

# LaserCut61

**Laser Engraving & Cutting Control System**

## **Manual**

V1.1

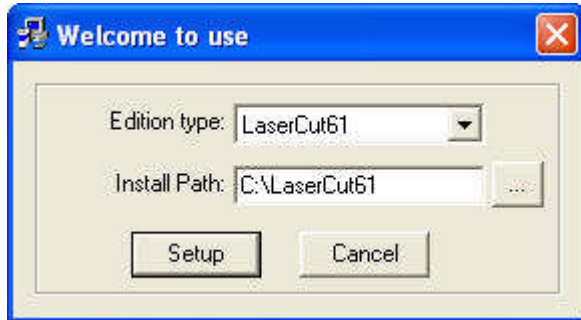
May, 2014

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# 1 System Installation

Run Setup.exe, dialog box appears as below:



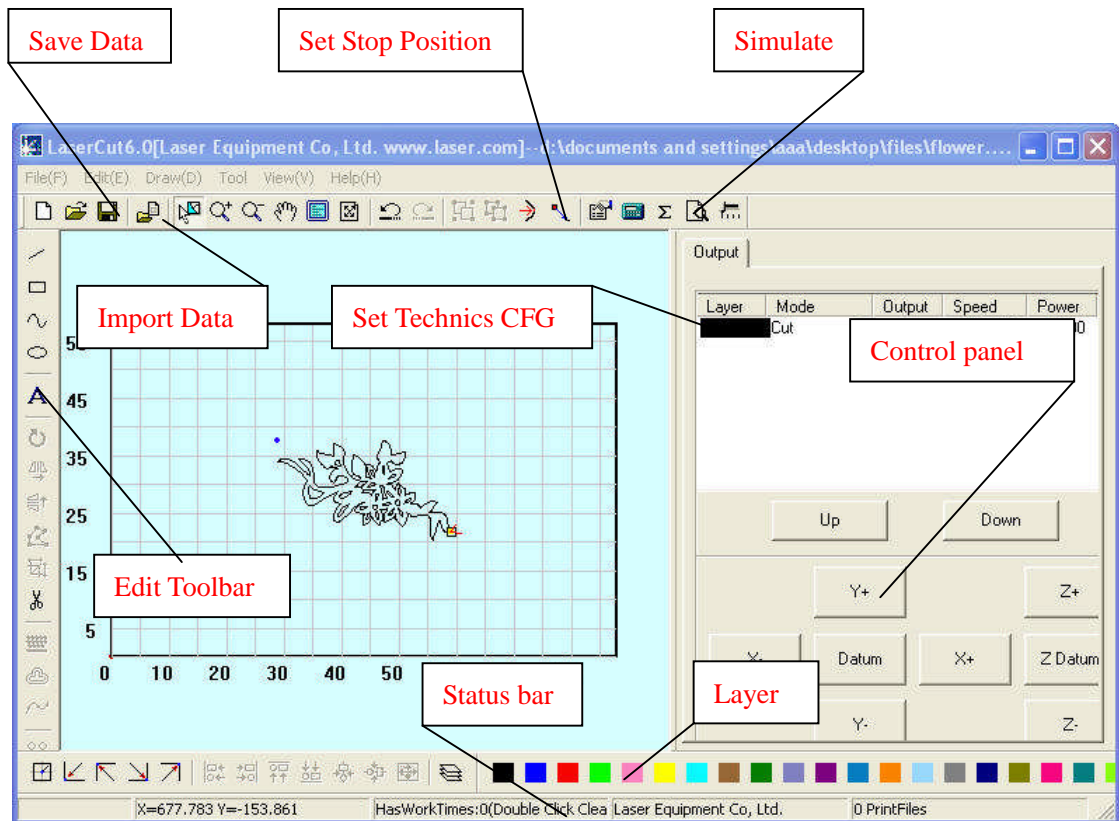
Click “Setup”, default install path C:\LaserCut61”, click  to change the path.

Note: LaserCut5.3, LaserCut6.0 can be installed in the same PC.

## 2 Quick Guide

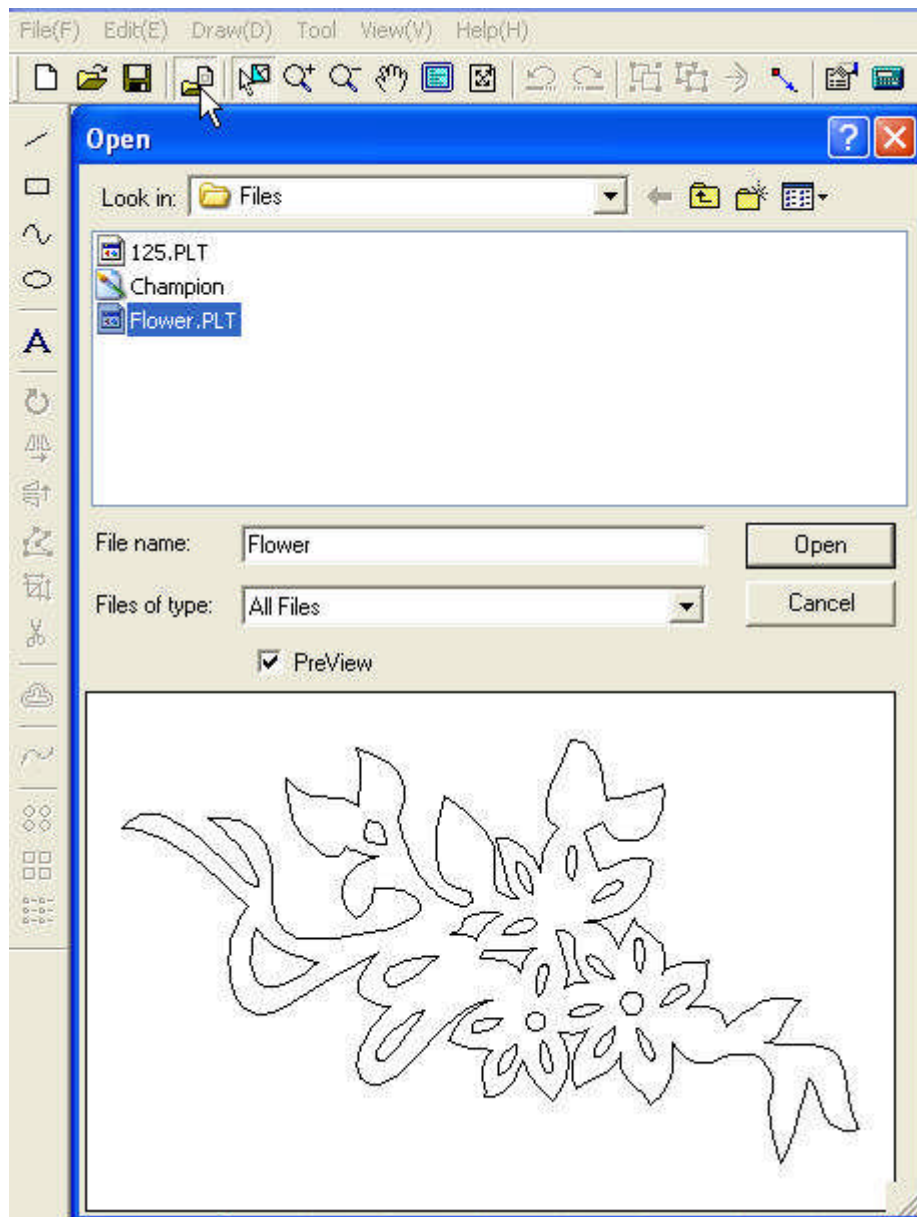
### 2.1 Main Interface of the Software

Run the software, main interface appears as below:



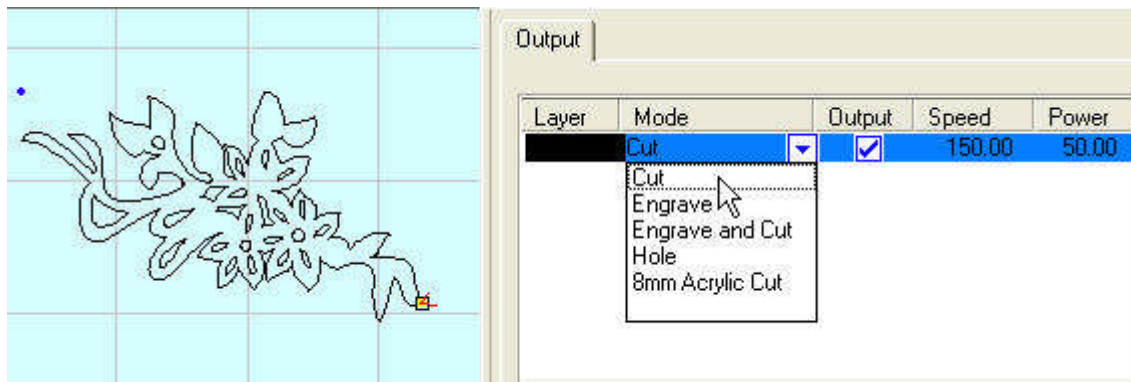
Functions can be shown after a short delay of the mouse on the button.

## 2.2 Import Data



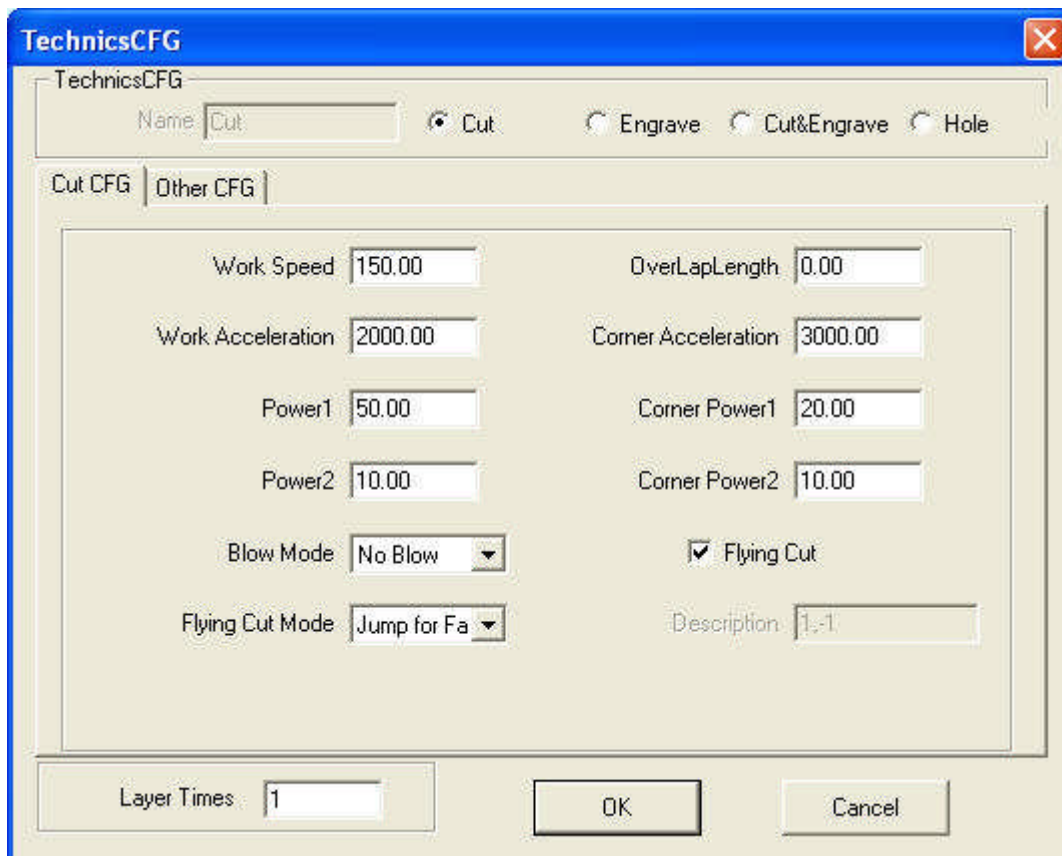
The button that the cursor indicates is “Import”.  
You can import files that the system supports.

## 2.3 Set Processing Parameter



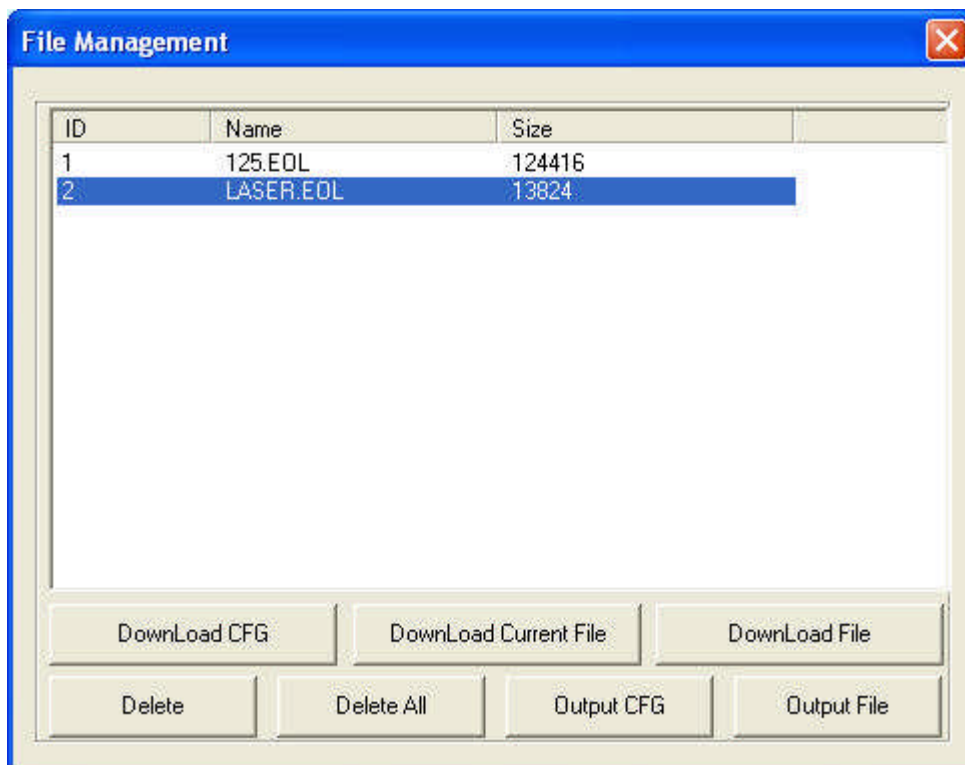
Select processing mode in the pull-down menu.

Double click and enter the processing parameter setting interface.



Input proper parameter (i.e. speed, power).

## 2.4 File Download



When first time operates the system, you should click "Download CFG".  
You can name the file when download.


## 2.5 Process

Click "Start" in the main interface and the file will be processed;  
Click "Start" on the control panel can also start the processing.  
When processing finished, the control panel will alarm.


## 3 Detail of Software Operation

### 3.1 Import and Save Data


#### 3.1.1 New

Click  to create a new processing file.


#### 3.1.2 Import

Click  to import software support file format, such as \*.PLT、\*.AI、\*.DXF、\*.DST、\*.BMP、NC code etc.

#### 3.1.3 Save

Click  to save the current editing graph as a processing file (\*.ftp) .

#### 3.1.4 Open


Click  to import a processing file (\*.ftp)

#### 3.1.5 Output


Save the current editing vector as a PLT or DXF file.

### 3.2 Drawing Tools


#### 3.2.1 Line

Click  on the left side toolbar to draw a line. After clicking the button, dragging the mouse on the screen will draw a line as will. Press “Ctrl” at the same time as you drag the mouse will draw a horizontal/vertical line.

#### 3.2.2 Rectangle


Click  on the left side toolbar to draw a rectangle. After clicking the button, dragging the mouse on the screen will draw a rectangle with any size. Press “Ctrl” at the same time as you drag the mouse will draw a square.

#### 3.2.3 Ellipse


Click  on the left side toolbar to draw an ellipse. After clicking the button, dragging the mouse on the screen will draw an ellipse. Press “Ctrl” at the same time as you drag the mouse will draw a circle.

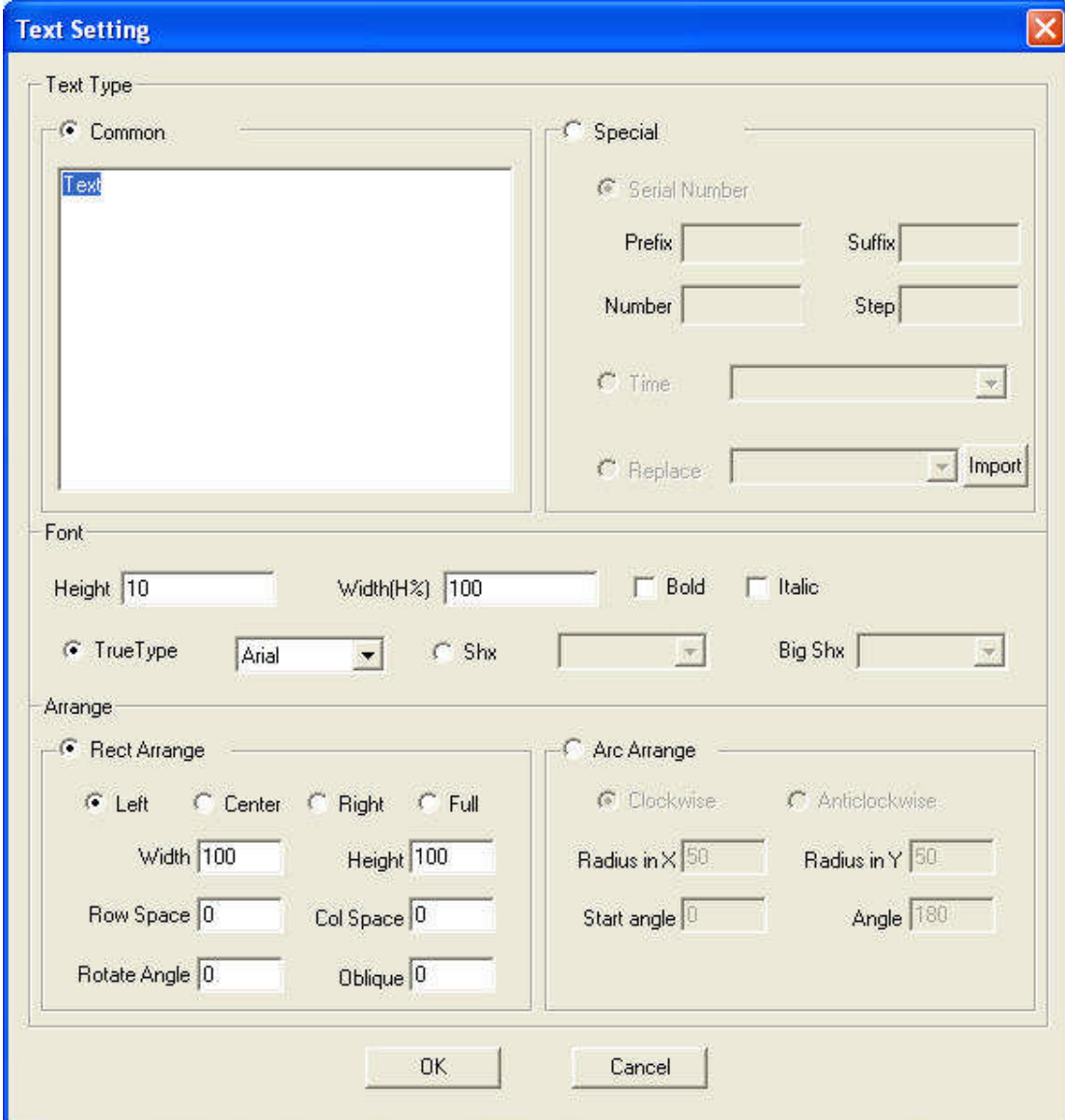


### 3.2.4 Bezier Curve

Click  on the left side toolbar to draw a Bezier Curve. After clicking the button, dragging the mouse on the screen will draw a Bezier Curve.

