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# Prologue

## **The introduction of software:**

The software is explored for large-area and high-speed engraving and cutting. It can edit processing graphics, set up processing parameters, control processing procedure and output processing graphics.

The following is the main features and functions of this software:

- A、 It can support AI, BMP, PLT, DXF and DST (embroidery software) format.
  - B、 After graphics input, you can do some simple editing (enlarge/reduce the size, circumgyrate and copy etc.).
  - C、 Data of different layers can be output respectively. Output power, output speed, sequence and mode (engrave/cut) of each layer can be set respectively. All the parameters will be saved automatically.
  - D、 Graphics can be engraved; Vector graph can be drawn, cut and engraved; precise level can be set up freely.
  - E、 Whole processing procedure can be simulated on computer through track emulation and processing time can be estimated.
  - F、 Support array output. Instant output (fixed point), origin output and etc.
  - G、 When process is going on, it can be controlled by "Pause", "Continue", and "Testing machine".
- All output process can be controlled on the interface of machine.
- H、 When output, "process along dialog box" can make feeding and location easier.
  - I、 Engraving speed can reach to 1500mm/s; Cutting speed can reach to 500mm/s; Engraving precision can reach to 0.1mm.
  - J、 360degree slope engraving. The slope can be set freely.
  - K、 Mass graphics(15M) can be calculated rapidly.
  - L、 Excellent optimized-path and path definition. So Output time is saved and output quality is increased.

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# Chapter 1 BASIC KNOWLEDGE OF SOFTWARE SYSTEM

## 1.1 Files in software system

The files of software system include driving procedure of movement-control card, driving procedure of USB DOG, control software and etc. All files are saved in CD that is in laser machine package.

Files	Explanation of files	Location
Laser.exe	File of main system procedure	Bin Root directory
SysCfg.ini	File of system collocation	Bin Root directory
Mpc03ls.dll	System support file	Bin Root directory
SetupMpc03.exe	Install procedure for movement-control card	Drivers directory
MicroDogInstdrv.exe	Install procedure for DOG	Drivers directory
HandBook.doc	File for customer manual (Word format)	Doc directory

## 1.2 The condition for install software system

- A、 Hardware requirement: IBM compatible computer
- B、 Basal running collocation: Above CPU Pentium 2; storage: 128 Meg; PCI extending slot; above one USB interface; Hardware: Above 1 G and CD-ROM
- C、 Operation system: Window 98、 Windows 2000 or Windows XP of Chinese or English version.

## 1.3 Software installation

### 1.3.1 Install USB DOG

There is a USB DOG in machine package that should be inserted in any USB slot of the computer. After this, there is an instruction to find new hardware. At first, please choose "cancel" and then run the file Drivers\ MicroDogInstdrv.exe in CD. You will see the dialog box as following:



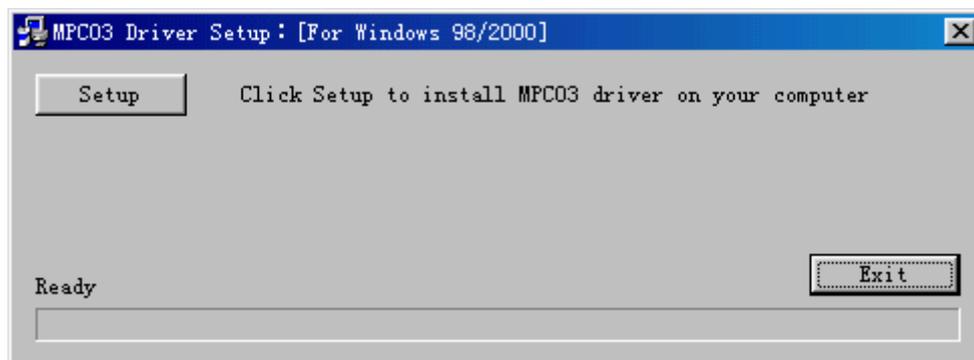
Please press "install Driver" button to install the driver of DOG.

