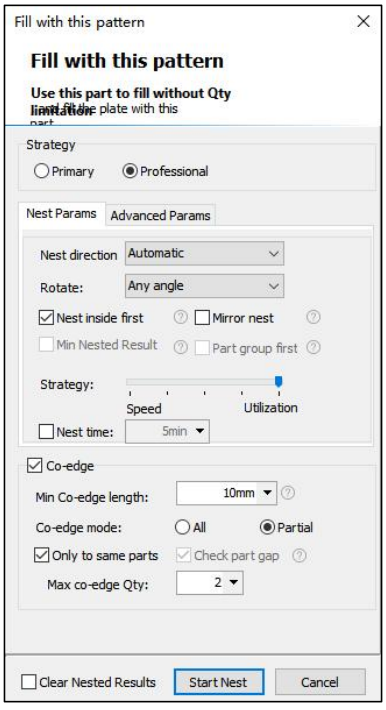


Figure 4-9 Fill

- Edit this part: Opens the ***Edit Part*** interface. For detailed instructions, refer to Part Editing.
- Rotate to the best angle/Rotate 90°: Rotates the selected part(s) to the optimal angle based on the software's algorithm or rotates them by 90°.
- Delete unnested parts: Deletes all parts that have not been nested. You can choose to delete the current part, selected parts, or all parts.

- Remove this part/Remove checked parts: Removes the currently nested part or selected parts from the current plate or from all plates.
- Modify the number of parts: Supports batch modification of part quantities for the current part, selected parts, or all parts in the list. Modification types include ***Increase***, ***Decrease***, ***Multiply***, ***Divide***, or ***Fixed***. Select the desired mode, specify the quantity, and click ***OK*** to apply the change.

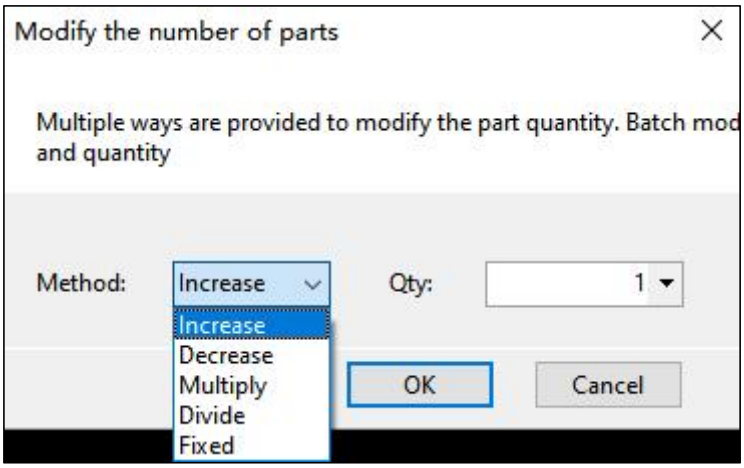


Figure 4-10 Modify the number of parts

- Modify compensation (unnested parts): Supports batch modification of compensation values for the current part, selected parts, or all parts in the list. Adjust values as needed for actual machining. Available for unnested parts only.

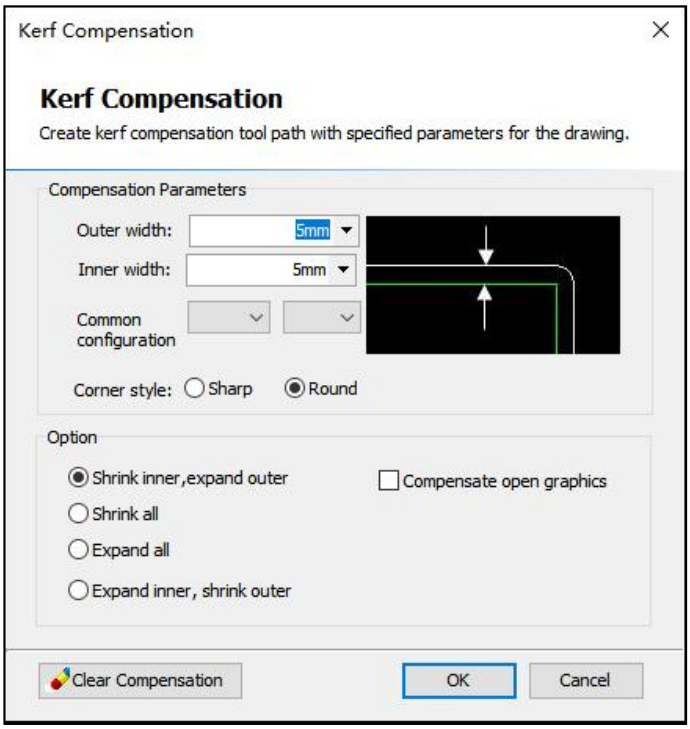


Figure 4-11 Compensation

- Automatic Cut-off (unnested parts): Large parts can be segmented into smaller pieces to improve material utilization. For oversized flanges or rings, the software applies ring/flange segmentation. For other parts, grid-based segmentation is used. Available for unnested parts only.
  - Grid divide parameters: Sets divide interval (ranging 100 ~ 9999 mm, default 800 ~ 1200 mm), select direction, then click ***OK*** to open the ***Edit Cutoff*** page and review the segmentation result. Segmented parts will appear in the part list.
  - Ring/flange cutoff parameters: The ***Number of division*** can be set up to 12. In the ***Edit Cutoff*** page, you can add/delete segmentation axes (up to 24 lines). Click **OK** to confirm. The cutoff result will be shown in the log.

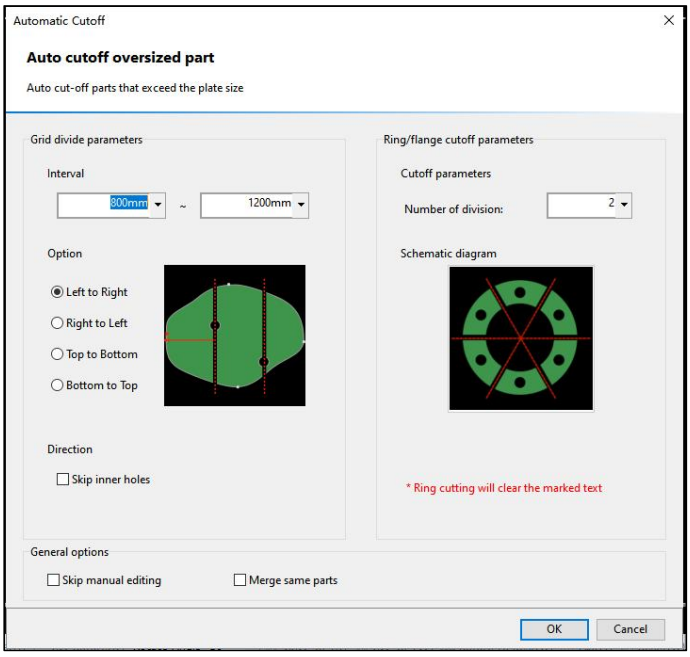


Figure 4-12 Automatic cut-off

- Only nest this part: Opens the ***Auto Nest*** interface for the selected part, and the specific settings can be seen in Auto Nest. After configuration, the software will nest only this part.
- Position the board: When enabled, the system log will indicate in which nests the selected part is used, including quantities. It also highlights the first nest using the part in the ***Nest List***. If the part is nested in multiple nesting result, you can switch between them from the system bar.

- Add part template: Opens the ***SmartDraw***. After drawing, you can define the part size and add constraints or construction lines. Save the generated *.mzb template file to: C:\Program Files\Friendess\CypNest\ScriptShapes, and then it can be imported and used in the standard parts library. For details, see Add New Standard Part.

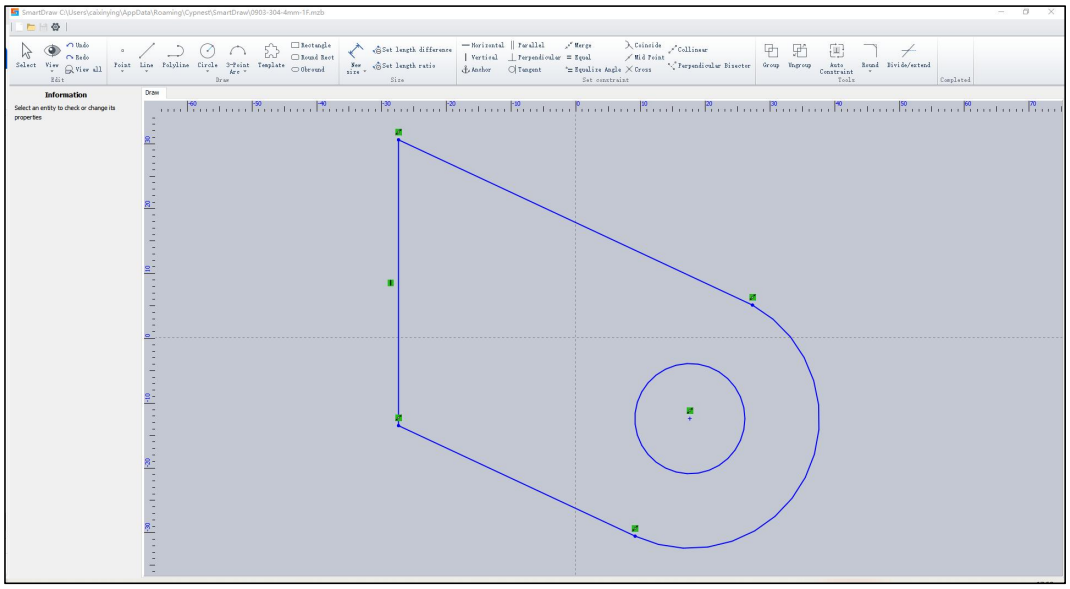


Figure 4-13 Part template

- Text mark: For parts with similar shapes and no identifying marks, this feature automatically adds text labels to distinguish them, improving efficiency and recognition. For more details, see Text Mark Operation Instructions:.

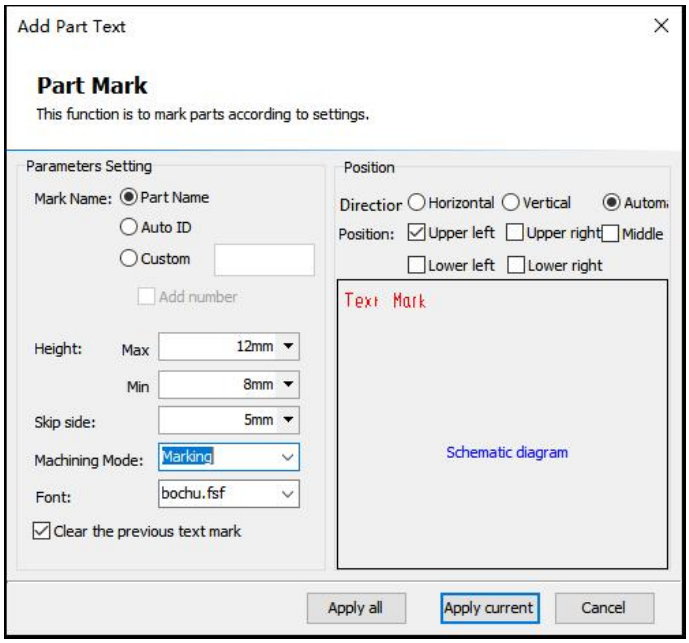


Figure 4-14 Add text mark

- Set up bevel parts: Available for unnested parts only. Once selected, the bevel plug-in interface opens.

For operation details, refer to Bevel Nest.

- Import Parts from Drawings: For operation details, refer to Import Parts from Drawings.
- Add Standard Parts: For operation details, refer to Add Standard Parts.
- Save as File: Exports the selected part. Supported formats: *.prts, *.lxds.

4.2 Auto Nest

Auto nest is a core feature of CypNest that automatically optimizes layout to minimize material waste. This section provides an explanation of the auto-nest parameters.

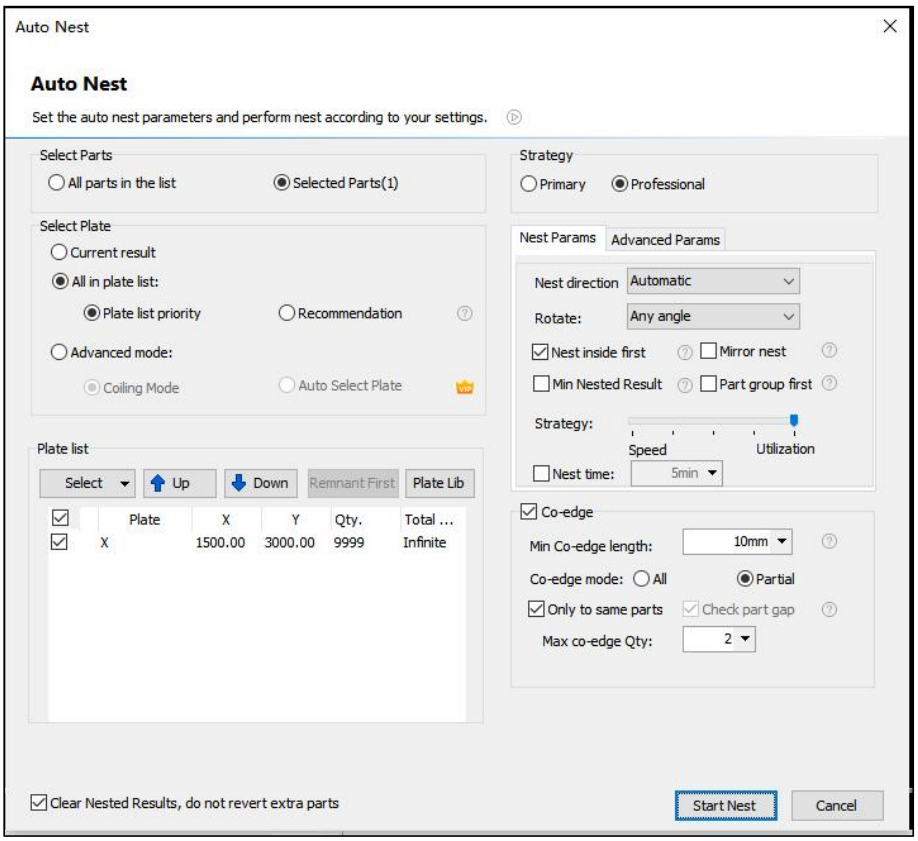


Figure 4-15 Auto nest

First, select the parts and plates to be used. You can choose either selected parts in the list or all parts for nesting. The plate list displays all available plates along with their dimensions, available quantities, and total quantities. The order of plates can be adjusted. Key parameter descriptions:

- Current: When selected, operations only apply to the current nest and do not affect other nested reults or those in the plate library.
- Plate list priority: Uses plates from top to bottom based on their order in the list.

- Recommendation: Ignores the ***Nest List*** order and automatically selects the most suitable plate for nesting to maximize material utilization.
- Coiling Mode: For coil stock usage. When enabled, you need to fill in the ***Coil Width*** and ***Max Length*** (i.e., the ***Machine working range***) and ***Margin***, and the ***Cut off mode*** supports ***Line cutoff*** and ***Border contour cut***.
- Auto Select Plate: Automatically calculates the most suitable plate size based on part shapes to maximize material utilization. This feature is designed for pre-nesting scenarios, and requires the Kaiping nesting pack.

Setting basic nest parameters. CypNest provides primary and professional strategies, and it is recommended to use the professional one. ***Min Nested Result***, ***Part group first***, and ***Nest time*** are not available for the primary strategy.

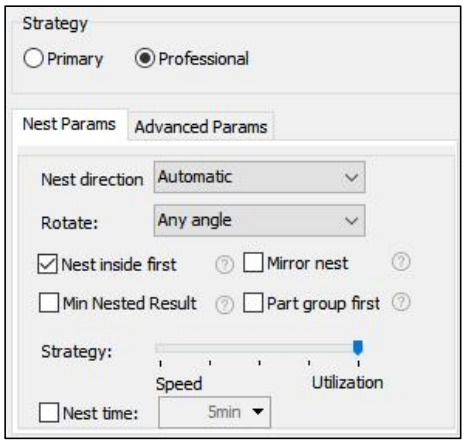


Figure 4-16 Nest parameter

- Nest Direction: Defines the general placement direction of parts. Options:
  - Automatic: Automatically chooses between horizontal or vertical based on part shapes.
  - Horizontal: Arranges parts from left to right.
  - Vertical: Arranges parts from top to bottom.
- Rotate: Sets allowed part rotation during nesting. Options include any angle, 90°, 180°, or no rotation.
- Nest inside first: Prioritizes placing small parts inside cutouts of larger parts to reduce waste, and then nests the parts on the plate when the large parts can not be inserted into the inner contour.

- Mirror nest: Allows mirrored placement (not suitable for parts with front/back side requirements).
- Min Nest Result: Minimizes the number of different nesting patterns to simplify sorting.
- Part group first: Prioritizes the use of parts groups for sorting. Applies to sets of parts grouped together (need to manually group parts first).
- Strategy: Dragging the bar closer to ***Speed*** reduces calculation time, suitable for regular-shaped sheet metal parts. Dragging the bar closer to ***Utilization*** prioritizes optimal material use, better for irregular shapes.
- Nest Time: When enabled, the software continues calculating within the set time limit to find the optimal nest result.

If you need to perform co-edge in the nest, you can check ***Co-edge***. The ***Auto Nest*** will follow the co-edge parameter setting to apply co-edge in the nest result.

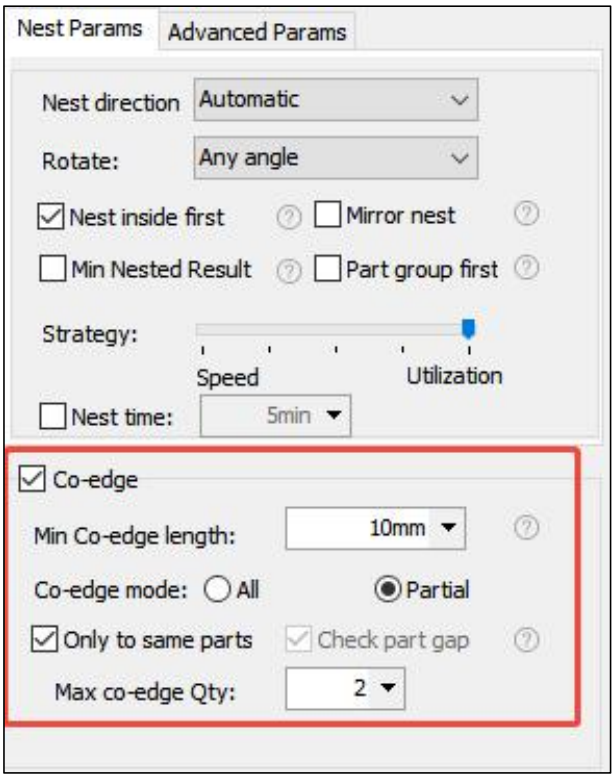


Figure 4-17 Nest parameter: enable co-edge

- Min Co-edge Length: Only edges longer than the specified value are considered for co-edge.
- Co-edge Mode: When selecting ***All***, any two edges longer than the ***Min Co-edge Length*** will be considered for co-edge cutting. When selecting ***Partial***, the number of co-edged parts cannot exceed ***Max Co-edge Qty***.

- Only to same parts: Only allows co-edge nesting between identical edges of identical parts.
- Check part gap: When ***All*** is selected, this option ensures minimum spacing between non-co-edged parts is maintained. If unchecked, the system may allow zero spacing between parts where co-edge rules don't apply.
- Max Co-edge Num: Limits the number of parts involved in ***Partial*** co-edge nest.

There are also advanced parameters for the nest, and here are the descriptions:

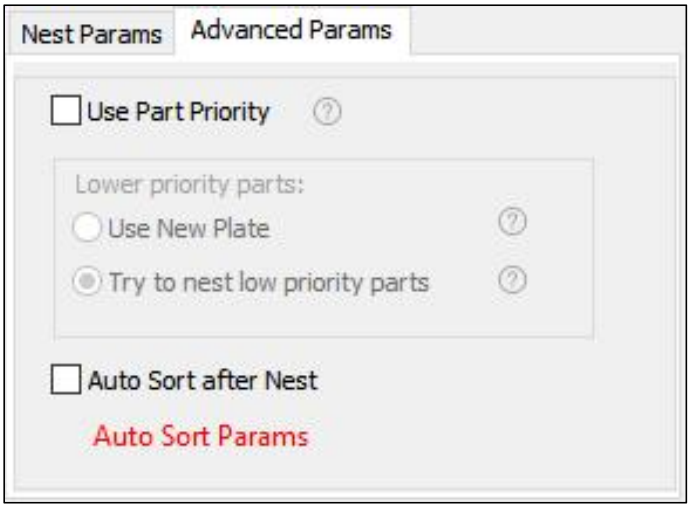


Figure 4-18 Nest parameter: advanced parameters

- Use Part Priority: When enabled, parts are nested based on the priority set in the part list. Lower-priority parts can be handled in two ways:
  - Use New Plate: Low-priority parts will use new plates even if the current one has space. This avoids mixing different priority levels but may reduce utilization.
  - Try to nest low priority parts: Attempts to nest low-priority parts into plates already used by high-priority parts before moving to new ones, improving utilization.
- Auto Sort after Nest: When enabled, CypNest will automatically sort nested layouts based on the sorting parameters set. For sorting parameter settings, refer to Auto Sort.

After setting all parameters, click ***Start Nest*** to begin. Once the auto nest is completed, you can perform auto-sort on the nesting results. For more details, see Auto Sort.

4.2.1 Region Nest and Nest in Non-remnant Area

To achieve optimal nesting results, large parts may be nested first, followed by smaller parts being filled into the gaps for local optimization. When there are many types of small parts and you want to nest them into a specific area, use ***Region Nest*** to designate a region within the current plate and nest small parts into it.

Go to the drop-down list of ***Auto Nest*** and click ***Region Nest***. In the pop-up window, configure the parameters for ***Region Nest***, whose configuration is similar to Auto Nest.

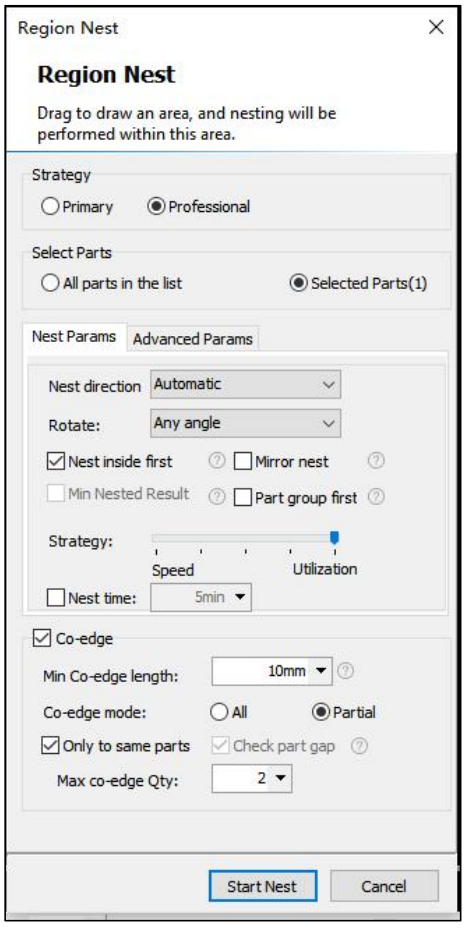


Figure 4-19 Region nest

Click ***Start Nest***, then click on the target area and drag the mouse to draw a rectangular box. Click again to finish the drawing. The software will automatically nest parts into the selected area.

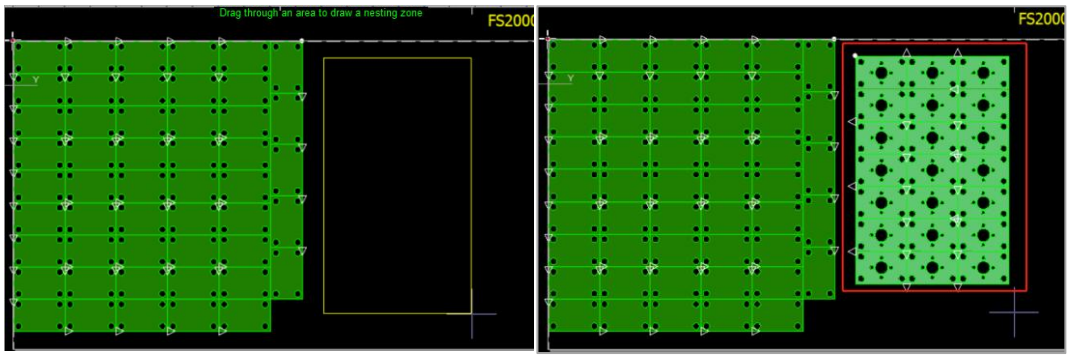


Figure 4-20 Region nest

Nest in Non-remnant Area is applied to the case that the remnant line has been added. If there is still room in the non-remnant area, small parts can be nested into the non-remnant area of all the nesting to improve the utilization rate. Go to the drop-down list of ***Auto Nest*** and click ***Nest in Non-remnant Area***. Set the relevant parameters to auto-nest in the non-remnant area.

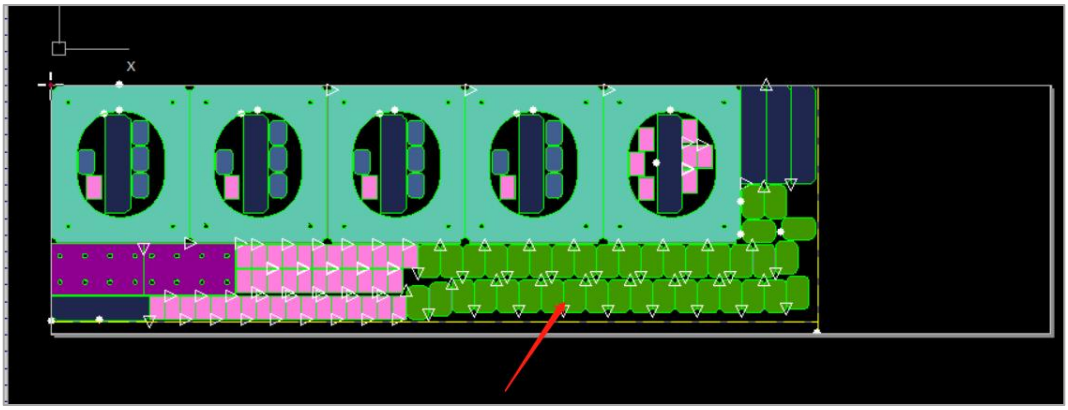


Figure 4-21 Nest in non-remnant area

4.2.2 Renest Current/Fill up Current/Adjust Current Result

After auto nest, you can further optimize the result using re-nest, fill up, or adjust functions.

If you're dissatisfied with certain nesting results but do not want to modify other nesting results, click ***Renest Current***. You can also select a plate, open the drop-down list of[***Renest Current***, and select ***Renest Selected*** or ***Renest All***. Set nesting parameters and click ***Renest*** to proceed.

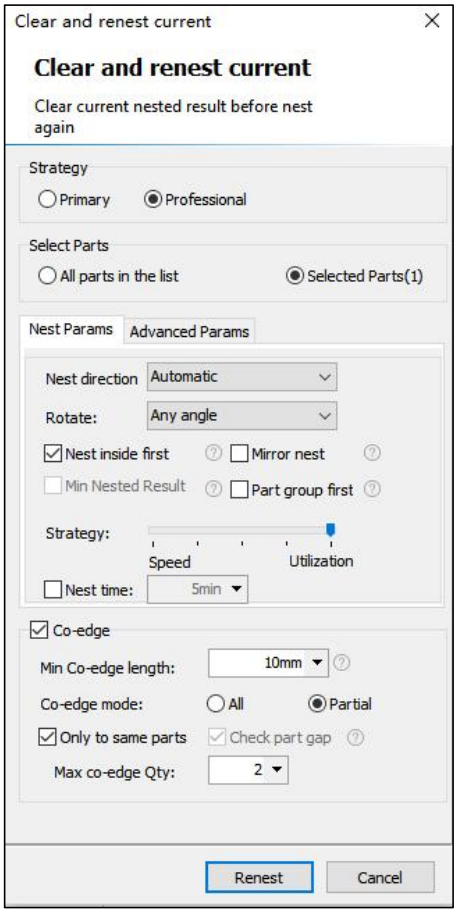


Figure 4-22 Renest current

If large parts have already been nested and you wish to fill in small parts without affecting the existing layout, use ***Fill up Current***.

After large part nesting, check the small parts you want to fill. Click ***Fill up Current***. Set the nesting parameters and click ***Continue Nest*** to automatically fill small parts into the current nesting layout.

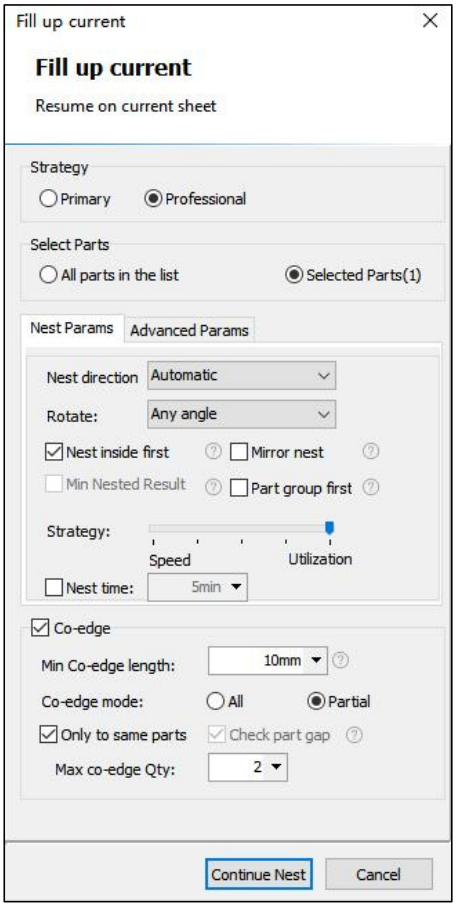


Figure 4-23 Fill up current

CypNest also provides an ***Adjust Current Result*** function to fine-tune part placement based on the current nesting result for better optimization. Select the target plate, check the adjustment options, and click ***Adjust Result*** to auto-adjust the nesting layout.

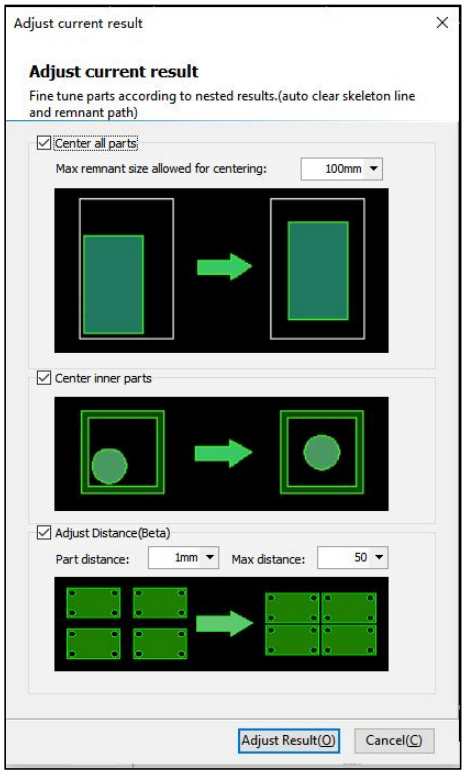


Figure 4-24 Adjust current result

- Center All Parts: When no more parts can be nested and the leftover material is too small to reuse, centering the layout helps increase the edge margin and distribute parts evenly, making the skeleton more stable for skeleton cutting. The maximum allowable centering remnant size must be larger than the distance between the part and the plate edge; otherwise, this function will not take effect.
- Center Inner Parts: When there are nested parts within other parts, adjusting for even distribution helps prevent part damage.
- Adjust Distance(Beta): When the kerf width is too wide after cutting and re-nesting is inconvenient, use this option to adjust the spacing between already-nested parts more easily.

4.3 Manual Nest

Manual nest allows you to drag parts from the parts list directly into the nesting area or to select parts on the plate for manual adjustment.