### 3.2.5 Text

Click  on the left side toolbar and drag the mouse on the screen, dialog box appears as below:



The image shows a 'Text Setting' dialog box with the following sections and controls:



- Text Type:**
  - Common: A text input field containing 'Text'.
  - Special:
    - Serial Number:
      - Prefix:
      - Suffix:
      - Number:
      - Step:
    - Time:  [v]
    - Replace:  [v]
- Font:**
  - Height:  Width(H%):
  - Bold  Italic
  - TrueType:  [v]  Shx:  [v] Big Shx:  [v]
- Arrange:**
  - Rect Arrange:
    - Left  Center  Right  Full
    - Width:  Height:
    - Row Space:  Col Space:
    - Rotate Angle:  Oblique:
  - Arc Arrange:
    - Clockwise  Anticlockwise
    - Radius in X:  Radius in Y:
    - Start angle:  Angle:

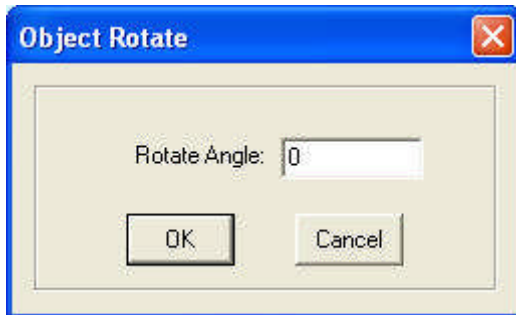
Buttons:

Text can't be processed, and it have to be converted to curve (Drawing—convert to curve). You can also set “Auto Convert Text to Curve” in Machine CFG.

## 3.3 Edit

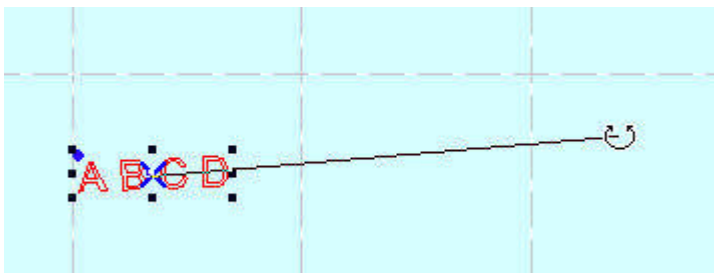
### 3.3.1 Rotate

Click the select button  first to select the graph need to be rotated, and then click “Rotate” button  on the left side toolbar to rotate the graph. Dialog box appears as below:







Precise rotate angle can be made by inputting relevant numbers and click “OK”.

Click “Cancel” and any rotation can be made by dragging the mouse as it shows below:




### 3.3.2 Mirror

Click the select button  first to select the graph need to be mirrored, and then click “Vertical Mirror” button  on the left side toolbar to vertically mirroring the graph.

Click the select button  first to select the graph need to be mirrored, and then click the “Horizontal Mirror” button  on the left side toolbar to horizontally mirroring the graph.

### 3.3.3 Node Edit




Click the button  on the left side toolbar to edit the node of the vector graph selected. Click the button and nodes on the vector graph selected will be shown in the form of small box. It appears as below:

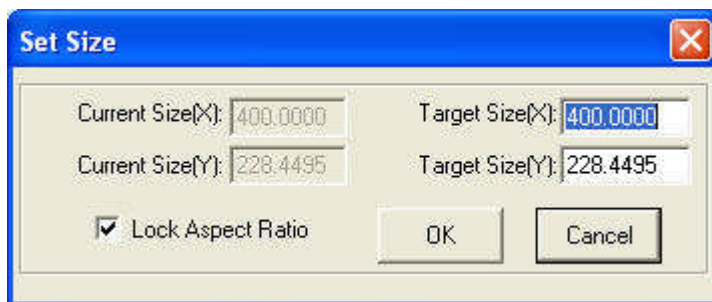


Move the mouse on the node and drag the mouse will change the shape of the graph.

Move the mouse on the graph, the mouse will change into cross, double click the mouse will add a new node. Move the mouse on the node and click “Delete” to delete a node.

### 3.3.4 Size



Click the button  to change the size of the graph. Click the select button  first to select the graph need to be changed, and click the button , dialog box appears as below:




Input the target size on the X, Y axis, and click “OK” to change the size of the graph.

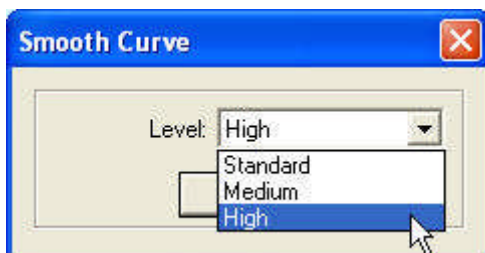
Select “Lock Aspect Ratio” and input the length of X or Y, and the size will change with the same proportion.

### 3.3.5 Cut

Click the select button  first to select the graph need to be cut, and click the button  on the left side toolbar and move the mouse to the graph. Click the left key of the mouse and the curve will be cut into two parts.



### 3.3.6 Smooth Curve

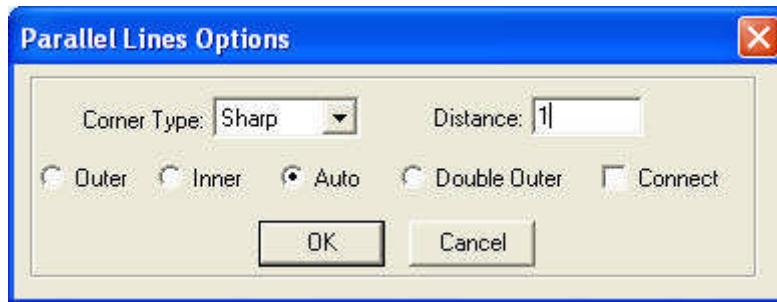
Click the button  on the left side toolbar to smooth the curve. By doing so, speed and stability of the cut process will be improved. Select the data need to be processed, and click the button, dialog box appears as below:



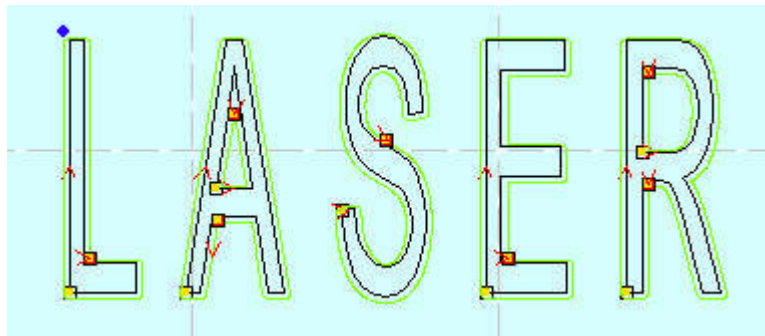
There are three levels: standard, medium and high. The graph will be bigger after smoothed.

### 3.3.7 Generate parallel lines

This is used to expand or reduce the vector graph. Click the select button  first to select the graph need to be processed, and then click the button  on the left side toolbar, dialog box appears as below:

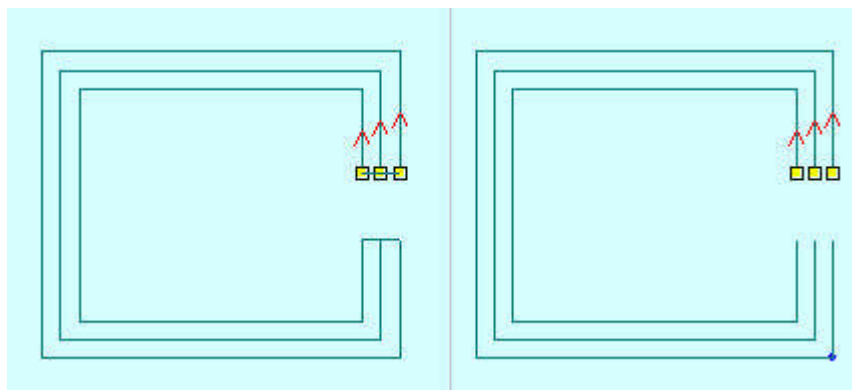


Select the needed option to generate parallel lines on a new layer. As it shows below:




Corner type can be selected as circle or sharp. Select circle, the lines will be smoother, but small distortion will be in the corner.

Combine: It is only used when “Double Outer” is selected. A sample shows as below:



The left side is the result when “Double Outer” and “Connect” are selected.



### 3.3.8 Invert color of Bitmap

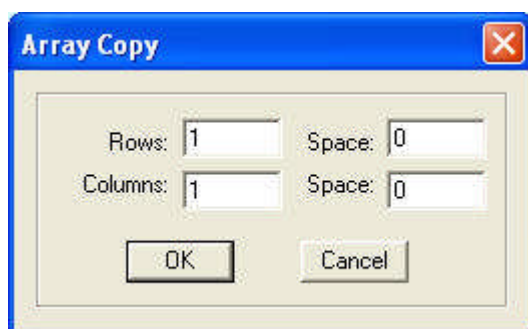
Click the button  on the left side toolbar to invert the color of the BMP image. The

process result will be intaglio or anaglyph. It appears as below:



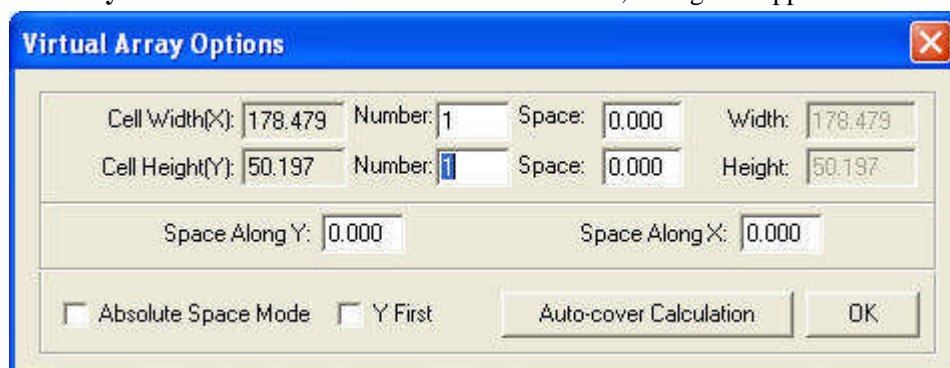
### 3.3.9 Array

**Array Copy:** Click the select button  first to select the graph need, and then click the button  on the left side toolbar, dialog box appears as below:



Input relevant parameters, identical graph with the number of the “lines × columns” will appear on the screen. The space between graphs will be determined by the “Space”.

**Virtual Array:** Click the button  on the left side toolbar, dialog box appears as below:



**Cell width (X):** original size of the graphics.

**Cell height (Y):** original size of the graphics.

**Number:** lines or columns needed for the output data.

**Space:** space between lines or columns.

**Width:** width of the whole data after virtual arraying.

**Height:** height of the whole data after virtual arraying.

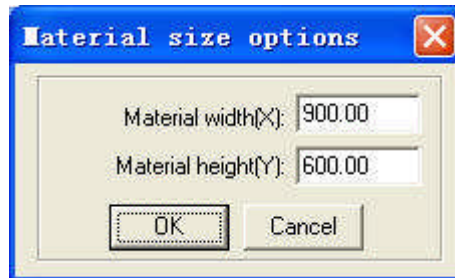
**Space Along Y:** space of the dislocation between adjacent columns.

**Space Along X:** space of the dislocation between adjacent rows.

**Absolute Space Mode:** if the space is 0, select “Absolute Space Mode”, and the graph will be overlapped completely.

**Y First:** the cut route will along Y direction.

**Auto-cover Calculation:** Click the button, and dialog box appears as below:

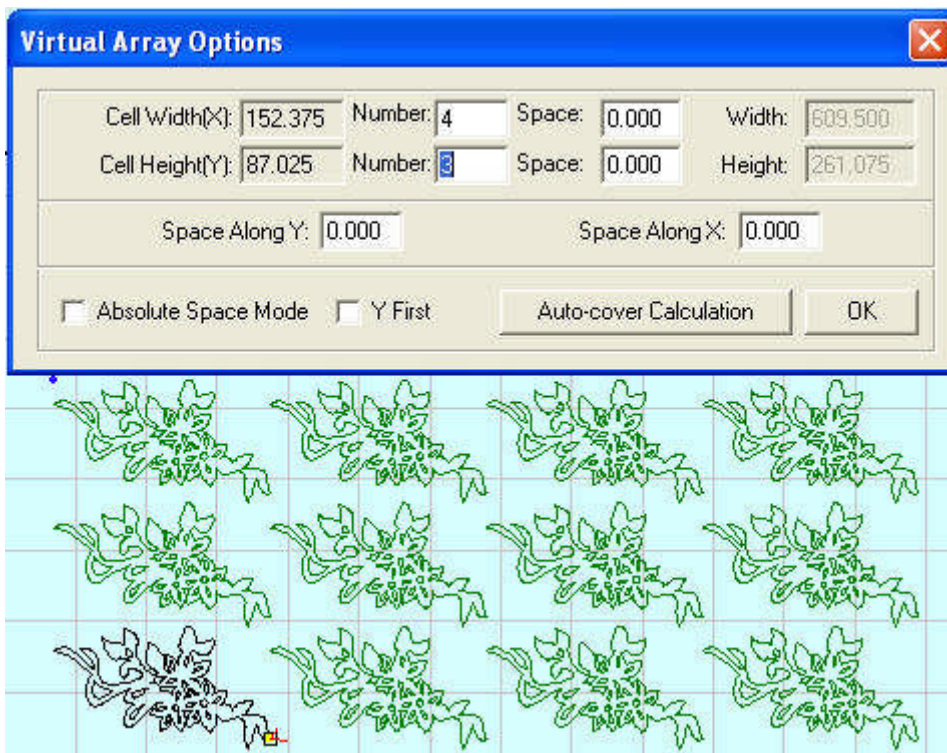


**Material Width:** width of the materials to process (default as the width of the worktable).


**Material Height:** length of the materials to process (default as the length of the worktable).

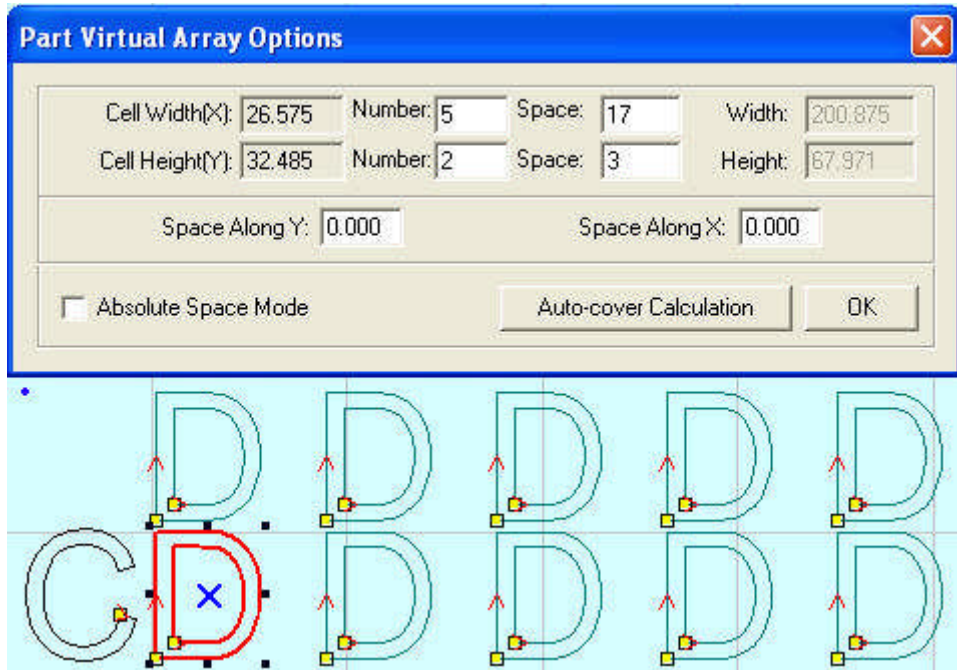
The rows and columns needed to cover the material will be calculated automatically according to the parameters input.

A sample shows as below:





### Part Virtual Array

If graph is made up of many graph entity, an entity of the graph can be virtual arrayed. Select the unit and click  on the left side toolbar, and dialog box appears as below:



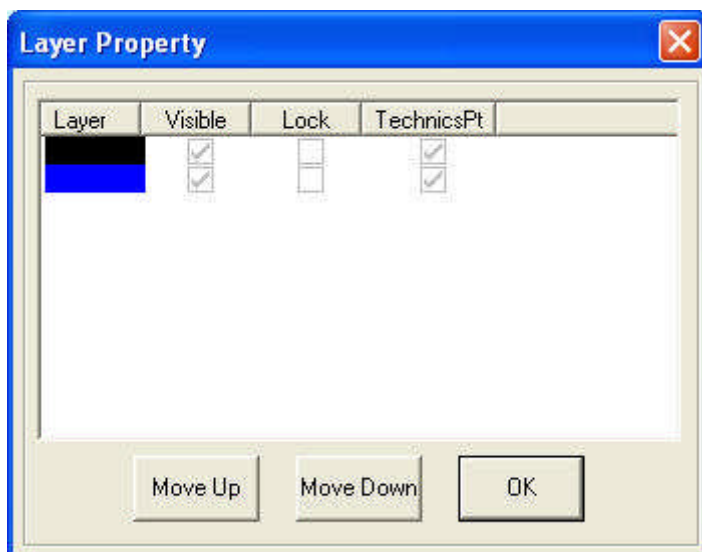
### 3.3.10 Group and Ungroup

Select the graph entity need to be grouped, click the group button , and the graph entity will be grouped.