### 1.3.2 Install movement-control card:

There is a PCI movement-control card in machine package. This card is based on PCI bus and should be inserted to PCI slot of the computer. To ensure your safety, the following procedure should be abided by:

- A、 Close PC, and cut off power.
- B、 Open PC's cover, choose the PCI slot that is not in use and insert movement-control card.
- C、 Fix movement-control card, and put cover on computer as it is.
- D、 Connect movement-control card with laser machine by data wire that is attached with machine.
- E、 Connect with power and start to run PC.

When operating system is started, the PCI card can be checked automatically. There is an instruction to find new hardware. At first, please choose "cancel" and then run the file Drivers\ Win98-2000 (Win XP)\SetupMpc03Drv.exe in CD. You will see the dialog box as following:



Click "Setup", the driver will be installed automatically. There are some notes for this operation, please read the file "readme.TXT" at first.

Then restart the computer please.

### 1.3.3 Install software

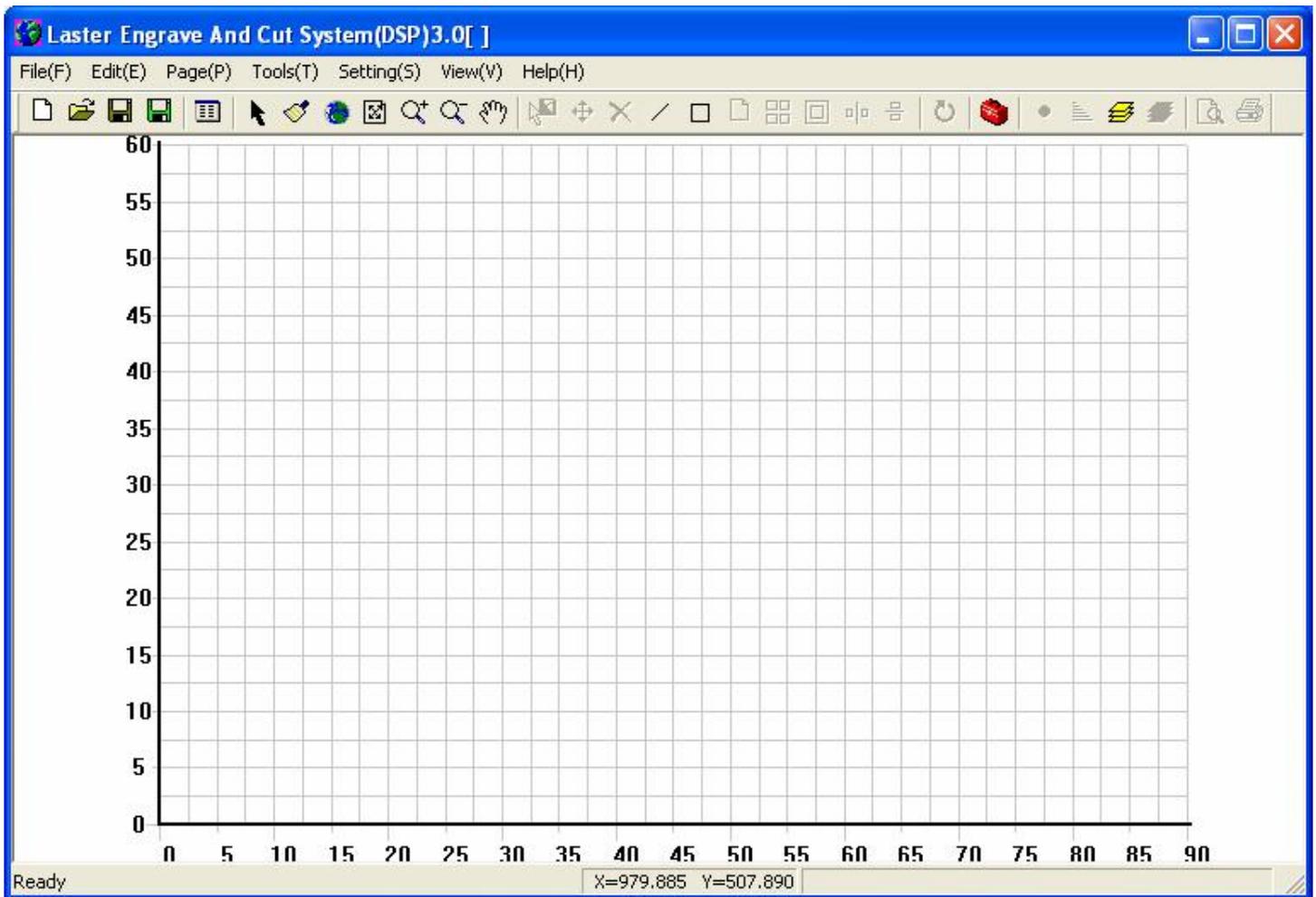
It is easy to install software, and you just copy all file in CD to hardware.