When a part is attached to the cursor, you can perform operations such as ***Rotate***, ***Mirror***, and ***Co-Edge***. When a part on the nesting layout is selected, enabling ***Fine-tune*** allows you to move the part using arrow keys based on the defined distance. If ***Fine-tune*** is disabled, pressing the arrow keys will quickly snap the part to the plate edge.

Right-click and select ***Manual Nest Params*** to enable ***Auto Attach***, set the ***Attach Radius***, and other options. For more shortcut keys and practical tips, see Manual Nesting Shortcuts and Manual Nesting Tips.

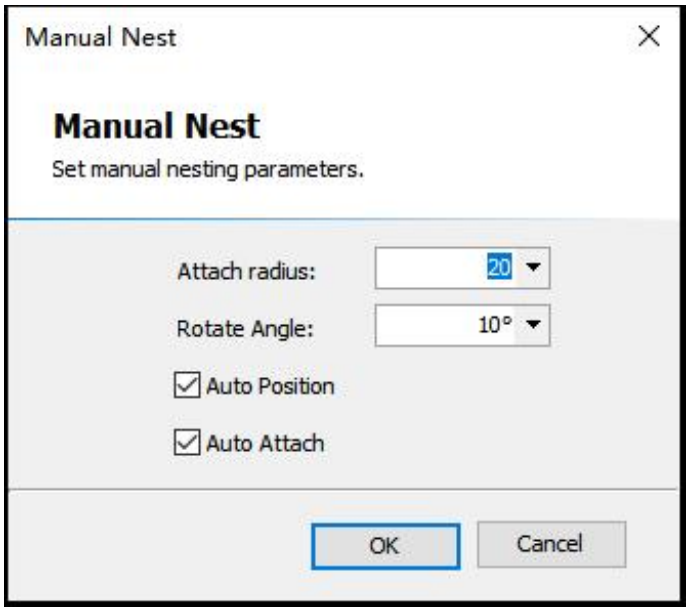


Figure 4-25 Manual nest parameter

4.3.1 Array

Used for quickly duplicating parts. Nest the selected parts in the form of an array. The software provides two types of array nesting for selected parts: ***Dynamic Array*** and ***Parametric*** array.

- Dynamic Array: Uses mouse to control the array layout. Press ***Ctrl+D*** to generate.
- Parametric: Automatically generates the array based on a defined number of rows, columns, and directions.

After selecting a part, open the ***Array*** drop-down menu and configure the array parameters based on whether to limit the part count. For a parametric array, parameter setting is not required.

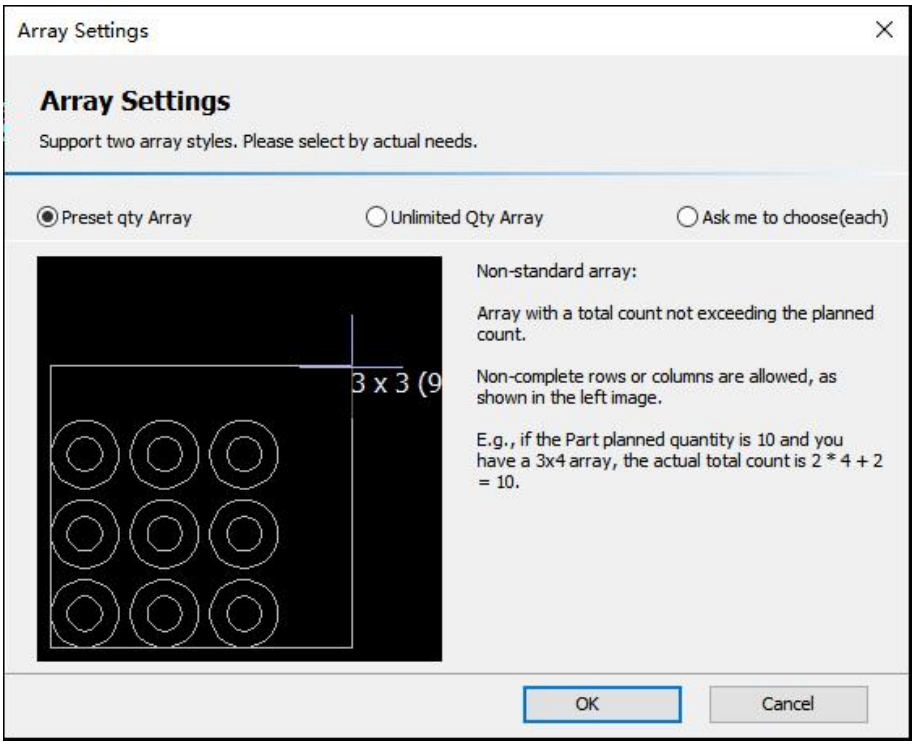


Figure 4-26 Array setting

Click ***Array***. Choose an array type as needed and set the corresponding parameters.

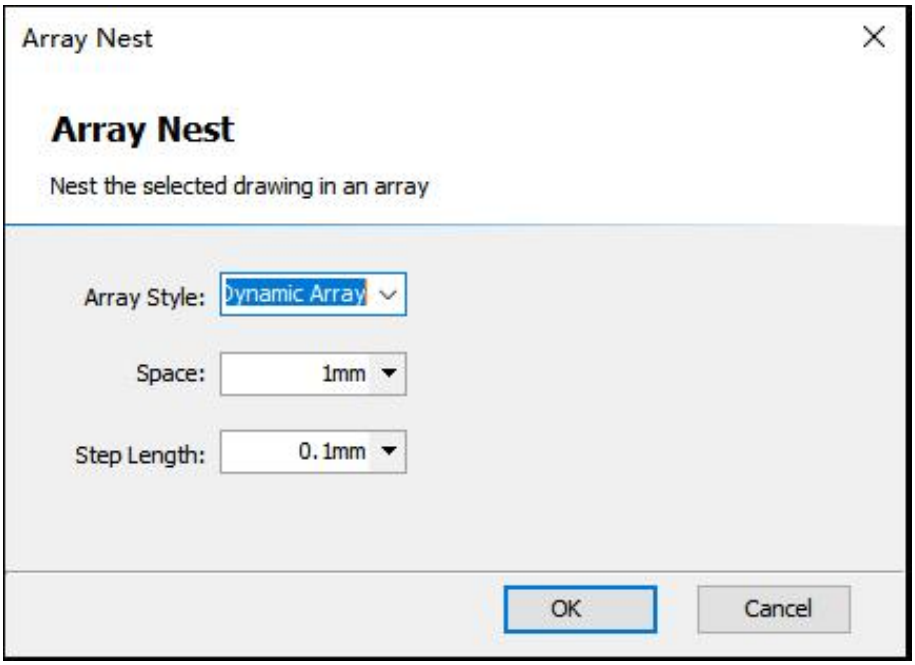


Figure 4-27 Array nest

4.3.2 Co-edge Array

Nests the selected part using ***Array***, with co-edge processing applied. This function does not support multiple parts at once. However, you can apply this function to co-edged groups.

After selecting a part, click ***Co-edge Array*** in the ***Nest*** toolbar to open the parameter window.

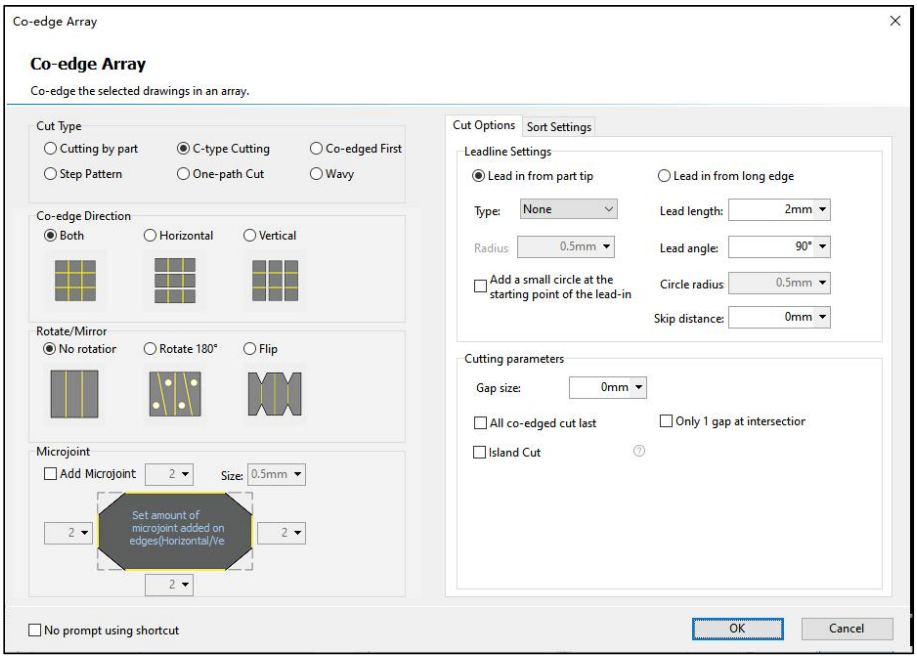


Figure 4-28 Co-edge array

Parameters of ***Co-edge Array*** are described as follows:

- Cut type:
  - Step Pattern: Cuts layer by layer in a stair-step pattern to reduce travels and piercing times.
  - One-path Cut: Suitable for triangular parts with shared edges.
  - Wavy: Recommended for mirrored parallelograms and rectangular parts.

For more details on cutting methods, refer to Generate Co-edged Toolpath.

- Cutting parameters:
  - Cut Sequence: ***S-shape*** means cutting in an s-shaped path, ***1-way*** means cutting in a single consistent direction.
  - Base plate last: The remaining material is referred to as baseplate (see red box below). When this option is enabled, the software prioritizes cutting toolpaths near the plate edge or previously cut parts and cuts those near the base plate last to reduce thermal deformation.

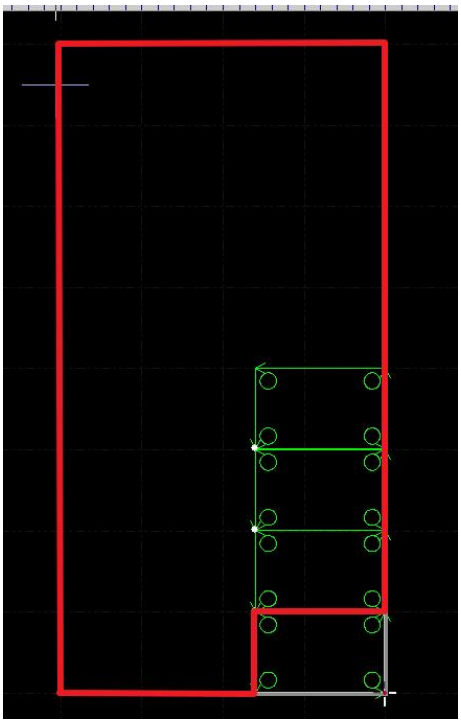


Figure 4-29 Baseplate

  - More parameter explanations can be found in Generate Co-edged Toolpath.
- Sort Settings: See descriptions in Auto Sort.

4.4 Auto Sort

After nesting is completed, use ***Sort*** to define the cutting order and co-edge toolpath for the nested layout.

Click ***Auto Sort*** to open the ***Auto Sort*** window, which consists of three sections: ***By-part Sort/In-part Sort***, ***Create Co-edged Toolpath***, and ***Advanced Params***.

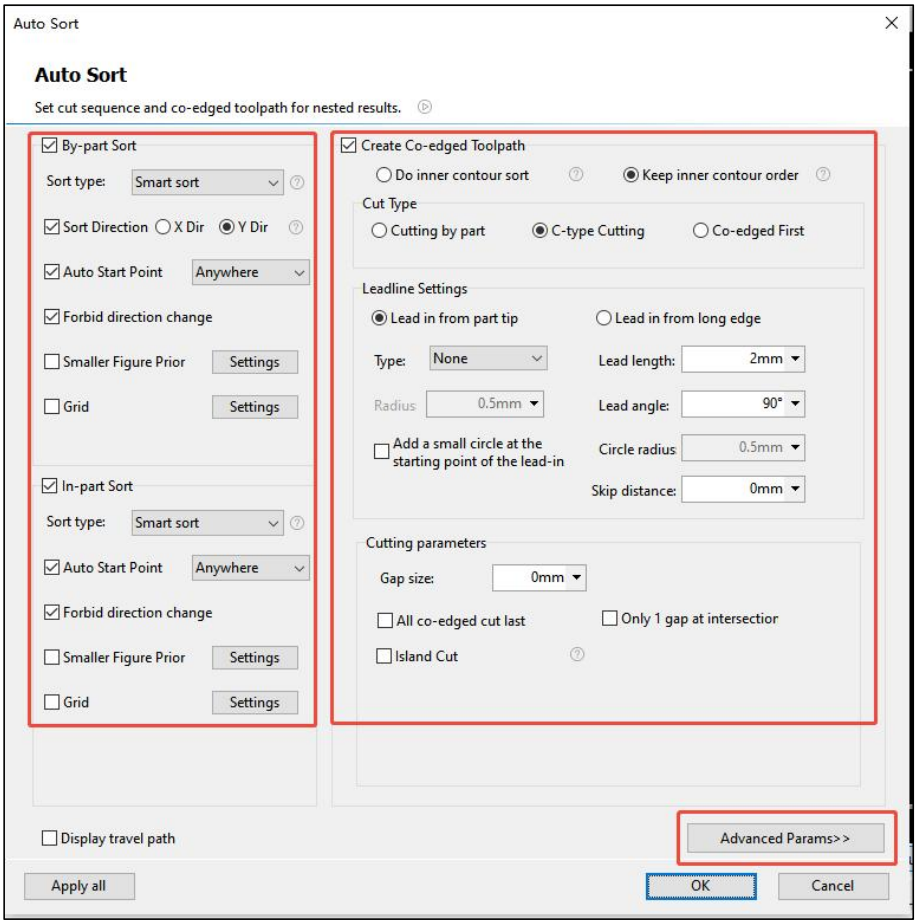


Figure 4-30 Auto sort page

4.4.1 Part sort

By-part Sort and ***In-part Sort*** apply to layouts without co-edged cutting. These options define the cutting sequence between parts, within parts, and between parts and co-edged groups. Parameter description for ***Auto Sort***:

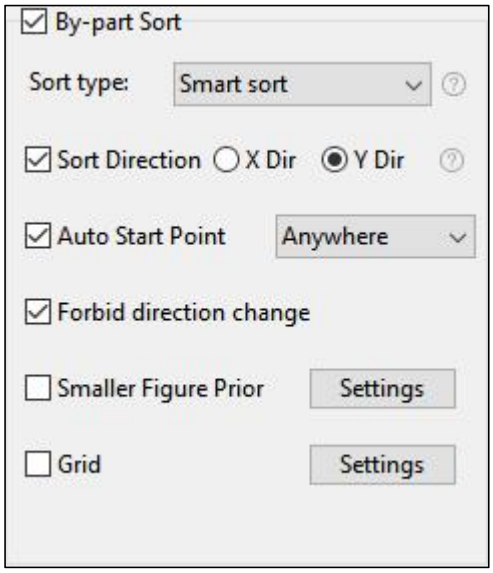


Figure 4-31 By-part sort

- Smart Sort: Automatically allocates the optimal cutting path based on zero reference positions and part arrangement. When enabled, you must select the sorting direction as either X or Y.
- Heat Dissipation: Suitable for parts with dense holes. Supports regional sorting to prevent material warping caused by heat distortion.
- Auto Start Point: Automatically optimizes the start point for inner and outer contours during sorting.
- Forbid Direction Change: When checked, keeps the originally set cutting direction; otherwise, the system may optimize it.
- Smaller Figure Prior: Ideal for layouts with mixed part sizes. Prioritizes smaller parts to avoid material deformation caused by cutting large shapes affecting subsequent cuts.
- Grid: Divides the entire plate into regions based on ***Width***, ***Path,*** and ***Dir*** in the grid setting. The path between grids can be ***S shape*** or ***1-Way***.
  - Path: ***S shape*** means the cutting follows an s-shaped path across adjacent regions, whose start points are on opposite sides, and the path only applies to smart sorting. ***1-Way*** means the cutting starts from the same position in each region and proceeds in a single direction.

- Jump Cut: When enabled, the divided regions are alternately selected for cutting according to the set parameters.

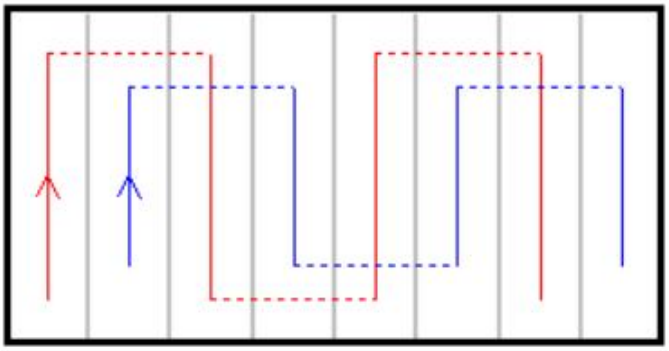


Figure 4-32 Vertical jump cut with s shape

- Skeleton Line Applied: Determines whether skeleton lines participate in grid partitioning. When unchecked, skeleton lines are independent of parts; only parts are placed within grid regions. When checked, skeleton lines are also cut region by region according to the grid order.

4.4.2 Generate Co-edged Toolpath

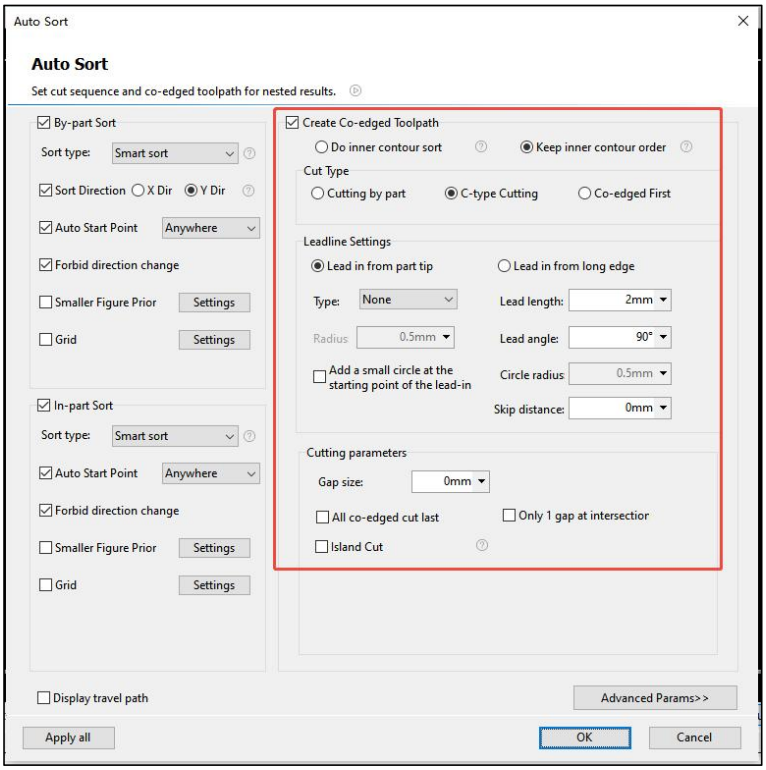


Figure 4-33 AutoSort Param - Co-edged Toolpath

- Do inner contour sort: Sorts the inner contours of co-edged parts according to the ***In-part Sort*** settings.

- Keep inner contour order: Keeps the original cutting sequence of the inner contours in co-edged parts.
- Co-edged Toolpath Cut type:
  - Cutting by part: Cuts each part's inner holes first, then its outer profile. The shared edge is cut only once during the process.

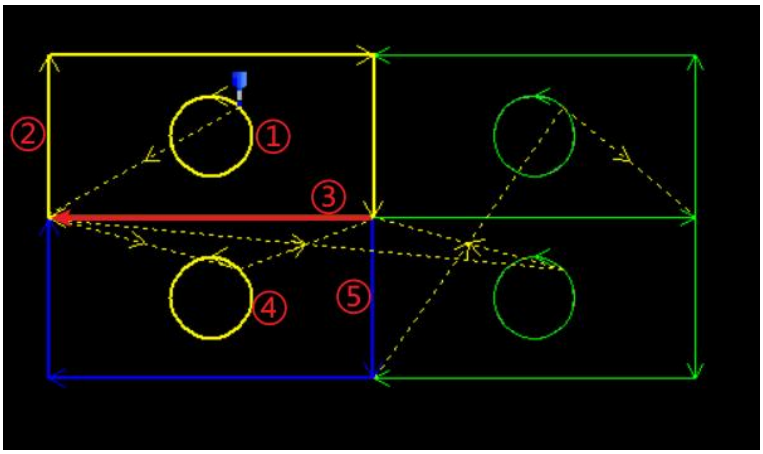


Figure 4-34 Cutting by part Tool Path

  - C-type cutting: Cuts the inner holes and three edges of Part 1 first. The shared edge with Part 2 is cut when cutting Part 2. This function is effective for rectangular parts, and helps to avoid head collisions and vibration.

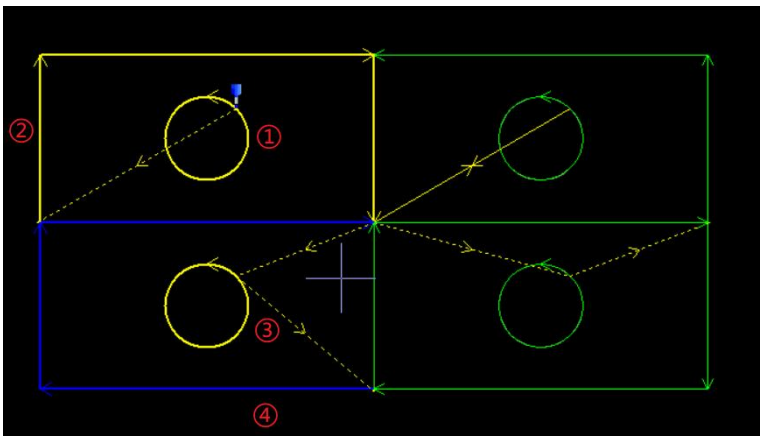


Figure 4-35 C-type cutting

- Co-edged first: First cut all inner holes, then all shared edges, and finally all outer contours.

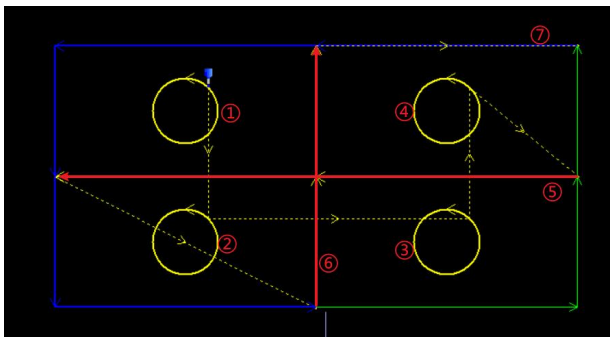


Figure 4-36 Co-edged first

- Lead parameters: For parameter descriptions, see Lead.
- Cutting Parameters:
  - Over Cut Distance: When cutting the outer contour of the first part, the cutting continues into the adjacent part's contour by a set distance.
  - Laser on Distance: When beginning to cut the second part, the head passes through the previously overcut path. This distance is defined by the ***Laser on Distance*** parameter.
  - Over cut path cut once: When returning to continue cutting the first part after overcutting, defines whether the laser remains on during the return path.
  - Gap Size: Defines the distance between the start and end points of the cutting path and the contours.
  - Island Over Cut: Cuts the entire waste region formed by the outer contours of co-edged parts in a single pass (may result in incorrect contour order for nested parts).
  - Island overcut: Adds overcut at island areas. Only available when cut type is set as ***Cutting by Part*** or ***Co-edged First***.

4.4.3 Advanced Params

Click the ***Advanced Params*** button at the bottom right of the ***Auto Sort*** window to open the ***Advanced Params*** page.

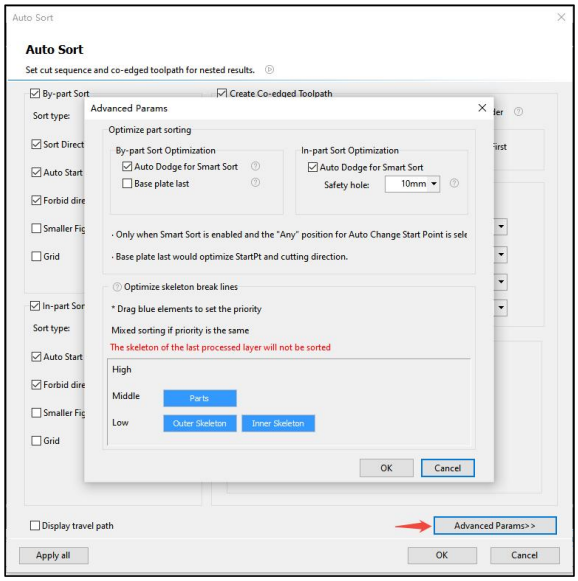


Figure 4-37 Auto sort - advanced parameter

- Auto Dodge for Smart Sort: Prevents the cutting head from passing through already-cut areas to avoid collisions. This function is only effective when ***Smart Sort*** is enabled and ***Auto Start Point*** is set as ***Anywhere***. To achieve the dodge of inner holes in co-edge grouped parts, ***Do inner contour sort*** must also be enabled under the co-edged toolpath.

- Base plate last: In nesting, the leftover material is referred to as the base plate. Optimize the start point and cutting direction of the outer contour of the part based on the results of the by-part sorting. Cut paths that are closer to the edge of the plate and finish parts first. Cut paths that are closer to the base plate later to minimize the impact of thermal deformation.

- Safety hole: Sets a threshold below which small holes are ignored during obstacle avoidance in smart sorting.

- Optimize skeleton break lines: Allows you to drag and arrange blue labels to set the priority (high, medium, low) for sorting toolpaths of parts and inner/outer skeleton lines. When enabled, skeleton lines will participate in sorting along with the parts. For more information on skeleton line layer settings, refer to Break Scrap Skeleton.

⚠ Notice: To sort the skeleton line layer, it cannot be set as ***Cut last***.

4.5 Manual Sort

Manually adjust the processing sequence of parts based on production needs or equipment characteristics. For parts with irregular shapes or special processing requirements, manual sort ensures that they are processed in a specified sequence.

This function is only applicable to non-co-edged parts.

⚠ Notice: A co-edge group is treated as a single part during sorting. The cutting sequence of individual parts within a co-edge group cannot be adjusted using manual sort. To edit the sequence within a common-edge group, refer to Generate Co-edged Toolpath.

Manual sort supports both by-part and in-part sort, and the operations for both are essentially the same. Click ***Sort*** → ***By-part Sort*** to open the manual sort interface, which consists of three main sections: sort tools, sort actions, and display options.

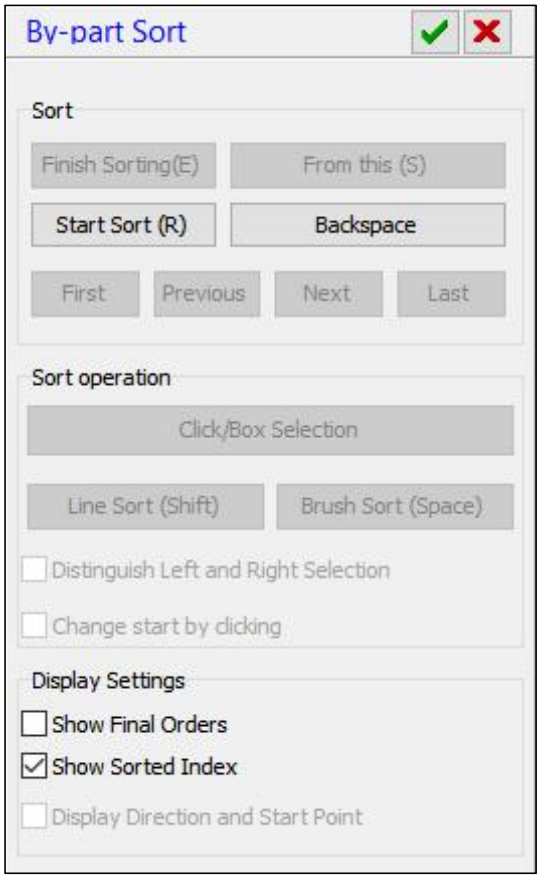


Figure 4-38 Sort: by-part Sort

After entering the ***By-part Sort*** interface, parts in the layout are shown in green. At this stage, any sorting action will not take effect. To activate sorting, click ***Start Sort*** from the left panel—parts will turn gray, and sort operations will take effect.

CypNest provides three sorting options: ***Click/Box Selection***, ***Line Sort***, ***Brush Sort***.

- Copy Sort Results: For in-part sort, you can copy the sorting result from identical parts, the current part, or parts with the same rotation angle.
- Click Selection: Click parts one by one to define the cutting sequence. The click order determines the processing order.
- Box Selection: Set the ***Box Selection Sort Params*** first, then drag to select parts. The sort sequence of selected parts is determined by ***Box Selection Sort Params***.
- Line Sort (Shift): Select the first part in the layout, then click ***Line Sort*** in the left panel. Hold the ***Shift*** key and drag the mouse on the layout— a yellow line connects the first selected part and your cursor. Click the target location to finalize the polyline. The sort order follows the sequence in which the yellow line intersects the parts.

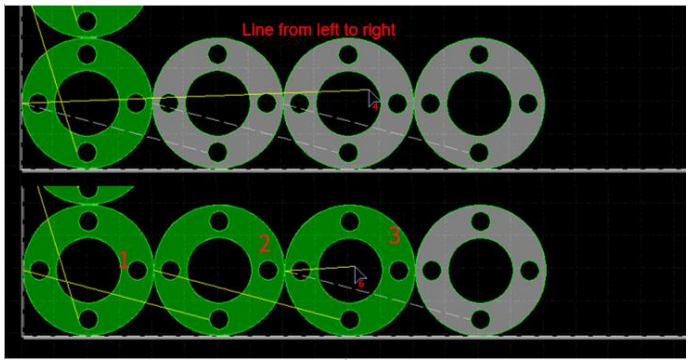


Figure 4-39 Line sort

- Brush Sort (Space): After enabling brush sort, hold the ***Spacebar*** and move the mouse. The cutting sequence is determined by the order in which the mouse passes over the parts.

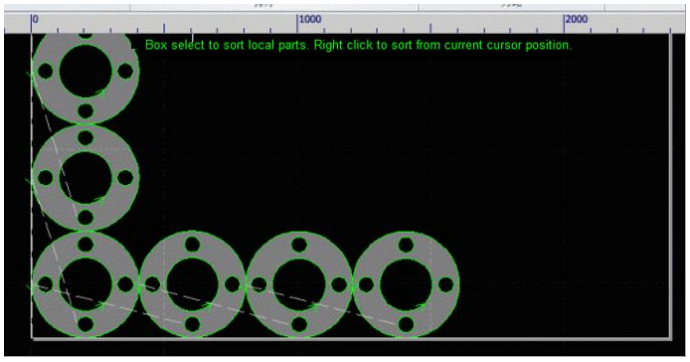


Figure 4-40 Brush sort

To fine-tune the by-part sort, you can insert sort points manually. Select a single-part contour—once selected, it will appear in blue. Right-click and choose ***Adjust Order***, enter the sequence number, and

press ***Enter*** to confirm. Alternatively, drag the selected part to another position in the layout to adjust its sequence.

There are also some display settings. Enable or disable display options based on your needs.

- Show Final Orders: Displays the order between unsorted parts.
- Show Sorted Index: Displays sequence numbers for already sorted parts.
- Display Direction and Start Point: Displays direction and start point (only available for by-part sort).

4.6 **Toolpath**

4.6.1 Edit Co-edged Toolpath

For individual parts, the ***Co-edge Array*** can be used to set up co-edged toolpaths. If the parts are already aligned for common-edge cutting but the combination is relatively complex and cannot be handled well by auto sorting, the ***Edit Co-edged Toolpath*** function allows you to manually edit the toolpath for that specific combination.

Double-click the co-edged group to enter the ***Edit Co-edged Toolpath*** interface. You must first explode and join segments to the toolpath, then use ***Manual Sort*** to generate the toolpath for the group.