Select the grouped graph, and then click the ungroup button , and the graph will be disassembled to several graph entity.

### 3.3.11 Layer Property

Corresponding icon is  on the grounded toolbar.



Visible: the layer is visible or not.

Lock: when a layer is locked, it cannot be edited.

TechnicsPt: the technique ports are shown or not.

### 3.3.12 Align

Corresponding icon is  on the grounded toolbar.

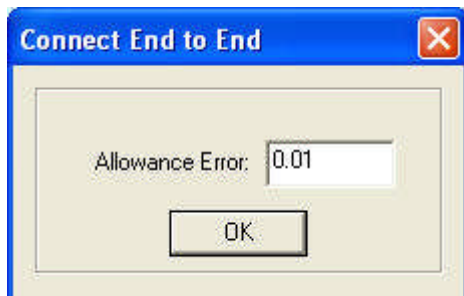
### 3.3.13 Quick move data

Corresponding icon is  on the grounded toolbar.

Move the selected data to corners of the drawing area.

### 3.3.14 Connect End to End lines

Location: Tool → Connect End to End.

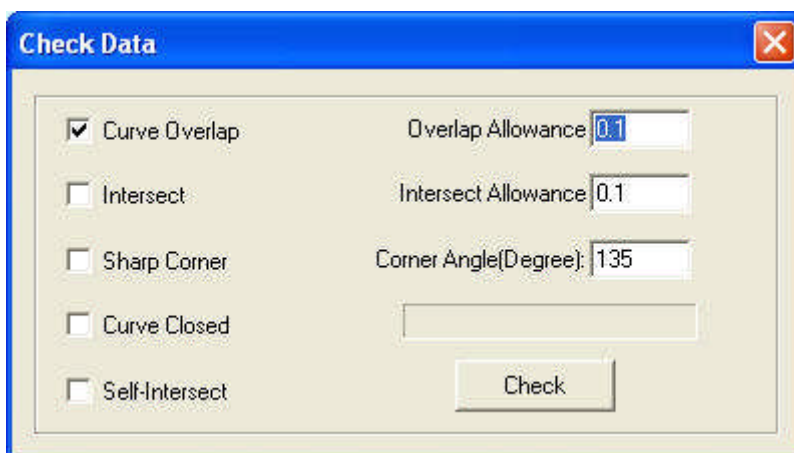


Connect the several lines linked end to end into one. Select lines need to be processed, and click the button will do.

### 3.3.15 Check Data

Location: Tool → Check Data.

Click the tool, and dialog box appears as below:

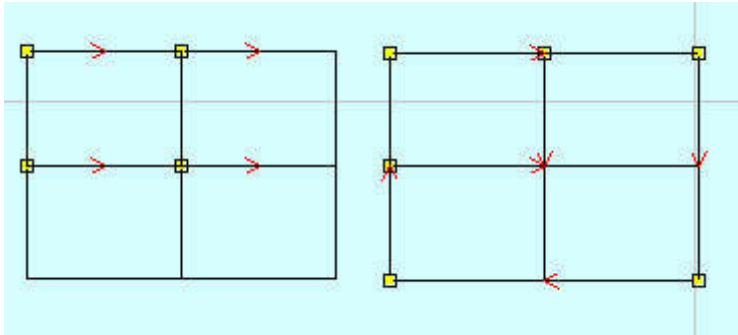


If abnormal phenomenon appears in the processing (such as fail to engrave, cut twice), use the tool to check all the data. Abnormal data checked will be shown as red. You can delete it or edit the node.



### 3.3.16 Delete Doubled One

Select the graph and click “Delete Doubled One”, the overlap lines will be deleted as follows:



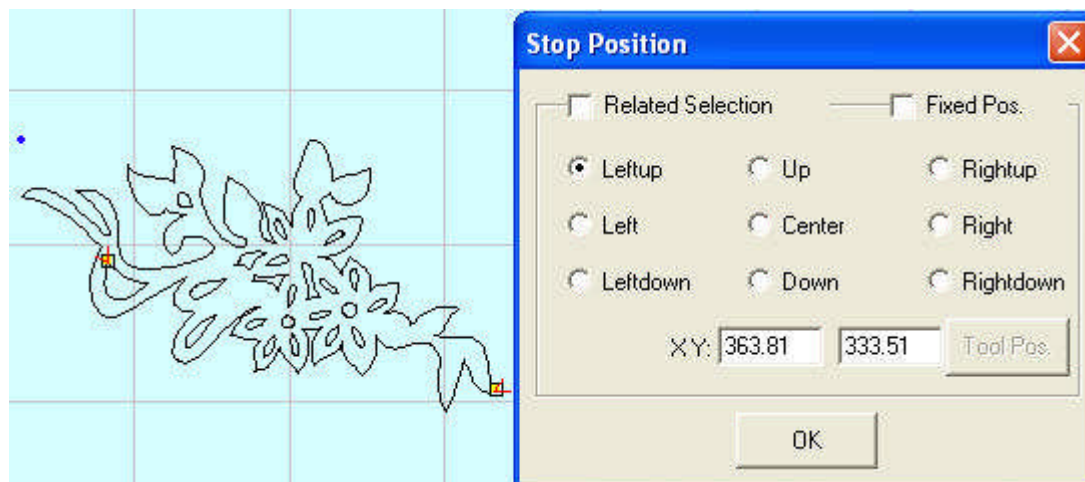
The left side is made up of 4 rectangles and the right side is processed. There are only 6 lines. This is very useful for array copy rectangles to improve the processing efficiency.

## 3.4 Technics Process

### 3.4.1 Set the Stop Position of the Laser Head

The corresponding icon is  on the toolbar.

The laser head will move to the point after the data is processed. Click the button and the mouse arrow will change to a circle, dialog box appears as below:



There are 4 modes:


**Related selection:** Select part of the graph first, select the “Related Selection” option, and select relative position of the graph (i.e. Left up, Right down).

**Relative whole graph:** Without selecting the “Related Selection” option, and select relative position of the graph (i.e. Left up, Right down).

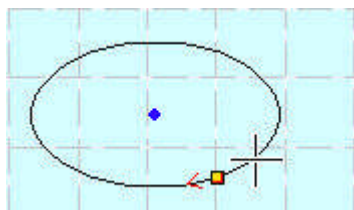
**Fixed Position:** Select “Fixed Pos.” and input the coordinate value to set the stop point precisely.

**Anywhere:** Move the mouse to any point and set the stop position as you need.

### 3.4.2 Set Start Point

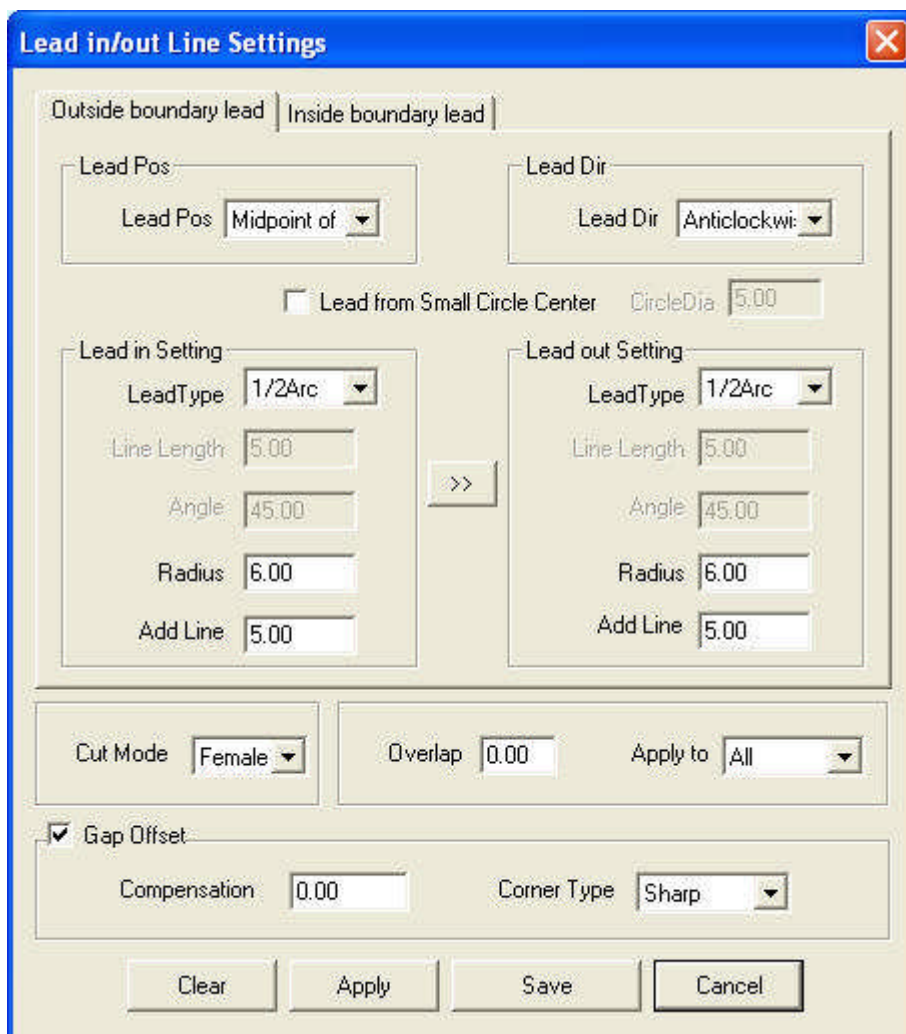
The corresponding icon is  on the toolbar.

The system will automatically define the start point (usually the crossed point of two lines) and the direction of cutting process. Select the vector graph, click this button, move the mouse to the vector graph, and the mouse will change to a cross. Click the mouse on any position of the vector graph, the point will be the start point of cutting, and click “F” to invert the direction. It appears as below:



### 3.4.3 Set lead-in/out line

Location: Tool → Set lead-in/out line.



**Lead Pos:** set the situation of adding lead line.

**Lead Dir:** set the cutting direction (clockwise or counter-clockwise).

**Lead in/out Setting:** set the shape and size of lead in/out lines.

**Cut Mode:** choose “Female Cut” or “Male Cut” in the drop-down list to define whether the lead-in/out line is in the outline of the figure or not.

**Overlap:** defines the sealing distance of the process vector graph.

**Apply to:** set the overlap apply to all the graph, outer boundary or inner boundary.

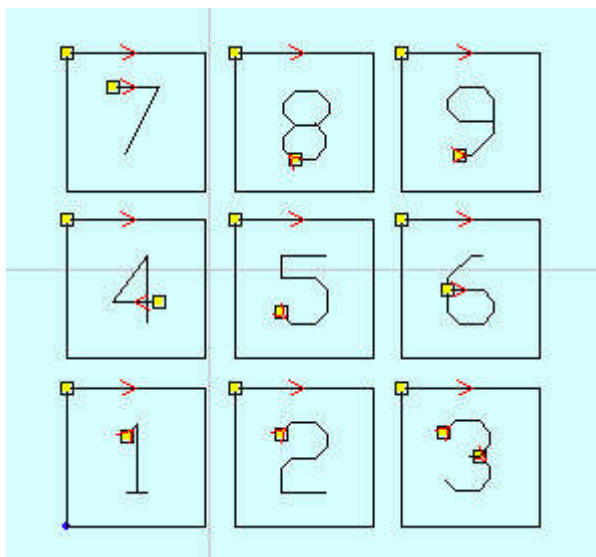
**Gap Offset:** set the compensation parameters.

**>>**: set the same parameter for the lead out line as those of the lead in line.

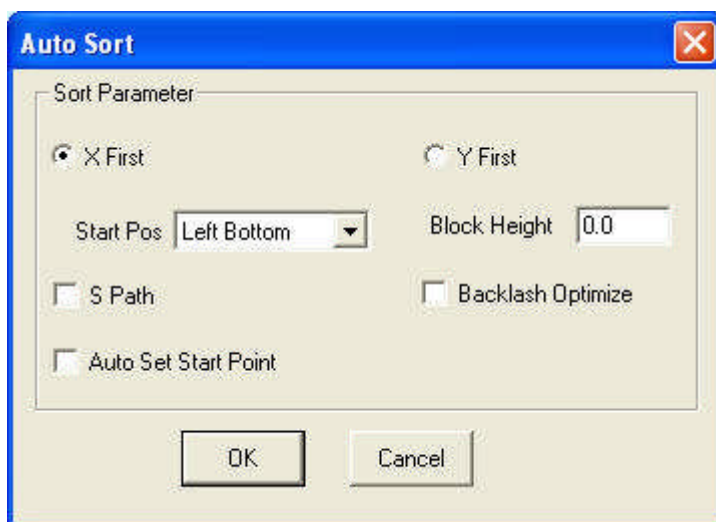
### 3.4.4 Set Output Sequence

**Auto set:**

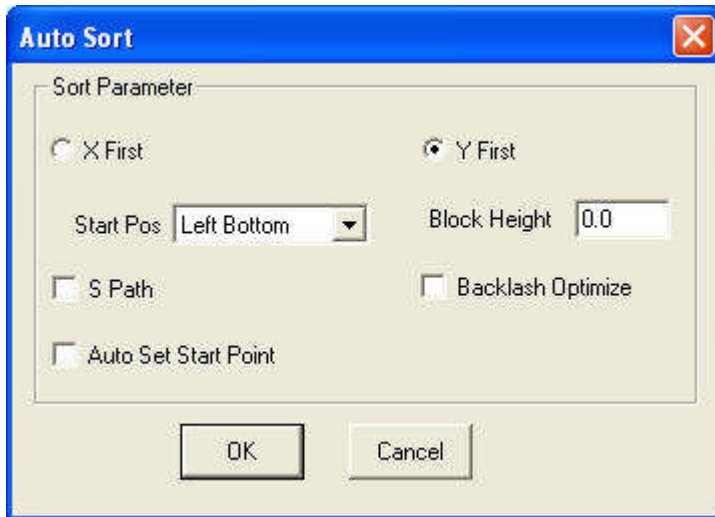
Location: Tool → Auto sort



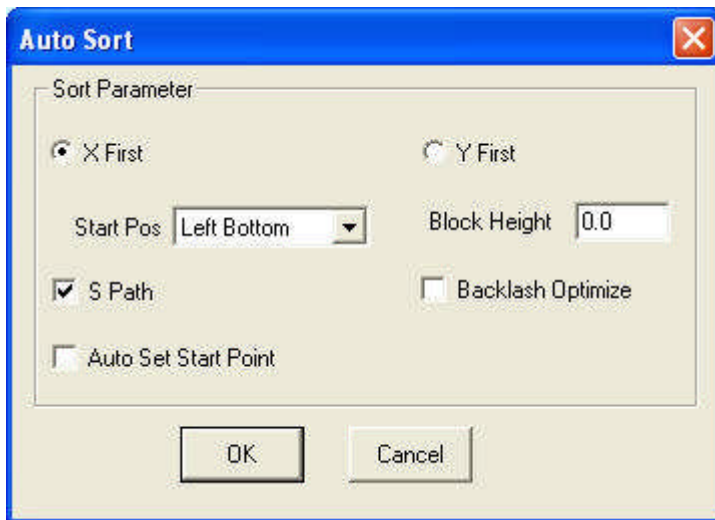
There are 9 rectangles as above, select different parameter and the cutting sequence as follows.



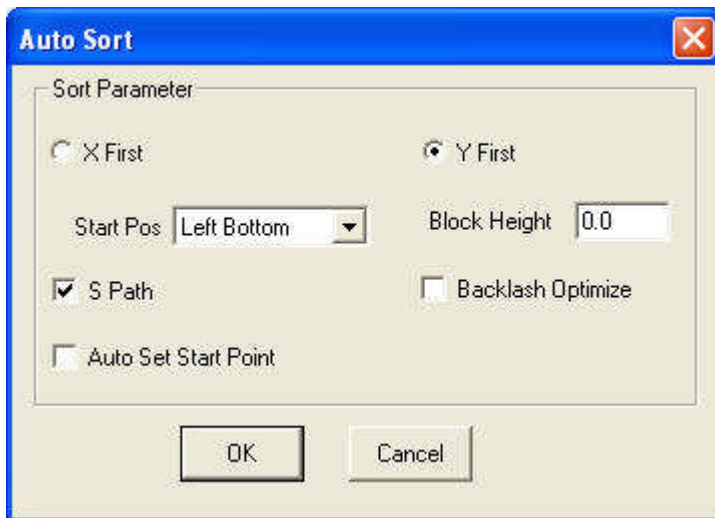
The sequence is: 1→2→3→4→5→6→7→8→9.



The sequence is: 1→4→7→2→5→8→3→6→9.

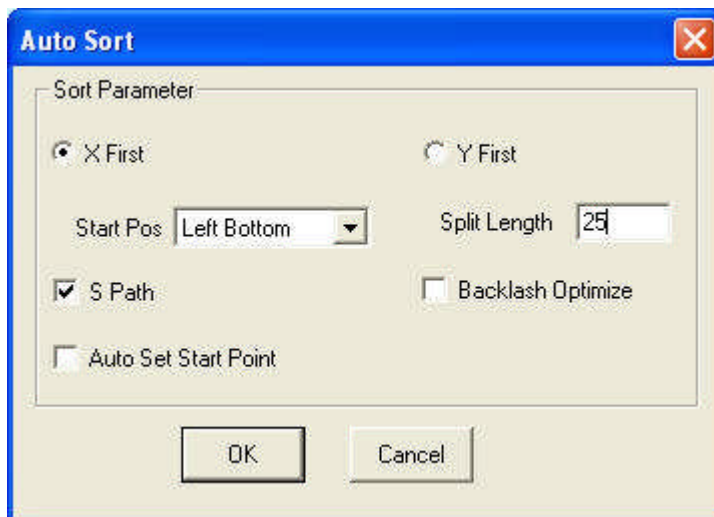
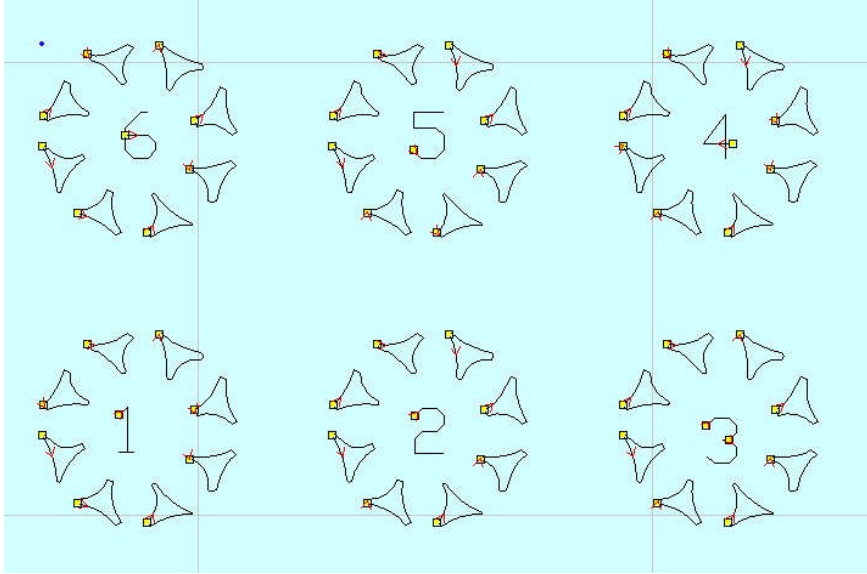


The sequence is: 1→2→3→6→5→4→7→8→9.