## 1.4 Update software

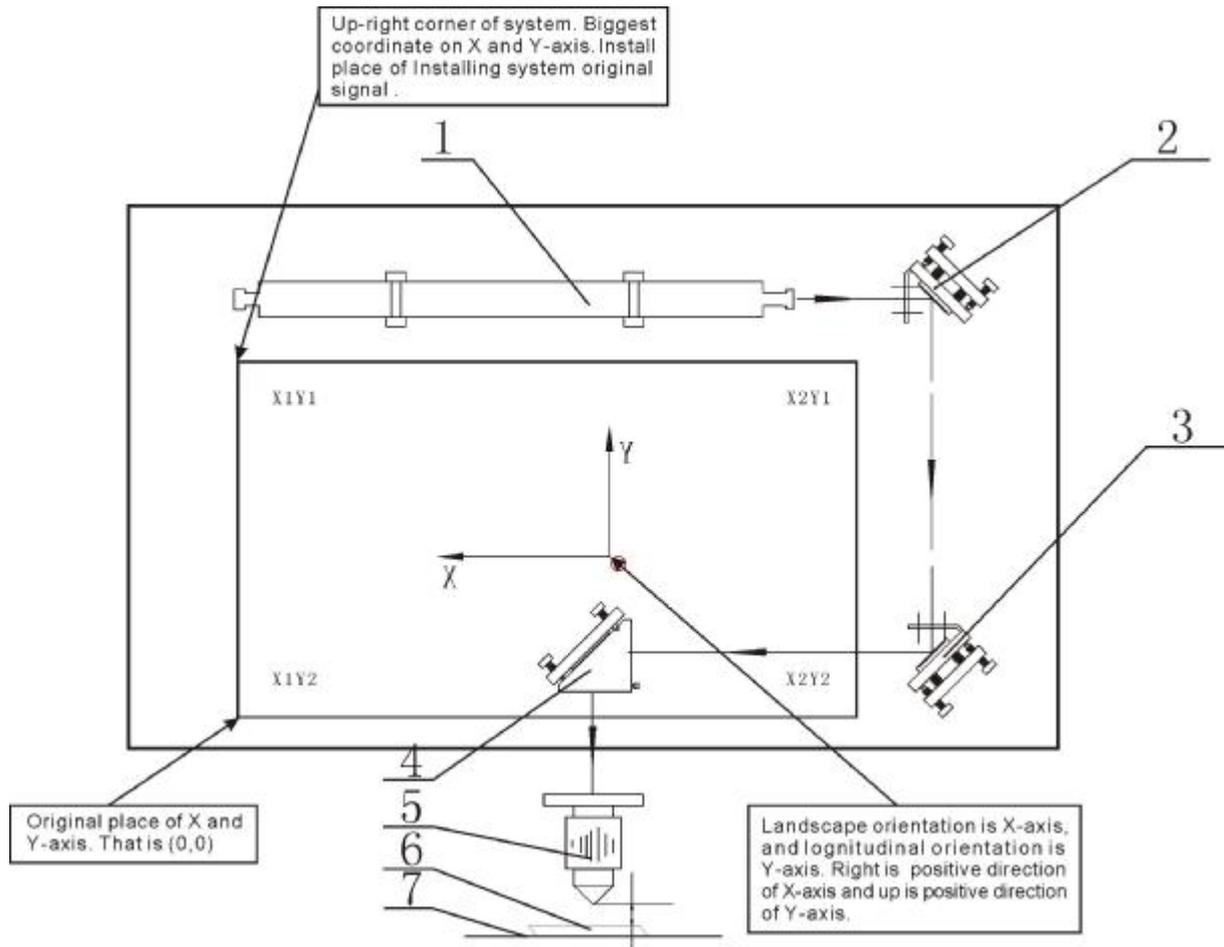
The software will be updated according to customer's requirement. When you update software, just replace the file "Laser.exe" "Mpc03ls.dll". All driving procedure and basic system file are not necessary to updated.