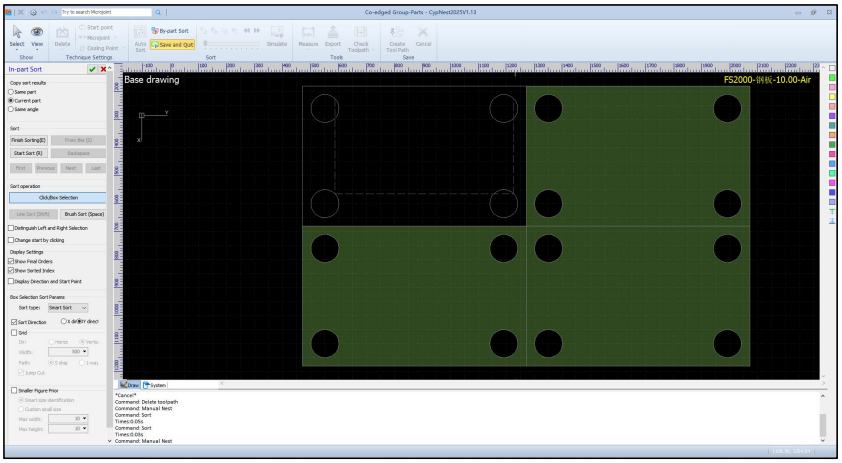


Figure 4-41 Edit Co-edged Toolpath—Manual Sort

You can also click ***Delete Toolpath***, and then select ***Auto Sort*** to define the cutting sequence among parts in the co-edged group. After sorting is completed, click ***Create Tool Path*** and set parameters to regenerate the toolpath for the group.

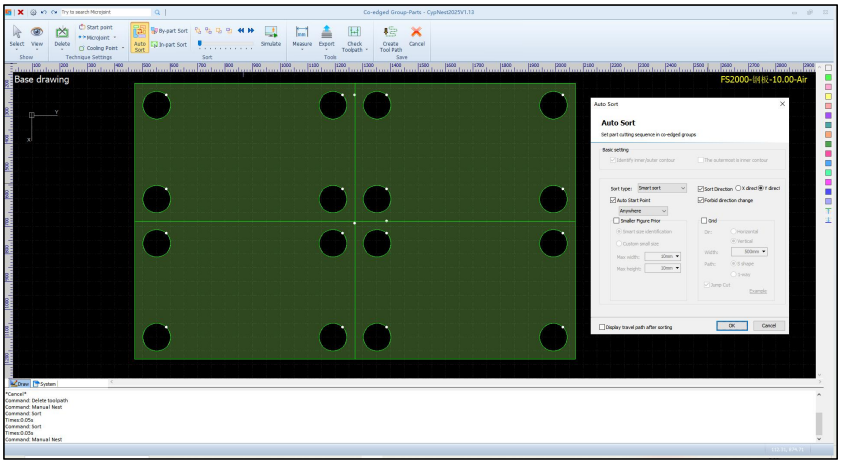


Figure 4-42 Edit Co-edged Toolpath—Auto Sort

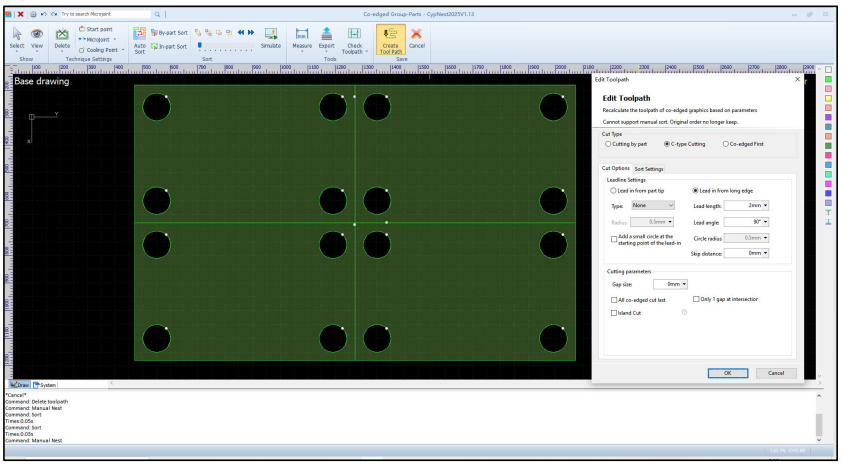


Figure 4-43 Edit Co-edged Toolpath—Create Tool Path

4.6.2 Advanced Sort State

This applies to complex nesting scenarios where co-edged groups coexist with individual parts or nested parts. If co-edged groups are cut first, followed by small or nested parts, deformation of the plate may cause the smaller parts to be scrapped.

In ***Advanced Sort*** state, common-edge groups are not treated as a whole for sorting. Instead, the group is split into individual parts for sorting and process assignments one by one. This allows for the cutting of small inner parts first, followed by larger ones, minimizing scrap risks.

Click ***Advanced Sort*** to reassign lead, cutting parameters, and inner contour sorting in the ***Edit Toolpath*** interface.

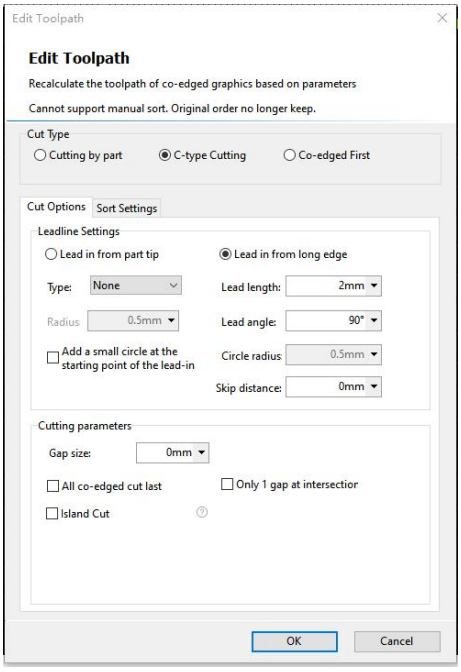


Figure 4-44 Edit toolpath

After editing the toolpath and clicking ***OK***, the system automatically enters ***Advanced Sort***, and the nesting interface will indicate that ***Advanced Sort State*** is active.

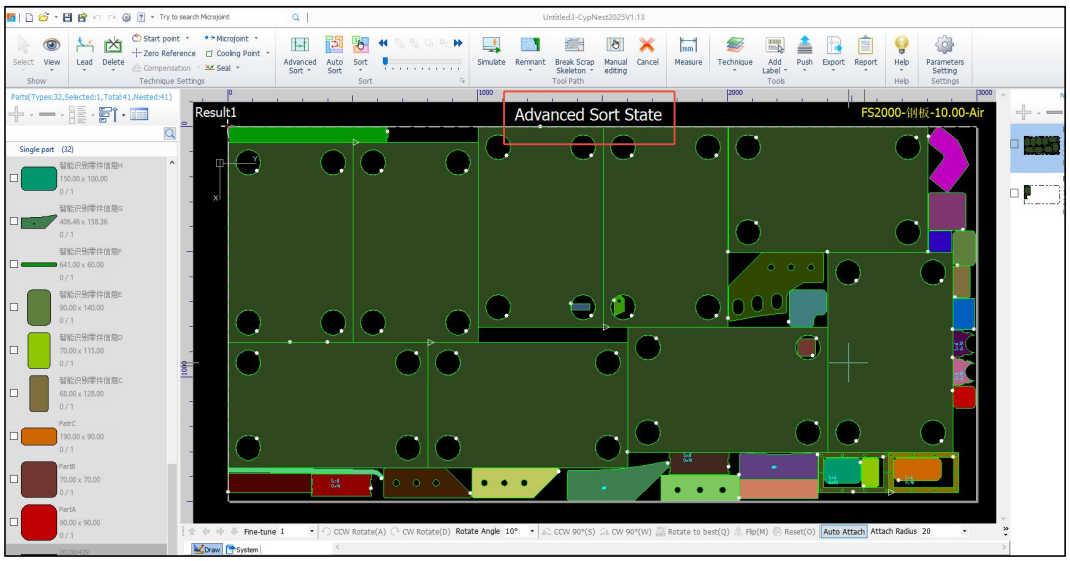


Figure 4-45 Processing the advanced tool path

Click ***Auto Sort*** and configure the sorting parameters. After the sorting result is generated, click ***Simulate*** to verify the result. Click ***Export*** to save the toolpath modifications made in ***Advanced Sort***. To exit, click ***Cancel*** or select ***Exit Advanced Path Sort*** from the ***Advanced Sort*** dropdown menu.

⚠ Notice:

1. In ***Advanced Toolpath Processing*** mode, lead-ins, micro joints, and other process features can be added.

2. After exiting this mode, changes made in the interface will be lost. It is recommended to export the machining file directly.

4.7 Simulate

After sorting and toolpath generation, it is recommended to verify the cutting path using the following two methods:

- Simulate: Click ***Simulate*** to check whether the cutting path of the current layout meets actual processing requirements.
- Interactive Preview: Click the interactive buttons to step through the processing order of each shape. You can also drag the progress bar to quickly browse through the overall processing order.

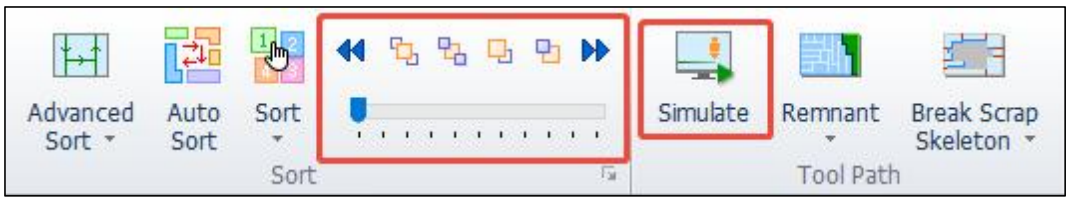


Figure 4-46 Simulate

Chapter 5 Technique Settings and Tools

5.1 Technique Settings

Graphic techniques can be added in multiple interfaces such as ***Nest Task Settings***, ***Drawing Processing***, ***Part Drawing/Editing***, ***Nest***, and ***Edit Co-edged Toolpath***. The function validity of objects and scopes varies depending on different interfaces.

After nesting, use the options in the ***Technique Settings*** column to modify graphic techniques added to the nested parts. All the operations are effective only for the parts in the nesting results, but not for the parts in the part list.

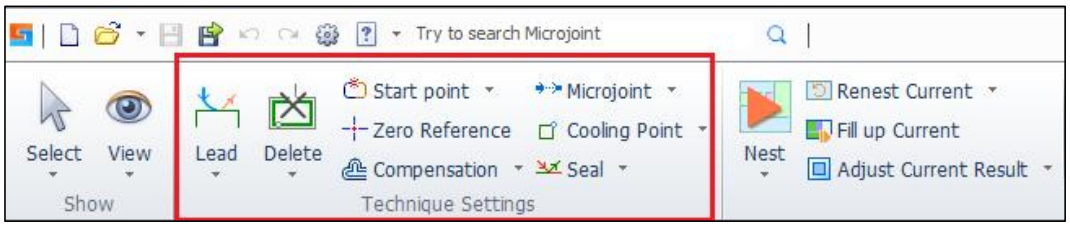


Figure 5-1 Menu bar-technique settings

5.1.1 Lead

Cutting directly start from the parts first may damage their integrity. To ensure good quality, it is necessary to add leadlines to introduce the cutting. Click ***Lead***, and set the lead parameters in the pop-up window.

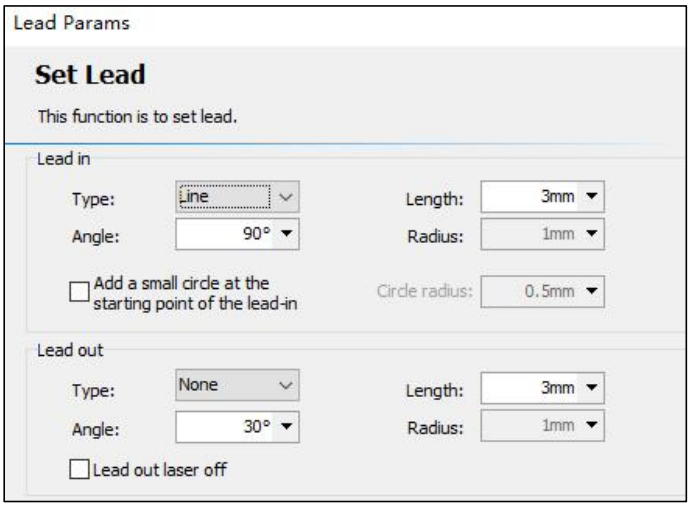


Figure 5-2 Lead-in and lead-out parameters

- Lead in:
  - Type: Choose ***Line***, ***Arc***, ***Line+Arc***, or ***None***.
  - Length: Define the distance from the lead start point to the part profiles. Proper length can prevent thermal effects and piercing debris from reducing the cutting quality of the part edge.
  - Angle: Set the angle of lead relative to the cutting part profiles. Proper angles can optimize the toolpaths and reduce heat concentration in critical locations, especially when in corners or narrow areas. This function helps protect the integrity of part edges.
  - Radius: Set the arc radius when the lead type is ***Line+Arc***.
  - Add a small circle at the starting point of the lead-in: Small circles at the lead-in start help discharge the piercing-generated slag/debris, preventing excessive accumulation that decreases initial cutting-edge quality.

⚠ Notice: Determine the lead type based on the actual cutting conditions (***Line*** is typically used). When cutting thick plates, ***Line*** leads may pose thermal damage risks. So it is recommended to use ***Arc*** or ***Line+Arc*** to mitigate heat accumulation.

- Lead out:
  - Parameters (***Type***, ***Length***, ***Angle***, and ***Radius***) have the same meaning as lead-in settings.
  - Lead out laser off: Prevents the parts drop-off and laser overburn when the cutting comes to an end.

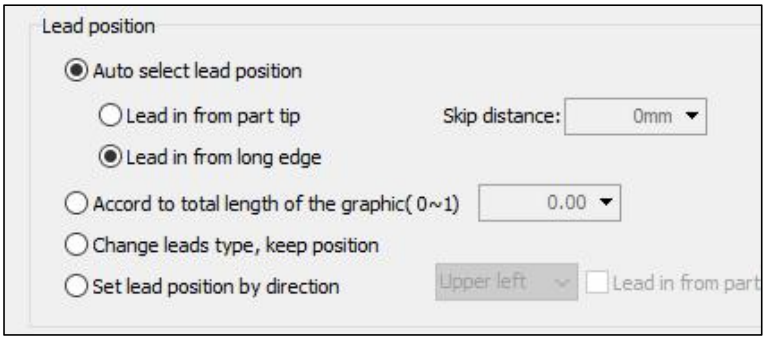


Figure 5-3 Lead position

- Lead position:
  - Lead in from part tip: When enabled, lead-in will be prioritized to originate at part vertices. Set ***Skip distance*** to prevent laser burning at the sharp corners due to the introduction of lead-in.

- Lead in from long edge: Prioritizes lead-in position along the longer part edge.
- Accord to the total length of the graphic (0 ~ 1): Enter a value between 0 ~ 1 to introduce the lead at a proportional position along the total graphic length. For example, entering 0.5 indicates that the introduced lead is placed at the midpoint of the total graphic length.
- Change leads type, keep position: When checked, only the lead type (such as ***Arc*** or ***Line***) is modified without adjusting the specific position of the lead.
- Set lead position by direction: Enables leads to start at midpoints or corners based on part orientation. Enables ***Lead in from part tip*** for acute-angled parts to avoid edge defects.

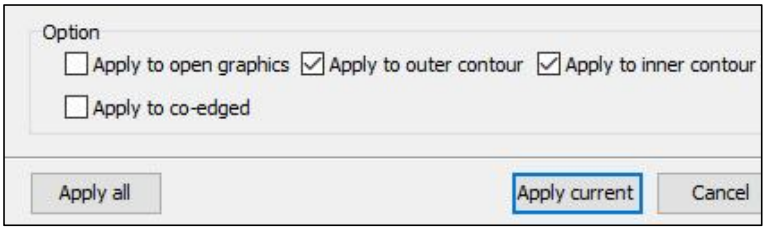


Figure 5-4 Application options

- Options: Select the target graphics for the lead application, including ***open graphics***, ***outer contour***, ***inner contour***, and ***co-edged*** parts.

From the ***Lead*** drop-down menu, you can select ***Check Leadlines*** to check the legality of the added leads. This function can shorten excessively long leads to prevent collisions with adjacent contours.

5.1.2 Delete

After clicking ***Delete***, hover over the contour added graphic techniques. When the yellow highlight appears, click to delete the corresponding graphic technique.

Figure 5-5 Delete technique

In addition, in the ***Delete*** drop-down options, you can select the specific graphic technique for deletion and assign its application scope, thus realizing batch deletion.

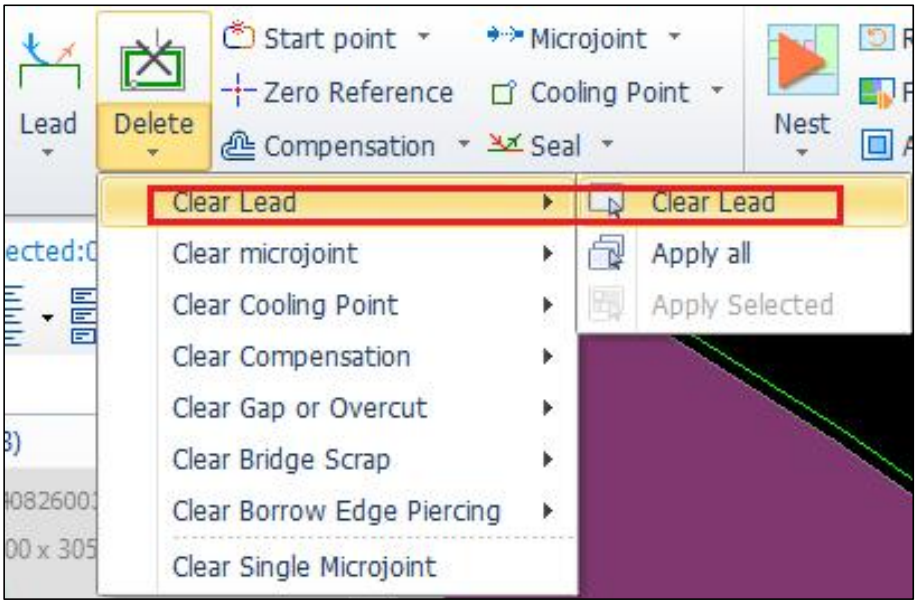


Figure 5-6 Batch deletion technique

5.1.3 Start Point

Used to modify the part starting point. After clicking ***Start Point***, you can select the application scope: ***Current part*** or ***Same part***.

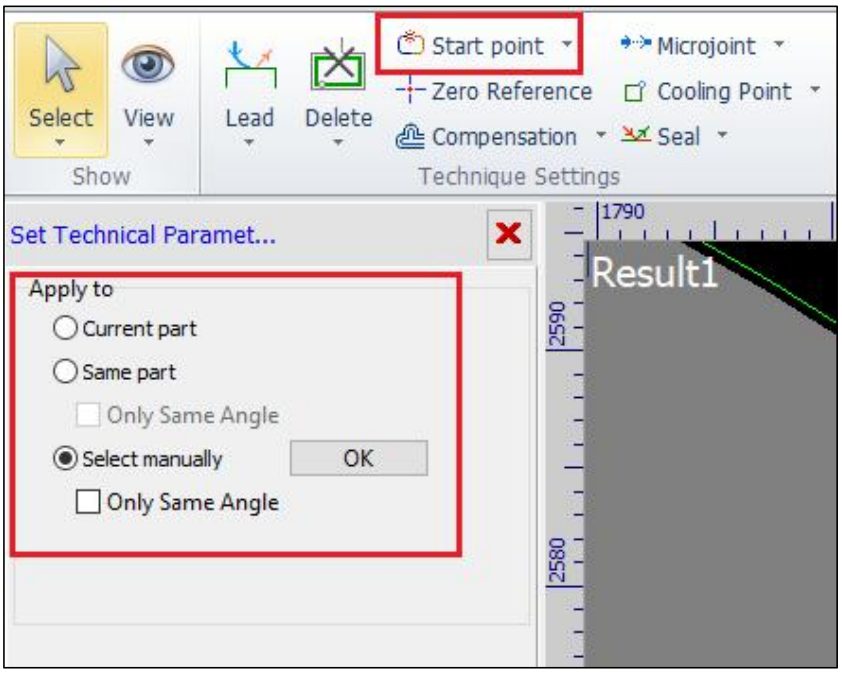


Figure 5-7 Add start point for parts

- Current part: Modifies the start point only for the current part.
- Same part: Applies start point changes to all identical parts in the current nesting result (including non-co-edged parts). If ***Only Same Angle*** is enabled, the start point is only added to parts with identical angles within the same nesting result.
- Select manually: When enabled, all parts in the current nesting result are grayed out. Click or drag to select the target parts first. Right-click and select ***OK*** to activate editing. At this point, clicking the part contour to add ***Start Point*** only applies to the selected part, not the grayed-out parts. Click ***Reselect*** to modify target parts. If ***Only Same Angle*** is enabled, parts with non-matching angles are excluded from adding a start point.

⚠ Notice:

1. ***Start Point*** can only be modified on closed contour.
2. After clicking ***Start Point***, if clicking outside the graphic and then clicking on part contour, you can manually draw a lead-in.

5.1.4 Zero Reference

Zero Reference indicates the resting position of the cutting head. Clicking different reference buttons can adjust the relative position between the graphics and the preset ***Zero Reference***. For example, if the cutting head is located in the lower-left corner of the part to be processed, set ***Zero Reference*** to the lower left.

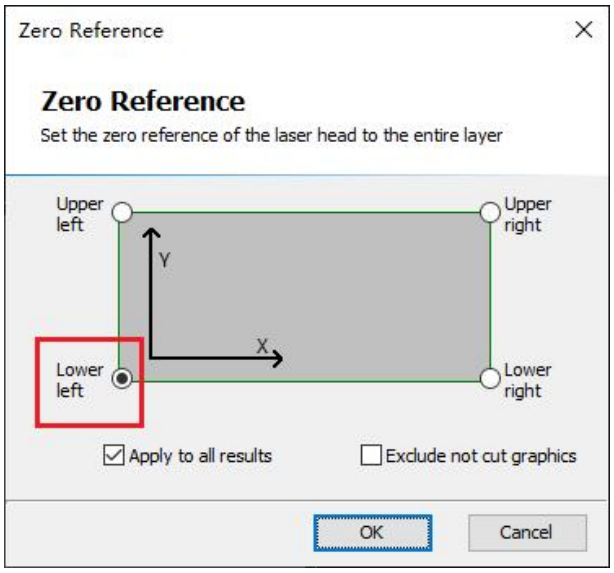


Figure 5-8 Zero reference setting

- Apply to all results: When enabled, the current result's ***Zero Reference*** can be applied to all results.
- Exclude not cut graphics: When the drawing contains a large number of parts and some parts do not need to be processed. The layer technique should be set as the white layer. Check this function if you want to enable direct machining from the corner points of adjacent processable parts.

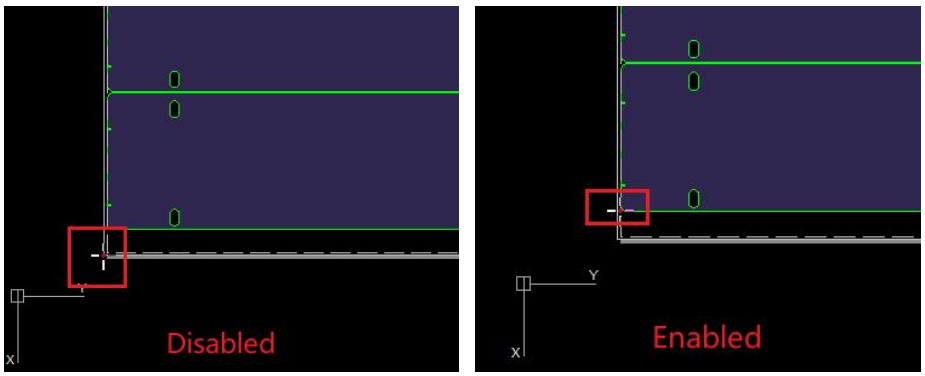


Figure 5-9 Exclude unprocessed graphics

⚠ Notice: The setting of ***Zero Reference*** in CypNest needs to be consistent with that in the cutting software.

5.1.5 Compensation

In order to offset the dimensional deviation caused by the cut loss, kerf compensation is required. Select the target graphic, click ***Compensation***, and set the parameters on the ***Kerf Compensation*** page. In CypNest, the compensated toolpaths are displayed in green, and will be used for actual processing.

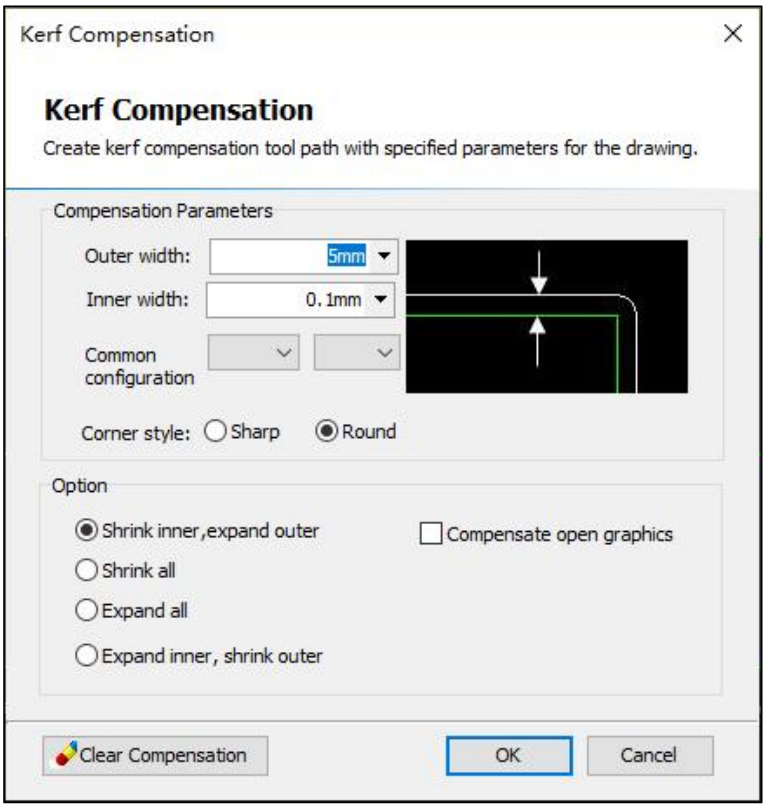


Figure 5-10 Kerf compensation parameters

- Outer/Inner Width: Set based on measured kerf width. It is recommended to perform a test cut and measure the kerf, and then set the compensation value (compensation value = $\frac{1}{2}$ kerf width).
- Corner style: Choose ***Sharp*** or ***Round*** for corner transition. Usually, round corners can ensure smooth transitions and edge alignment with original graphics.
- Options:
  - Shrink inner, expand outer: Reduces inner hole sizes; enlarges outer contour.
  - Shrink all: Reduces both inner and outer contour dimensions.
  - Expand all: Enlarges both inner and outer contour dimensions.
  - Expand inner, shrink outer: Reduces outer contour sizes; enlarges inner holes.

- Compensate open graphics: Applies kerf compensation to open graphics.

⚠ Notice:

1. Kerf compensation must be applied before enabling co-edge nesting.
2. Parts with compensated outer contours cannot use ***Align***.

5.1.6 Microjoint

Microjoints are non-cut segments inserted into toolpaths to prevent part warping or fall-off. When the cutting head reaches a microjoint, the laser shuts off automatically.

Click ***Microjoint***, and then click on target positions along the contour to add microjoints. Check the visual feedback during the operation.

- Yellow: Indicates the microjoint to be added.
- Blue: Indicates the microjoint to be deleted.
- Red: Indicates the microjoint cannot be added because it will overlap with the existing microjoints.

Once added, small white squares will be displayed as markers in the graphics. Toggle visibility via ***View → Display Microjoint Tag***.

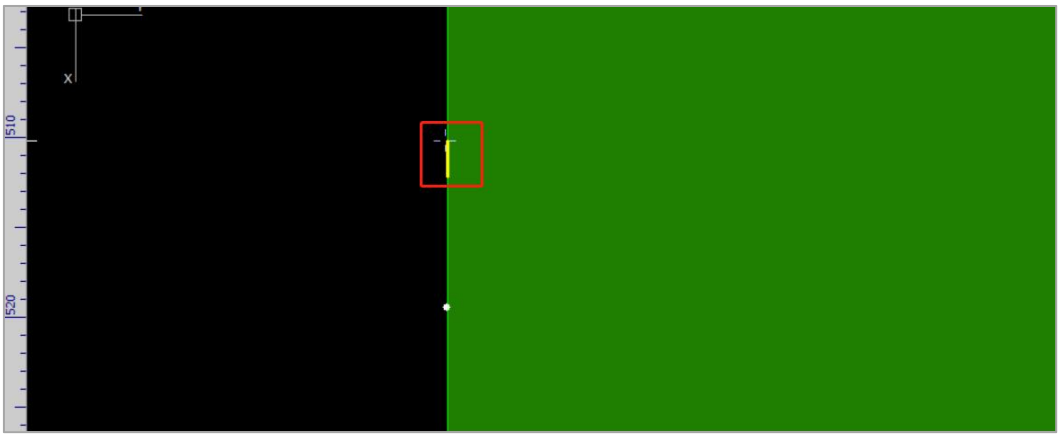


Figure 5-11 Add microjoints

From the ***Microjoint*** drop-down menu, multiple functions related to microjoints can be accessible.

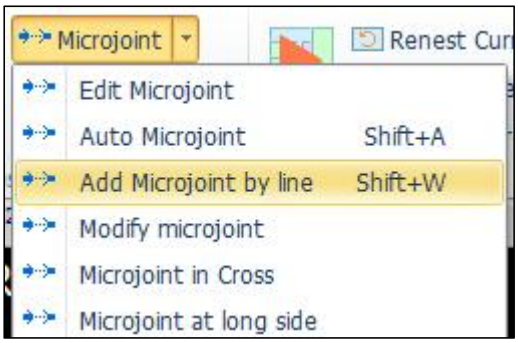


Figure 5-12 More microjoint functions

- Edit Microjoint: Batch adjusts the existing microjoints.
- Auto Microjoint: Automatically add microjoints to the graphics based on given parameters. For the tutorial, see CypNest-Auto Microjoint.
- Modify Microjoint: Batch modifies microjoint lengths.
- Microjoint at long side: Applies parameter-defined microjoints to long edges (filter by length range).
- Microjoint in Cross: Add microjoints at co-edge intersections to prevent parts from warping or falling off.
- Add Microjoint by line: Draw lines across contours to batch-add microjoints for regular parts or co-edged toolpath. After setting the parameters, click on the position you need to add, then drag the mouse to draw a line to complete the operation.

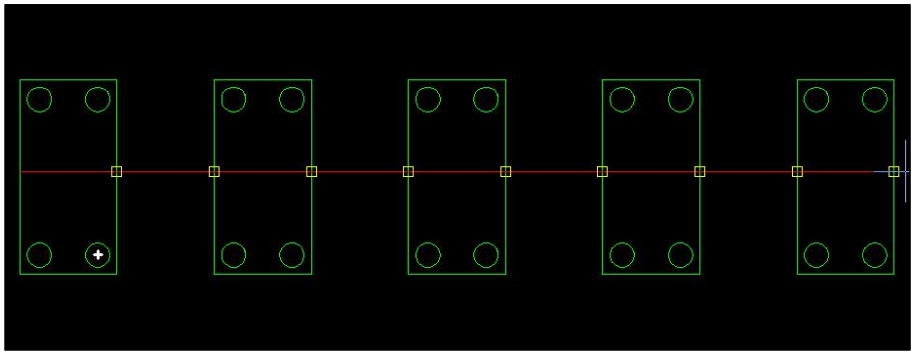


Figure 5-13 Add microjoint by line

5.1.7 Cooling Point

Primarily used for corner thermal management. By inserting cooling points at sharp corners, this function helps mitigate corner burning during cutting. During machining, when the cutting head reaches a cooling point, the laser shuts off, and cooling gas is triggered based on global parameters (duration configurable in the cutting control software). After the cooling, the laser reactivates to resume normal cutting.