The sequence is: 1→4→7→8→5→2→3→6→9.

Sample of “Divide Height” (There are 6 sections (20mm\*20m), and each includes 8 triangles).



Divide height value 25 means the whole graph is divided into 6 sections (25mm\*25mm). The 6 area run sequence 1→2→3→4→5→6.

**Start Pos:**

This is the start position of the cutting route. There are 4 options: Left Bottom, Right Bottom, Left Up, and Right Up.

**Auto Set Start Point:**

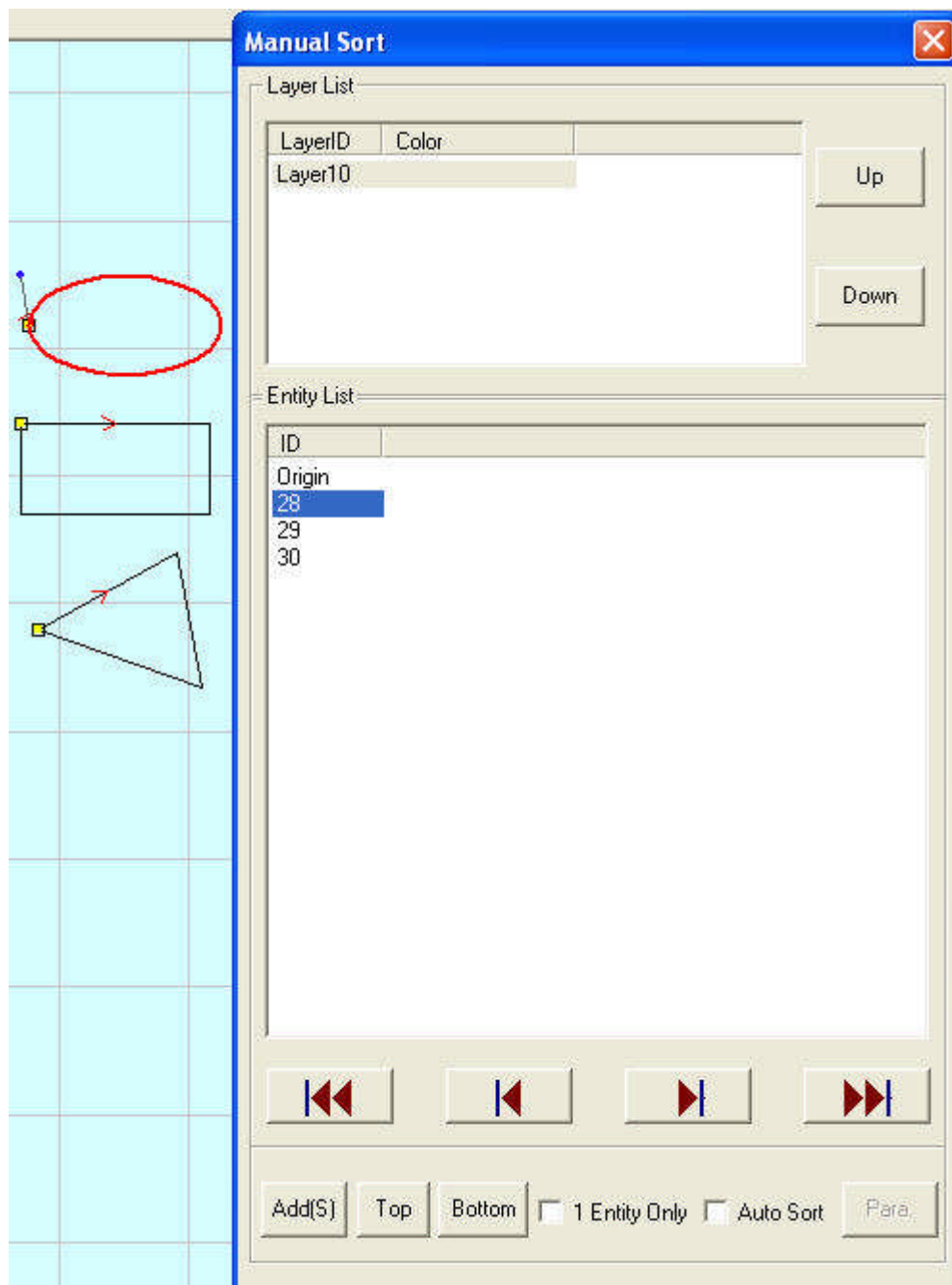
Check this option and the system will adjust the start point to get shortest path.

**Backlash Optimize:**

Check this option and the system will automatically define cut direction to compensate the backlash in cutting. But it will increase the idle movement. Generally, this option won't be checked.

**Manual Sort:**

Location: Tool→Manual Sort



As above, the graph is made up of 3 entities: a circle (28), a rectangle (29) and a triangle (30).  
Default sequence is circle (28), rectangle (29) and triangle (30).

Click 2 in graph list, and select the triangle, click “Add(S)”, the sequence will change to: circle (28), triangle (30), and rectangle (29).

**Add(S):** add the selected entity to graph list.

**Top:** add the selected entity to the head.

**Bottom:** add the selected entity to the end.

**1 Entity Only:** select this option, and only one entity can be selected.

**Auto Sort:** select this option and the system will set the sequence according to the parameters

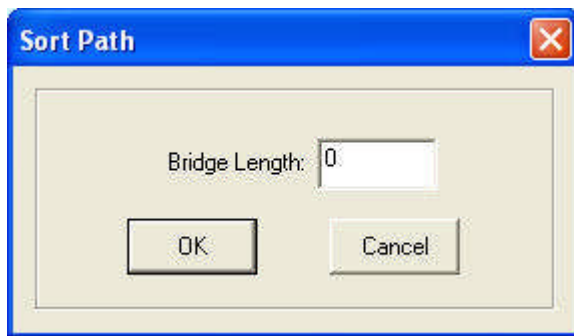
in “Para”.

If there are many layers, “Up” and “Down” can change the sequence of the layers.

Graph can be re-selected, and the re-selected part will be arranged at the first time that it be selected.

**Knife mold sort:**

When check “Knife mold” as the auto sort mode in Machine CFG, the “auto set” interface will be shown as bellow.



Bridge Length: it is determined when drawing the file. Input the value is OK.

**3.4.5 Divide Layer**



If the graph has many colors, system will divide it to many layers automatically.

If the graph has only one color, select some figures and click a color on the layer toolbar, and the system will divide the graph to many layers as wants.

**3.5 Set Processing Parameters**

**3.5.1 Layer Management**



Layer	Mode	Output	Speed	Power
	Cut	<input checked="" type="checkbox"/>	150.00	50.00
	Engrave	<input checked="" type="checkbox"/>	800.00	80.00
	Engrave and Cut	<input checked="" type="checkbox"/>	800.00	60.00
	Hole	<input checked="" type="checkbox"/>	1.00	30.00

Process sequence is from the top to the bottom of the layer list. Select one line in the list and click  or , and the process sequence will be changed.

Process mode can be selected in the drop-down list of the “Mode” column. It shows as below:

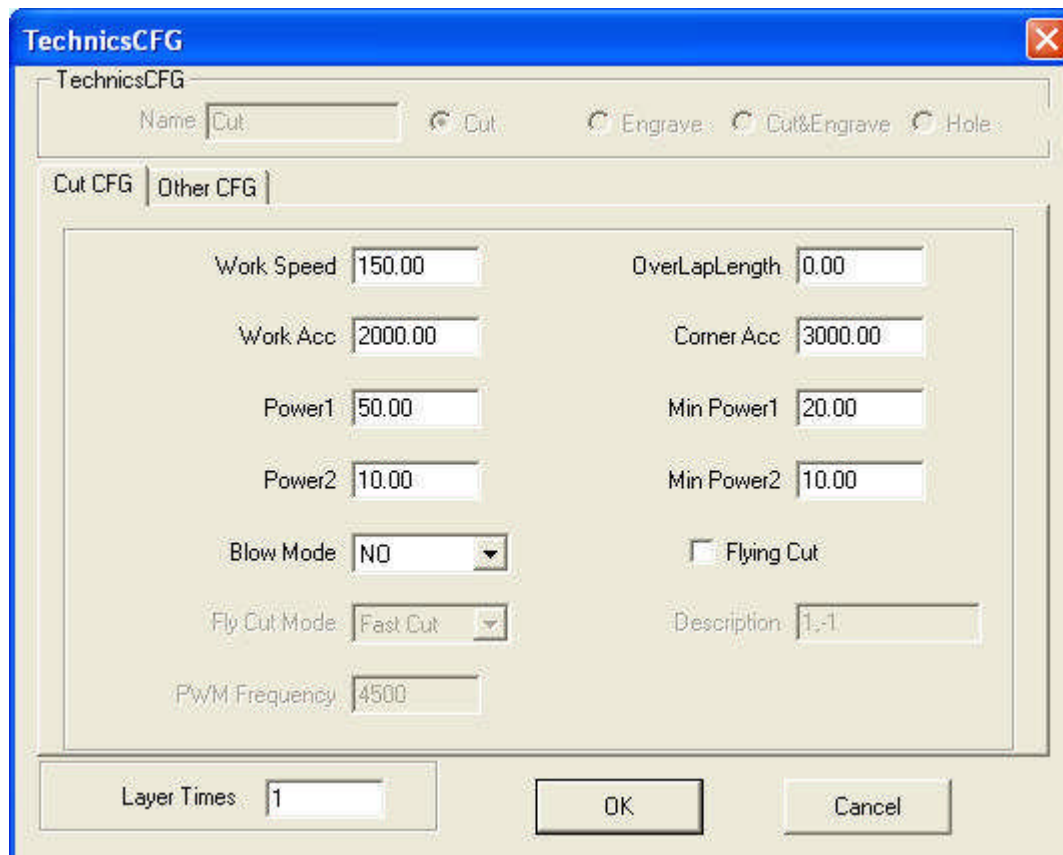


Layer	Mode	Output	Speed	Power
	Cut	<input checked="" type="checkbox"/>	150.00	50.00
	Cut	<input checked="" type="checkbox"/>	800.00	80.00
	Engrave	<input checked="" type="checkbox"/>	800.00	60.00
	Engrave and Cut	<input checked="" type="checkbox"/>	1.00	30.00
	Hole			
	8mm Acrylic Cut			

Output the layer or not can be set in the “Output” column.  is output and  is not.

Double click one line in the list and set processing parameters.

### 3.5.2 Set Cut Parameters



**Work Speed:** cutting speed of the laser head in cutting.

**Work Acceleration:** the acceleration of the movement on the X, Y-Axis.

**Corner Acceleration:** when laser head moves to the corner of the curve, it has to decrease the speed. If the value is too large, the machine will shake intensively when the laser head moves into the corner and create saw tooth. If it is too small, the process efficiency will be decreased. It is generally 2 times of the acceleration.

**Power1/2:** adjust the laser power (unit: %).

**Corner Power1/2:** adjust power of laser head when the speed is the minimum in the variable speed motion.

(Adjustment of the power and corner power can ensure an unchanged strength of the laser in the process).

**Overlap Length:** closed graph may not to be cut down due to the mechanical error. This parameter helps to solve the problem, but it should not be too large. It is suggest to adjust mechanical assemble precision to solve the problem.

**Blow mode:**

**Not Blow:** not to blow in the process.

**Cut Blow:** blow when laser on, stop blowing when laser off. This function needs hardware support.

**Always blow:** blow at the moment laser head begins to move, and close at the end of the process. This function needs hardware support.

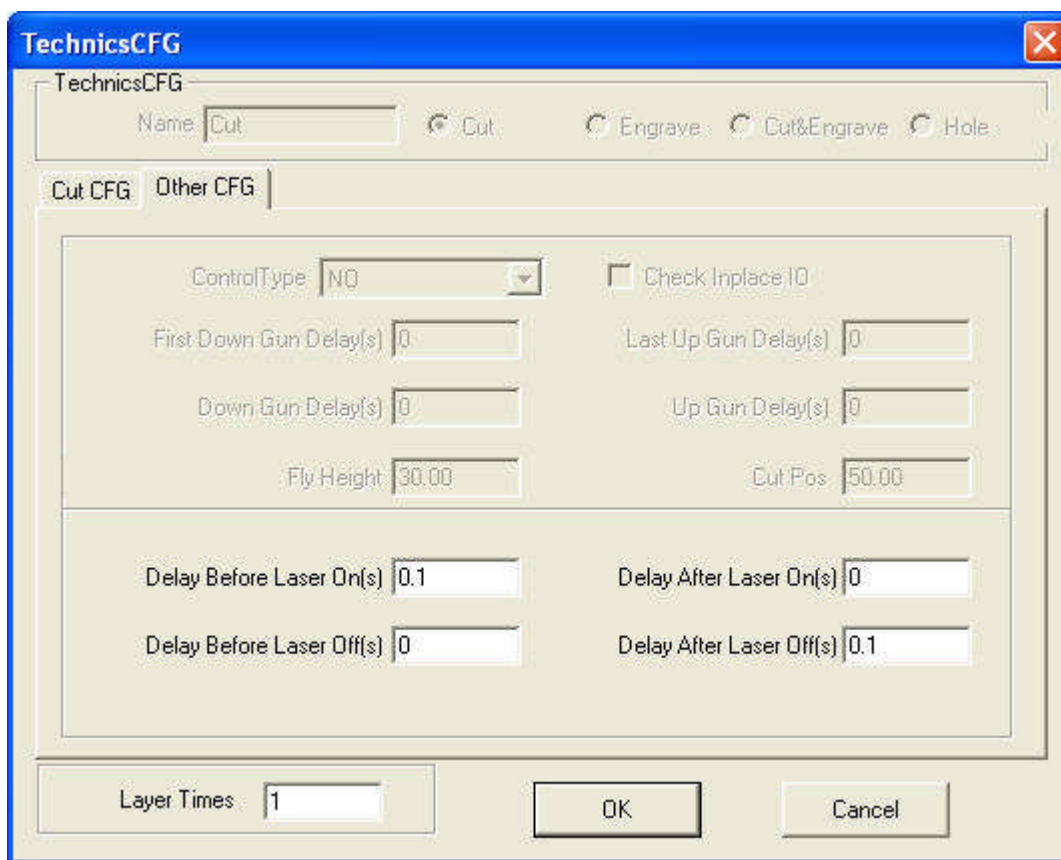
**Flying Cut:** select this option and the system will cut with fast mode.

**Flying Cut Mode:**

**Dotted Line:** cut the line to dotted line. 1,-1 descript the dotted line.

**Jump for Fast:** this mode can increase cutting efficiency and quality, but it is only useful when the graph processed by “Part Virtual Array”.

**Layer Times:** a layer can be processed many times. Input the value as you need.



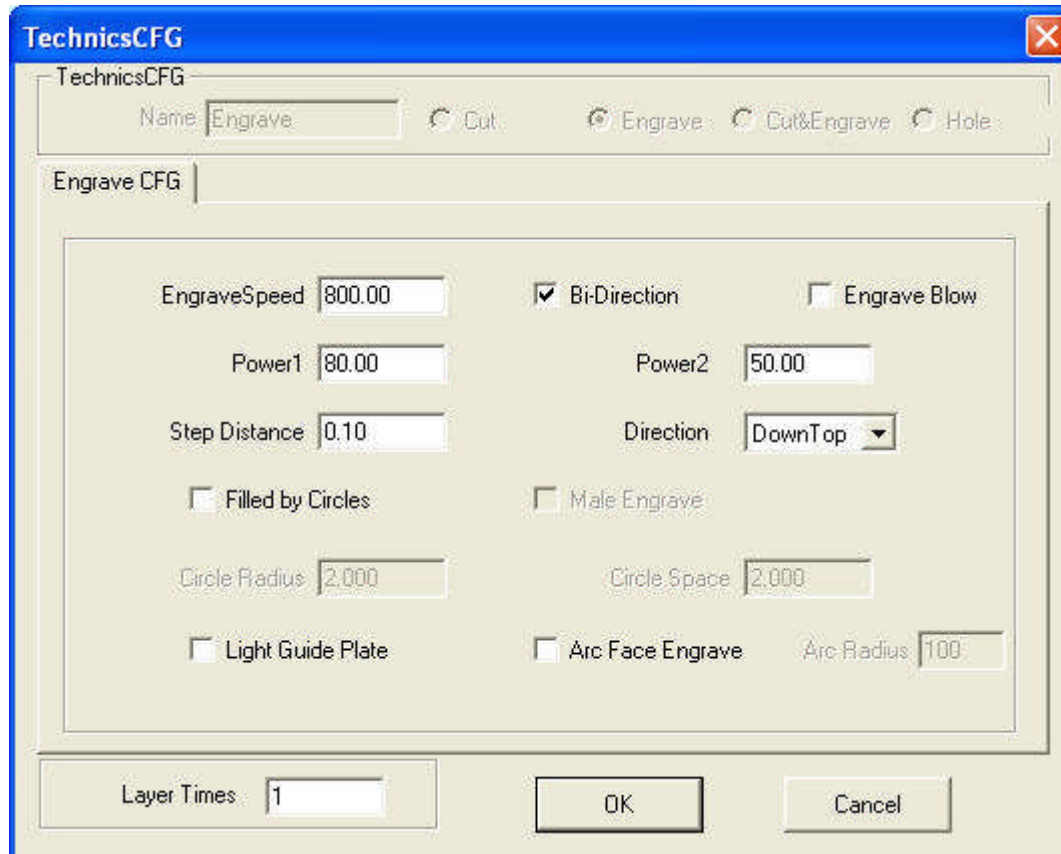
**Delay before laser on:** set the delay before the laser is on

**Delay after laser on:** set the delay after the laser is on.

**Delay before laser off:** set the delay before the laser is off.

**Delay after laser off:** set the delay after the laser is off.

### 3.5.3 Set Engrave Parameters



**Engrave Speed:** engraving speed on X-axis.

**Power1/2:** adjust the laser power (unit: %).

**Step Distance:** movement distance on Y-axis when engrave a row on X-axis.

**Bi-direction:** laser is on both on positive and negative X-axis when this parameter is chose. The efficiency is high, but if you need a high process precision, do not choose this option. The efficiency will be cut half.

**Engrave Blow:** blow or not, with this option selected or not.

**Direction:** this is the engrave direction.

**Filled by Circles:**

Select the option and graph will be filled by circles with the radius you set.