## 1.5 Running software

Find storage directory of the software file. Double click Laser.exe, the interface as following is appeared:



## 1.6 Basic knowledge of laser machine



- 1、 Laser tube
- 2、 The first reflect mirror
- 3、 The second reflect mirror
- 4、 The third reflect mirror
- 5、 Focus lens
- 6、 Material
- 7、 Working table

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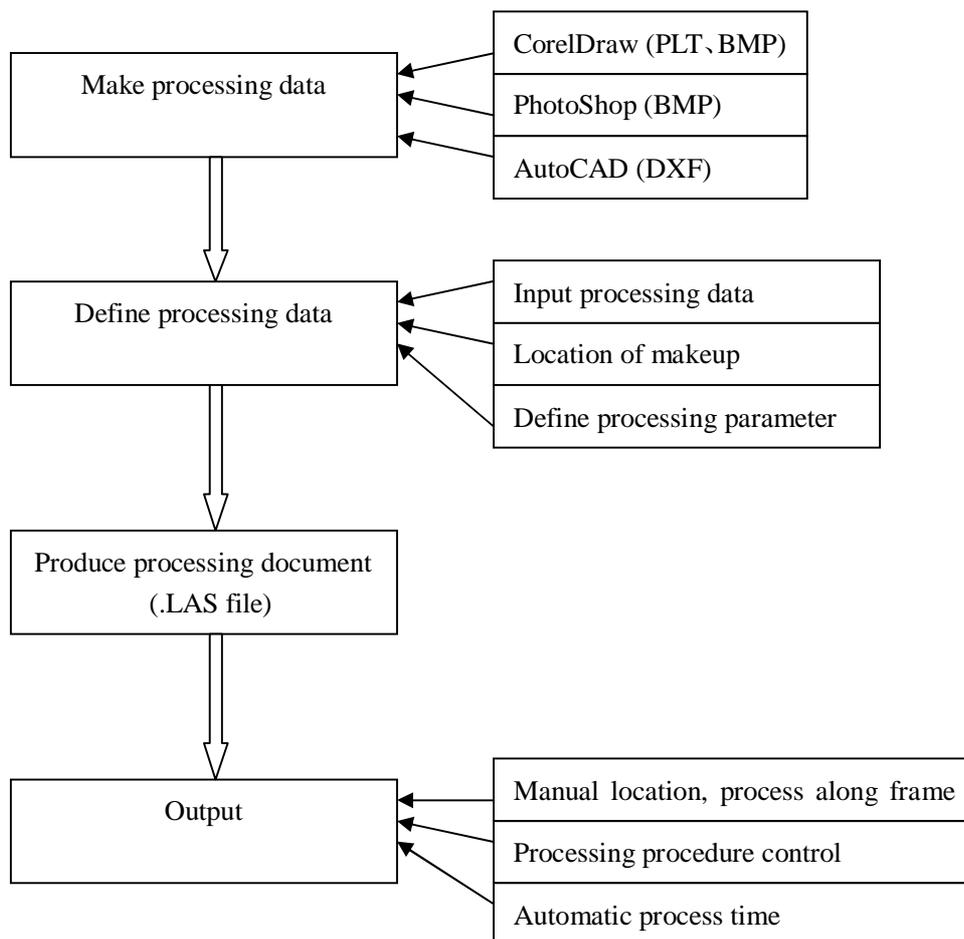
# Chapter 2 Software operation