Click ***Cooling Point***, and then click on target positions along the contour to insert cooling points (multiple placements supported). Added cooling points are displayed as solid white dots on the drawing area.

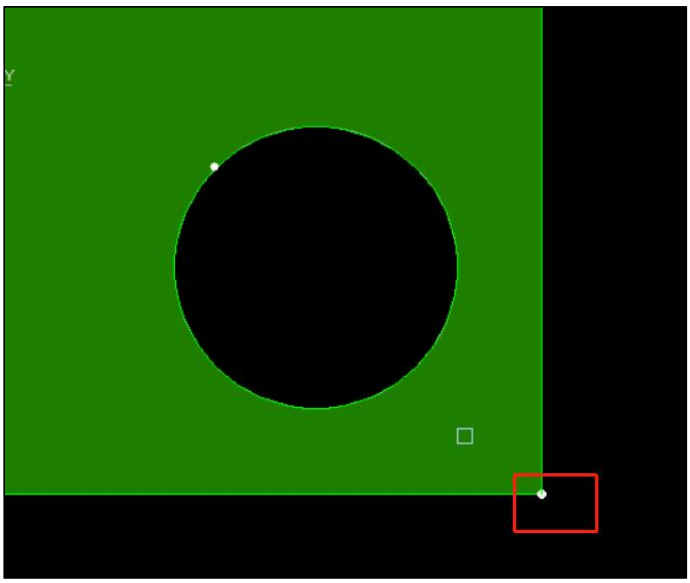


Figure 5-14 Add cooling points

Auto Cooling Point is accessible in the ***Cooling Point*** drop-down menu. Click the function and set the parameters in the pop-up window.

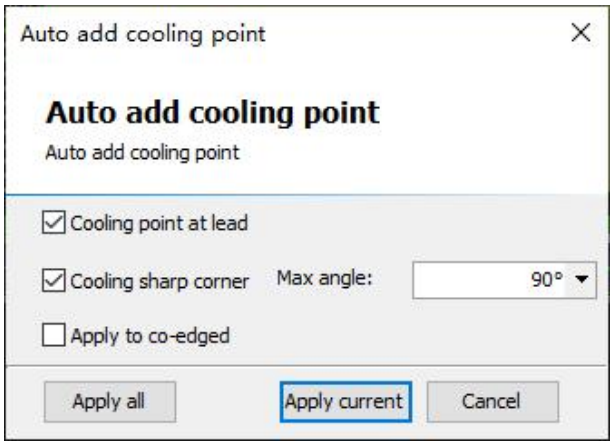


Figure 5-15 Auto add cooling points

- Cooling point at lead: Add cooling points at the end of lead-in paths. When enabled, cooling points become part of the lead-in path and adjust dynamically with lead-in modifications.
- Cooling sharp corner: Insert cooling points at acute angles.
- Apply to co-edged: Enable/disable cooling points for co-edged graphics.

5.1.8 Seal/Gap/Over Cut

Gap refers to a non-cut segment left at the end of a cutting path to prevent part warping or detachment. From the ***Seal*** drop-down menu, select ***Gap***. Set parameters and click ***Apply current*** to generate gaps.

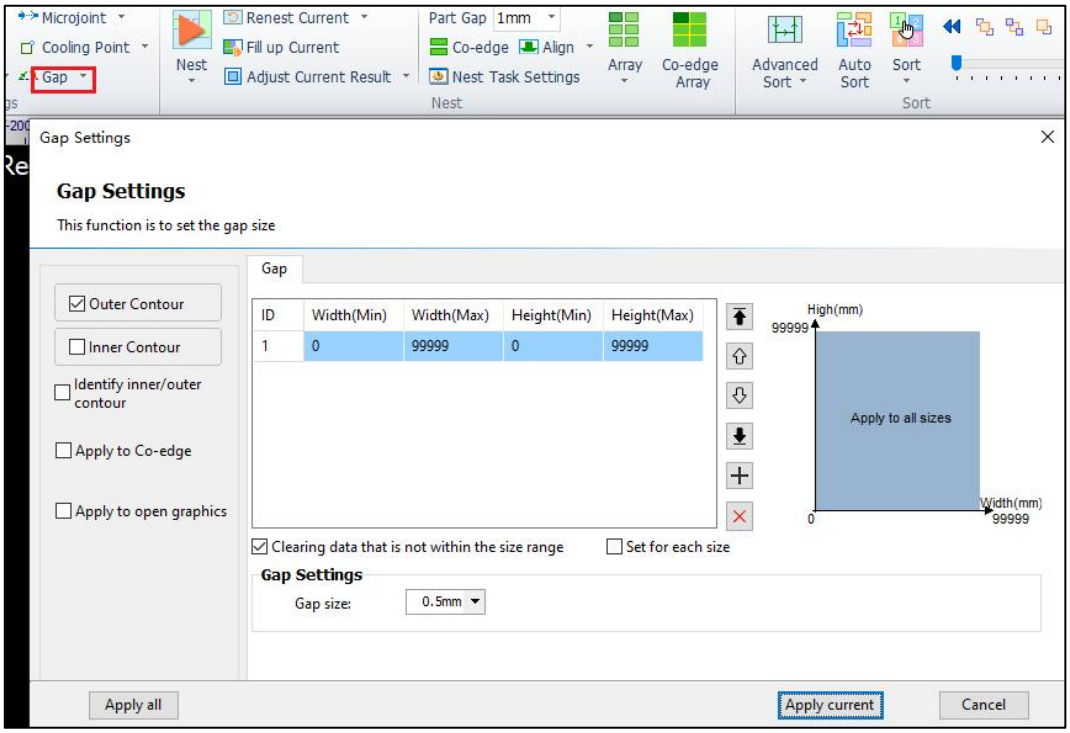
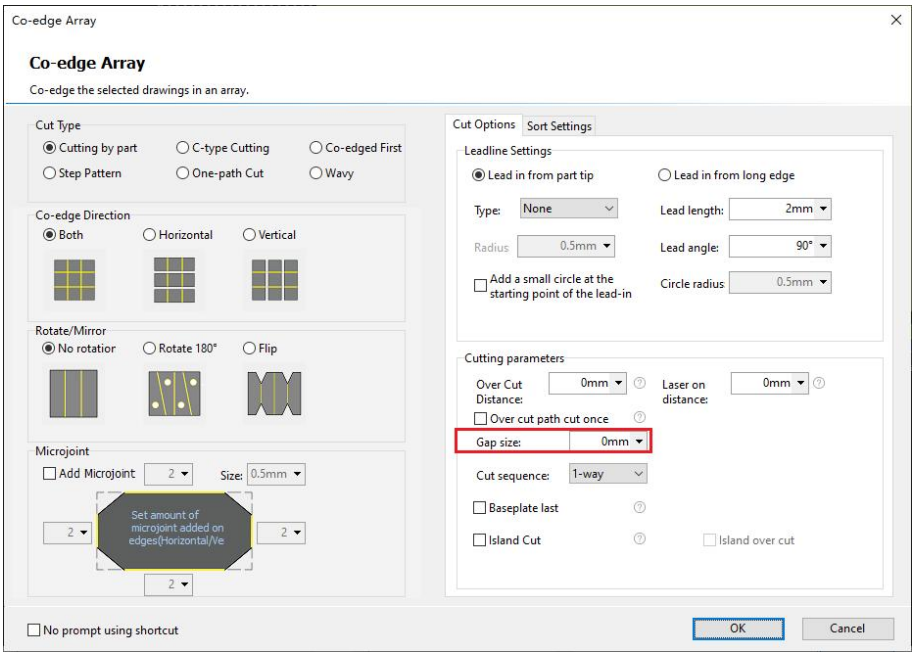


Figure 5-16 Gap settings

For co-edged parts, add gaps in the ***Co-edge Array*** and ***Auto Sort*** interfaces for ***Cutting by part***, ***C-type cutting***, and ***Co-edged first***.



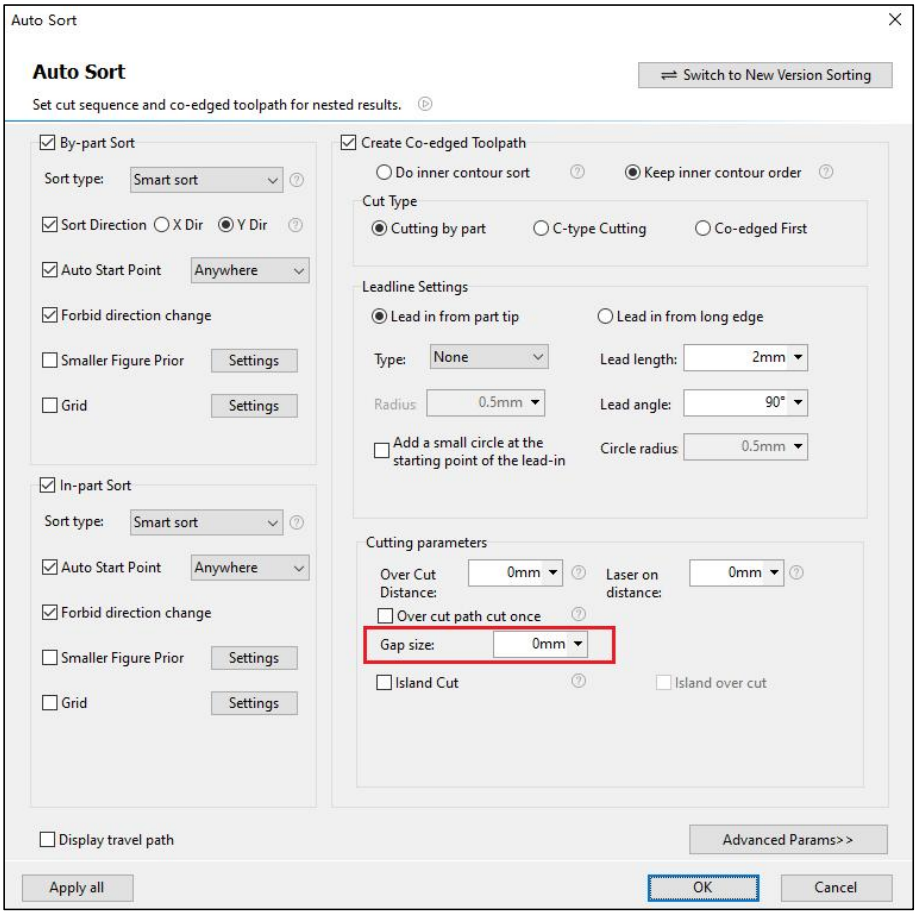


Figure 5-17 Add gaps in the co-edge array and auto sort interfaces

Over cut refers to adding an extended cutting segment to the toolpath end of the open graphics, starting from the initial point along the contour. For ***Cutting by part***, adding ***Over cut*** permits the cutting head to proceed along the part contour after completing the primary cut, preventing incomplete cutting at the initial cutting start point.

In the ***Seal*** drop-down menu, click ***Over cut***. Set the parameters, and click ***Apply current***.

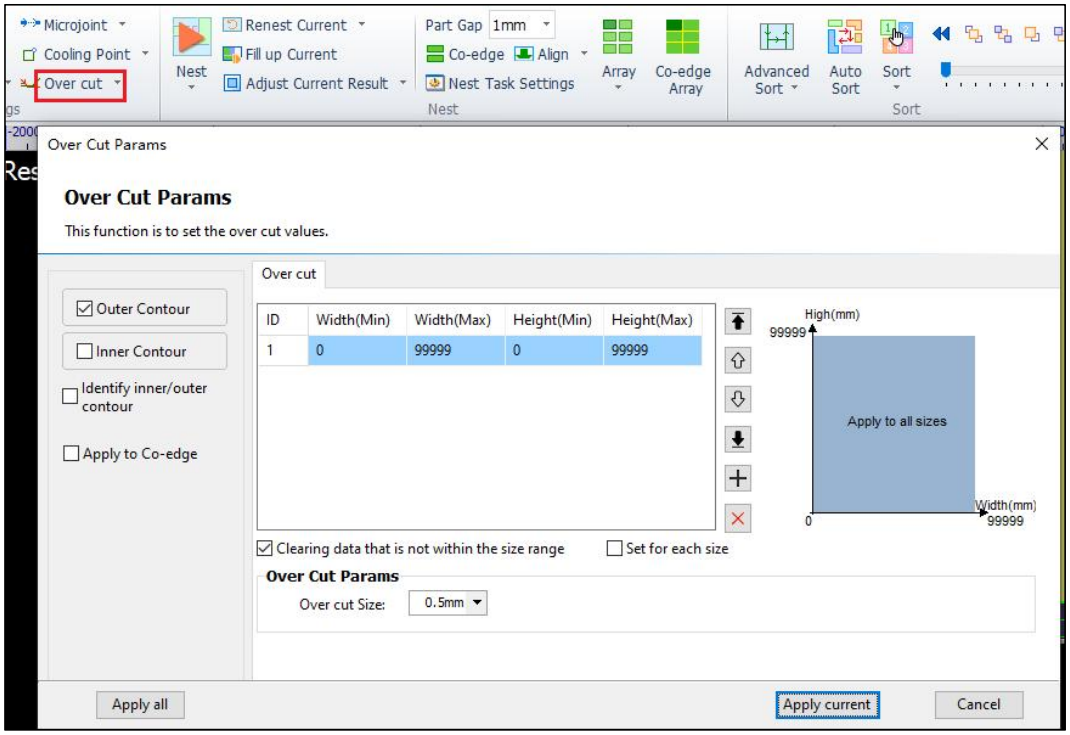


Figure 5-18 Over cut parameter setting

Seal is used to remove all added gaps/overcuts and restore the original cutting path.

5.2 Tools

The toolbar supports layer technique configuration, part labeling, nesting result export, and report generation.

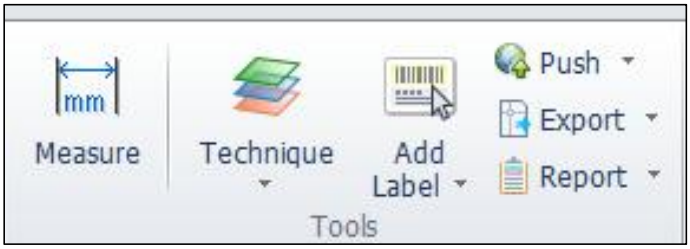


Figure 5-19 Menu bar - tools

5.2.1 Technique

Used to configure cutting parameters for specific layers, including ***Cut speed***, ***Peak power***, ***Gas pressure***, ***Pierce***, among others. The technique parameters directly affect time calculations in the ***Report*** and can be imported from external files.

Click ***Technique*** on the Tools bar to open the ***Layer Params*** window. The first tab is ***Global Parameters***, which controls non-layer-specific settings such as ***Motion Parameters***, ***Default Params***, and ***Other Params***. The other tabs are for all the layers currently in use. Click on any layer to individually set the technique parameters.

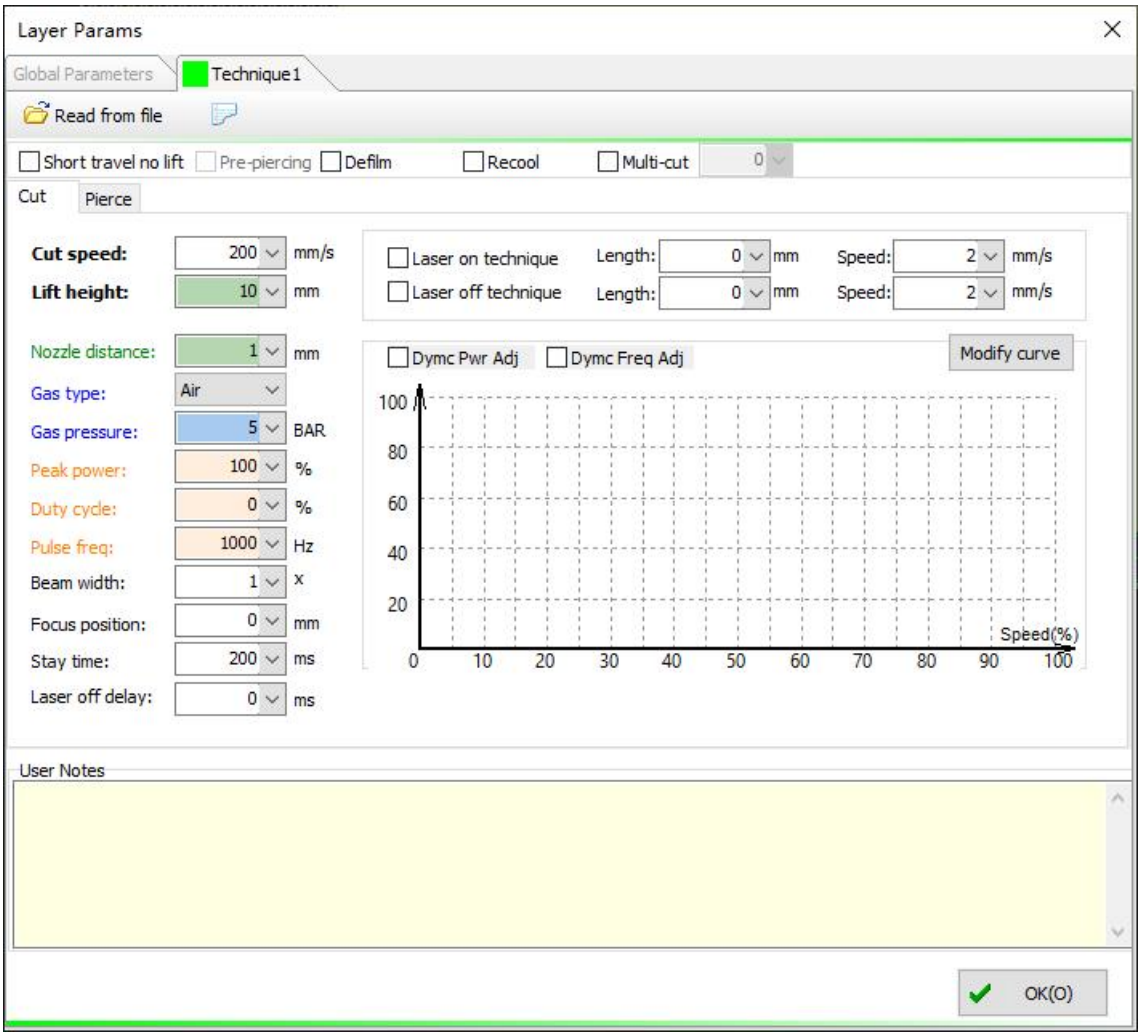


Figure 5-20 Technique-layer parameters

⚠ Notice: The parameters displayed on the ***Layer Paras*** page vary based on hardware configurations (e.g., laser type, gas systems, height controller). The above figure is only for reference and check the software interface for actual options.

5.2.2 Add Label

Adds labels to the parts. Working with inkjet marking systems and galvo-based laser markers, this function can process labels to parts through inkjet printing or galvo-laser marking.

Click ***Add Label*** and design the label.

⚠ Notice: Labels may be lost during nesting/array operations.

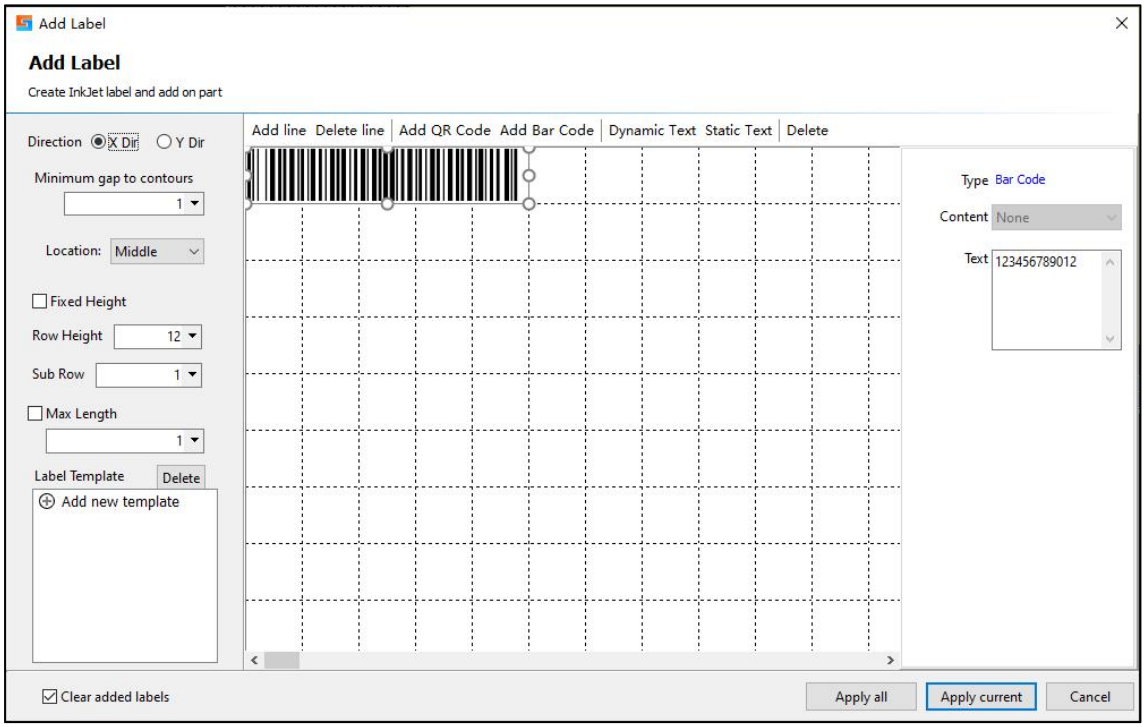


Figure 5-21 Add label

The steps for ***Add Label*** are as follows:

Step 1 Create a new template and set the parameters for the label outer frame.

- Direction: Aligns labels along the X/Y axis.
- Minimum gap to contours: Minimum distance between label content and part edges (inner/outer).
- Location: Selects the relative position of the label within the part (***Middle***, ***Upper left***, ***Upper right***, ***Lower left***, ***Lower right***).
- Fixed Height: Sets the fixed row height at 12.7 mm.
- Row Height: When ***Fixed Height*** is disabled, manually define row height, that is, the height of the white square.

- Sub Row: Splits existing rows into sub-rows.
- Max length: Sets the label length (the maximum length of the white square). When disabled, the label length is determined by the label content. When enabled, limits label length to a user-defined value.

Step 2 Add the contents of the rows and labels.

Figure 5-22 Add tag content

- Add line: Inserts a new row in the current label.
- Delete line: Deletes the selected row.
- Add QR Code: Inserts QR codes displaying the part name or plate name. After adding, scan the QR code to display. The text contents can be selected from ***Part Name*** and ***Plate Name***.
- Add Bar Code: Custom text input and scan the ***Bar Code*** to display the customized text.
- Dynamic Text: Adds text by selecting ***Part Name***, ***Plate Name***, ***Nested Plate***, and ***Material***.
- Static Text: Manually input text content.
- Delete: Deletes the selected content in the label.

Step 3 Customize to adjust the size of the label content column, font, width, and alignment.

- Clear added labels: When enabled, it will first clear the previously added label and add a new one according to the set parameters. When disabled, add a new label while keeping the previously added labels.

Chapter 6 Remnant and Skeleton

6.1 **Remnant**

When significant residual plate remains after nesting, you can generate remnant paths and export remnant plate drawings for future reuse.

Click ***Remnant*** to access ***Auto Remnant Path***, ***Draw/Edit Remnant Path***, ***Clear Remnant Line***, ***Add Remnant Text***, and ***Export Remnant Plate***.

6.1.1 Auto Remnant Path

Click ***Auto Remnant Path*** to open the parameter setting window.

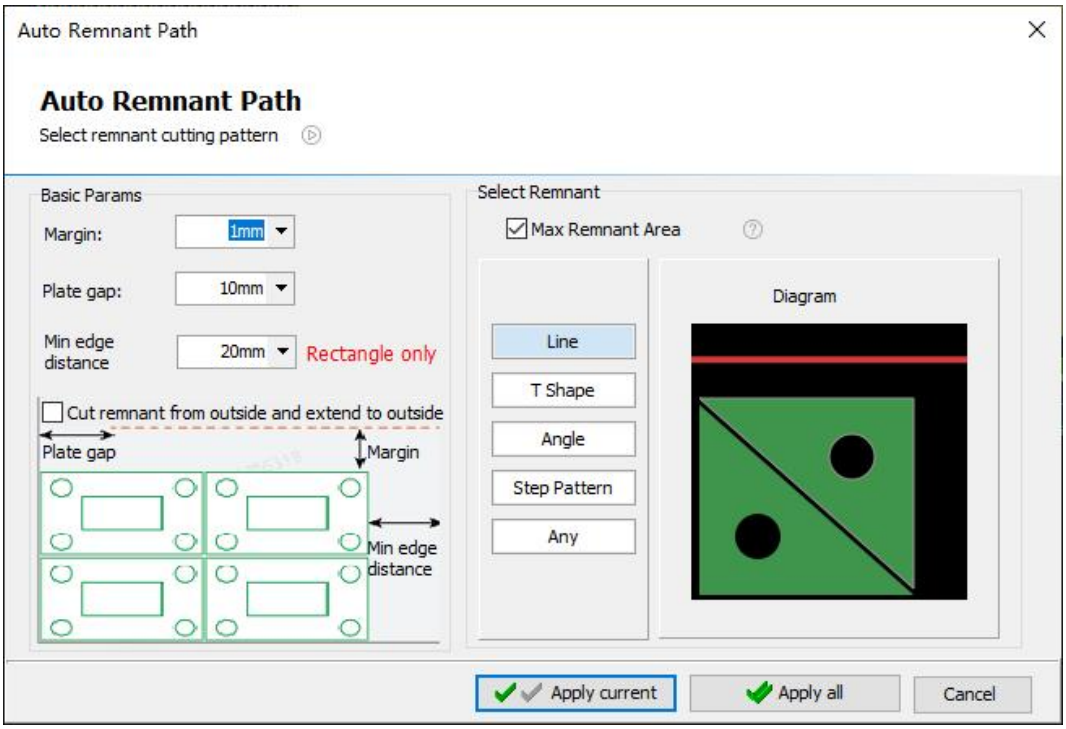


Figure 6-1 Auto remnant path

Set the parameters of remnant paths as desired. The parameters are described below:

- Margin: Minimum clearance between the remnant path and the nested parts.
- Plate gap: The spacing between the remnant paths and the plate edge.
- Min edge distance: The width between the generated remnant paths and the plate edge. Remnant

paths cannot be generated if the actual width is less than the set value (Min. value is 10 mm). This function is only applicable to rectangular plates.

- Cut remnant from outside and extend to outside: When enabled, remnant paths are converted to the cutoff line displaying the knife icon in the nesting result. When importing into the cutting software for machining, extension lines should be added. This function is typically used for cutting off plates, which starts and ends the toolpaths outside the plate (only supported in CypCut 901 HypCut 2020B or higher versions).

The software provides a variety of remnant path shapes for quick selection. When ***Max Remnant Area*** is enabled, the generated remnant path is the optimal result for the corresponding shape (only for ***Line*** and ***T-shape***).

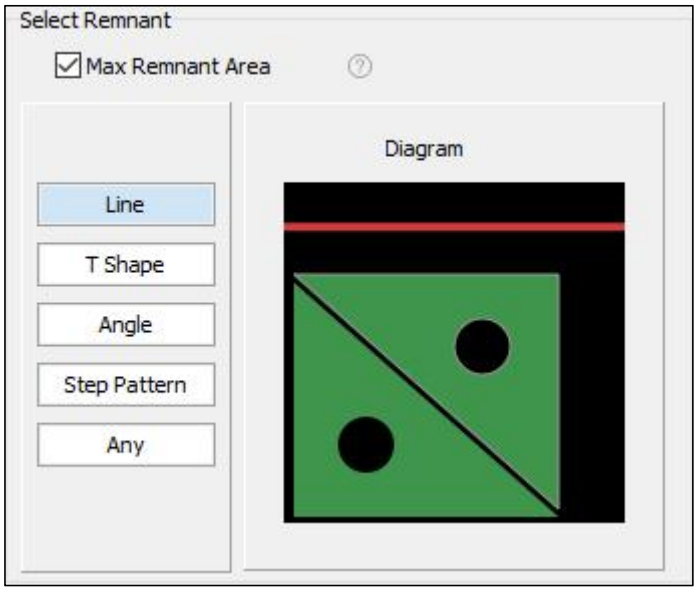


Figure 6-2 Auto remnant path-select remnant cutting pattern

6.1.2 Draw/Edit Remnant Path

Allows more flexibility in drawing and adjusting the remnant path. Click ***Draw/Edit Remnant Path*** in the ***Remnant*** drop-down menu, and the ***Edit Remnant Path*** hover window appears.

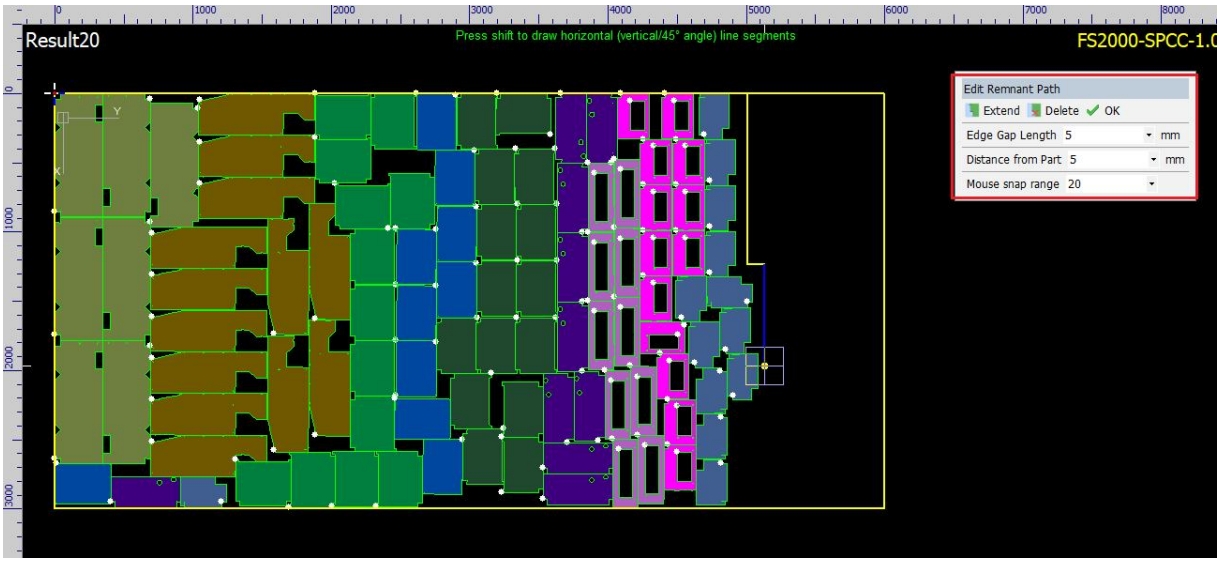


Figure 6-3 Edit remnant path

Set the parameters of ***Draw/Edit Remnant Path***.

- Edge gap length: Distance between the remnant path endpoint and plate edges.
- Distance from part: Minimum spacing between remnant path and nested parts.
- Mouse snap range: Within the setting range, the mouse will automatically snap to the part/plate edges.

Click ***Draw***, then left-click to define the starting point of the remnant path. Continue left-clicking to generate connected segments (blue preview lines). Use ***Extend*** or ***Delete*** to modify the path mid-drawing. After drawing, click ***End*** to generate the yellow remnant path.