**Male Engrave:** define the engrave way of the circles.

**Circle Radius:** radius of the circle.

**Circle Gap:** space between the circles.

**Light Guide Plate:** choose this option and the system will convert the data to dot matrix data for light guide plate.

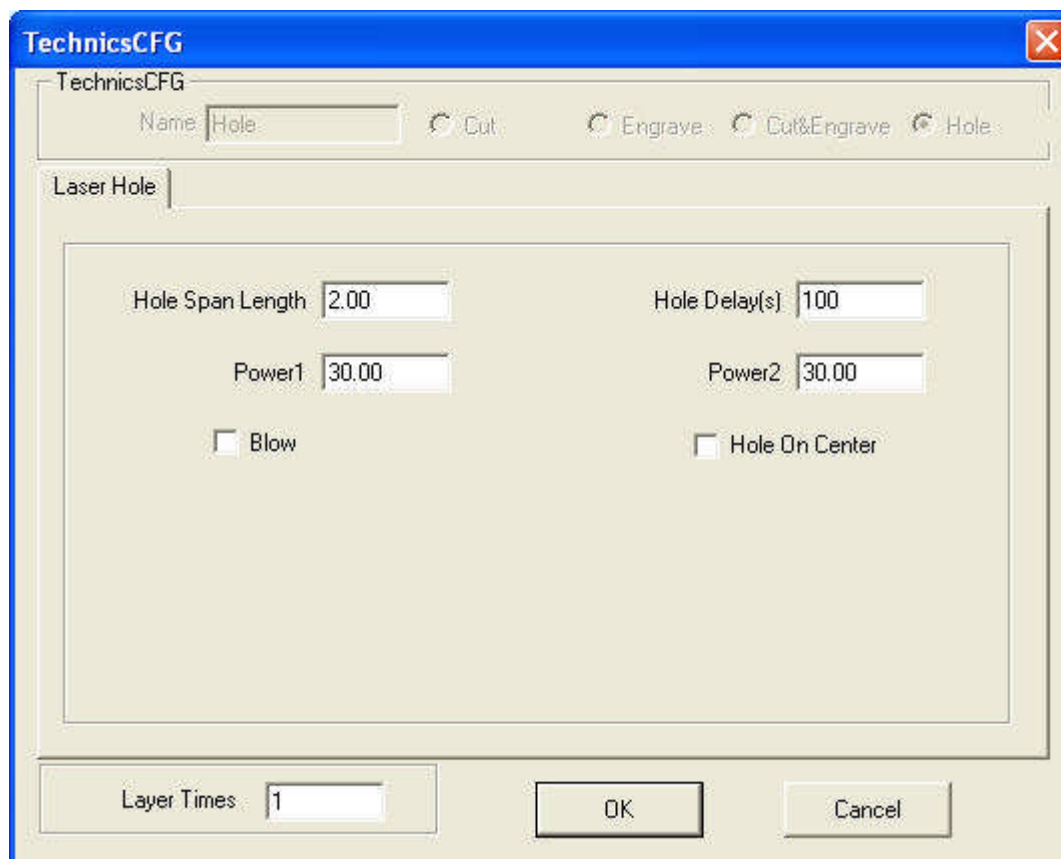
**Layer Times:** a layer can be processed many times. Input the value as you need.

### 3.5.4 Set Cut and Engrave Parameters

Please refer to 3.5.2 and 3.5.3.

Engrave and cut mode means when process a graph, engrave first and then cut.

### 3.5.5 Set Hole Parameters



**Hole Span Length:** distance between two adjacent holes.

**Power1/2:** adjust the laser power (unit: %).


**Hole Delay:** delay time of the laser head in punching a hole (unit: second).

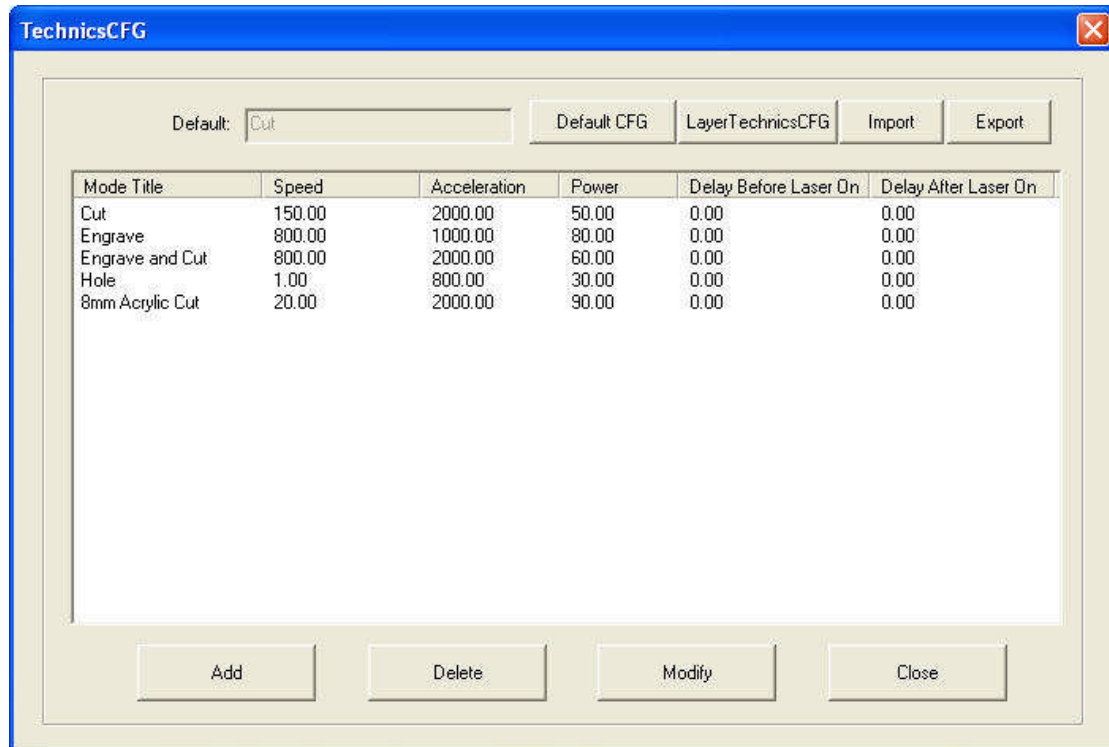
**Blow:** blow or not, with this parameter chose or not.

**Hole on Center:** punch a hole on the center of each closed vector graph.

**Layer Times:** a layer can be processed many times. Input the value as you need.

### 3.5.6 Set Fixed Parameters

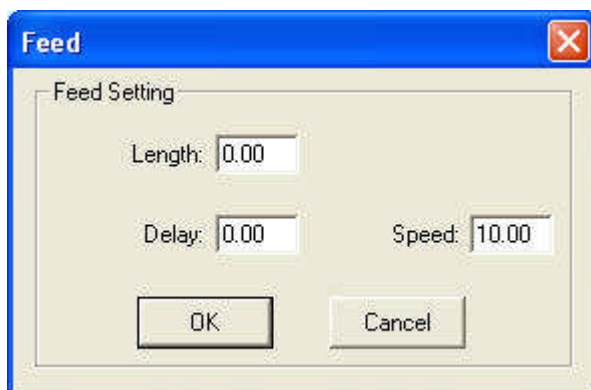
The corresponding icon is  on the toolbar.



**Default CFG:** If “Cut” is set to be default CFG, system will set the process mode as “Cut” automatically when create a new file.

User can fix the parameters of some material that usually used. When the same material processed, choose the mode in drop-list and the parameters will be proper.

### 3.5.7 Feed Parameters

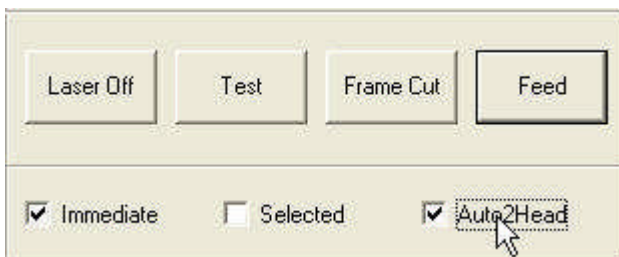


**Length:** after each processing, Z-Axis will feed a relevant distance for the feeding of the materials.

**Delay:** the machine will delay a certain time for feeding after processing.

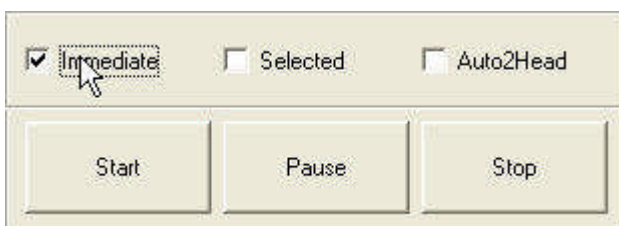
**Speed:** feeding speed of the Z-Axis.

### 3.5.8 Auto 2-Head



If the machine has automatic separation function, select this option and the space between the two laser head will adjust automatically; or the space between the two laser head won't adjust and the machine will be used as simple double laser head machine.

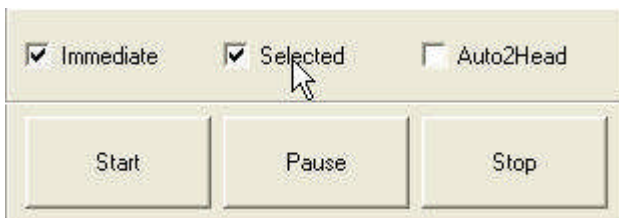
### 3.5.9 Immediately Output



System will process the data according to their coordinate in the worktable range when the option not selected.

System will process the data from where the laser head is when the option selected. Relevant relations between the stop position and the processing data remain unchanged.

### 3.5.10 Selected Output

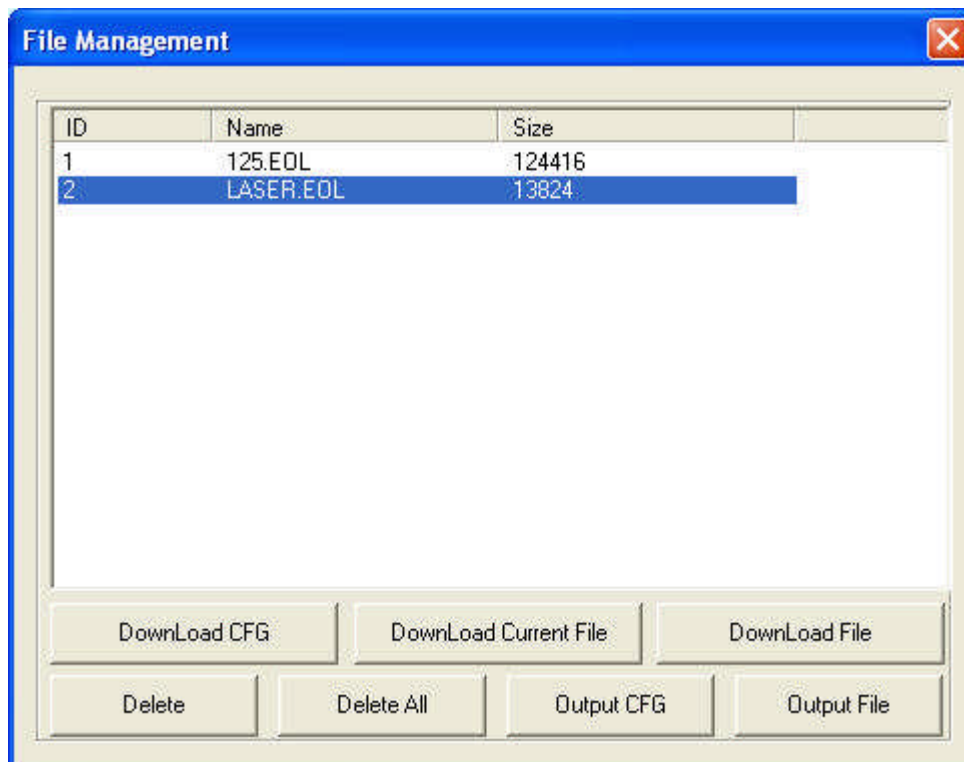


When select the option, system will only process the graph selected.

## 3.6 Output

### 3.6.1 Download File

Click “Download” button, dialog box appears as below:



**Download CFG:** Download parameters of the machine to controller.

**Download Current File:** Download the current processing data to controller.

**Download File:** Download the processing files (\*.mol) which have been generated to controller.

**Delete:** Delete the selected file.

**Del All:** Delete all the files in controller.

**Output CFG:** This will generate a \*.mol file which includes all the parameters of “Machine Setting”. The file can be downloaded to controller by USB disk.

Note: after the file is downloaded into controller, you should select the file and click “OK” to take the new parameters into effect.

This function is the same with that in the 3.6.1 (Download CFG).

**Output File:** This will generate a \*.mol processing file with all the well-set parameters. This file can be downloaded to controller by USB disk.

This function is the same with that in the 3.6.1 (Download Current File). The difference is that files can be downloaded without the connection of the computer.

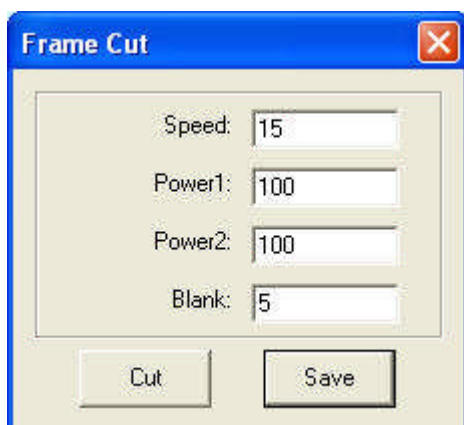
### 3.6.2 Test

Click the button, and the laser head will move a rectangle contouring the data with the laser off. This function is used to define the position of the materials to process.

### 3.6.3 Frame Cut

Set parameters of cutting the work piece well-processed off the materials.

Click the button after the process finished, dialog box appears as below:



**Speed:** operating speed of the laser head in cutting. Different speed can be set according to the materials. It is better to define proper speed through testing.

**Power1/2:** power of the laser in cutting.

**Blank:** distance between processing figure and edge of the work piece cut down.

**Cut:** click the button to cut the piece.

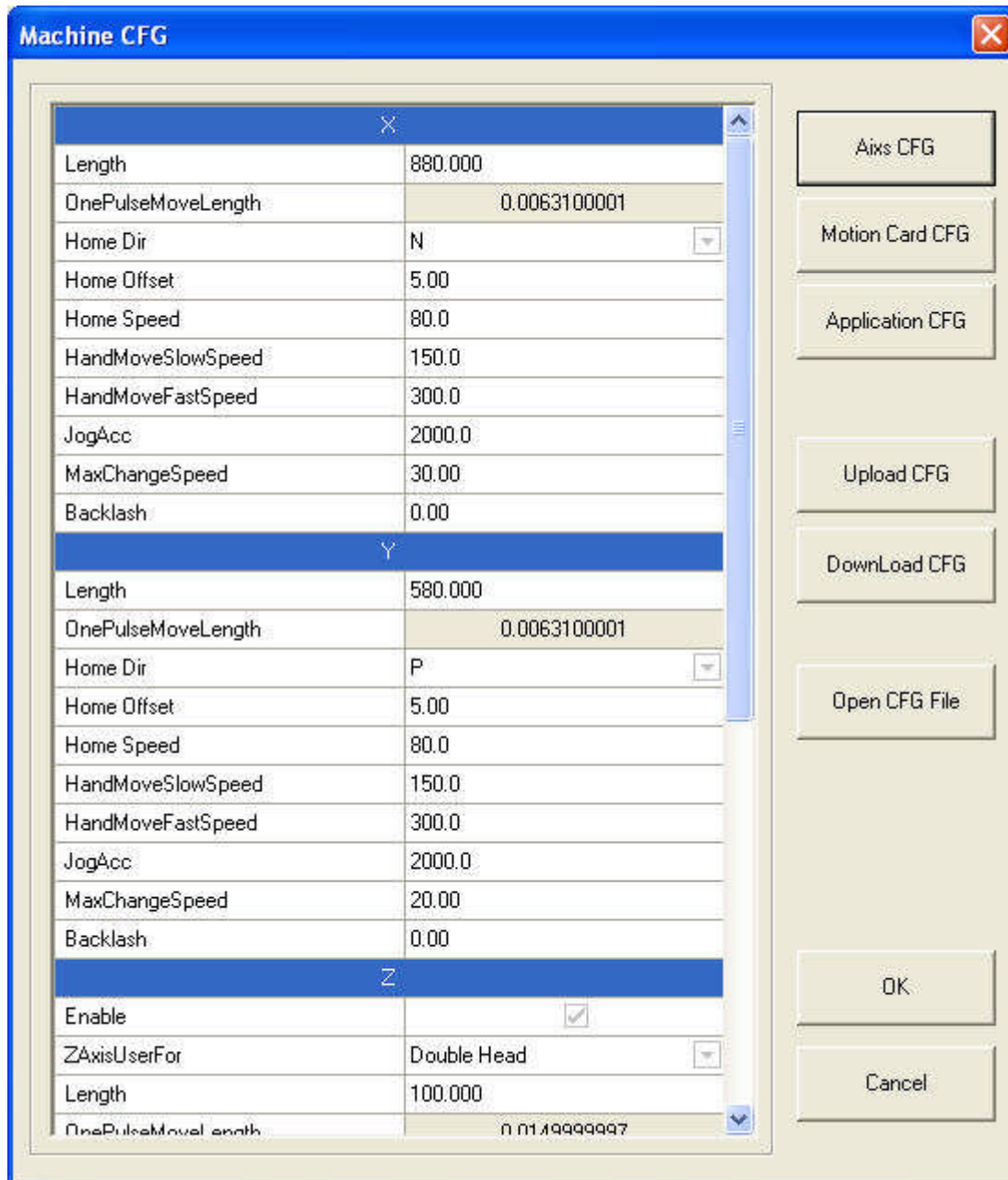
**Save:** click the button to save the parameter in case of the future use.

The parameters will be effective only when the processing data be re-downloaded.



## 3.7 Machine Setting

### 3.7.1 Axis Parameter

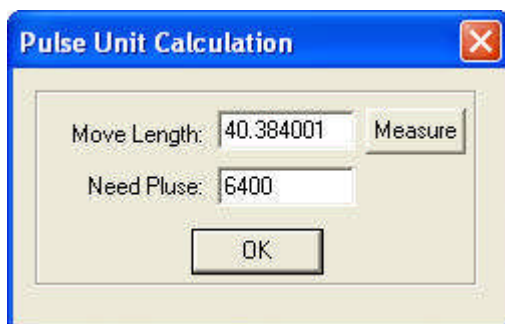


#### 3.7.1.1 Range

Maximum range of the laser head's movement (unit: mm).