## Procedure of operation

### 2.1.1 Procedure of data process

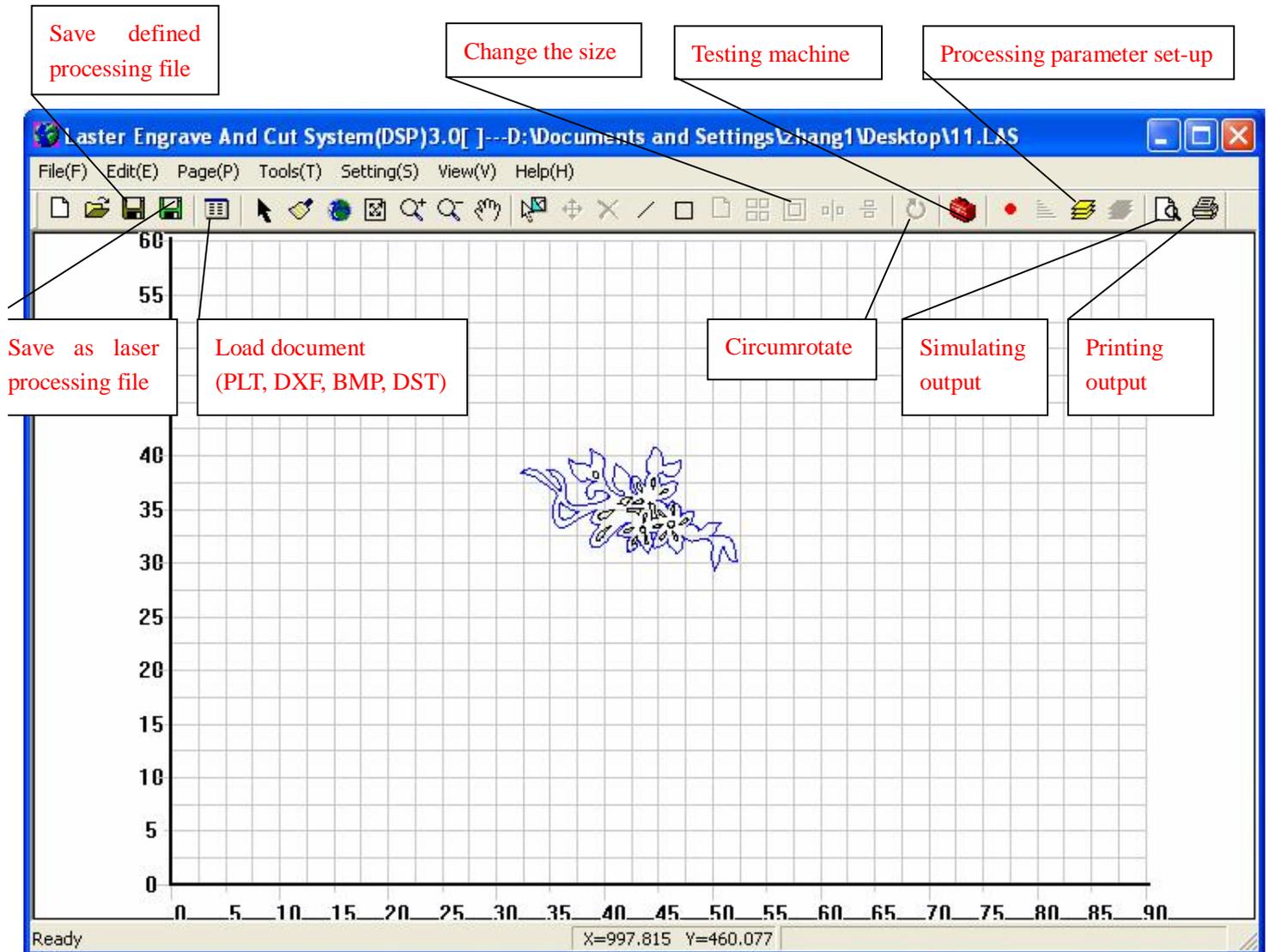
Procedure: make graphics in CorelDraw (version 9.0 and 11.0 are supported by this system), Photoshop, AutoCAD2000 or DST. Start software system, load data that is needed to process. Collocate parameters of processing data. Create processing file and output data for processing.