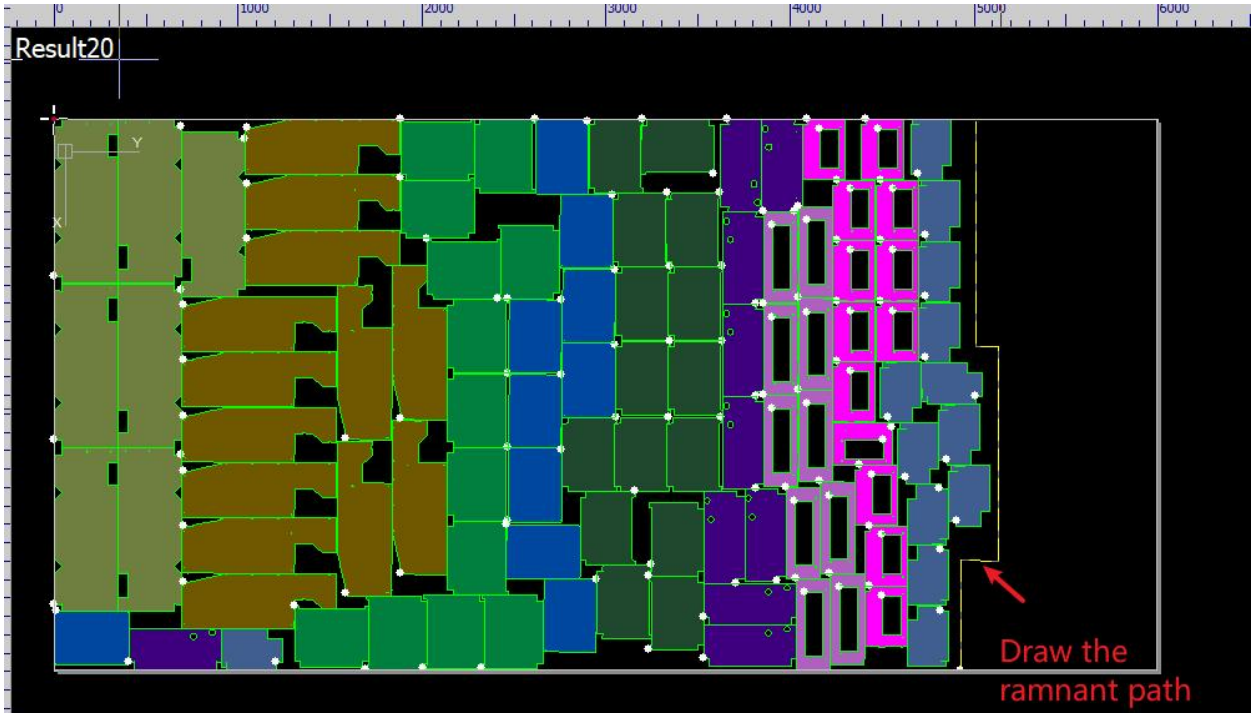


Figure 6-4 Manually draw the yellow remnant path

To delete the generated remnant path, click ***Clear Remnant Line*** in the ***Remnant*** drop-down menu and select the application scope.

6.1.3 Export Remnant Plates

Click ***Export Remnant Plates*** in the ***Remnant*** drop-down menu and select the target result.

After exporting, you can use the remnant plate for nesting by clicking ***Import Remnant File*** on the ***Plates Manage*** and ***Nest Task Settings*** pages.

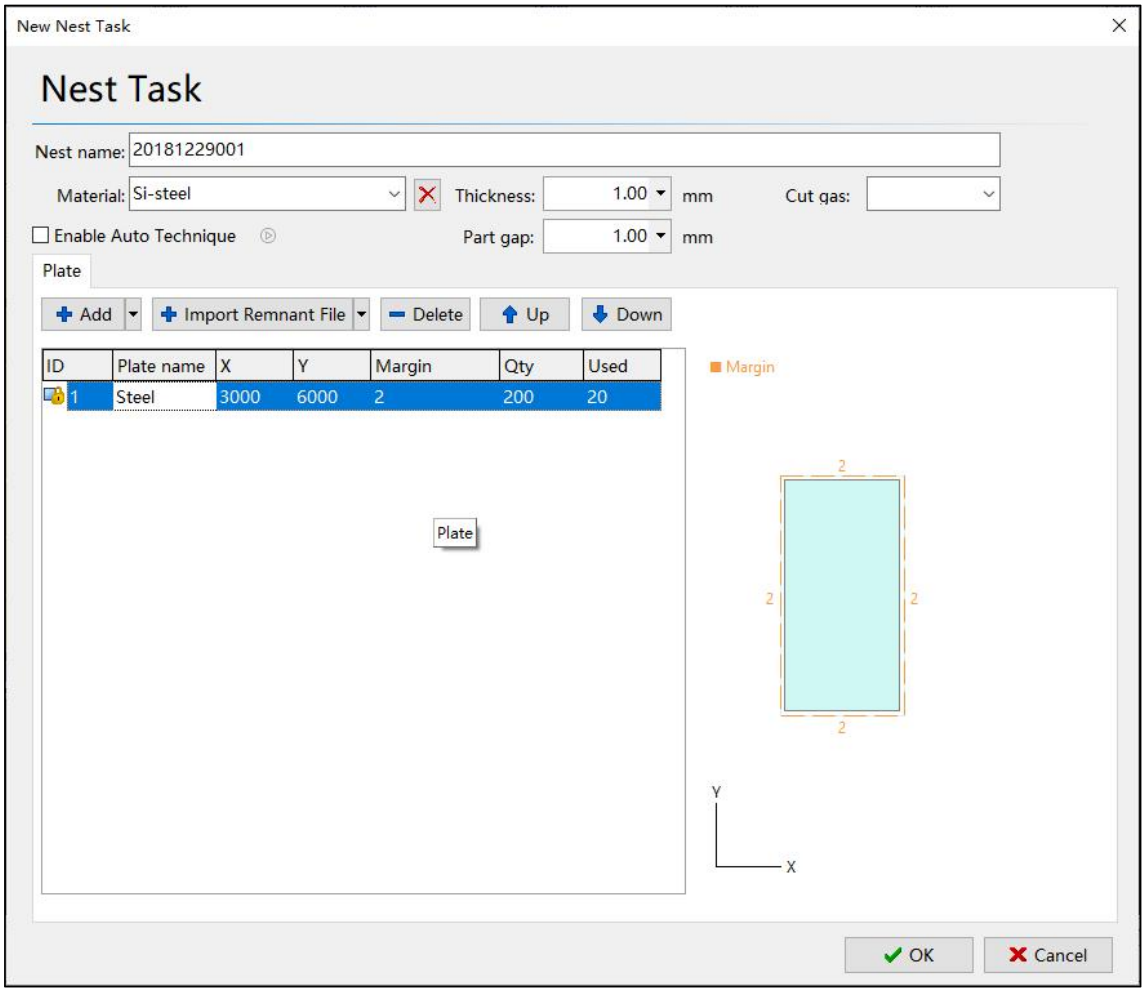


Figure 6-5 Import remnant files

6.2 **Break Scrap Skeleton**

Break Scrap Skeleton refers to cutting residual material between nested parts into smaller pieces for easier part separation. This function applies to scenarios when parts are densely nested or scrap skeletons are too large for automated handling.

6.2.1 Break Scrap Skeleton

Click ***Break Scrap Skeleton*** to set the parameters.

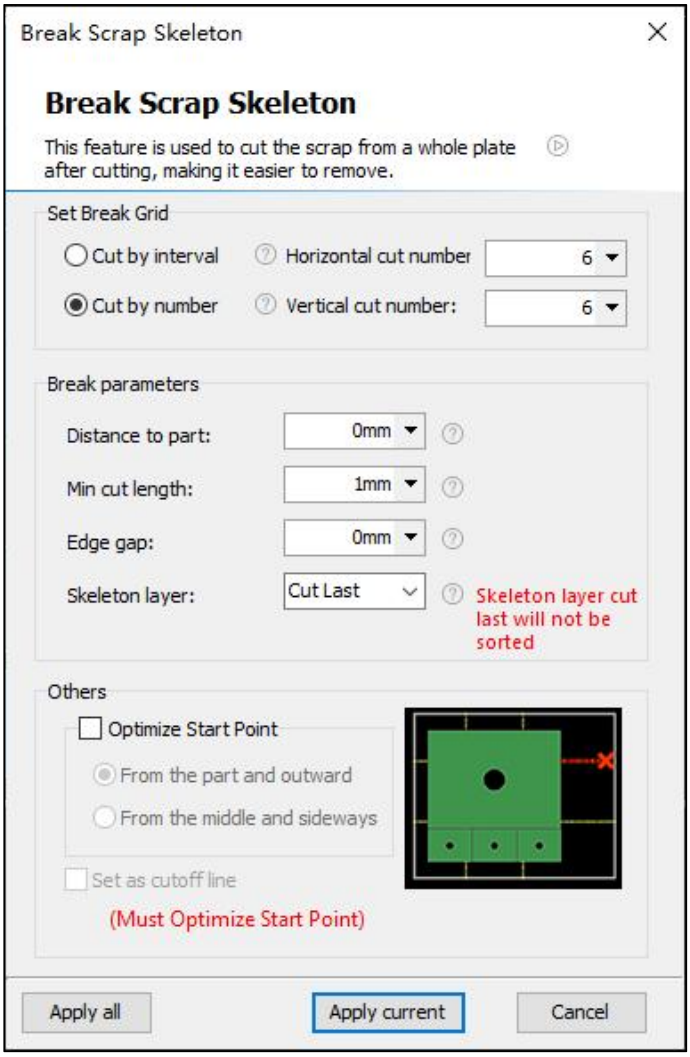


Figure 6-6 Break scrap skeleton

Select ***Cut by interval*** or ***Cut by number*** and enter the corresponding quantity. The parameters are described below:

- Distance to part: Clearance between the endpoint of the skeleton line and the nested parts (prevents part damage).
- Min cut length: Skeleton lines shorter than the set value cannot be generated.
- Edge gap: The distance between the endpoint of the skeleton line and the plates (disabled for cutoff line mode to avoid collisions).
- Skeleton layer: When the skeleton layer is set to ***Cut Last***, it is excluded from any sorting. When it is

set to layer1 ~ 14, the layer will be processed first by default. You can adjust the cutting sequence of the skeleton line in ***Auto Sort*** → ***Advanced Params***.

- Optimize start point: When the plate is a non-standard rectangle, starting cutting from the plate edge may cause collision as no plate exists under the cutting head. Choose the position of ***Start Point***.
- Set as cutoff line: Accessible when ***Optimize Start Point*** is enabled. ***Edge gap*** is not supported for cutoff lines.

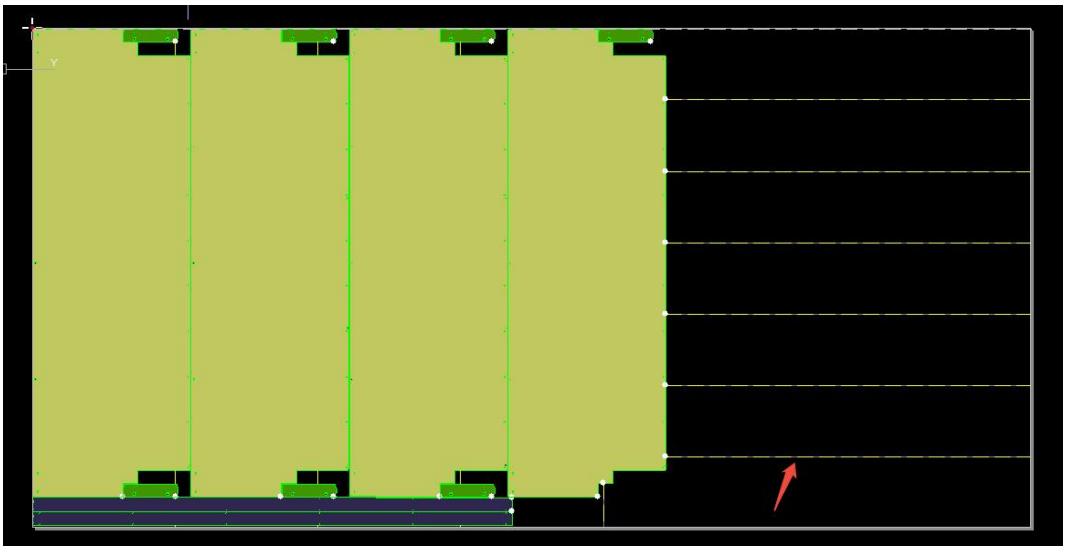


Figure 6-7 Break scrap skeleton example

⚠ Notice: To edit skeleton line, choose ***Edit single/whole break line*** in the ***Break Scrap Skeleton*** drop-down menu. Click on a single or whole skeleton line in the nesting result to move its position, or press ***Del*** to remove it.

6.2.2 Manual Draw Break Line

Allows flexible adjustments to skeleton lines, supporting addition, edition, and removal operations. Click ***Manual Draw Break Line***, and set the parameters and other properties in the pop-up window.

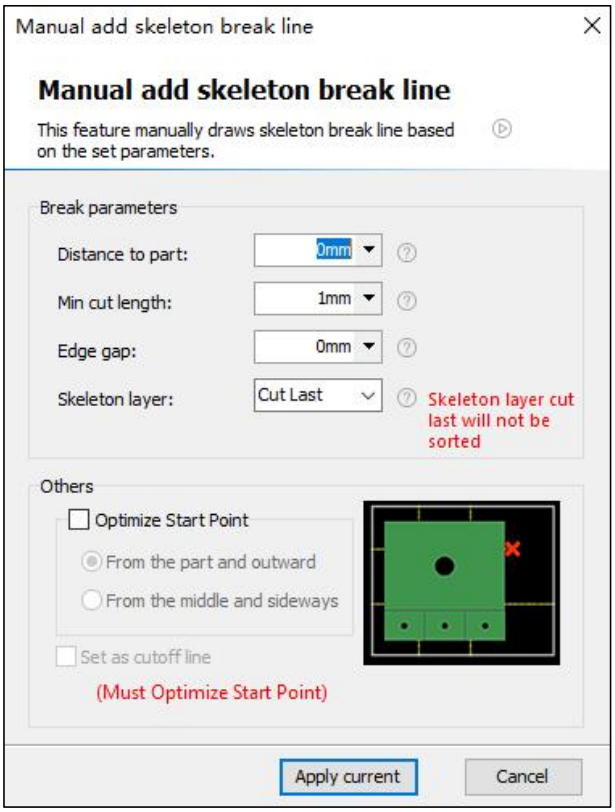


Figure 6-8 Manual draw break line

Move the cursor over the nesting result to display blue preview lines. Press ***Shift*** to toggle between horizontal/vertical orientations. Left-click to place skeleton break lines sequentially.

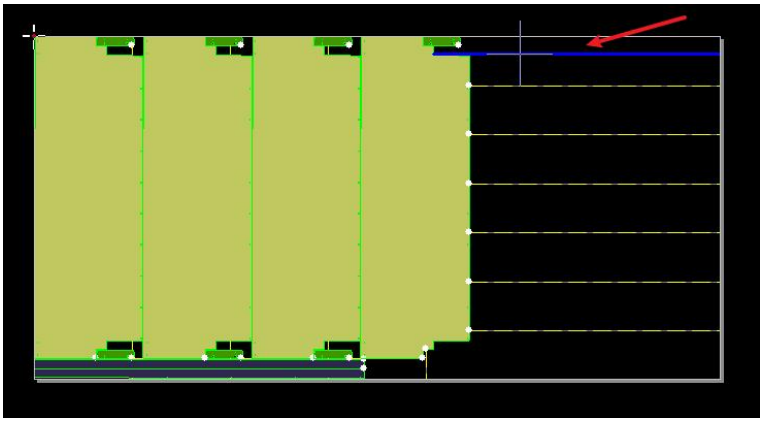


Figure 6-9 Manual draw break line example

⚠ Notice: Use ***Draw Regional Break Skeleton*** to generate skeleton lines with specific parameters in different areas.

Chapter 7 Export and Push

7.1 Export Reports

CypNest supports types of reports: ***Custom Report***, ***Excel Report***, ***Single Report***, and ***Report Old Version***. Before generating reports, configure the related parameters on the ***Report Paras*** page.

7.1.1 Report Parameters

On the ***Report Paras*** page, configure the parameters of ***Quote***, ***Statistics***, and ***File Config***.

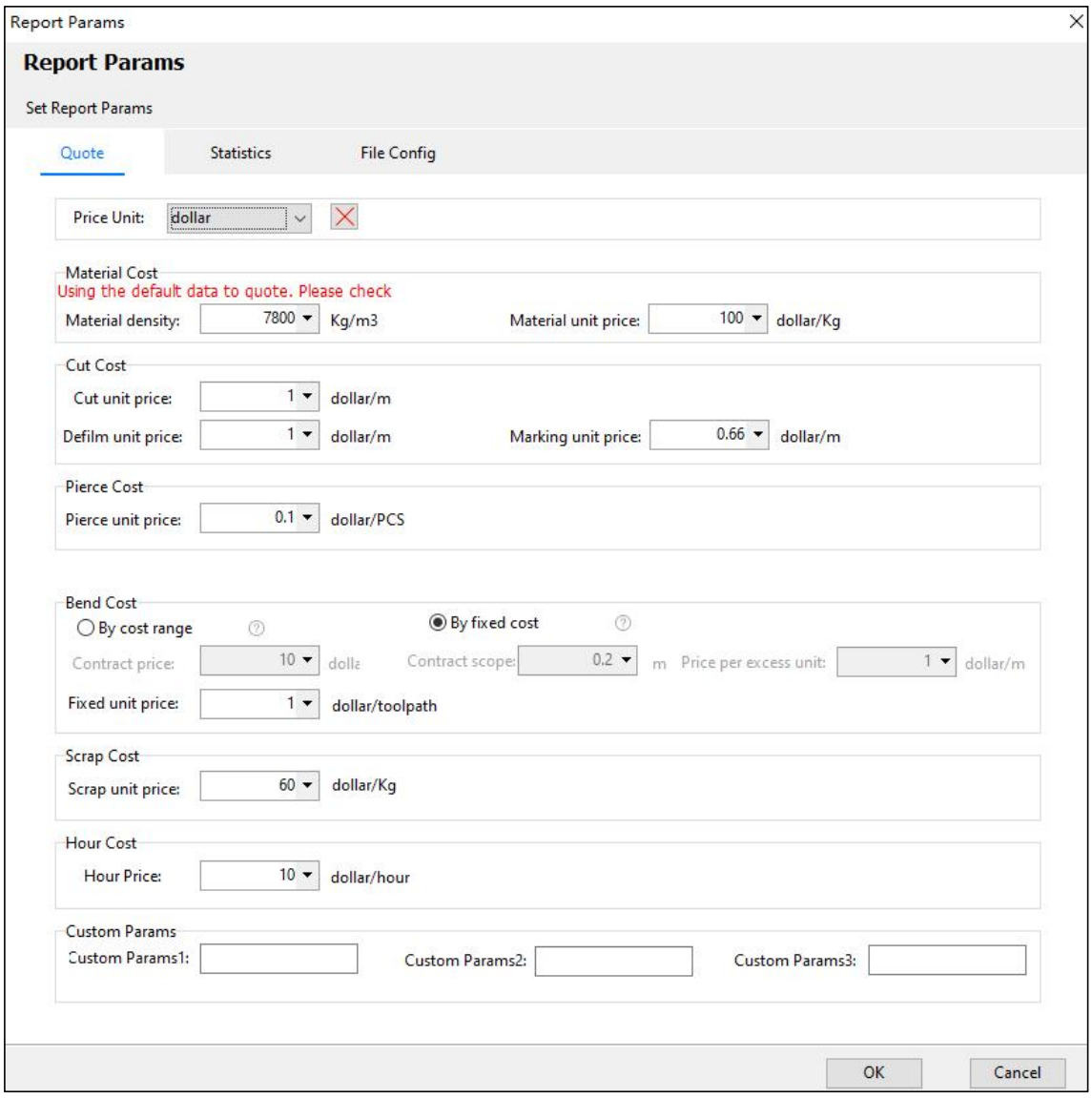


Figure 7-1 Report parameters page

The main configuration options are as follows:

- Quote: Set ***Price Unit***, ***Material Cost***, ***Cut Cost***, ***Pierce Cost***, ***Bend Cost***, ***Scrap Cost***, ***Hour Cost***, and ***Custom Params***, according to the actual conditions. The software can be based on the settings to generate quotations.
- Statistics:
  - Material Summary: Select the material summary type.
    - By whole plate size: Charges based on entire plate area (ignores part utilization).
    - By parts bounding rectangle: Uses the minimum rectangular area enclosing nested parts.
    - By parts envelope area: Uses the envelope area of the nested parts.

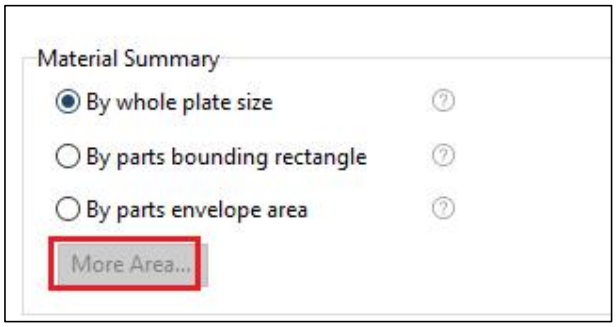


Figure 7-2 More area greyed out

Enable/Disable ***More Area*** when selecting ***By whole plate size*** or ***By parts bounding rectangle***. You can choose to expand or subtract the plate area.

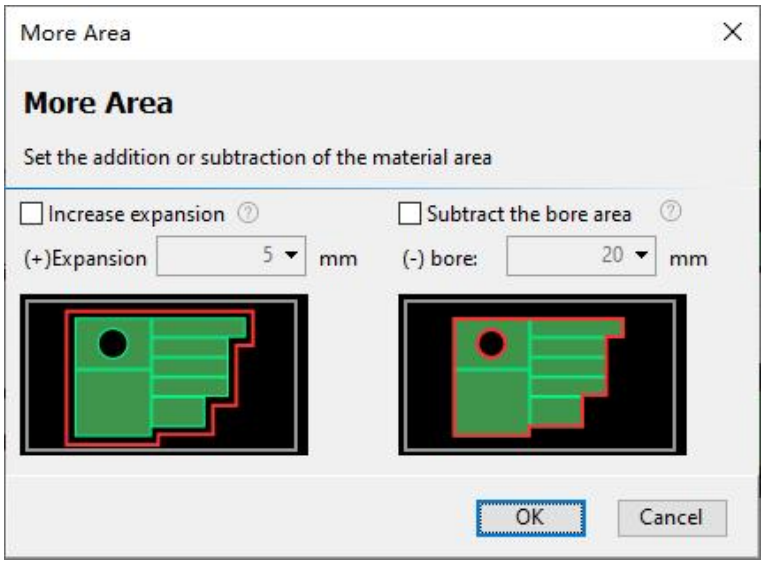


Figure 7-3 More area

- Pierce Summary: Choose ***By the actual pierce number*** to count the actual pierces performed. Or choose ***By contour number*** (including/excluding marking contour) to calculate all part contours.

- Cutting Summary: When ***Single part cut length summary*** is selected, the calculation method is cutting length of a single part * part quantity in the nesting result. When ***Actual cutting length*** is selected, the calculation only considers the actual cutting length (co-edge line counts once only).

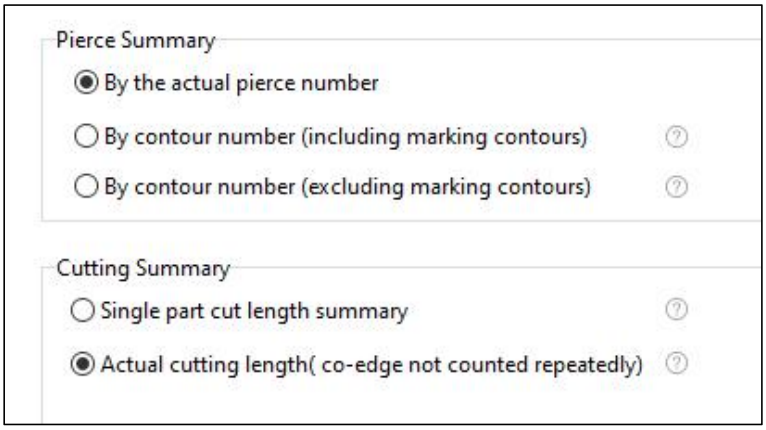


Figure 7-4 Pierce and cutting summary

- More summaries: Supports statistics and quotes for ***Bend Summary***, ***Hour Summary***, and ***Scrap Summary***.

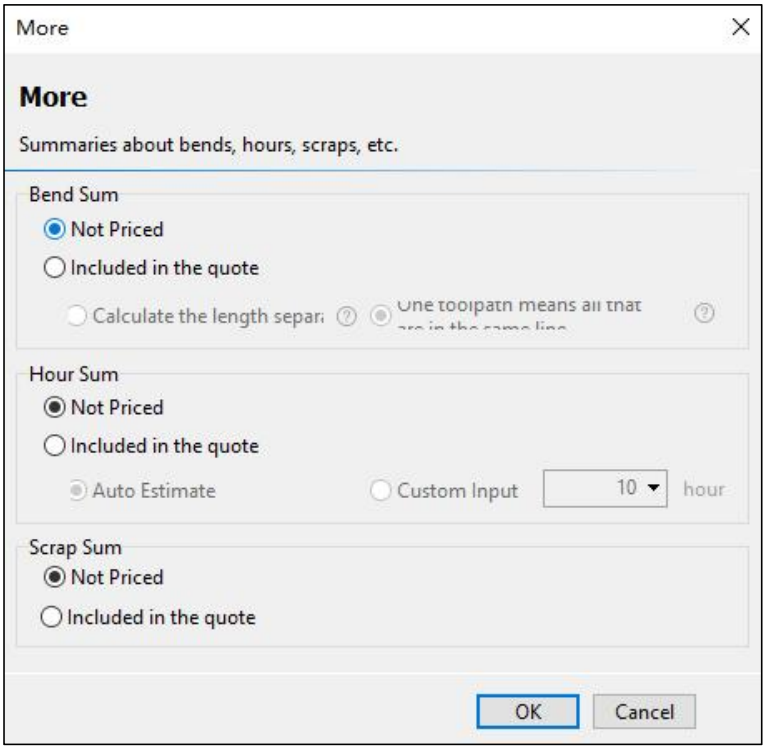


Figure 7-5 More summaries

- File Config: Includes ***File Name***, ***Time Unit***, ***PDF Params***, and other content options.

7.1.2 Report

Four types of report types are included: ***Custom Report***, ***Excel Report***, ***Single Report***, and ***Report Old Version***. Select the type as required in the ***Report*** drop-down menu. The function button can remember and automatically goes to the last selected type.

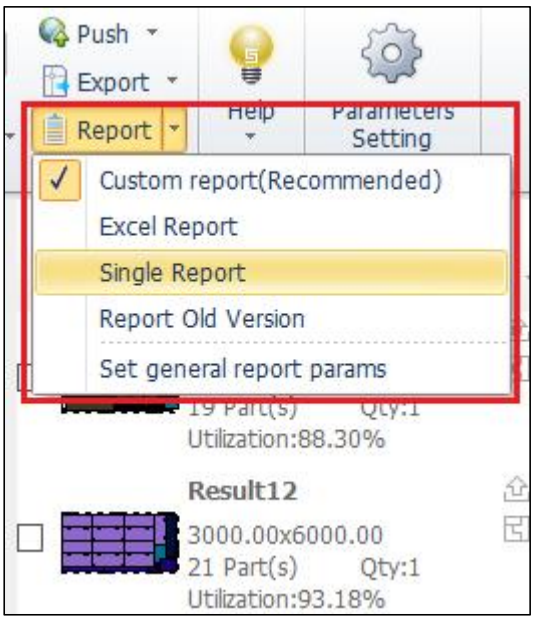
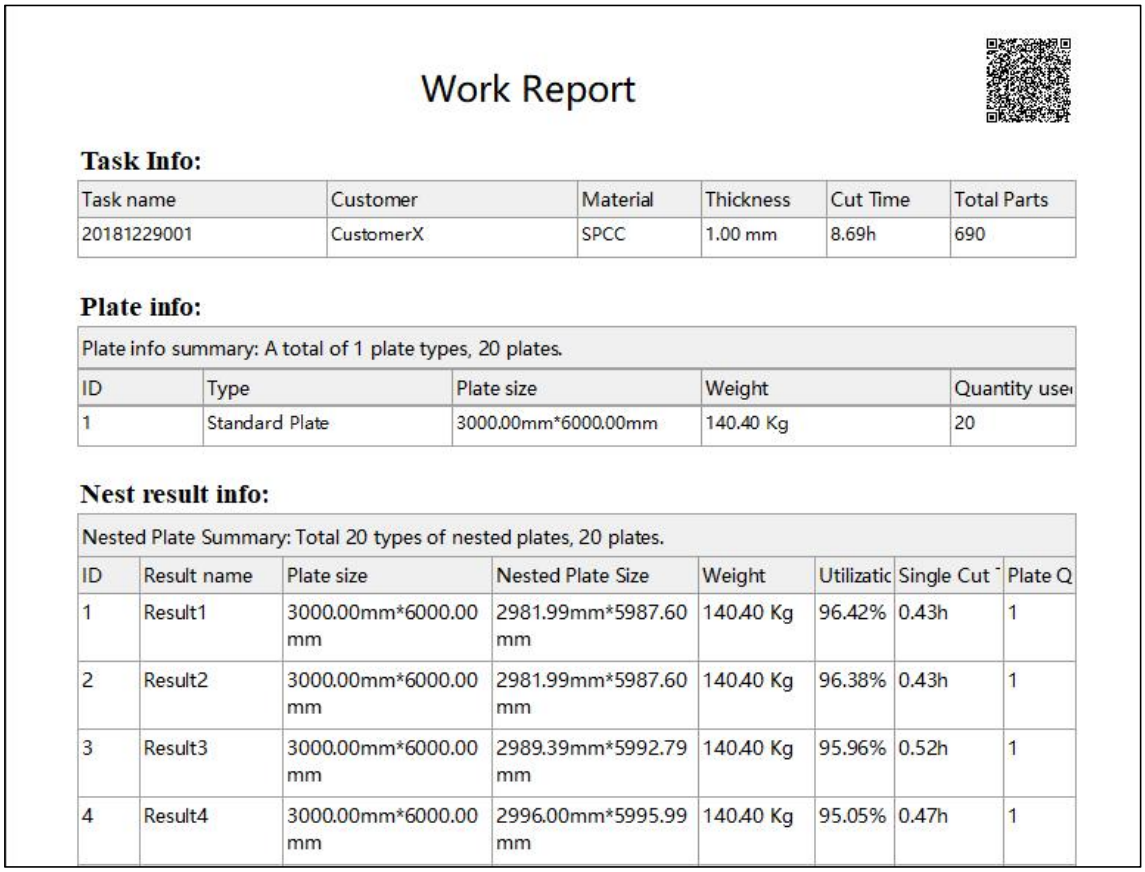


Figure 7-6 Type of reports

Ensure ***Motion Parameters*** on the ***Global Parameters*** page match the machine tool's actual configuration in the cutting control software. Inconsistent parameters will distort time calculations. Refer to Bind Machine Tools and Scheduling.

In the ***Custom Report*** window, the fixed forms include ***Work Report***, ***Quotation***, ***Report***, and ***Single Part Quotation***. These preset forms cannot be modified or edited. To customize the preset form, you can right-click and select ***Copy to user template*** for editing.

- Work Report: Consists of the information about the task, plate, nest result, and part. It mainly outputs the actual processing information, including thumbnails, utilization rates, cutting lengths, and so on.