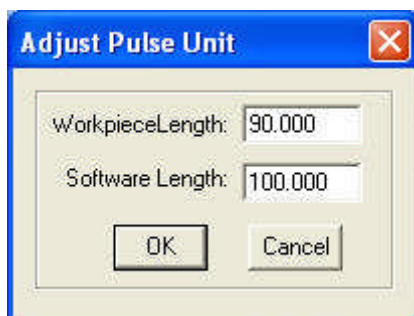
#### 3.7.1.2 Pulse Unit

It controls the distance the laser head moves when the control system output a pulse. Click the button and dialog box appears as below:



40.384001 in the picture above means the distance of the laser head moves every round of the motor is 40.384001 mm. 6400 is the pulse every round of the motor needs.

Pulse unit can be set by measuring. Click “Measure” and dialog box appears as below:



As the above picture indicate, draw a line in the software that the length is 100mm and cut. Measure the work piece and the actual length of the line is 90mm, and input the value, the system will calculate the pulse unit automatically.

#### 3.7.1.3 Home/Datum Dir

Right of the X-Axis and upside of the Y-Axis are positive direction. Ensure the correspondence of the switch position on the original point and the setting of this option.

#### 3.7.1.4 Home/Datum Offset

After datum, the laser head will move a distance along the reverse direction of the origin switch.

#### 3.7.1.5 Home/Datum Speed

Speed of the laser head going back to the original point. It should not be too large, or the switch of the original point may be damaged.

#### 3.7.1.6 Slow Jog Speed

Test speed of the laser head, when “Auto datum” is not been chosen.

#### 3.7.1.7 Fast Jog Speed

Test speed of the laser head, when “Auto datum” is been chosen.

#### 3.7.1.8 Jog Acceleration

It is the acceleration from start speed to jog speed.

#### 3.7.1.9 Max Change Speed

It is the maximum speed of changing direction of the X or Y axis. The smaller the value is, the better the quality is, but the lower efficiency of the processing is.

#### 3.7.1.10 Backlash

It is used to compensate the backlash in cutting.

#### 3.7.1.11 Z-Axis

Z-axis should be enabled. Z-axis can be used as auxiliary head of 2-Head machine, feeding

axis and Z axis (lifting the worktable).

### 3.7.1.12 FeedEx

If the machine has automatic separation 2-head, the Z-axis should be used as 2-Head and the FeedEx can be used as feeding axis.

## 3.7.2 Controller Parameter

The screenshot shows the 'Machine CFG' window with the following sections and parameters:

MotionCard	
MotionCard Type	MPC6585
Coordinate System	
Space Speed	500.000
Space Acc	6000.000
StartSpeed	10.000
AccAcc	50000.000
Signal CFG	
Home Limit IO Level	Low Level Effective
Laser Frequency	20000
Laser power control mode	Db Laser Analog
MaxLaserPower(%)	100.0
Enable Water Protect	<input type="checkbox"/>
AdvancedCFG	
Enforce go home before work	<input checked="" type="checkbox"/>
Enable Breakpoint Protect	<input type="checkbox"/>
BreakPoint Back Distance(mm)	2.0
MinCloseBlowLength(mm)	0
Output Type	Output By Layer
Curve Disperse Accuracy	0.30
Enable Adjust Small Circle Speed	<input checked="" type="checkbox"/>
Set Adjust Small Circle Speed	Set
Set Engrave Parameters	Set

Buttons on the right side of the window: Aixs CFG, Motion Card CFG, Application CFG, Upload CFG, DownLoad CFG, Open CFG File, OK, Cancel.

### 3.7.2.1 Controller Model

It is determined by the controller in the machine. If it is MPC6585, choose MPC6585 in the drop-down list of the Controller Model. Please replace the DLL of the controller when change the controller model.

### 3.7.2.2 Quick speed

It is the highest speed of the laser head in the process when the laser is off.

#### 3.7.2.3 Quick acceleration

It is the acceleration when the machine moves on quick speed.

#### 3.7.2.4 Home Limit IO Level

Set the effective level of the original signal.

#### 3.7.2.5 Laser frequency

It controls the PWM frequency of the laser power. It can be adjusted between 200Hz—200KHz.

#### 3.7.2.6 Laser Power Control Mode

Set the mode of the laser power control. It includes: single analog quantity, double analog quantity and PWM control.

#### 3.7.2.7 Auto-Datum

It determines whether the laser head automatically go back to the original point when power on the system. Without choosing this option, jog speed of the laser head is relatively slow to avoid striking the machine, or jog speed will be quicker and no worry about striking of the machine.

#### 3.7.2.8 Enable Breakpoint Protection

Choose this option, and the system will record the coordinate value of the laser head when power off. When the system re-powered, the system will remind user to continue process or not.

#### 3.7.2.9 of Breakpoint Back Distance

This is effective when the break-point resume function is chosen. Laser head will move back a certain distance when re-powered to ensure the line can joint smoothly with the line before power off.

#### 3.7.2.10 Min Distance of Blowing Off

The system will not close blowing when the space between two graphic units is less than the value.

#### 3.7.2.11 Output Type

Output by Layer: When there are many layers, the system will process the graph layer by layer.

Output by Object: When there are many layers, the system will set the process sequence as one layer while the processing parameters of each graphic unit (i.e. speed, power) will refer to the processing parameters of the layers.

#### 3.7.2.12 Curve Disperse Accuracy

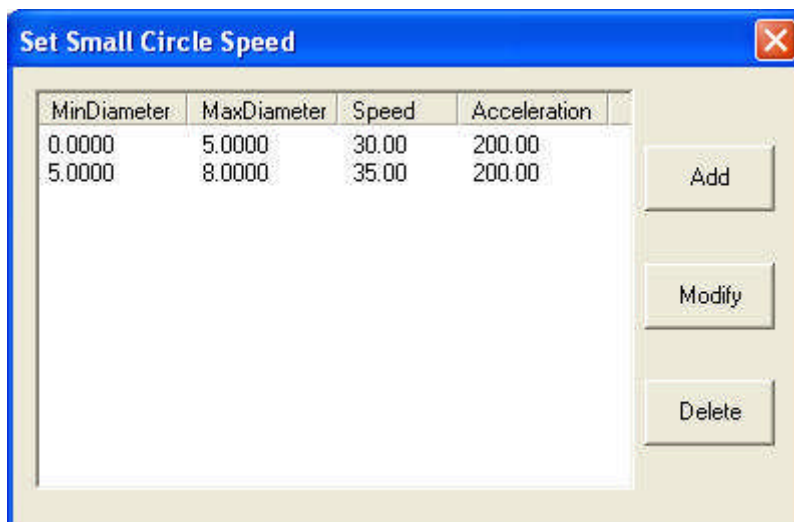
The smaller the value is, the more precise the figure is, but the slower the computation speed is. And it will influence the process speed also. Generally, you can choose a relatively small number to cut synthetic glass, and please use the default value when cutting other material.

#### 3.7.2.13 Enable Adjust Small Circle Speed

Enable this option and the system will restrict the speed for best quality when cutting small circles that the diameter is in the range.

### 3.7.2.14 Parameter of Small Circle Speed

It defines the cutting speed of small circles. If it is suitable, cut quality of the small circle will greatly increased.



Double click one line (or select one line and click “Modify”), dialog box appears as below:



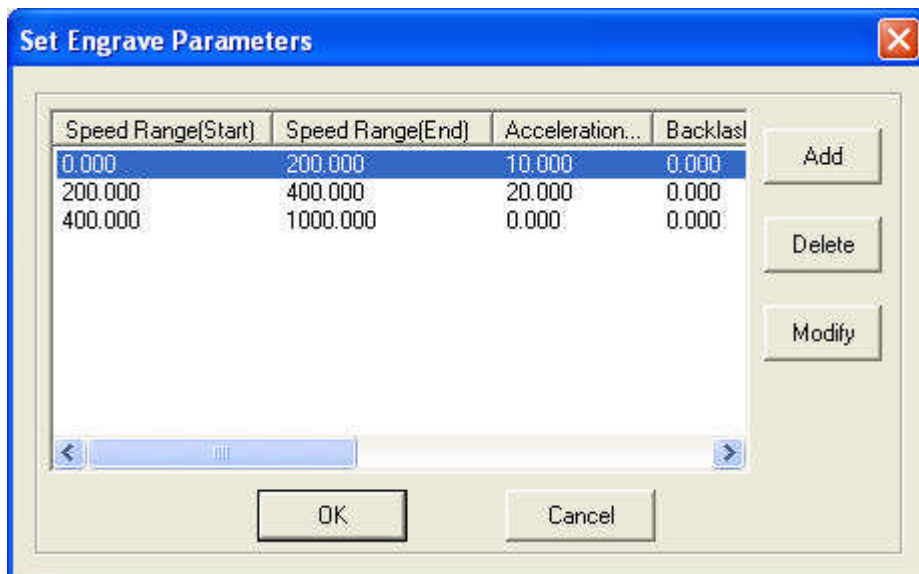
**Min diameter, Max diameter:** range of the circle's diameter.

**Speed:** cut speed of the circle within the range.

**Acceleration:** acceleration of cutting with the speed.

Click “OK” to set the cut speed of the circles with different speed range. It is suggested that the maximal diameter is no more than 3.

## 3.7.2.15 Set Engrave Parameter



Double click one line (or select one line, and click “Modify”), dialog box appears as below:



**SpeedRange(Start):** Set the start point of the speed range.

**SpeedRange(End):** Set the end point of the speed range.

**Acceleration Distance:** Set the acceleration length of the laser head during the time when speed accelerates from the jump speed to the operating speed.

**Backlash:** It is used for compensating mechanical gaps. If the engraving edge is not orderly, please set a number in “Backlash”. This number can be positive or negative. Details information is in “5.5” of Chapter 5.

**X Start Speed:** Start speed of the laser head in engraving. Too large value will lead to the malposition of the engraving while too small value will greatly decrease the process efficiency.

**X Acceleration:** It is the acceleration of the X-axis from start speed to operating speed.

**Y speed:** It is the maximum of the laser head speed on the Y-axis. If the number is too large, the machine will shake intensively.

**Y Acceleration:** It is the acceleration of the Y-axis from start speed to operating speed.

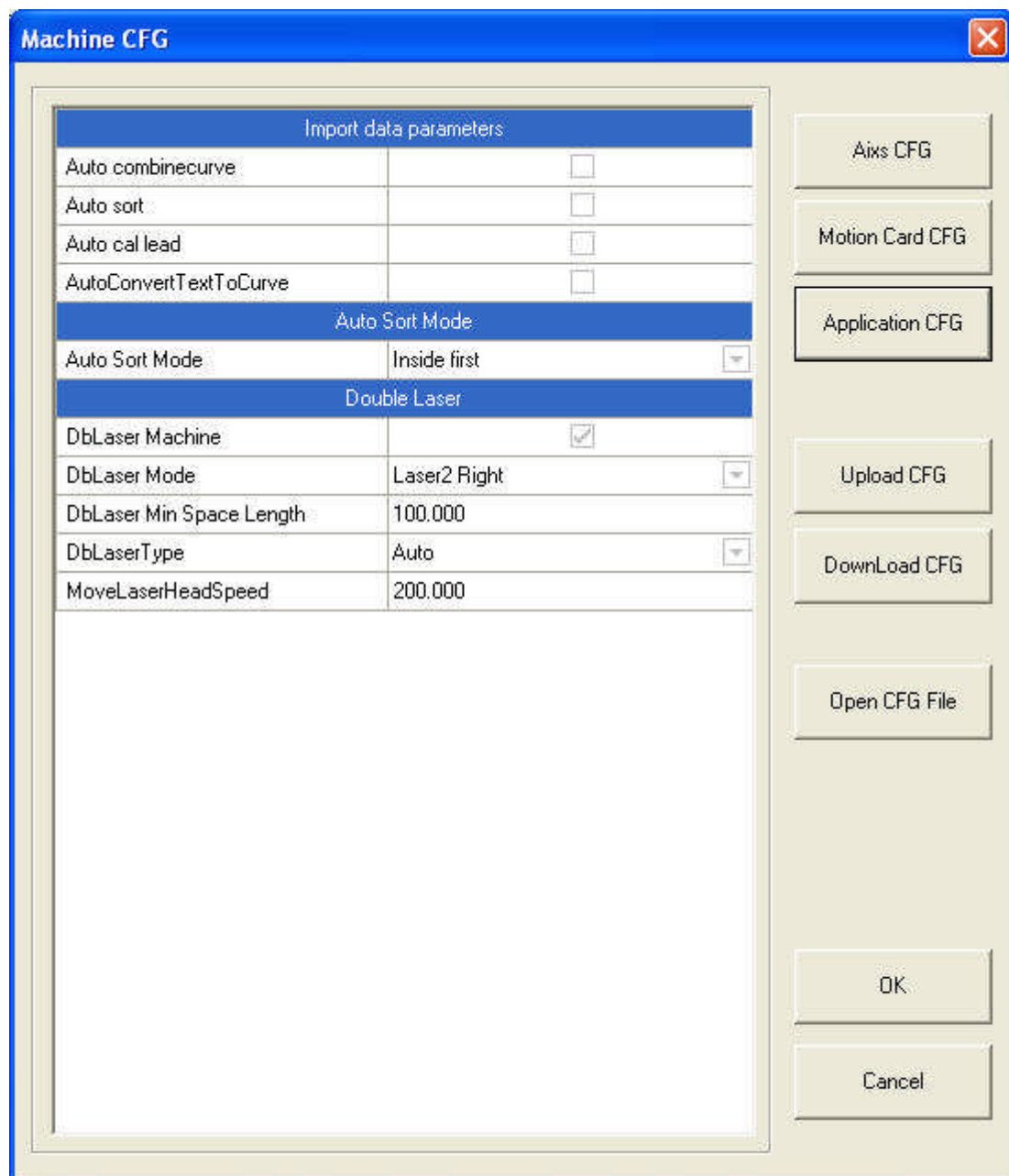
**X Offset:** It is applied only to servo motor. When servo motor is chosen, offset will be generated between the engraving and cutting position. It is to compensate offset on the X-axis in

engraving.

**Y Offset:** It is applied only to servo motor. When servo motor is chosen, offset will be generated between the engraving and cutting position. It is to compensate offset on the Y-axis in engraving.

Click “OK” to set different process parameter according to different speed range.

### 3.7.3 Application Parameter



#### 3.7.3.1 Import Data Parameters

**Auto Connect End to End:** Choose this option and the conjoint lines will be combined as one when file imported.

**Auto Route:** Choose this option and the system will set the route according the parameters of “Auto Route” when file imported.

Auto Set Lead in/out Line: Choose this option and the system will set the lead line according to the parameters of “Set Lead Line” when file imported.

Auto Convert Text to Curve: Choose this option and the system will transform the text to curve when drawing text.

#### 3.7.3.2 Auto sort mode

Inside first: the inside graph will be cut first and then the outer.

Nearest first: this mode will get a nearest route while it won't be restricted by the rule “inside first”.

Knife mold: this mode is only applied for knife mold machine.

#### 3.7.3.3 Auto Separation 2-Head

Auto Separation 2-Head Machine: This option can only be chosen when the machine is an automatic separation machine.

2-Head Mode: Choose the location of the auxiliary laser head is on the left or right according to the structure of the machine.

Min Distance between 2 Heads: Input the distance of the two laser head according to the structure of the machine.

Separation Type: There are 2 options: Auto and Semi-Auto.

Speed of Separating Head:

#### 3.7.4 Open CFG File

Click Open CFG File button, and open the configuration file.

All the parameters of machine setting are saved in this file which named syscfg.ini. The file is in C:\LaserCut61.

Please save the file as a backup file. When re-install the software or parameter error, replace the configuration file in C:\LaserCut61.



## 3.8 Machine Check

### 3.8.1 Machine IO Check

The 'Machine Diagnosis' dialog box contains the following settings:

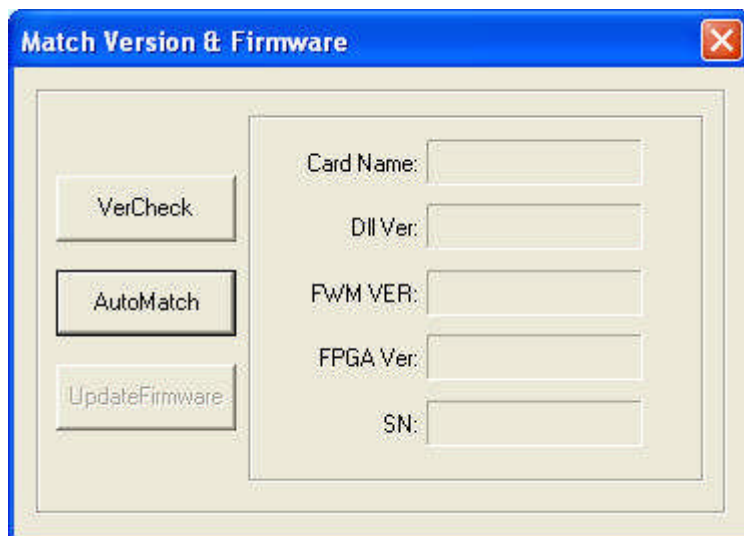
Axis	Parameter	Value
X	Negative limit	<input type="checkbox"/>
	Positive limit	<input type="checkbox"/>
	Home	<input type="checkbox"/>
	Enable Alarm	<input type="checkbox"/>
Y	Negative limit	<input type="checkbox"/>
	Positive limit	<input type="checkbox"/>
	Home	<input type="checkbox"/>
	Enable Alarm	<input type="checkbox"/>
Z	Negative limit	<input type="checkbox"/>
	Positive limit	<input type="checkbox"/>
	Home	<input type="checkbox"/>
	Enable Alarm	<input type="checkbox"/>
FeedEx	Negative limit	<input type="checkbox"/>
	Positive limit	<input type="checkbox"/>
	Home	<input type="checkbox"/>
	Enable Alarm	<input type="checkbox"/>
Input IO	1(IN1)	<input type="checkbox"/>
	2(IN2)	<input type="checkbox"/>
	3(IN3)	<input type="checkbox"/>
Output IO	1(OUT1)	<input type="checkbox"/>
	2(OUT2)	<input type="checkbox"/>
	3(OUT3)	<input type="checkbox"/>
	4(OUT4)	<input type="checkbox"/>

Buttons: IO Enable, Cancel

Input: If there is signal input, it shows ;

Output:  and output a signal.

### 3.8.2 Version Check



Power on the controller, and ensure it communicate with PC correctly.

Click “Version Check” button, and the system will show the version information of the controller and DLL.

Click “Auto Match” button, and the system will match the correct DLL according to the controller.

### 3.8.3 Firmware Update

Power on the controller, and ensure it communicate with PC correctly.

Click “Firmware Update” button, and system will update the controller to the latest version automatically (please ensure the software is latest).