### 2.1.2 Flow chart of processing procedure



### 2.1.3 Explanation for system function

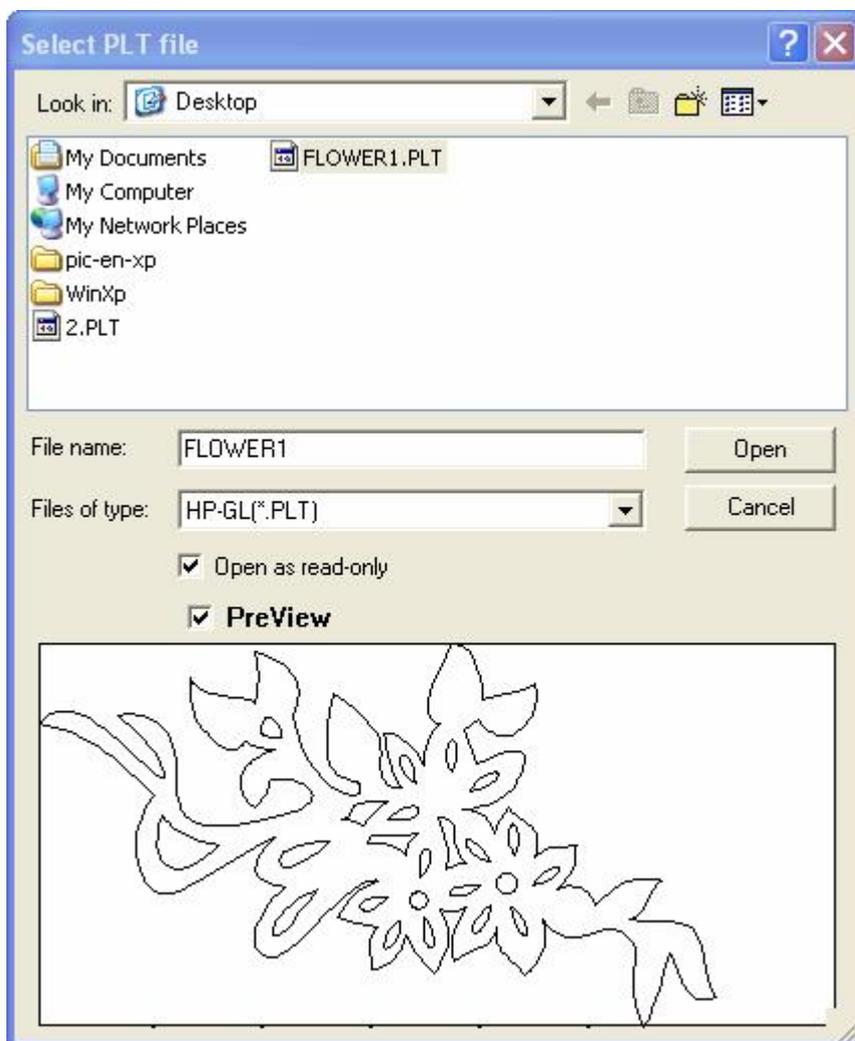
When you start software, you will see the interface as follows. All system function can be found on tool columns.



Let mouse stay on an icon for a moment, and you can see the explanation of basic function of tool columns. The following is the explanation of all tool columns.

-  : Built up a laser processing file (\*.LAS)
-  : Open laser processing file (\*.LAS).
-  : Save the graphics which processing parameters have been defined as laser processing file (\*.LAS).
-  : Save the processing graphics as laser processing file (\*.LAS) or output it as standard PLT file (\*.PLT).

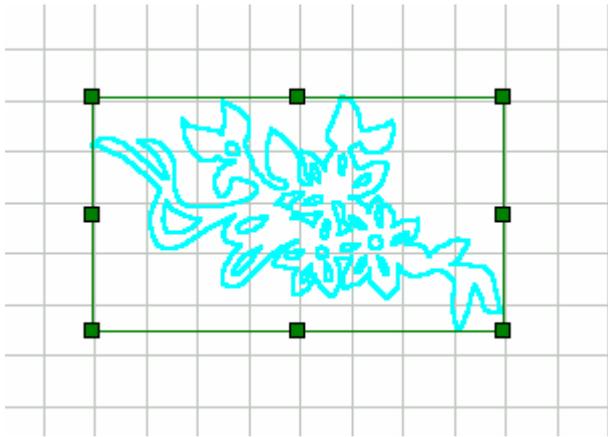
: Input outside-data file. Choose "Type of file", you can input AI, PLT, BMP, DXF, DST and \*.100 (a kind of file of embroidery machine) respectively. After clicking this button, system will inform you to choose processing file. Choose one, then system can read the data of file and show it on screen.