Work Report

Task Info:

Task name	Customer	Material	Thickness	Cut Time	Total Parts
20181229001	CustomerX	SPCC	1.00 mm	8.69h	690

Plate info:

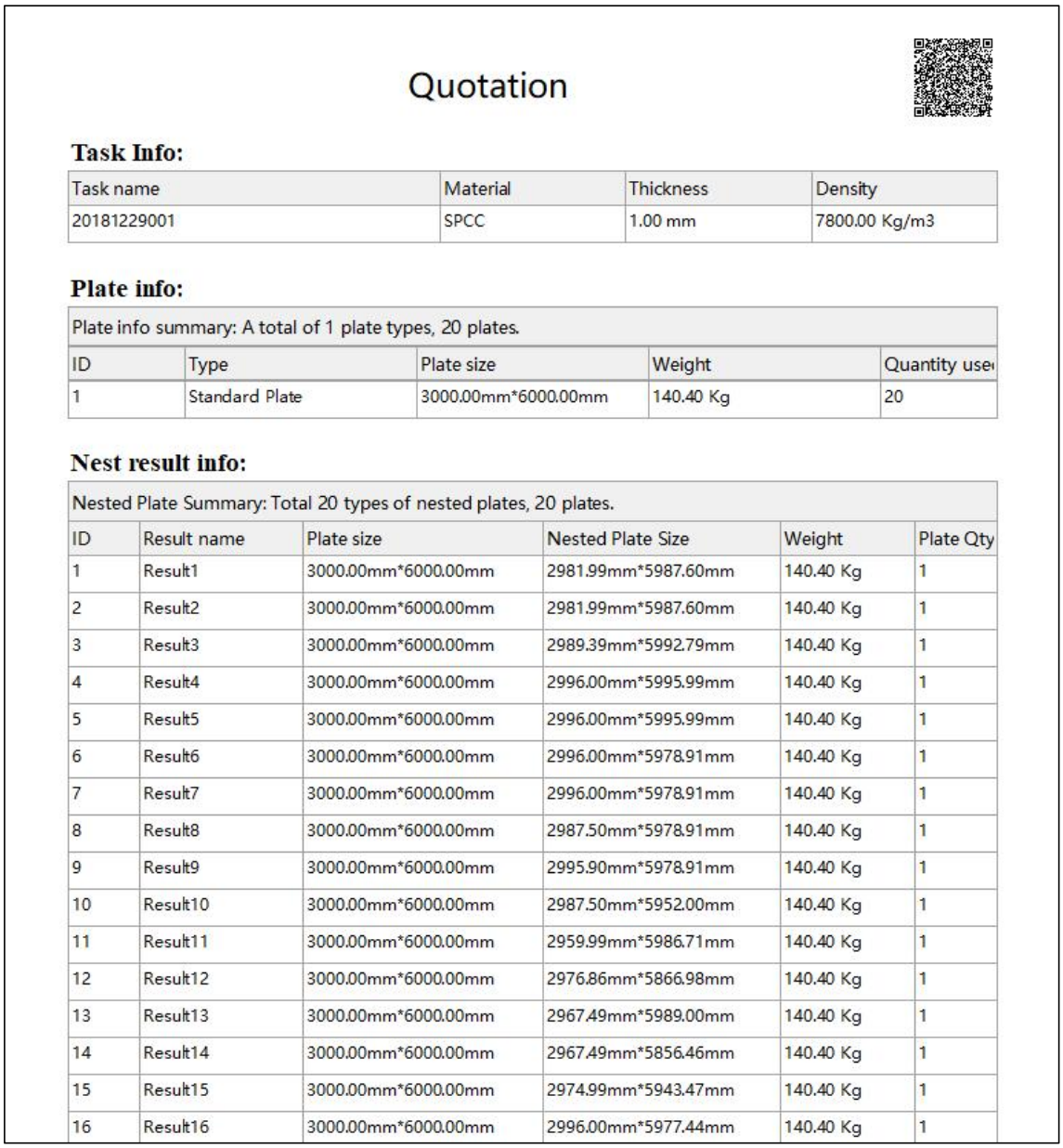
Plate info summary: A total of 1 plate types, 20 plates.				
ID	Type	Plate size	Weight	Quantity use
1	Standard Plate	3000.00mm*6000.00mm	140.40 Kg	20

Nest result info:

Nested Plate Summary: Total 20 types of nested plates, 20 plates.							
ID	Result name	Plate size	Nested Plate Size	Weight	Utilizatic	Single Cut	Plate Q
1	Result1	3000.00mm*6000.00 mm	2981.99mm*5987.60 mm	140.40 Kg	96.42%	0.43h	1
2	Result2	3000.00mm*6000.00 mm	2981.99mm*5987.60 mm	140.40 Kg	96.38%	0.43h	1
3	Result3	3000.00mm*6000.00 mm	2989.39mm*5992.79 mm	140.40 Kg	95.96%	0.52h	1
4	Result4	3000.00mm*6000.00 mm	2996.00mm*5995.99 mm	140.40 Kg	95.05%	0.47h	1

Figure 7-7 Work report

- Quotation: Compared to ***Work Report***, it supplements ***Price information*** additionally. It mainly outputs processing and material prices. The data in the ***Price information*** is calculated according to the settings on the ***Report Params*** page.



Quotation

Task Info:

Task name	Material	Thickness	Density
20181229001	SPCC	1.00 mm	7800.00 Kg/m3

Plate info:

Plate info summary: A total of 1 plate types, 20 plates.				
ID	Type	Plate size	Weight	Quantity use
1	Standard Plate	3000.00mm*6000.00mm	140.40 Kg	20

Nest result info:

Nested Plate Summary: Total 20 types of nested plates, 20 plates.					
ID	Result name	Plate size	Nested Plate Size	Weight	Plate Qty
1	Result1	3000.00mm*6000.00mm	2981.99mm*5987.60mm	140.40 Kg	1
2	Result2	3000.00mm*6000.00mm	2981.99mm*5987.60mm	140.40 Kg	1
3	Result3	3000.00mm*6000.00mm	2989.39mm*5992.79mm	140.40 Kg	1
4	Result4	3000.00mm*6000.00mm	2996.00mm*5995.99mm	140.40 Kg	1
5	Result5	3000.00mm*6000.00mm	2996.00mm*5995.99mm	140.40 Kg	1
6	Result6	3000.00mm*6000.00mm	2996.00mm*5978.91mm	140.40 Kg	1
7	Result7	3000.00mm*6000.00mm	2996.00mm*5978.91mm	140.40 Kg	1
8	Result8	3000.00mm*6000.00mm	2987.50mm*5978.91mm	140.40 Kg	1
9	Result9	3000.00mm*6000.00mm	2995.90mm*5978.91mm	140.40 Kg	1
10	Result10	3000.00mm*6000.00mm	2987.50mm*5952.00mm	140.40 Kg	1
11	Result11	3000.00mm*6000.00mm	2959.99mm*5986.71mm	140.40 Kg	1
12	Result12	3000.00mm*6000.00mm	2976.86mm*5866.98mm	140.40 Kg	1
13	Result13	3000.00mm*6000.00mm	2967.49mm*5989.00mm	140.40 Kg	1
14	Result14	3000.00mm*6000.00mm	2967.49mm*5856.46mm	140.40 Kg	1
15	Result15	3000.00mm*6000.00mm	2974.99mm*5943.47mm	140.40 Kg	1
16	Result16	3000.00mm*6000.00mm	2996.00mm*5977.44mm	140.40 Kg	1

Figure 7-8 Quotation

- Report: Includes nesting result thumbnails, machining information, and parts lists. It primarily outputs information about the nesting results and the parts in each nesting result.

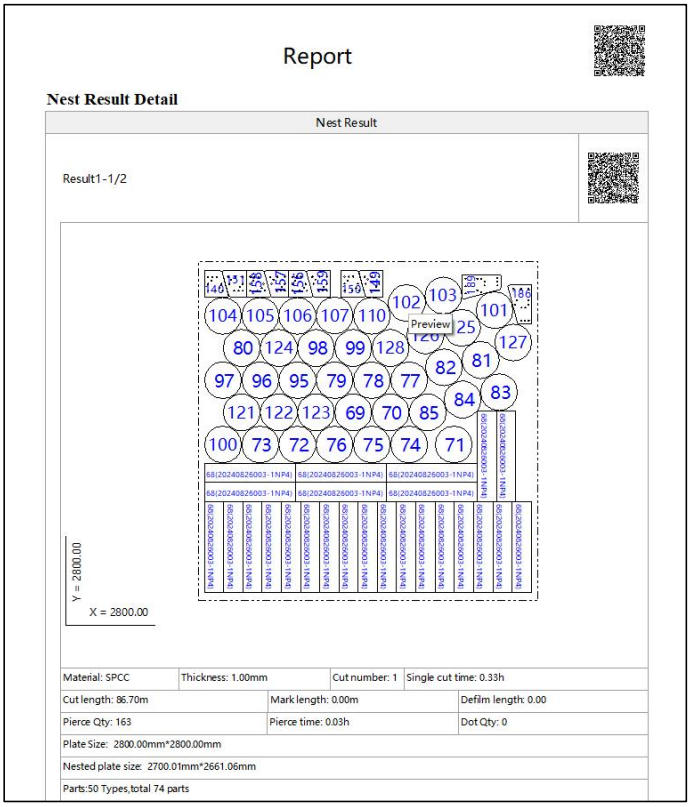
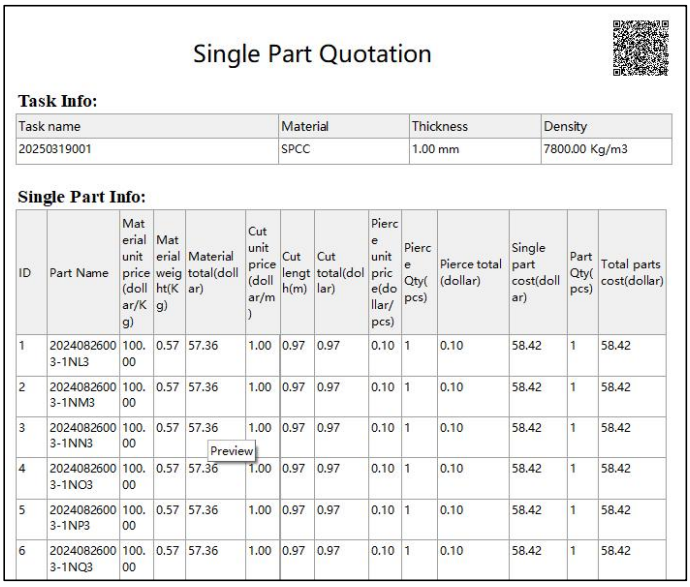


Figure 7-9 Report

- Single Part Quotation: Includes task information and single-part quotation information. It mainly outputs and summarizes the price information of a single part.



Single Part Quotation

Task Info:

Task name	Material	Thickness	Density
20250319001	SPCC	1.00 mm	7800.00 Kg/m3

Single Part Info:

ID	Part Name	Material unit price (dollar/Kg)	Material weight(Kg)	Material total(dollar)	Cut unit price (dollar/m)	Cut length(m)	Cut total(dollar)	Pierce unit price(dollar/pcs)	Pierce Qty(pcs)	Pierce total (dollar)	Single part cost(dollar)	Part Qty(pcs)	Total parts cost(dollar)
1	20240826003-1NL3	100.00	0.57	57.36	1.00	0.97	0.97	0.10	1	0.10	58.42	1	58.42
2	20240826003-1NM3	100.00	0.57	57.36	1.00	0.97	0.97	0.10	1	0.10	58.42	1	58.42
3	20240826003-1NN3	100.00	0.57	57.36	1.00	0.97	0.97	0.10	1	0.10	58.42	1	58.42
4	20240826003-1NO3	100.00	0.57	57.36	1.00	0.97	0.97	0.10	1	0.10	58.42	1	58.42
5	20240826003-1NP3	100.00	0.57	57.36	1.00	0.97	0.97	0.10	1	0.10	58.42	1	58.42
6	20240826003-1NQ3	100.00	0.57	57.36	1.00	0.97	0.97	0.10	1	0.10	58.42	1	58.42

Figure 7-10 Single part quotation

You can modify the four report forms in the ***Personal Template***. Select the target report form, and click ***Edit*** below.

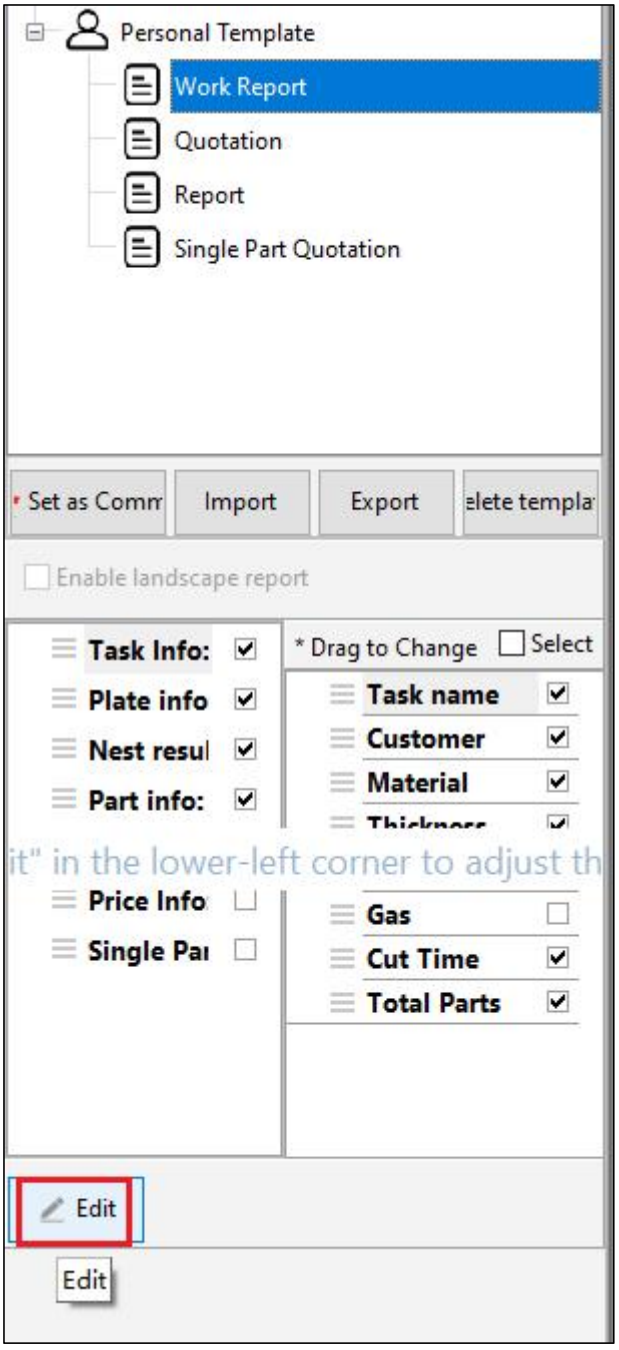


Figure 7-11 Edit reports

Toggle checkboxes in the field panel to add or remove fields in the form. You can also drag the columns to change the field order. Changes are reflected immediately in the ***Preview*** tab. After editing, click ***Save*** or ***Save As*** to apply the changes.

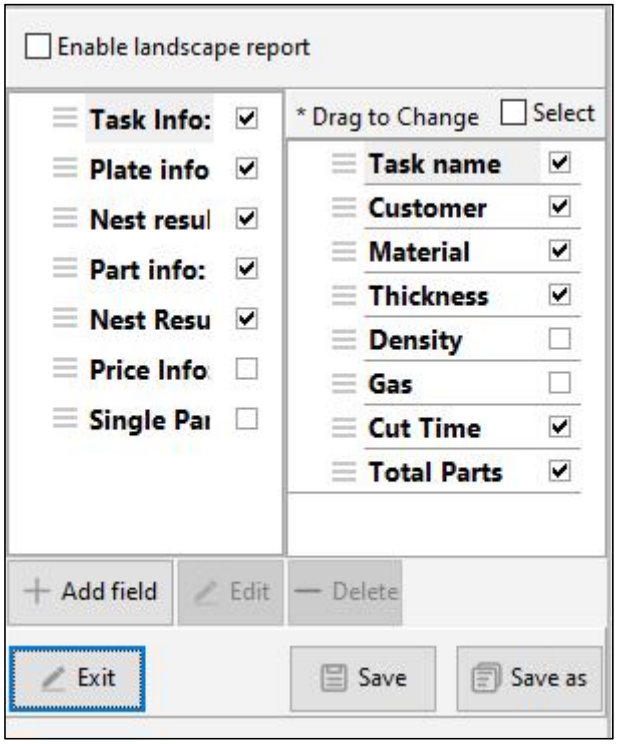


Figure 7-12 Edit a field

To change the column width of the form, just drag the column border.

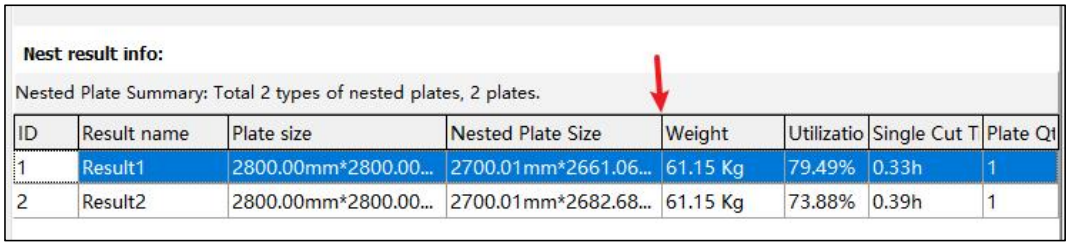


Figure 7-13 Drag the column border to change the column width

After editing, click ***Print*** or ***Export PDF*** in the upper right corner.

7.2 Push

When the nesting computer and cutting control computer are separated, using ***Push*** to directly generate machining task files from nesting results and sends them to the binding machine tool.

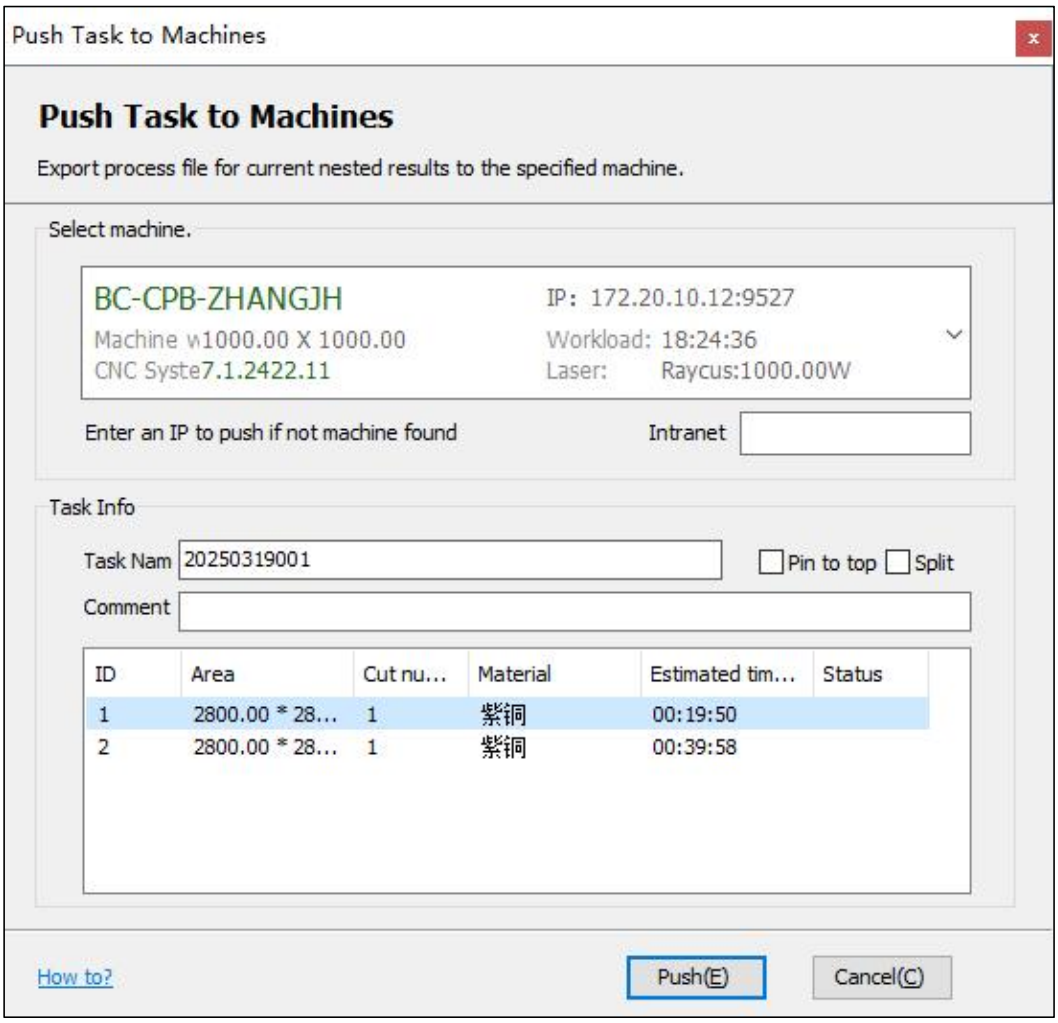


Figure 7-14 Push files to machine tools

Use CypCut/HypCut software. Ensure both computers are on the same LAN. Select the binding machine tool and fill in the task information. Click ***Push*** for processing as required.

⚠ Notice: Currently, for CypCut 6.3.721.3 and higher version support ***Push*** for processing (view the software version in the About screen). All added graphic techniques and layer techniques are saved in the push file and do not need to be set again on the cutting control software.

7.2.1 Push Task to Raybox

Make sure you have purchased and connected RayBox before using the function. Select ***Push Task to Raybox*** from the ***Push*** drop-down options, pushing the cutting tasks directly to RayBox for unified management.

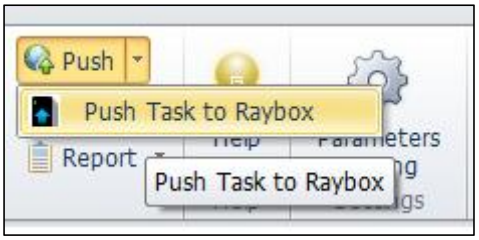


Figure 7-15 Push task to Raybox

In the pop-up window, check the ***IP Address*** of the Raybox and confirm it by clicking ***OK***. Then, you can also modify the ***Nest name*** and view the estimated cutting time. Check the options for pushing the nest report or pin a task in the RayBox queue.

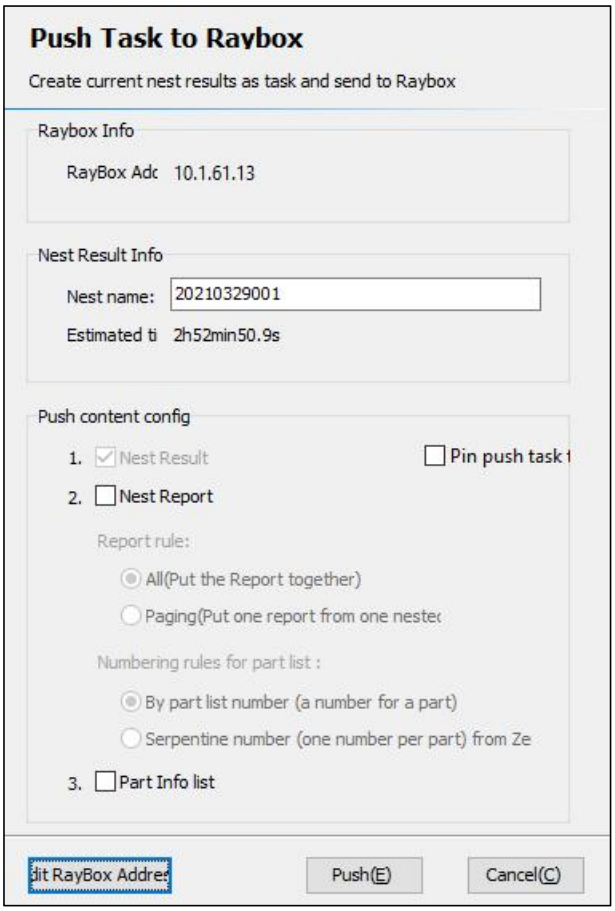


Figure 7-16 Push task to Raybox

To modify the ***IP Address*** of the current RayBox, click ***Edit RayBox Address*** in the lower left corner.

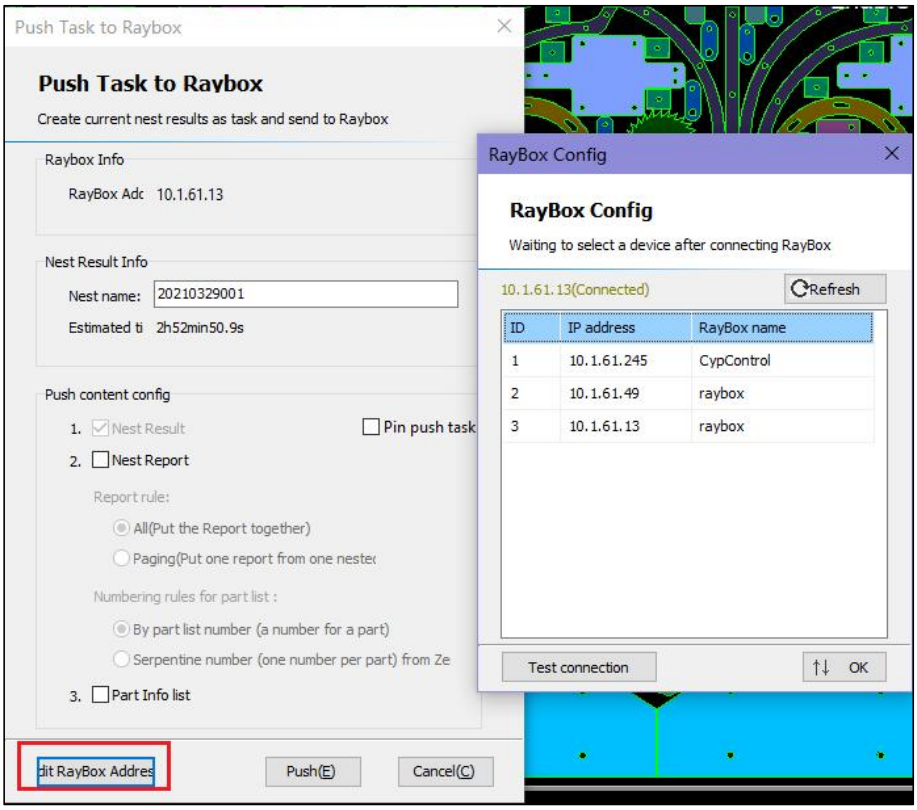


Figure 7-17 Modify the IP address

After the push, navigate to the ***Plane Task*** page to check the corresponding task name and perform unified management.

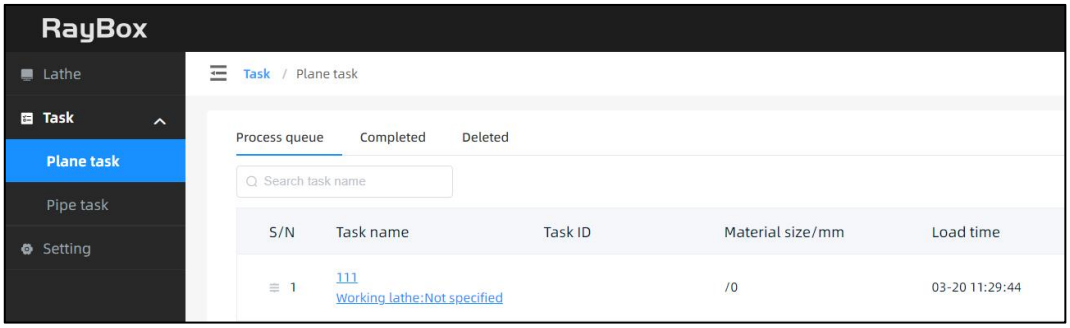


Figure 7-18 RayBox task list

7.3 Export Cutting Files

The export format and the corresponding software version are described in the following table:

Table 7-1 Cutting File Format Description

Export Option	File Format	Description	Adapted Cutting Software
Export Cutting Files (Recommended)	*.nrp2	Processing task packages that contain multiple nesting results in one file.	● CypCut (V731.5 or higher) ● HypCut ● FACut
	*.nsds	Storage format for CypNest nesting task files.	/
Export Cutting Files in Older Version (V731.5 or older)	*.nrp	Older processing task packages.	● CypCut (V712.5 and later, V731.5 and earlier versions) ● HypCut
	*.nsds	Storage format for CypNest nesting task files Choose whether to enable ***Auto save Nsds*** when exporting and the corresponding directory on the ***Parameter Settings → Export Settings*** page.	/
Export NC	*.nc	The manufacturer's NC instruction file is required. Then, enable ***Generate Beckoff NC Program*** and set the related parameter on the ***Parameter Settings → Post-processing*** page.	Compatible with specific Beckoff CNC systems and flame/plasma cutting machines.
Export to FACut	*.slp	Bevel processing files, which need specialized bevel processing equipment.	FACut
Save as LXDS(L)	*.lxds	One nesting result generates one cutting file.	● CypCut (CypCut V739 and higher)

Export Option	File Format	Description	Adapted Cutting Software
			● HypCut ● FACut
Save as DXF(D)	*.dxf	Export drawing files without any graphic techniques and layers techniques. Not recommended.	/

Chapter 8 Highlight Functions

Beyond core nesting and sorting functions, CypNest provides specialized capabilities such as ***Multiple Materials***, ***Auto Microjoint***, ***External Batch Import***, ***Import Nest Result from File***, ***Bevel Part Nest***, ***Auto Technique***, ***Machine Params***, among others. Partial functions require feature packs. This chapter introduces ***Add Remnant Plate from Picture***, ***Import Nest Result from File***, and ***Multiple Materials***.

8.1 Add Remnant Plate from Picture

This function applies to the scenario when processing remnant plates without existing remnant drawings. The specific steps are as follows:

⚠ Notice: Download and install the remnant picture recognition module during initial use.

Step 1 Click ***Add Remnant Plate from Picture***.

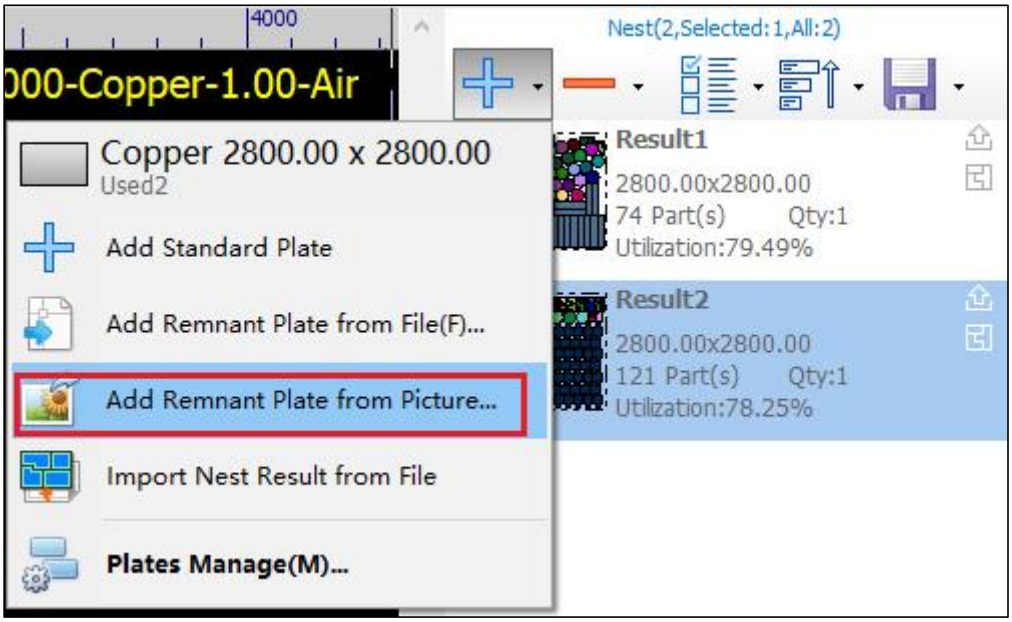


Figure 8-1 Function entrance

Step 2 Select the target remnant picture from the local files to import.

Step 3 After importing, perform calibration first.

Figure 8-2 Two calibration options are provided.

➢ 2-point Calibration: Click to select two anchors in the picture and enter the size value.