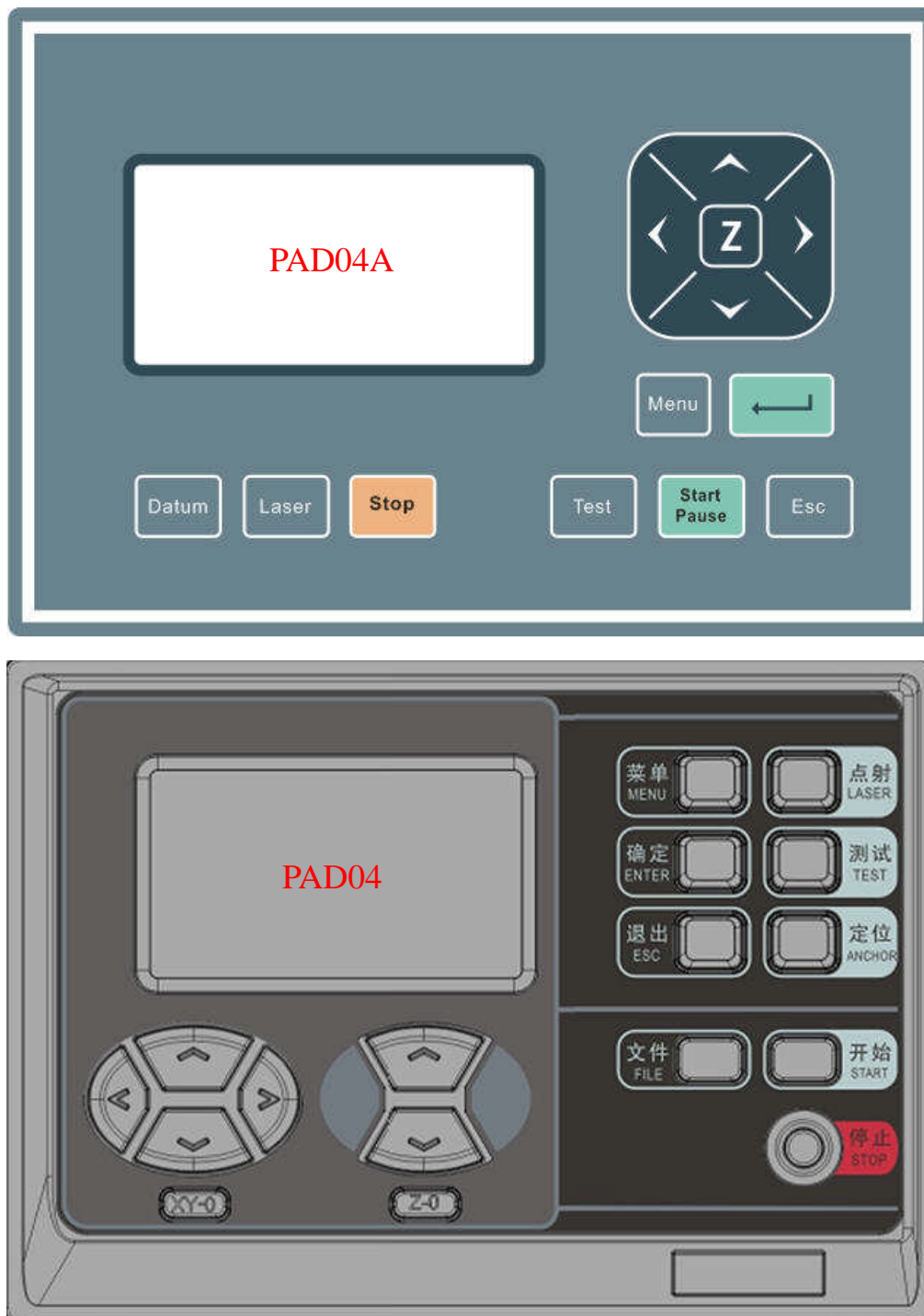
Notice:

If the machine power off during the updating, you have to update the controller by USB flash disk.

## 4 Control Panel

### 4.1 Overview of Control Panel

#### 4.1.1 Face of the Control Panel



### 4.1.2 Function of the Keys

Datum (XY-0): Laser head moves to the original point of the machine slowly. It is mainly used to estimate cumulative error. Make sure that the application of datum switch and lead the switch signal to the controller.

Laser: Laser on/off.


Stop: Stop operation.

Test: The laser head will run along the outline border of the processing data.

Start/Pause: Start/pause the processing operation.

Esc: Escape the current status window.

Menu: Enter supporting interface.

: Click this button and switch to Z status (PAD04 has individual Z keys). Click “^ ” “v ” to move the Z axis. This function needs hardware support.

: Enter.

## 4.2 Start Interface

When system started, it is displayed as follows:

```

SYSTEM STARTING
PLEASE WAIT
Vx. x. x

```

## 4.3 Main Interface

If there's no communication problem with MPC65\*5, main interface will be shown as follows:

```

FILE: XXXXXXXX
SPEED: XXX%
POWER: XXX/XXX%
PIECES: XXX DEL

```

### 4.3.1 Description of Parameters

File: processing file name;

Speed: percentage of the processing speed;

Power: percentage of processing power. The first one is the power corresponding to low speed, while the latter is the power corresponding to high speed.

Pieces: repeat times of a processing file.

#### 4.3.2 Cursor Appears (Initial Status)

Press < > to move the cursor and select the option want to modify;

Press ^ v to set the values of selected option, including processing speed, power corresponding to low speed, power corresponding to high speed and pieces. Stepping=1;

Press ^ v to select a file when the cursor is on "File". If there's no file in controller, no name of file will be shown.

To delete a file: move the curse to **DEL**, and press **ENTER**;

To process a file: Press **START**.

Note:

Press **ENTER** to confirm the settings on speed, power and pieces. The parameters will not lose when power off.

#### 4.3.3 Cursor Disappear

Press **ESC** and the cursor disappear.

Press < > ^ v to move the laser head.

#### 4.3.4 Laser

Press **LASER** to beam according to the settings of shooting;

#### 4.3.5 Test

Press **TEST** to make contouring motion:

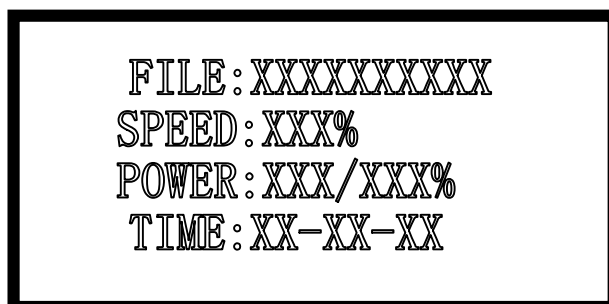


When contouring finished, system will return to main interface. When contouring, only **START** and **STOP** can be used.

### 4.4 Process

#### 4.4.1 Process Interface

Press **START** to start the processing:



Parameter descriptions are as follows:

File: processing file name;

Speed: percentage of the processing speed;

Power: percentage of processing power. The first one is the power corresponding to low speed, while the latter is the power corresponding to high speed;

Time: processing time spent.

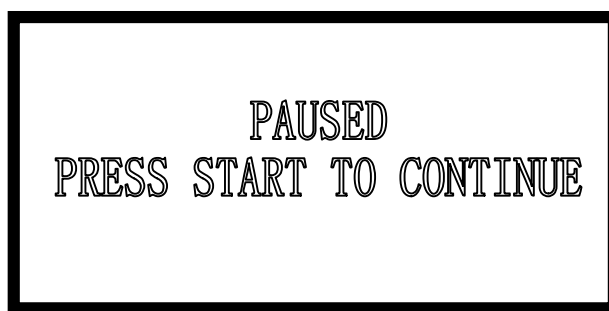
#### 4.4.2 Process Control

During the process, only following buttons can work-- **START**, **STOP**, **<**, **>**, **^**, **v**:

Buttons **^**, **v** are used to change the processing speed. Stepping=1. The value ranged from 0-100.

Buttons **<**, **>** are used to change the power corresponding to high speed. Stepping=1. The value ranged from 0-100.

Press **START** for odd times, it will enter pause interface and show as follows:



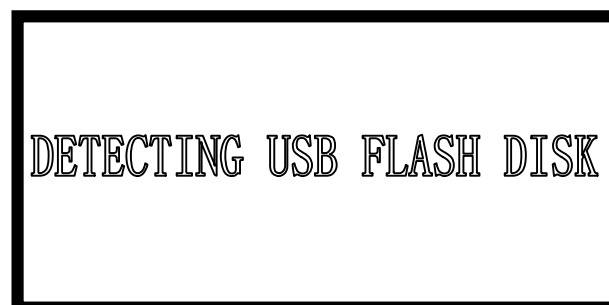
In this interface, only **START** and **STOP** buttons can work;

Press **START** for even times during processing, it will return from pause interface to process interface.

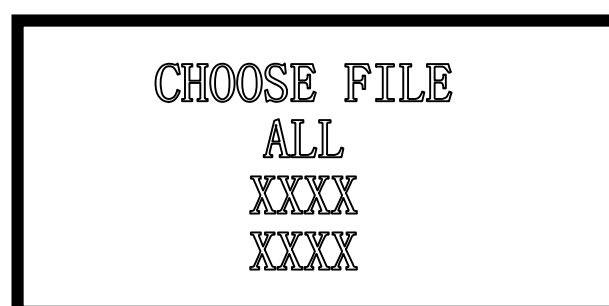
Press "**STOP**" during the processing, it will stop the processing.

#### 4.4.3 Download with USB Flash Disk

When a USB flash disk is plugged into the controller, main interface will show as follows:



Controller starts choose the process files once the USB flash disk is detected. Interface displays as follows:



Press  $\wedge$ ,  $\vee$  choose the file wanted, and press **ENTER** to download the file. Presses **ESC** to exit download processing.



DOWNLOADING  
STATUS : XXX%

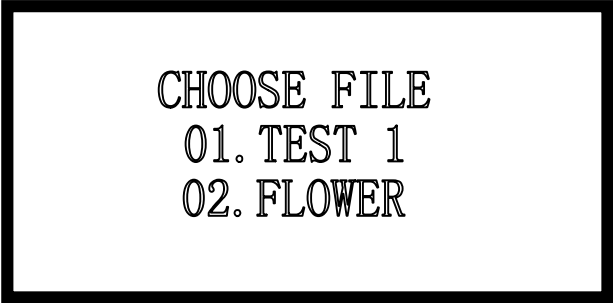
Once the downloading completes, the interface displays:



DOWNLOAD COMPLETED  
REMOVE USB FLASH DISK

#### 4.4.4 Select File (PAD04)

Press **FILE** in main interface and choose the files in controller.



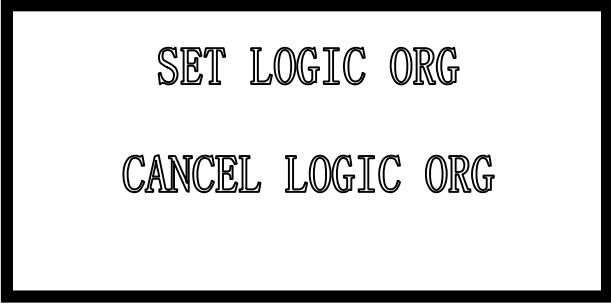
CHOOSE FILE  
01. TEST 1  
02. FLOWER

Press  $\wedge$   $\vee$  and move the curse to the file need to process, and press **ENTER**, the file will be chosen.

In main interface, when move the curse to "FILE NAME", press  $\wedge$   $\vee$  can also choose file.

#### 4.4.5 Set and Cancel Logic Original Point

Press **ENTER** on PAD03/PAD06 (**ANCHOR** on PAD04) in the main interface, and set the logic original point, or cancel the logic original point.



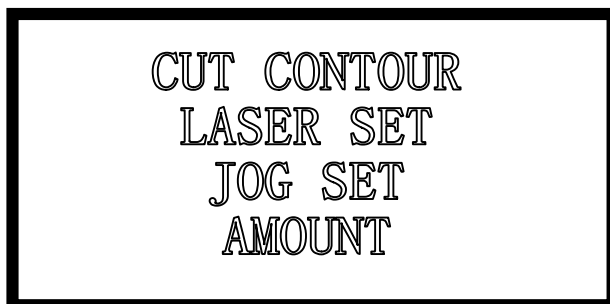
SET LOGIC ORG  
CANCEL LOGIC ORG

Press < > and move the curse to the option, and press **ENTER** to confirm and return to the main interface.

This operation can set the current piont as logic original point, and the coordinate will be saved. But it is only effective when the machine successfully reset and “Immediate Output” is selected.

## 4.5 Supporting Interface

Press **MENU** once to enter the supporting interface, which displays as follows:



Press **MENU** twice to enter another supporting interface, which displays as follows:



Press < > to move the cursor;

Press **ENTER** to confirm;

Press **ESC** to return to main interface.

### 4.5.1 Cutting Contour

Select CUT COUNTOUR by cursor and press **ENTER**:



When the machine is cutting contour, only **START** and **STOP** can be used. It will return to the main interface once the motion completed.



#### 4.5.2 Laser Set

Select LASER SET by cursor and press **ENTER**:

```
TIME :
XXXXms
POWER :
XXX%
```

The default value of time is 0 ms, default power value is 100%;

Press <> to move the cursor to choose Time or Power;

Press ^ v to set parameters, setting=1;

Time ranged from 0 to 99999ms. Power ranged from 0 to 100%. Press **ENTER** to make the settings effective.

Press **ESC** to return to supporting interface while the settings won't be effective.

If the time=0, laser will be on immediately upon pressing the button **LASER**, and be off when stop pressing. If time is set to be a fixed value, laser will be on a certain time for each press.

#### 4.5.3 Jog Set

Select JOG SET by cursor and press **ENTER**:

```
JOGGING DISTANCE

XXX.X mm
```

Press ^ v to set parameters. Press **ENTER** to confirm and return to supporting interface.

The default value =0, start moving upon pressing <> ^ v, and stop when stop pressing. If the value is not 0, laser head start moving a fixed distance at high speed.

#### 4.5.4 IP Set

```
MACHINE ID 1
IP MODE AUTO
IP SET
192.168.001.001
```

Press <> to move the cursor and press ^ v to set parameters, setting=1;

Machine ID: When one LaserCut controls several machines, the machine ID should be set on the PAD panel. It is suggested that the ID should not be the same.

IP Mode: There are 2 modes to set the IP address of the controller, auto and static. The default is "AUTO".

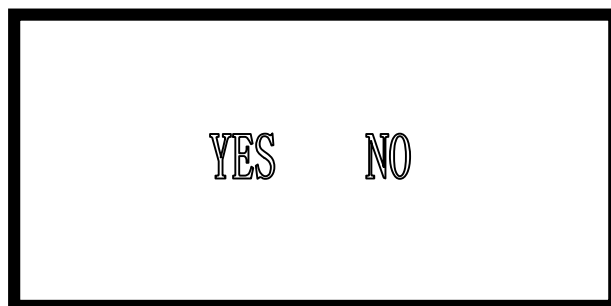
When the mode is "STATIC", you can input any number to identify different machine.

By "STATIC" mode, the PC can communicate with the controller in 1 second; and by "AUTO" mode, it should be 10 second.

If there is a router between the PC and the controller, The PC can communicate with the controller in 1 second no matter the mode is "AUTO" or "STATIC".

#### 4.5.5 Screen Protect

Select SCREEN PROTECT by cursor and press **ENTER**:



Press  $\wedge$   $\vee$  to set parameters. Press **ENTER** to confirm. Press **ESC** to return to supporting interface while the settings won't be effective.

#### 4.5.6 Language Option

Select LANGUAGE by cursor and press **ENTER**:



Press  $\wedge$   $\vee$  to set parameters. Press **ENTER** to confirm. Press **ESC** to return to supporting interface while the settings won't be effective.

If without pressing any button to set a language, system will choose the language where the cursor is and return to the supporting interface automatically in 5 minute.

#### 4.5.7 Alarm Time

Select ALARM TIME by cursor and press **ENTER**:

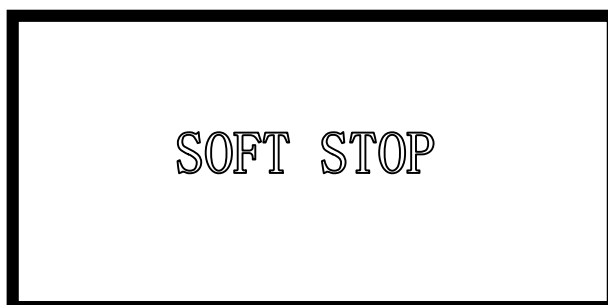


Press  $\wedge$   $\vee$  to set parameters. Press **ENTER** to confirm. Press **ESC** to return to supporting interface while the settings won't be effective.

## 4.6 Error Alarm Interface

If there's any failure of the system, PAD\*\* can display the error, and the user can find the error immediately.

### 4.6.1 Soft Limit Error



Cause:

The system detected that the process data size exceed the workplace range.

Solution:

Move the laser head to correct place and run again.

### 4.6.2 Limit Switch Error



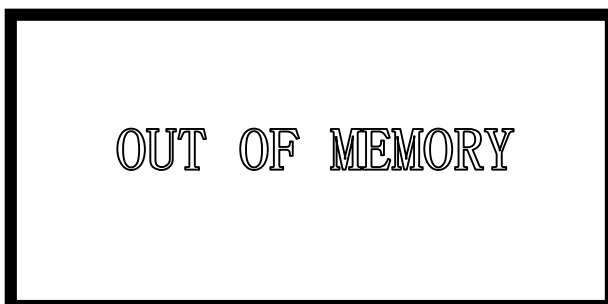
Cause:

The machine has not been reset and the user chooses the "Immediate Output" mode.

Solution:

Move the laser head to correct place and run again.

### 4.6.3 Memory Alarm



Cause:

1. These are more than 32 files in the controller.

2. All the files in the controller exceed 128M.

Solution:

Delete some files and re-download process file.

#### 4.6.4 Configuration doesn't Match the Firmware



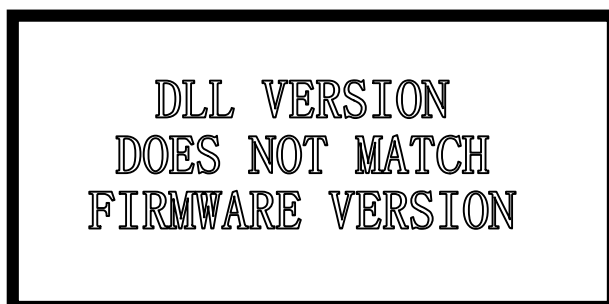
Cause:

Process file or configuration file doesn't match with the firmware version.

Solution:

Replace the DLL with the correct one matching with the firmware version, and download the configuration file.

#### 4.6.5 Dll Version doesn't Match with the Firmware



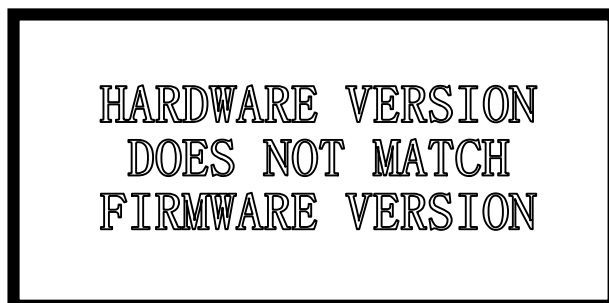
Cause:

Incorrect DLL has been used in the software.

Solution:

Replace the correct DLL in the software, delete all the files in controller, and re-download the process files.

#### 4.6.6 Dll Version doesn't Match with the Firmware



Cause:

Incorrect firmware file (\*.fmw) has been downloaded to the controller.

Solution:

Re-download correct firmware file.

## 5 Appendix

### 5.1 IP Set

There are 2 modes to set the IP address of the controller, auto and static. The default is “AUTO”.

```
MACHINE ID  1
IP MODE     AUTO
IP SET
192.168.001.001
```

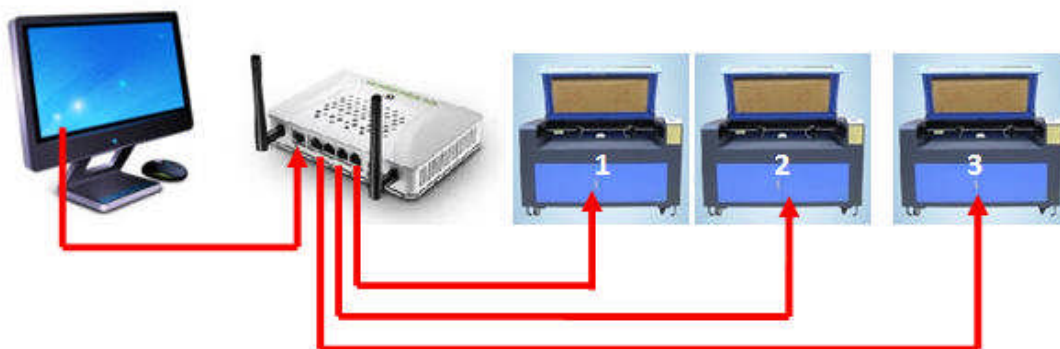
When the mode is “STATIC”, you can input any number to identify different machine.

By “STATIC” mode, the PC can communicate with the controller in 1 second; and by “AUTO” mode, it should be 10 second.

If there is a router between the PC and the controller, The PC can communicate with the controller in 1 second no matter the mode is “AUTO” or “STATIC”.

### 5.2 How to control several machine in one software

#### 5.2.1 Wiring Diagram



#### 5.2.2 Set IP Mode

Set the IP mode as “AUTO” on the PAD panel.

```
MACHINE ID  1
IP MODE     AUTO
IP SET
192.168.001.001
```

### 5.2.3 Set Machine ID

Set the machine ID on the PAD panel.

It is suggested that the ID should not be the same.

### 5.2.4 Networking

Connect all the controller to the router by net cable, and the router connects with the PC.

### 5.2.5 Identify the machine ID

Power on the machines and run the LaserCut61, the software will get the IP address of the machines automatically and show the machine ID.

### 5.2.6 Choose machine ID and download data

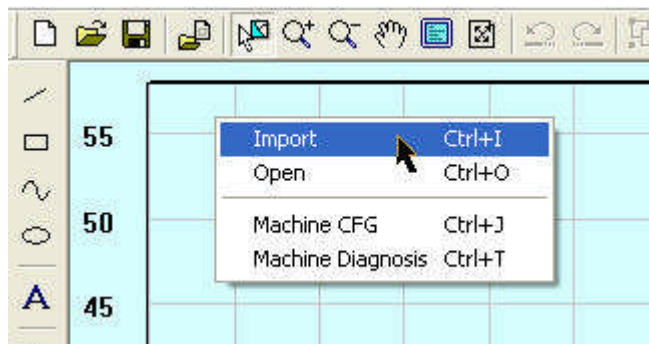
Before download data, machine ID should be choose firstly.

## 5.3 Quick Operation

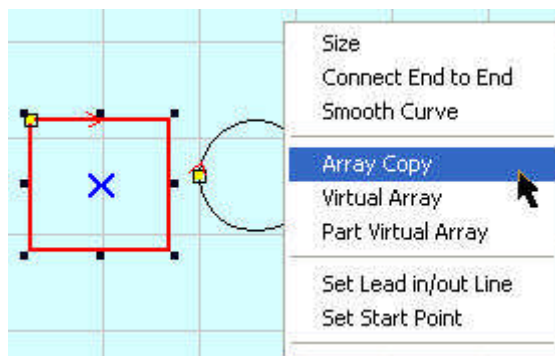
### 5.3.1 Right Key of the Mouse

At different situation, click right key of the mouse to get to the tools quickly.

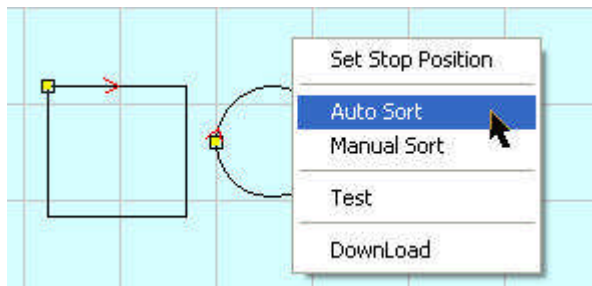
When there is nothing in the drawing area, click right key and is shows as below:



When selected graphics, click right key and is shows as below:



There is graph in the drawing area. Without selecting any graphics, click right key and is shows as below:



### 5.3.2 Ctrl+A

Select the entire graph in the drawing area.

### 5.3.3 Ctrl+Y

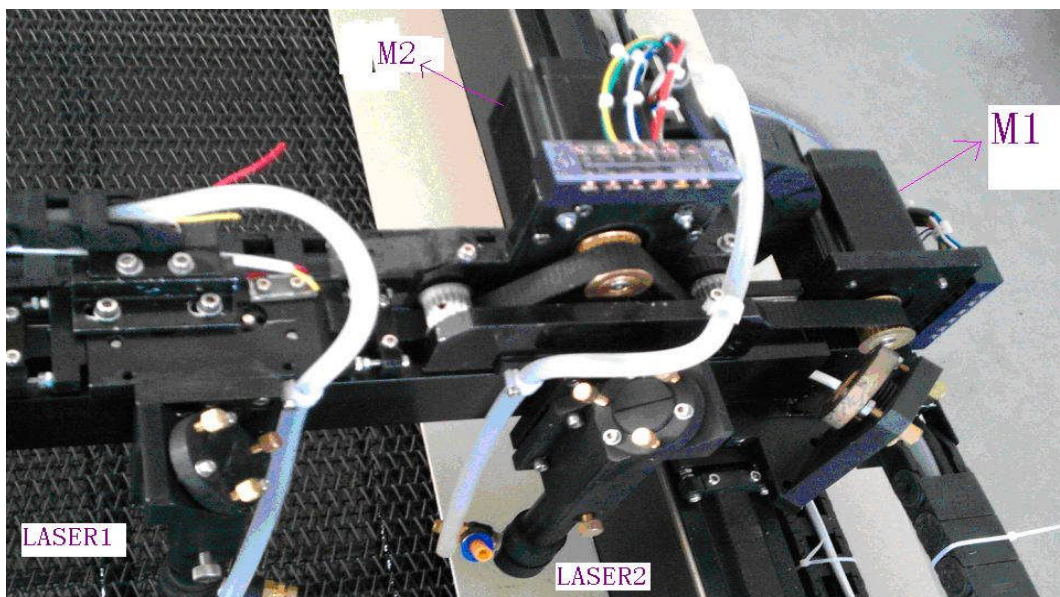
Move the selected graph to the center of the drawing area.

Without selecting any graphics, the whole graph will be moved to the center of the drawing area.

## 5.4 Description of Auto Separation 2-Head Machine

### 5.4.1 Working condition

The system supports the single-belt auto separation 2-head machine as follows.



There are 2 laser heads on the X-Axis and they are fixed on one belt.

### 5.4.2 Set the machine parameters

Set the Z-Axis as “2-Head” in “Axis CFG” as follows:

Z	
Enable	<input checked="" type="checkbox"/>
ZAxisUserFor	2-Head <span>▼</span>
Range	2-Head <span>▼</span>
One Pulse Move Distance	Feed
Home/Datum Dir	Z <span>▼</span>

Set the “Power Mode” as “Double Laser Analog” in “Motion Card CFG” as follows:

Signal CFG	
Home Limit IO Level	Low Level Effective <span>▼</span>
Laser Frequency	20000
Laser Power Control Mode	Double Laser Analog <span>▼</span>
Advanced	Double Laser Analog <span>▼</span>
Auto Datum	Single Laser Analog <span>▼</span>
	PWM

Set parameters about auto separation 2-head in “Application CFG” as follows:

Auto Separation 2-Head	
Auto Separation 2-Head Machine	<input checked="" type="checkbox"/>
2-Head Mode	Auxiliary Head on the Right <span>▼</span>
Min Distance between 2 Heads	100.000
Separation Type	Auto <span>▼</span>
Speed of Separating Head	200.000

**2-Head Mode:** Auxiliary head is the laser head that is controlled by the motor (M2). The motor can move on the X-Axis. LASER1 in the upper figure is auxiliary head and “辅助头在左” should be selected.

**Min Distance between 2 Head:** The distance between the two laser-head after datum. The value should be measured accurately.

Download the Machine CFG after the machine parameters have been set.

### 5.4.3 Graph typeset operation

This function is only used for cutting vector graphics.

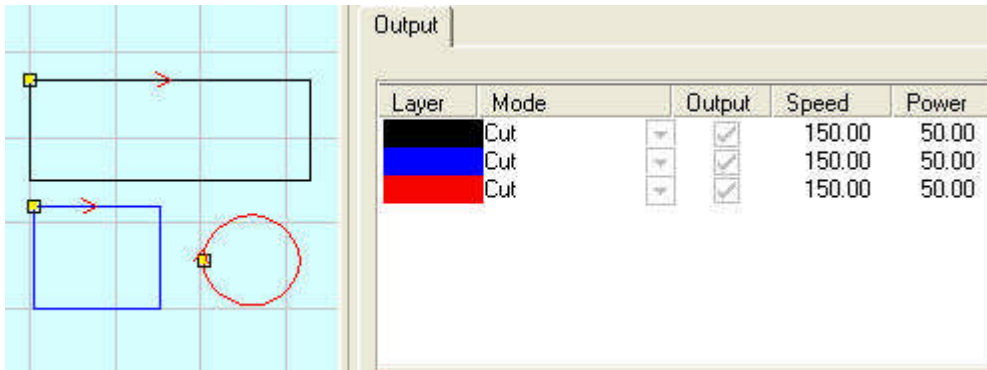
#### 5.4.3.1 Select “Auto 2-Head” mode

Laser Off	Test	Frame Cut	Feed
<input checked="" type="checkbox"/> Immediate	<input type="checkbox"/> Selected	<input checked="" type="checkbox"/> Auto2Head	



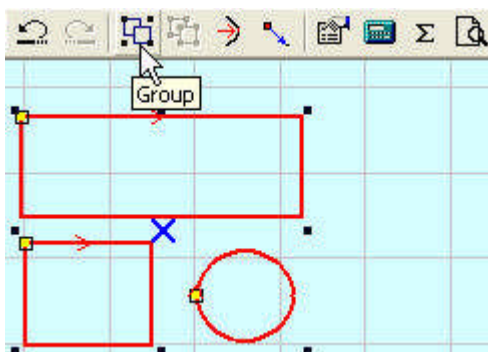
### 5.4.3.2 Import data and set processing parameters

Import data and set layers. Set the processing parameters of each layer.

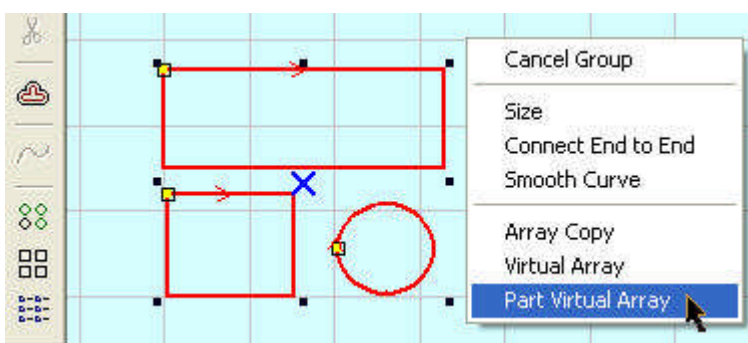


### 5.4.3.3 Group the graphics

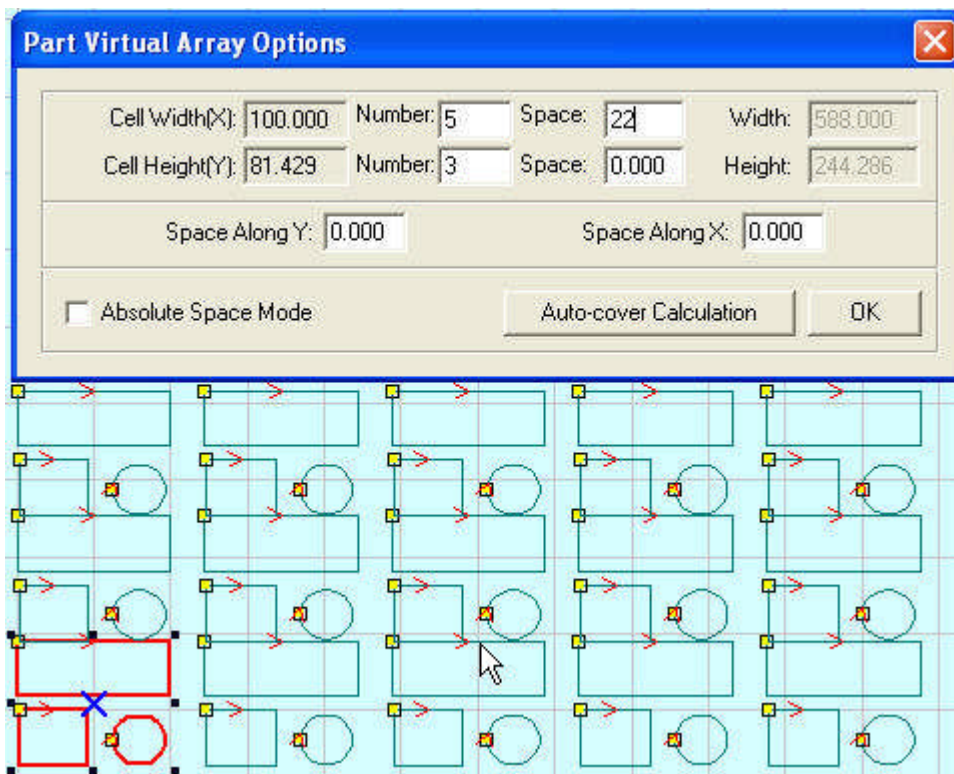
Group the graph entities into one graphic unit.



### 5.4.3.4 Virtual Array



Set virtual array parameters.



#### 5.4.3.5 Download processing file

Download the processing file to the controller and start the processing.

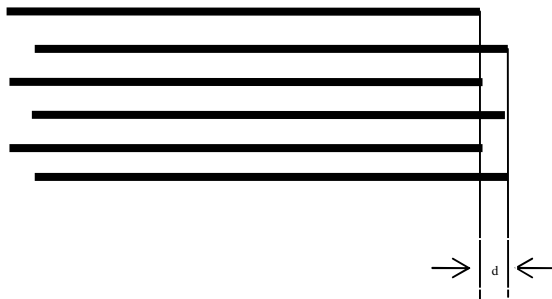
## 5.5 Make AI File

Cutting the AI Format is smoother, and makes less strike, especially of constant speed. It is suggested to use AI Format File as much as possible. If some obvious strike in cutting of varied speed, and the figure distorted, change the file to PLT.



## 5.6 Backlash Adjustment of Engraving

In engraving of high speed, burr may appear in the processing edge due to the tightness of the belt. It appears as below:



There is Backlash Compensation set in the Engrave Set of the Machine CFG. The backlash can be negative or positive value. Change the engrave step to 2mm, backlash 1mm, and start processing. If  $d$  increase, change it to a negative value; if  $d$  decreases, increase the number. Gradually  $d$  will near 0 after several adjustments. The value of the Backlash Compensation differs from different speed; you should set it according to different speed range.

## 5.7 FQA

### 5.7.1 PLT figure can't be engraved

The graph is unclosed or overlapped. Please use the “Check Data” tool to check if there are such occasions.

### 5.7.2 Size of the output of engrave/cut is not the same with the graphics

Please adjust the “Pulse Unit”.

### 5.7.3 When engraving, the edge is not in order

It is mainly caused by the backlash. You can adjust it as follow:

a) Draw a rectangle, set the 0.5mm in “Laser Engrave” and “Engrave Step”. Theoretically, the engrave result will be ok, that is, edges of the odd lines are in order and edges of the even lines are in order. But odd lines and even lines may not be in order.

b) Open “Set Engrave Options”, there are different processing parameters for different speed range. But set values in the “Backlash” are all 0. You can set the value according to the actual situation, both negative and positive.

c) If you require a better engrave result, choose one direction laser on. Uncheck the “Bi-Dir” will do. But this will decrease the process efficiency.

### 5.7.4 Axis doesn't move (MPC6585)

Set direct voltage 5V by a multimeter, measure the voltage between PUL and GND. Take Y-axis as an example. Press up or down button, the normal value is about 2.8V. If it is not, controller is damaged. Please change controller. If it is, step on.

Change the output terminals of the two drivers, and press up or down button. If X-axis is right, then Y-axis motor is damaged. Please replace Y-axis motor. If X-axis does not move, then Y-axis driver is damaged. Please replace Y-axis driver.

### 5.7.5 Axis can only move to one direction (MPC6585)

Set direct voltage 5V by a multimeter, measure the voltage between DIR and GND. Take X-axis as an example. Press left and then right button to see if there are changes of the voltage (higher than 2.8V or lower than 0.8V). If not, the controller is damaged. Please replace it. If yes, check if the driver is ok.

### 5.7.6 Laser always off (MPC6585)

Set direct voltage 5V by a multimeter, test the voltage between LAS and GND. Press “Laser” on the control panel to see if there are changes of the voltage (higher than 2.8V or lower than 0.8V). If not, controller is damaged, please replace it.

Moreover, set 0ms in the “Time” of the laser in the control panel PAD (laser time after you stop pressing the laser on button). Adjust the power (0%~100%), press “Enter” and press the “Laser” button. Measure the voltage change between DA and GND. It should be varied from 0~5V. If there is not, controller is damaged. Please replace it.

If the controller is OK, laser power supply is damaged. Please replace it.