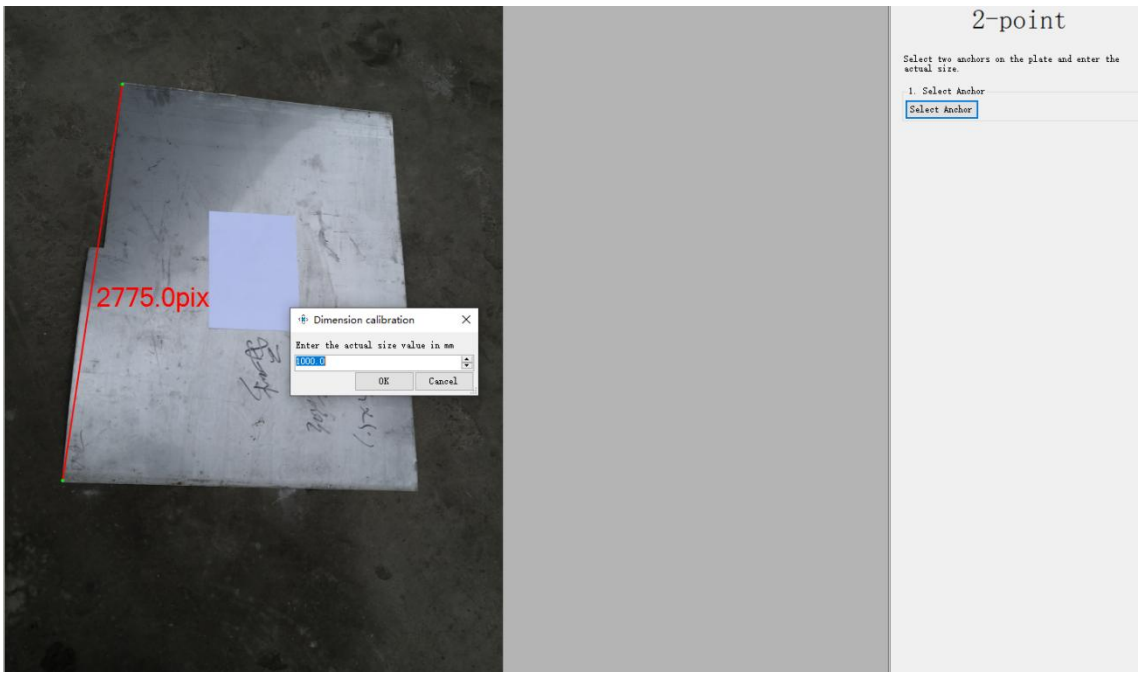


Figure 8-3 2-point calibration

- 4-point Calibration: Click to select four anchors in the picture. It is recommended to apply automatic calibration. Place a piece of A4 or A3 paper on the remnant plate and click ***Auto Calibration***.

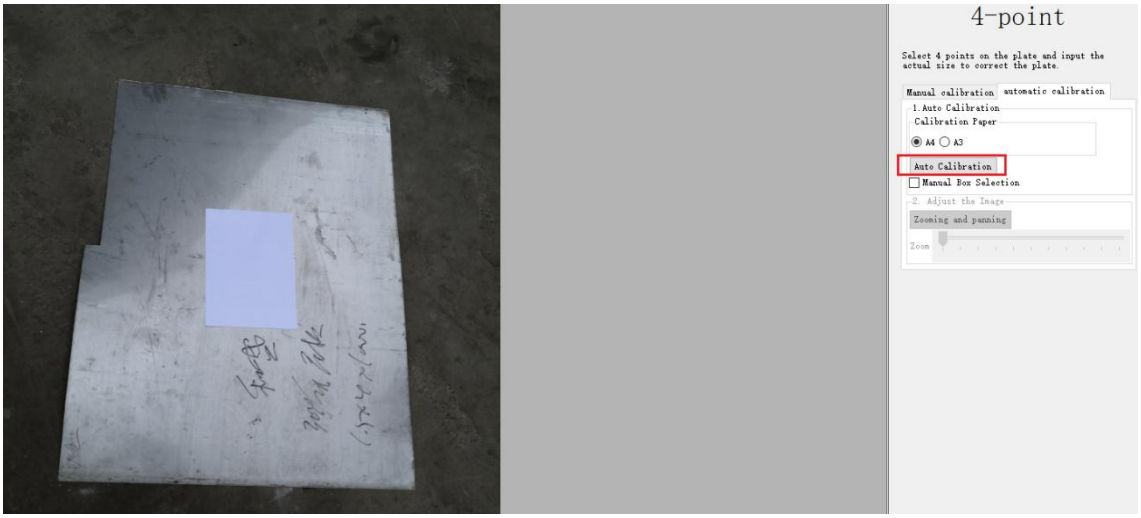


Figure 8-4 Place A4 paper

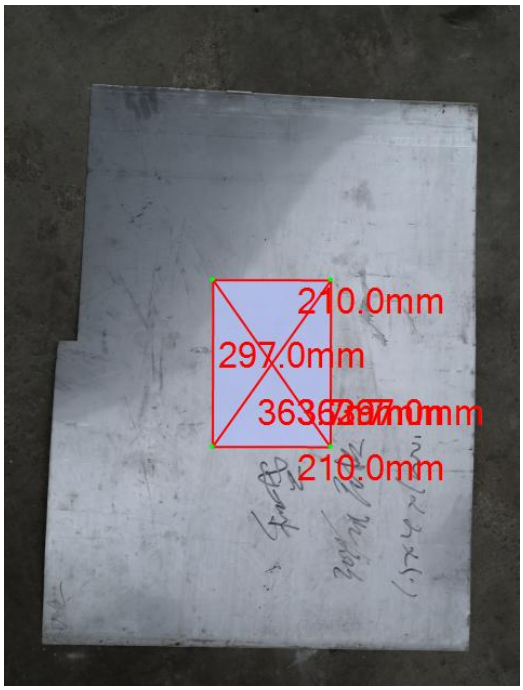


Figure 8-5 Complete calibration.

Step 4 Extract the contour of the remnant plate picture for generating drawings. Click ***Extract Contours*** and then modify the auto-extracted contours for post-processing.

Figure 8-6 Extract contours

- Extraction of Inner Contour: Multiple contours may exist. Choose whether to extract the inner contour as required.
- Remove Small Contours: Multiple small contours may exist. Remove the size-determined contours as needed by dragging left or right.

Figure 8-7 Remove the small contour

Figure 8-8 Keep the small contour

Step 5 (Optional) If the auto-extracted function does not meet the actual needs, enable ***Manual Adjustment*** for fine adjustment.

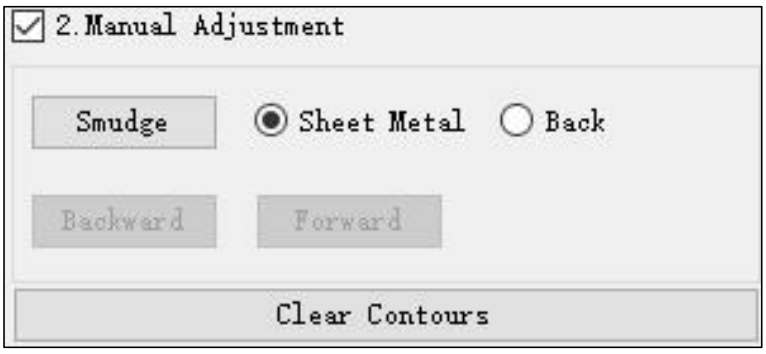


Figure 8-9 Manual adjustment

Step 6 (Optional) Click ***Hand Painted Plate*** or ***Modify Sheet*** to enter the drawing page for more customized editing operations.

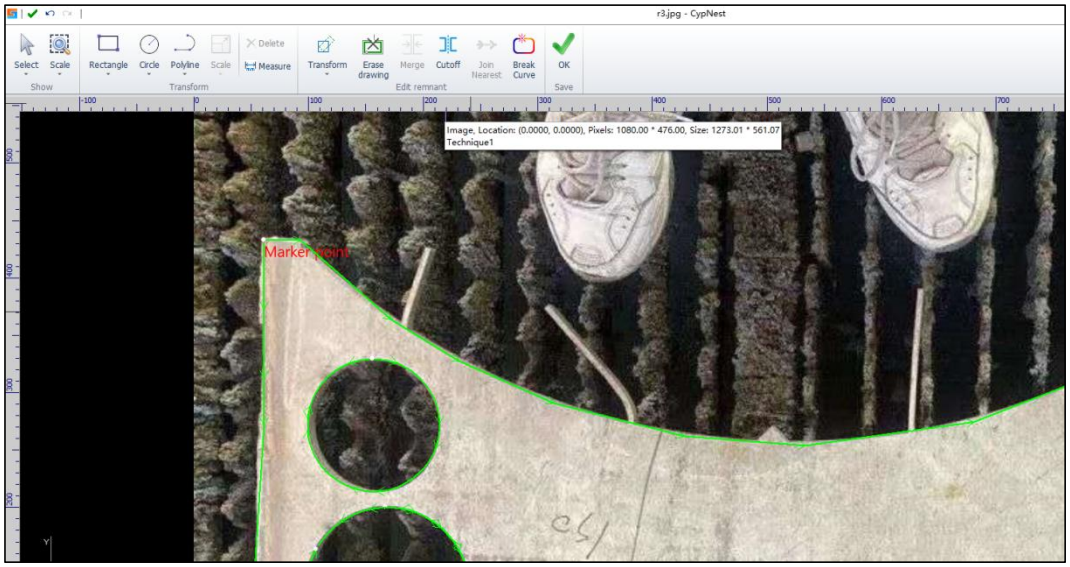


Figure 8-10 Drawing page

Step 7 Perform part nesting by applying the imported remnant plate.

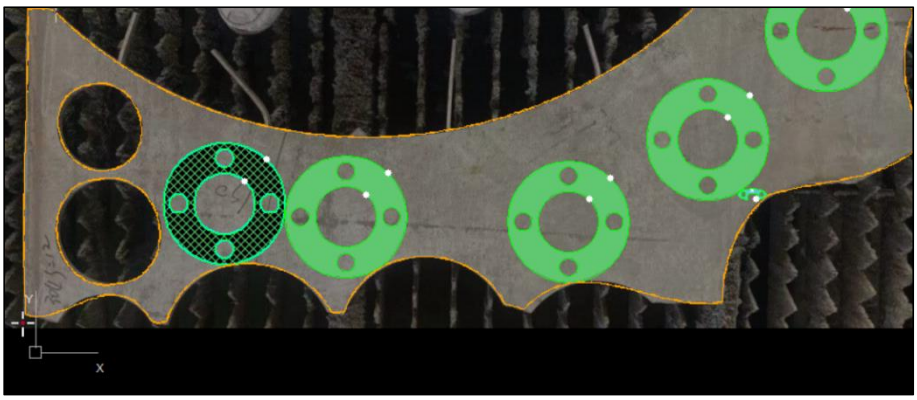


Figure 8-11 Nesting by using the remnant plate

8.2 Import Nest Result from File

CypNest supports the editing of CAD files. This function applies to the scenario when the nesting is performed in CAD software but needs further operations like editing and sorting in CypNest. After editing, you can push the nesting results to the binding machine tool for processing. The specific steps are as follows:

⚠ Notice: Only non-co-edged nesting results can be imported.

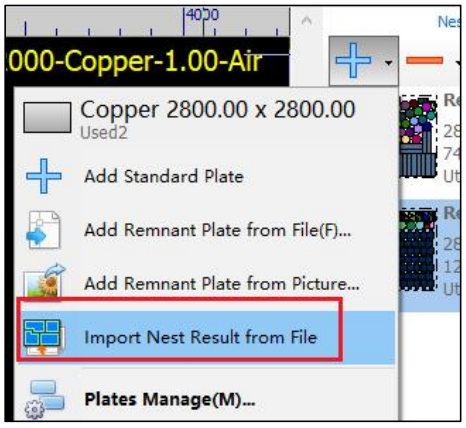


Figure 8-12 Import Nest Result from File

Step 1 After importing CAD files, set the parameters on the ***Optimize Drawing***, ***Drawing Processing***, and ***Identify Content*** pages for auto-optimization.

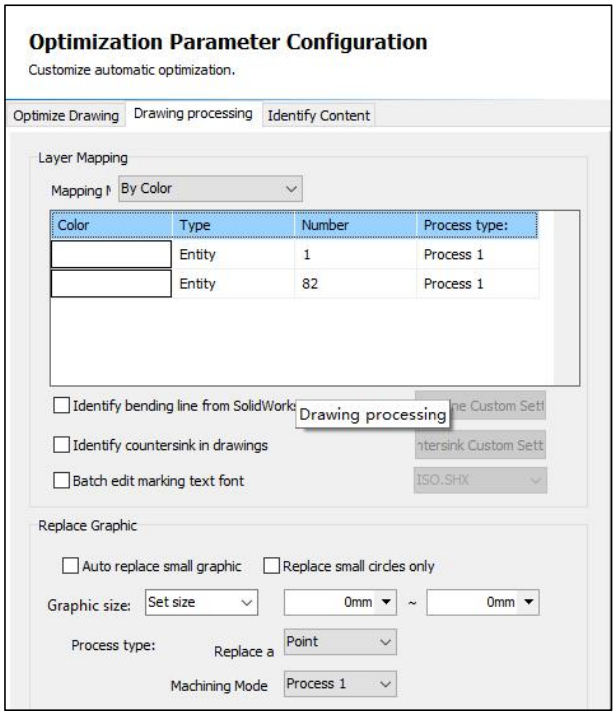


Figure 8-13 Optimization parameter configuration

Step 2 Click ***Multi-Plate*** to configure the identification parameters of the nested results. Specific parameters are described below:

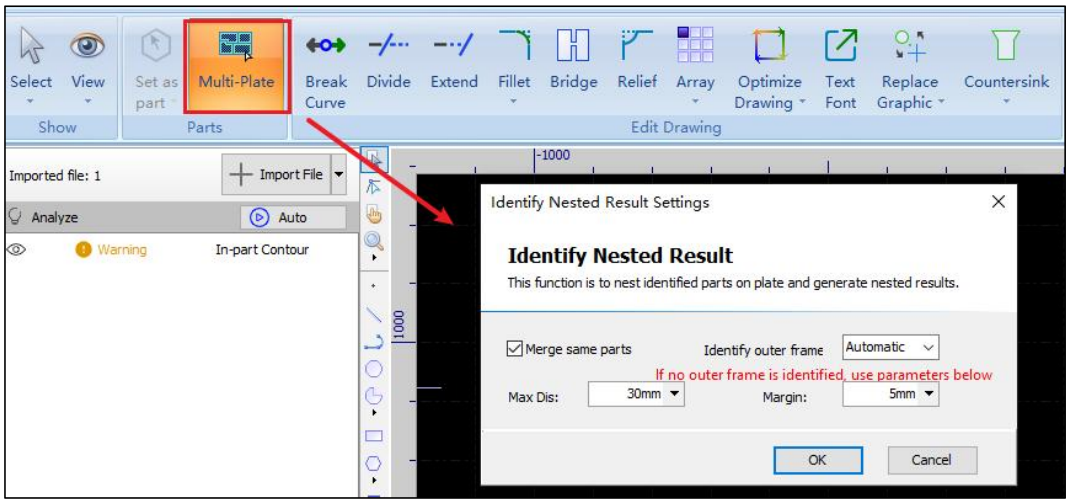


Figure 8-14 Identify nested result settings

- Merge same parts: Choose to merge identical parts in the nested result.
- Identify outer frame: Set the outer frame of the nested result as ***Plate*** or ***Parts***.
- Max Dis: Measure the part gap, then set the value as required. For example, the measured part gap is 300 mm. If the input value is greater than 300 mm, the imported file only generates one nesting result. Otherwise, the imported nesting files will be separated into several nesting results.

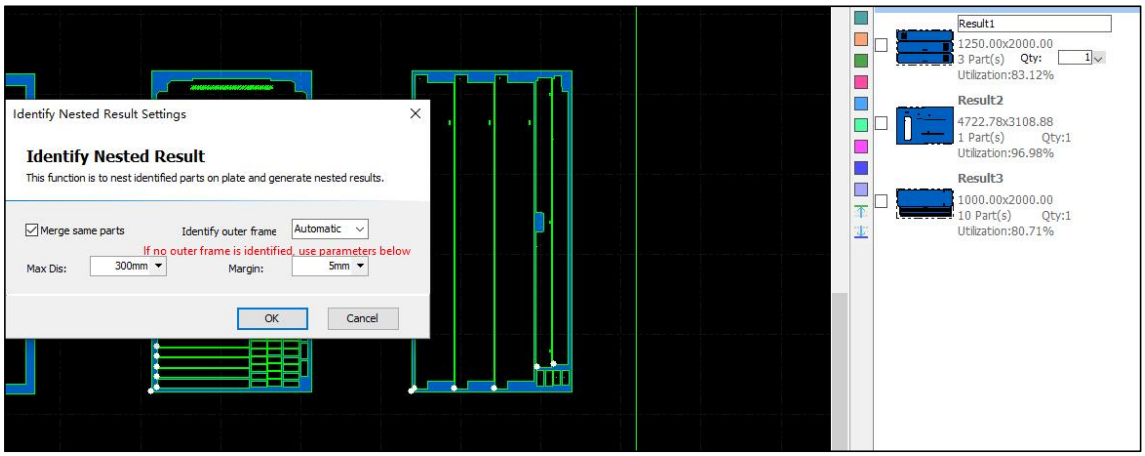


Figure 8-15 Multiple nesting results

- Margin: Calculated automatically. If the outer frame fails to be identified, manually input the value.

Step 3 After the identification, you can modify the quantity on the right side, and click ***OK*** to go to the ***Nest*** interface.

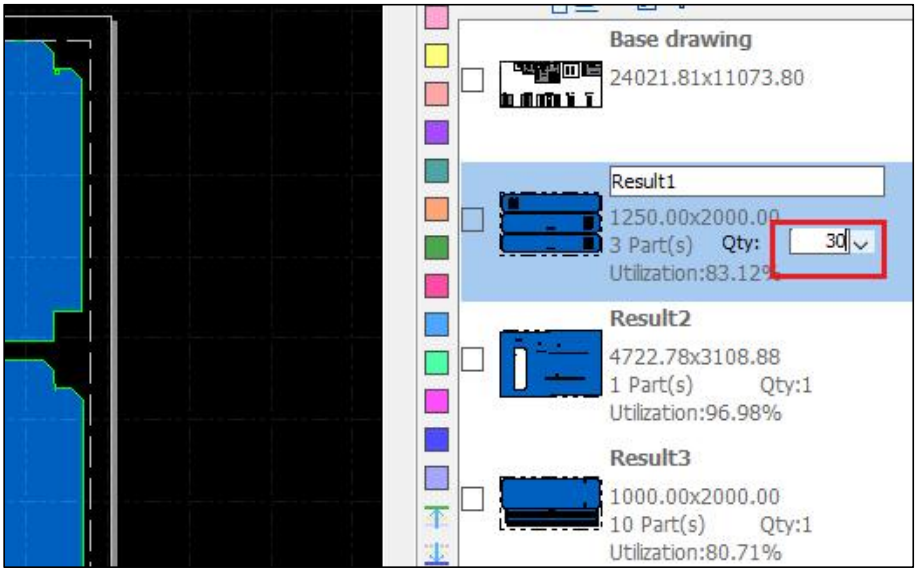


Figure 8-16 Quantity modification

Step 4 Perform the next step to the imported result, or export the files for processing directly.

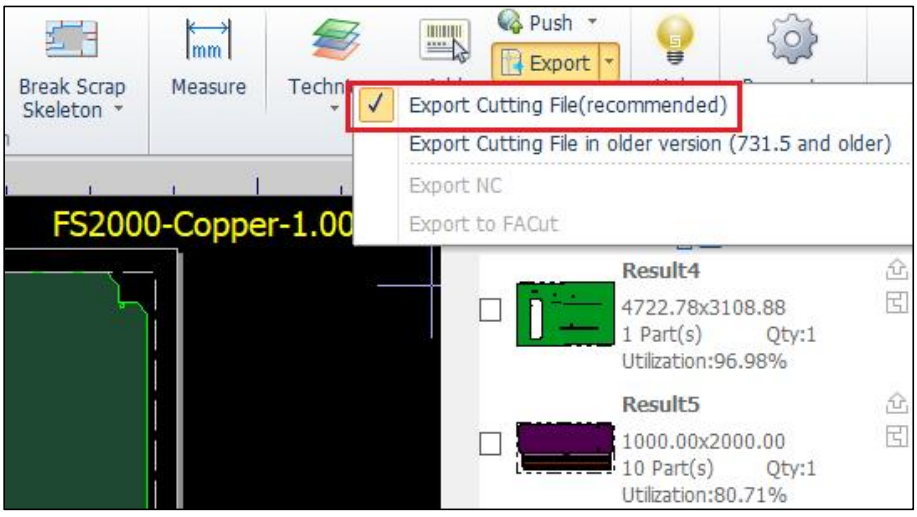


Figure 8-17 Export

8.3 Multiple Materials

When the drawings contain parts with mixed material types and varying thicknesses, this function can automatically identify part information and create nesting tasks respectively, eliminating the efforts in repetitive task creation.

The main workflow of multi-material nesting is as follows:

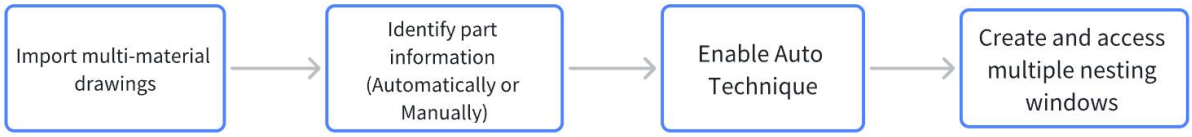


Figure 8-18 Multi-material nesting workflow

After accessing the Home page, click ***Multiple Materials*** in the ***New Nest*** drop-down options.

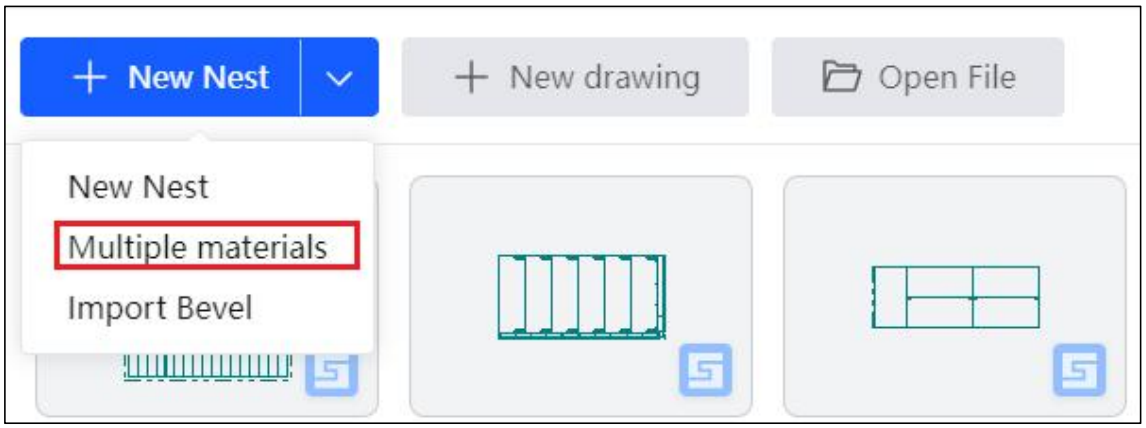


Figure 8-19 Multi-material entrance

In the pop-up window, select the target drawings and click ***Ctrl*** for multiple selection. Confirm the selection, then click ***Open*** to access the ***Part Recognition and Pre-process*** interface (default). You can choose to directly access the ***Drawing processing*** interface as required.

The ***Part Recognition and Pre-process*** of multiple materials nesting tasks is basically the same as the operation of the general nesting task. Refer to Part Recognition and Pre-process. Note that for multi-material nesting tasks, ***Material label*** and ***Thickness label*** can be used to identify part information in the ***Identify Content*** column. The prerequisite is that the required identification information tags are set in the imported drawings. Then, the software can automatically identify the tags within the parts and filter the target parts by material or thickness.

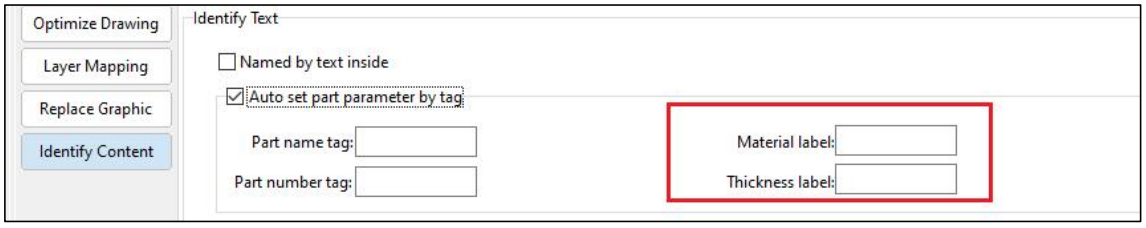


Figure 8-20 Material and thickness tags

In addition to identifying part information through the tags, you can also enter the ***Drawing Processing*** page to enable ***Identify part information from text***.

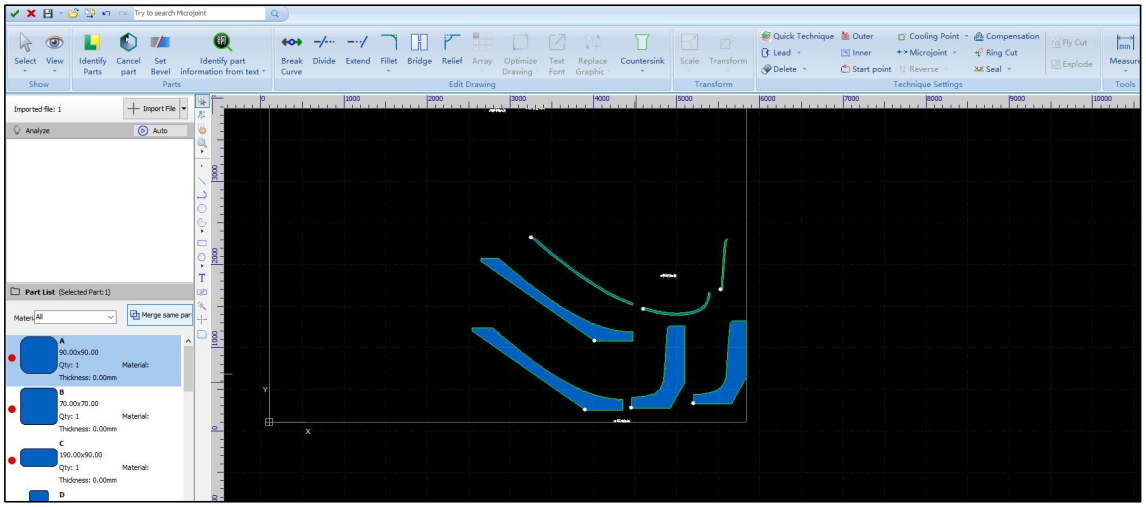


Figure 8-21 Drawing processing interface

After identification, you can click ***Quick Technique*** to set graphic techniques for the same material-thickness part with one click, and for the multiple material-thickness separately. When completing the drawing processing, click ***OK t***o enter the ***Nest*** interface.

Note that each material creates a nesting task, namely, a new nesting window. Follow the standard nesting workflow in the windows separately: add plate, nest, sort, and export.

For easier operation, you can just keep the current working window and close others. The closed ones can be reopened in the Home page.

Chapter 9 Parameter Settings

The ***Parameter Settings*** page supports unified management and configuration of CypNest parameters. It consists of seven main configuration items: ***Common Settings***, ***Display Settings***, ***Shortcut Settings***, ***Auto Technique***, ***Post-processing***, ***Report***, and ***Device Manager***.

9.1 Common Settings

Included are ***Import Settings***, ***Work Settings***, and ***Export Settings***.

9.1.1 Import Settings

In the ***Import Setting*** screen, you can set the ***Part Recognition Settings***, and ***Custom Part Template***.

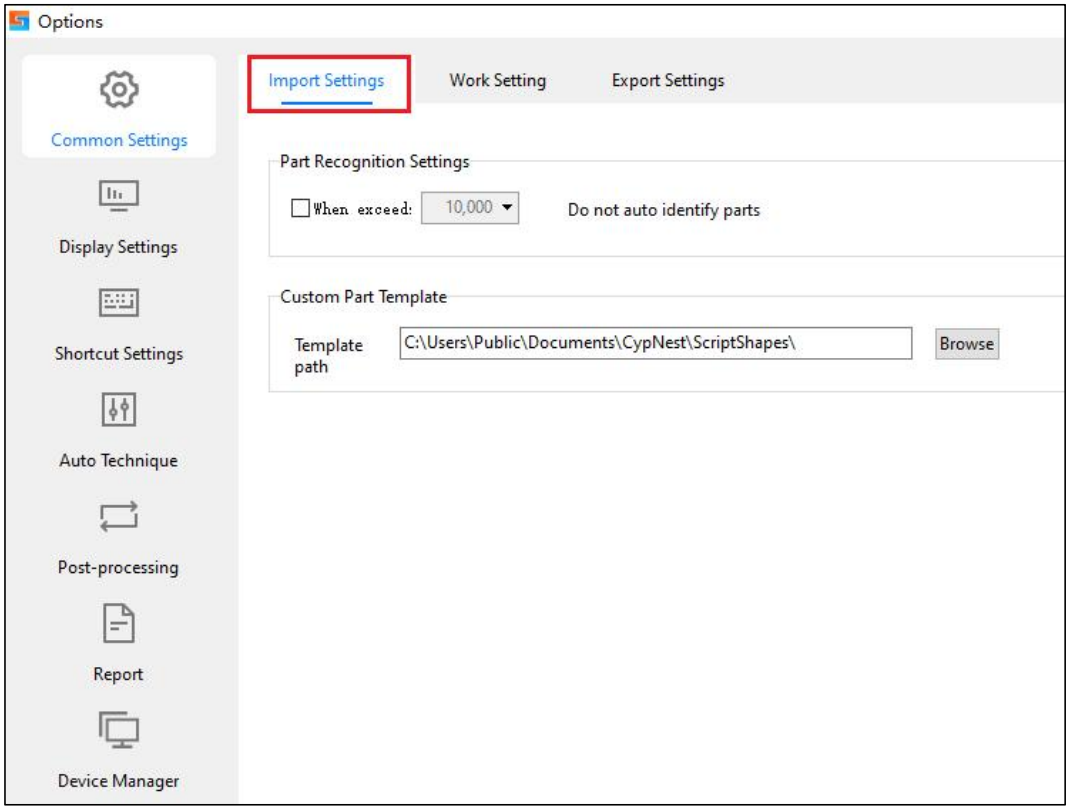


Figure 9-1 Import settings

- Part Recognition Settings: After importing drawings, the software will automatically recognize graphics without errors as parts (filled in blue). When the graphic quantity is more than 10,000, drawing loading may be slow. You can limit the quantity for part auto-identification. When enabled, if the number of imported graphics exceeds the set quantity, the software will not perform part

auto-recognition. Custom the quantity (default is 10,000).

- Custom Part Template: Set the local storage path for storing custom part templates.

9.1.2 Work Settings

Consists of six main configuration options: ***Safety Check***, ***Manual Nest***, ***Co-edged Toolpath***, ***Leadline Settings***, ***Utilization***, *and* ***Auto Backup.***

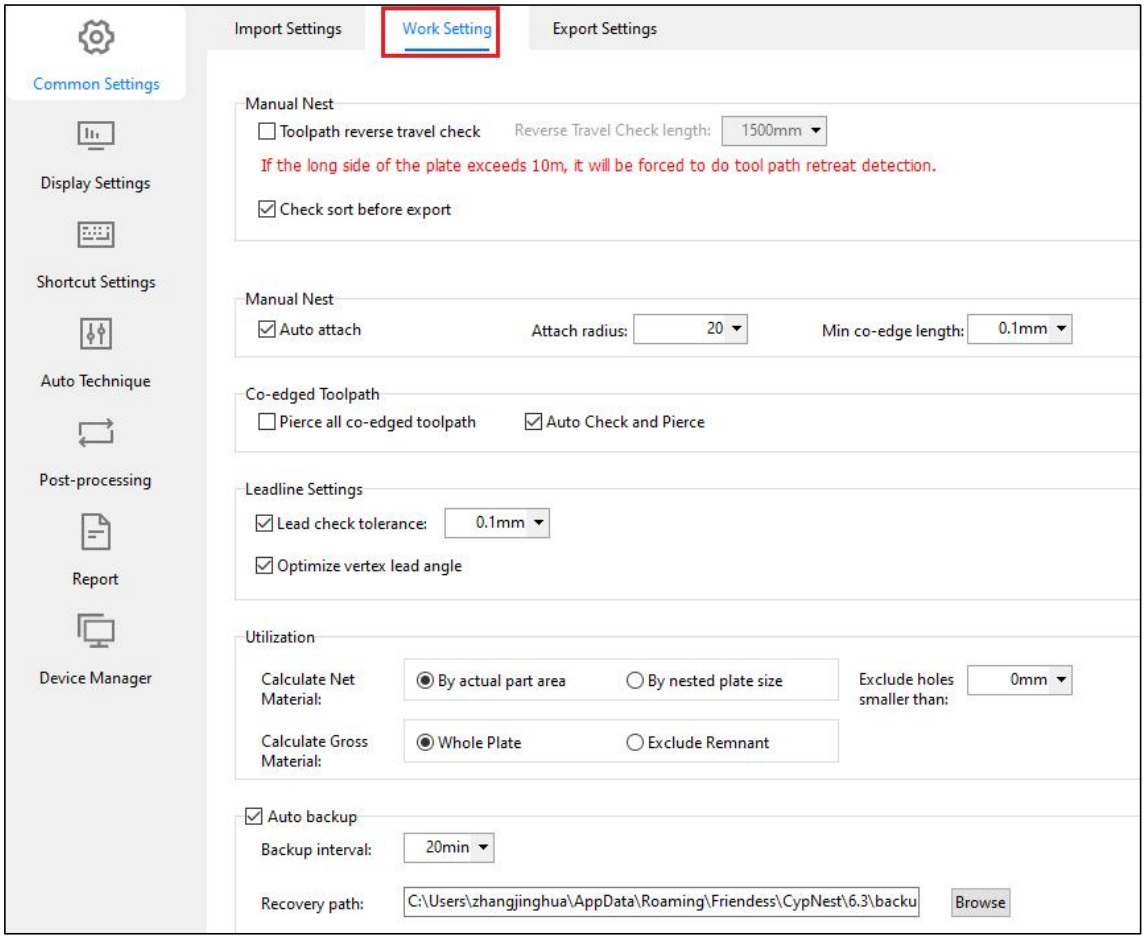


Figure 9-2 Work settings

- Safety Check: Mainly used to check if the toolpath exists reverse travel and sorting is performed before exporting.
  - Toolpath reverse travel check: Abnormal reverse toolpath travel may pose operator collision risks. When this function is enabled, the system detects any reverse toolpath travel and allows you to set the check length (default is 1,500 mm) to ensure safe machining.
  - Check sort before export: When enabled, the software will automatically check if the parts have been sorted before exporting.

- Manual Sort: Choose to enable ***Auto attach*** during the manual sort process, and set ***Attach radius*** and ***Min co-edge length***. The range of ***Auto attach*** is determined by the preset ***Attach radius***. When moving the part, the part will be attached to the mouse. During manual nesting, you can right-click and select ***Manual Nest Params*** to modify.

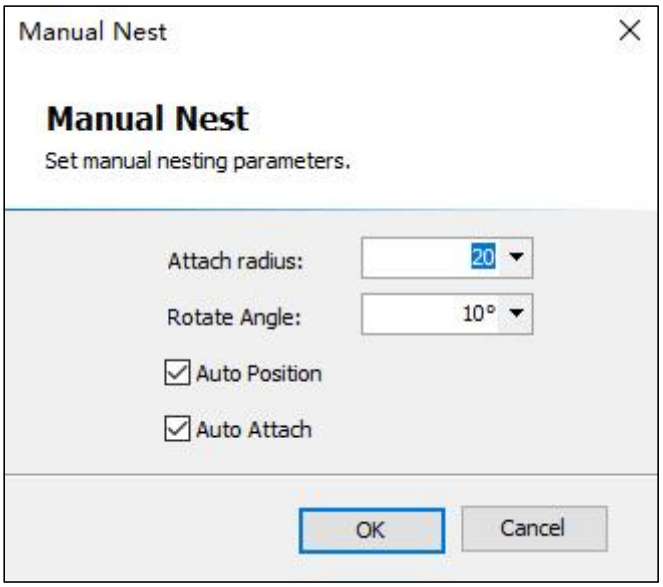


Figure 9-3 Manual nest parameters

  - Auto attach: When the spacing between two parts is less than the set ***Attach radius***, parts can be attached automatically to each other to facilitate rapid co-edge nesting.
  - Min co-edge length: This parameter is a global constraint with a valid range of 1 ~ 20 mm. Once configured, graphic edges shorter than the set value cannot be co-edged.

Figure 9-4 Common setting-manual nest

- Co-edged Toolpath:
  - Pierce all co-edged toolpath: By default, CypNest initiates cutting without pre-piercing for the co-edged toolpath. To enable piercing, you can click ***Pierce all*** in the ***Start Point*** drop-down menu. When this function is enabled, it is possible to more quickly set piercing to the co-edged toolpath for all nesting tasks.
  - Auto check and pierce: Enabled by default. If the piercing position does not start from a cut seam, automatic piercing will be performed.
- Leadline Settings: Choose whether to enable ***Lead check tolerance*** and ***Optimize vertex lead angle***.

- Lead check tolerance: After entering the tolerance value, the software will define the influence range of the lead. The range is calculated by the circular area centered at the lead-in start point, with the tolerance value as the radius. The software will check the range for any overlap with the part, which further enhances the safety of the lead cutting.

- Auto Backup: Set ***Backup interval*** and ***Recovery path*** for the nesting process. The default interval is 20 min.

  - Normal: The file backup path is C:\Users\Public\Documents\CypNest\AutoSave.

  - Exception: The files are backed up to the user-defined path. If the software is closed due to unforeseen circumstances, ***Auto backup*** can preserve the original workflow. After reopening the software, you can click ***OK*** in the pop-up window to restore the nesting files and resume interrupted tasks. Meanwhile, the recovered files will be saved in the user-defined ***Recovery path***.

9.1.3 Export Settings

On this page, the setting options include: ***Export Default Settings***, ***Auto Save Path***, ***Lock Settings***, ***Auto Name***, and ***Technique Settings***.

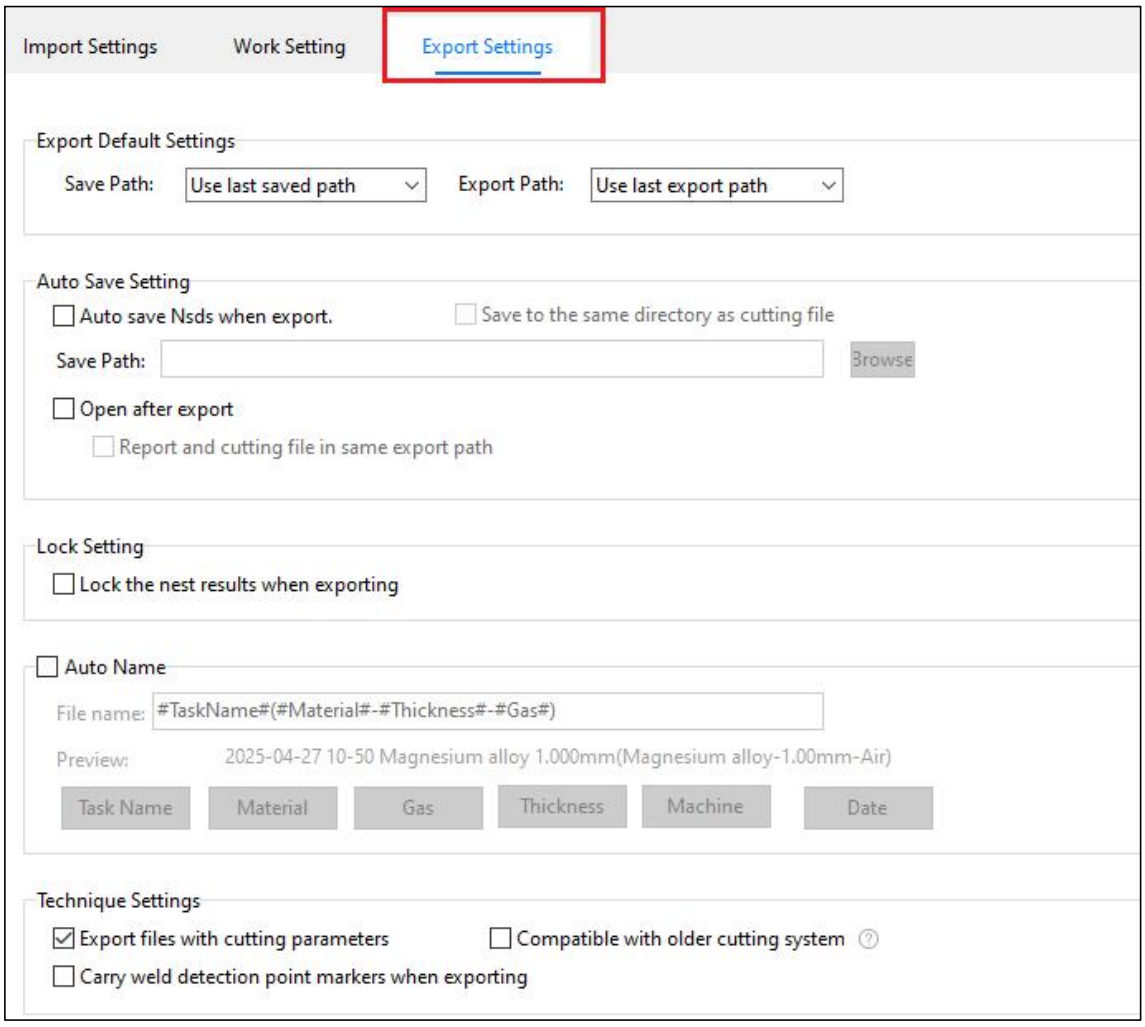


Figure 9-5 Export settings

- Export Default Settings: Configure the default directory for file saving and exporting.
- Auto Save Settings: Check whether to auto-save the nesting result files. When enabled, *.nsds files can be saved together with *.nrp or *.nrp2 files. Save *.nsds files to the same directory as the cutting files, or customize the ***Save Path***. Choose whether to open the report after exporting, and define the save path to the same path as the cutting files.
- Lock Settings: When enabled, locked nesting results are not allowed to be exported again.
- Auto Name: The nesting files can be named according to ***Task name***, ***Material***, ***Gas***, ***Thickness***, ***Machine***, and ***Date***. Click the corresponding naming elements below to configure the file name.

- Technique Settings: Three settings related to techniques can be enabled: ***Export files with cutting parameters***, ***Compatible with older cutting system***, and ***Carry weld detection point markers when exporting***.

9.2 Display Settings

Set the corresponding settings for ***CAD Display***, ***Function Display***, and ***Drawing***.

9.2.1 CAD Display

Select the specific object to be displayed when importing CAD files.

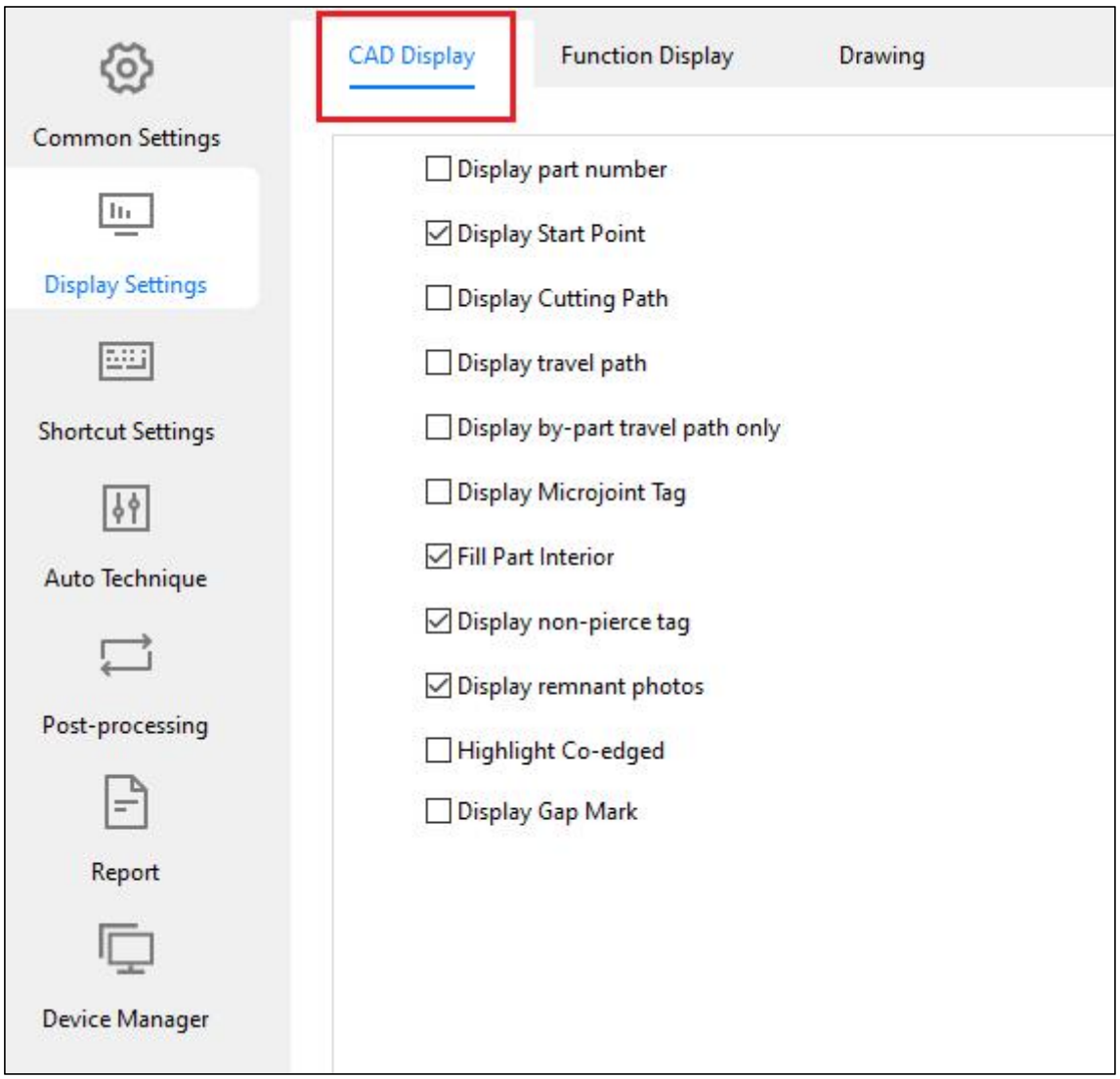


Figure 9-6 CAD display

9.2.2 Function Display

When importing drawings, choose whether to navigate to the ***Nest*** interface or the ***Drawing processing*** interface. In addition, you can disable or enable the part quantity limit for ***Dynamic Array*** and ***Copy and Paste***.

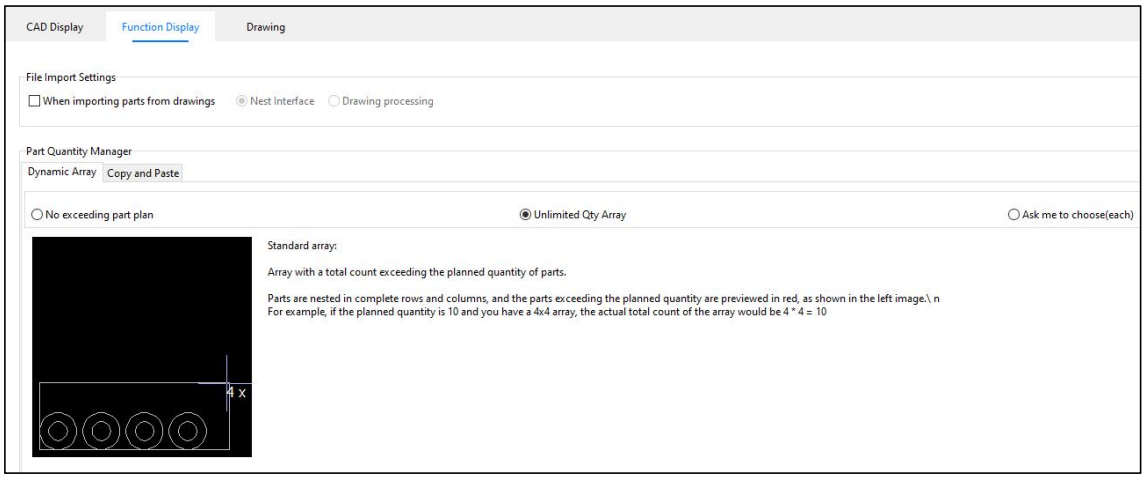


Figure 9-7 Function display

9.3 **Shortcut Settings**

Customize the shortcuts for the operations in the ***Nest*** Interface, ***Part drawing/editing interface***, and ***Drawing processing***.

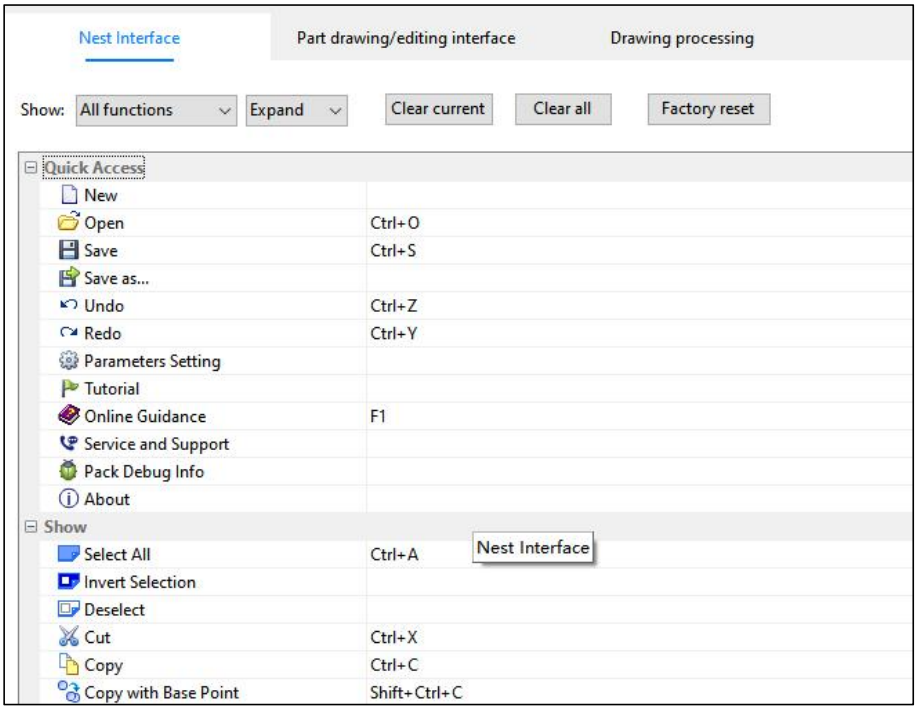


Figure 9-8 Shortcut settings

9.4 Post-processing

Co-edged toolpath precision applies to narrow gaps between non-co-edged parts, with a range of 0.1 mm to 2 mm. This function can avoid repetitive cutting at the same position. Preview the effect in the advanced sort pattern.

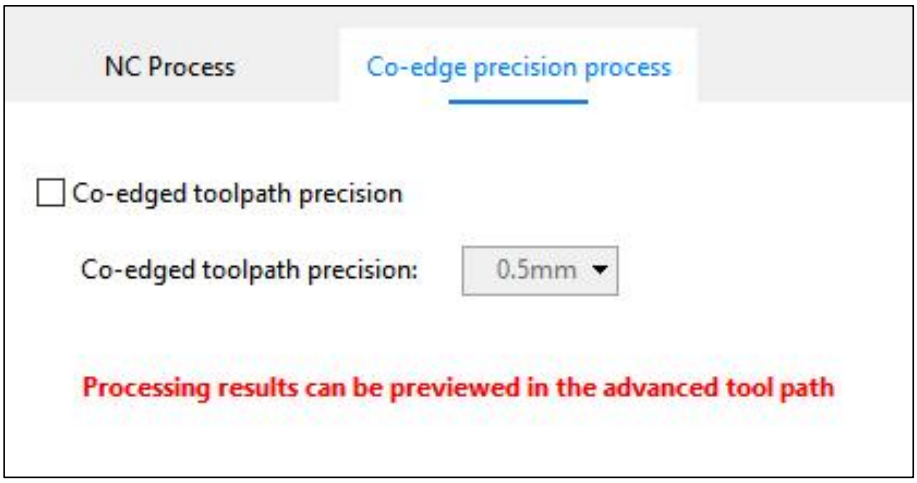


Figure 9-9 Co-edge precision process

9.5 Report

Configure parameters of ***Quote***, ***Statistics***, and ***File Config***. For details, see Report Paramerters.

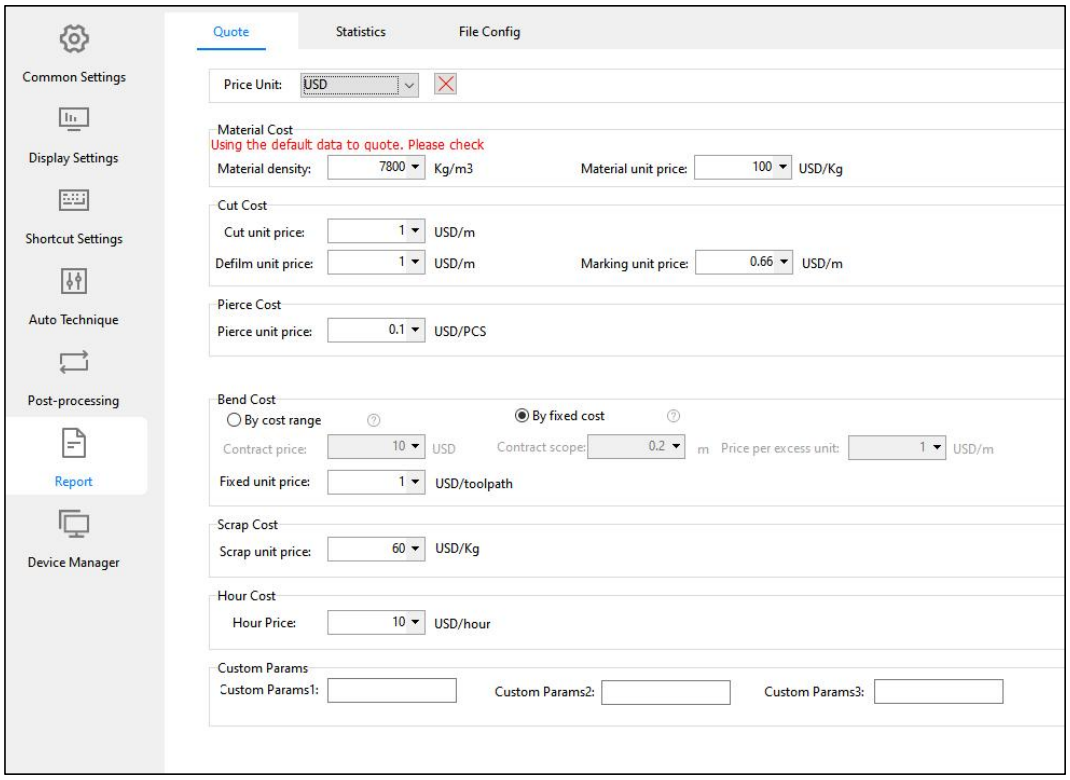


Figure 9-10 Report

9.6 Device Manager

Used to manage the devices, including RayBox and Machine.

9.6.1 Machine

Click the + button to enter the ***Machine configuration*** page. Mouse over CypCut or HypCut icon to view the corresponding ***Backup*** function position. Save the configuration file from CypCut or HypCut to the local.

Click ***Upload*** to import the backup file. After uploading, CypNest will directly refresh the information about ***CNC system***, ***Version***, ***Laser***, and ***Machine working range***.

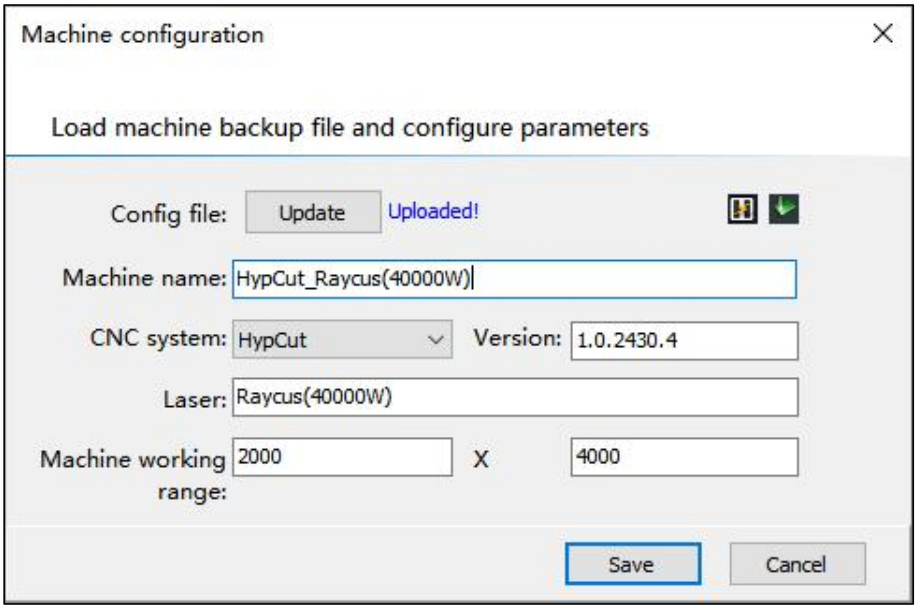


Figure 9-11 Machine configuration

Click ***Save***, and the configured machine will be updated in the machine list. Select the target machine, then configure the technique.

Click ***Add*** to import the technique file. Files (*.fsm) saved from CypCut need to be imported separately. You can edit, delete, and check them in CypNest. Files (*.hpm) saved from HypCut can be viewed and deleted after import, but editing is not supported.

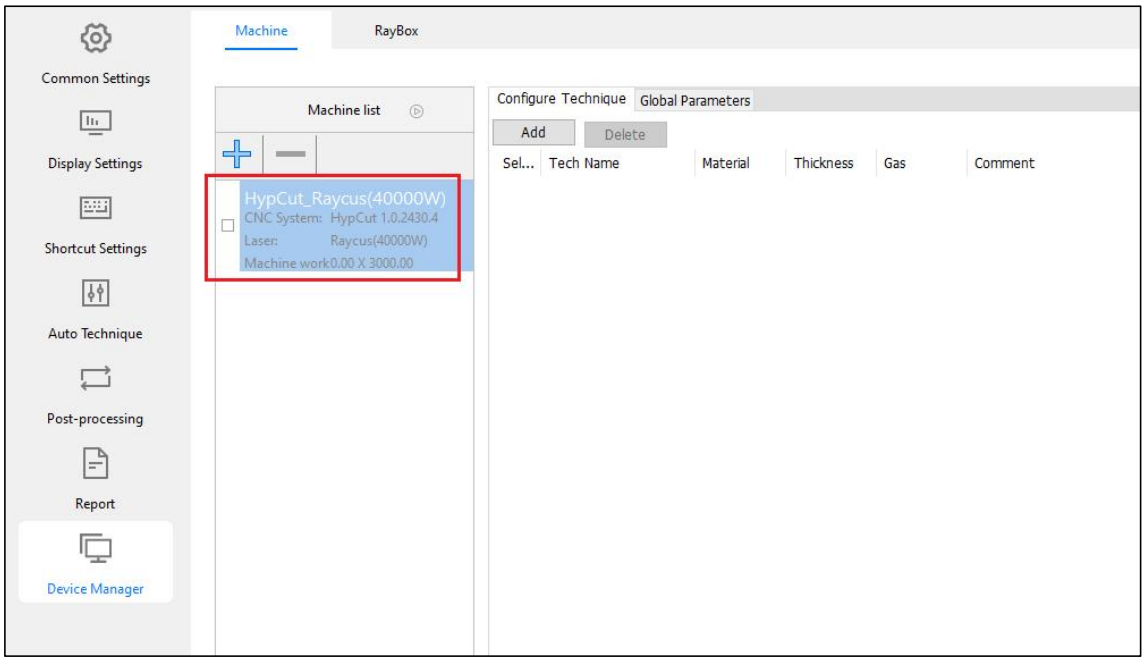


Figure 9-12 Import technique files

9.6.2 RayBox

RayBox provides comprehensive and integrated management of all machine tools and nesting tasks. All cutting tasks can be pushed to the RayBox. In addition, CypNest can connect to RayBox and work seamlessly with other cutting software. Switch to ***RayBox*** tab, and click ***Refresh*** to show all devices under the same LAN connection.

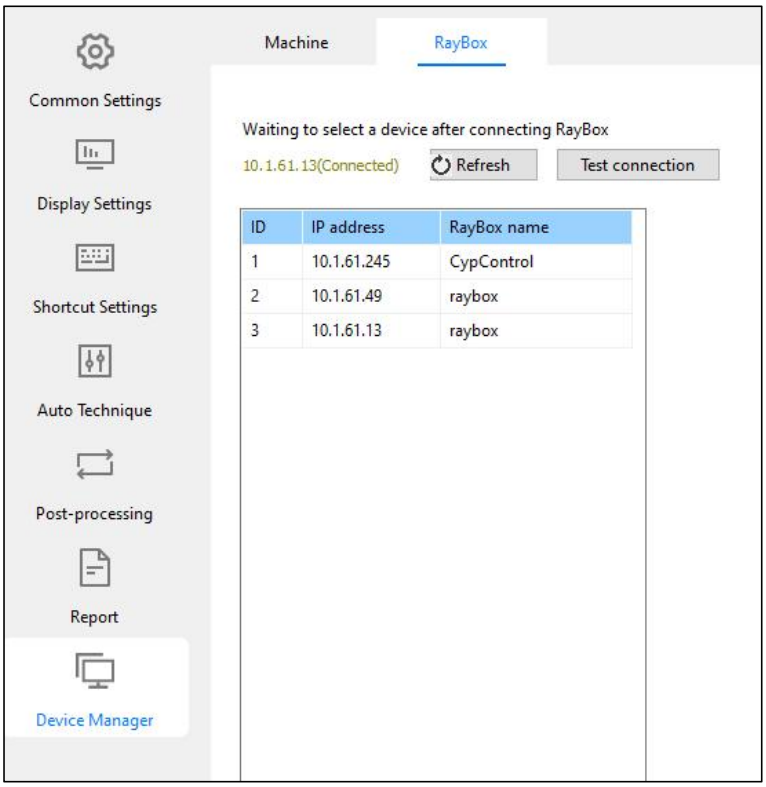


Figure 9-13 RayBox list

Chapter 10 Appendix

Table 10-1 Manual Nest Shortcuts

Part Status	Key Name	Description
Parts attached to the mouse	***W***	Rotate 90° clockwise.
	S	Rotate 90° counterclockwise.
	D	Rotates the specified angle to the right.
	A	Rotates the specified angle to the left.
	M	Mirror.
	G	Press and hold to open the co-edged part and release to close.
	Hold ***Alt***	Collision detection.
	Hold ***Ctrl***	Turn off auto-attach and collision detection.
	1 (not keypad)	Rotate 1° counterclockwise.
	4 (not keypad)	Rotate 45° counterclockwise.
	0 (not keypad)	Restore the original angle.
Nested parts are selected.	***Ctrl+D***	Quick part copy in interactive arrays.
	←	Move to the far left.
	→	Move to the far right.
	↑	Move to the top.
	↓	Move to the bottom.

Table 10-2 Manual Nest Tips

Manual Nest Tips	Description
Copy and paste	Select the part. Press ***Ctrl***+***C*** to copy, ***Ctrl***+***X*** to cut, and ***Ctrl***+***V*** to paste.
Quick array	Select the part. Press ***Ctrl***+***D*** to ***Quick Array*** (non-co-edged parts).
Plate quantity modification of the nesting results	Modify the quantity in the nesting result list.
Co-edge array	One-step setup for co-edge part nesting and toolpath generation
Common shortcuts	Click ***W\S\D\A*** for quick rotation and alignment to the plate border. Press ***G*** to switch the co-edge function, and ***Alt*** to disable collision detection.
Manual nest parameters	With the parts selected in the drag state, right-click and select ***Manual Nest Params***.
Split co-edged group	Hold ***Alt***, select a specific part, and release ***Alt***.
Fine-tune	Click ***Fine-tune*** to enable, then set the distance. Select the target part, and click the arrow keys to move the parts.
Align	Click ***Align***, and then nest the parts with the same dimensions as the plate.
Adjust the horizontal and vertical gap of arrayed parts	Select the parts. Click ***Ctrl***+***D*** to quick array, and press the arrows to adjust the part gap at the same time.

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