: Choose graphics. Choose graphics or a part of the graphics. You can delete, move, change layers of the graphics you choose and etc.

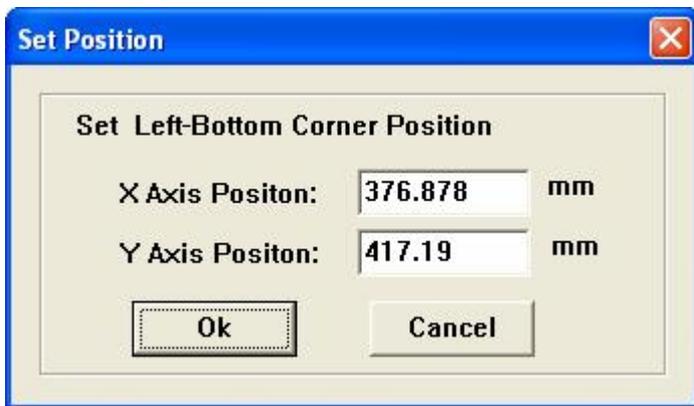
There are other functions about this button:

Click this button, and choose the graphics you prefer, then you can see the following dialog box:



Move the mouse to the nodes, then drag the mouse, you can change the shape of the graphics as you prefer.

Move the mouse to the frame, and then click "ENTER". You can see the following dialog box:



Input the coordinate of the X-axis and Y-axis, you can change the position of the graphics.

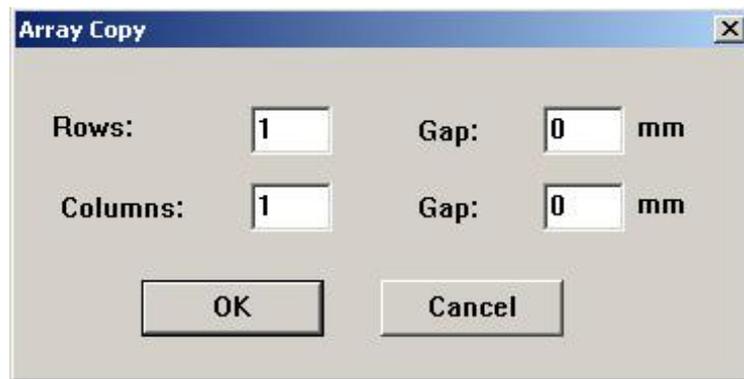
- : Refurbish screen.
- : Show the whole processing area within the scale of reference frame.
- : Show the processing area completely. It can show the processing date in max on screen.
- : Enlarge showing graphics. Click this button, then click your graphics with mouse and the graphics can be enlarged for show.
- : Reduce showing graphics. Click this button, then click your graphics with mouse and the graphics can be reduced for show.
- : Move screen. Click this button, press the left button of your mouse continuously, and move your mouse on any place of the graphics, then the graphics can move.
- : Move graphics. Click "choose" button , and then choose the graphics you want to move and click this button again. When you move mouse on the screen, the graphics you choose can be moved.
- : Delete graphics. Click "choose" button , then the graphics you want to delete is on the screen. Click this button again, and you can delete the graphics.

: Draw lines. Click this button, move your mouse on the screen, and you can draw straight lines freely.

: Draw rectangle. Click this button, and you can draw rectangles of various size.

: Copy. Click "choose" button , and choose the graphics you want to copy, then click this button again, and move mouse on the screen, now the graphics is copied. When you move again, you can copy another.

: Array copy. Click "choose" button , and choose the graphics you want to array copy then click this button again, you will see following dialog box.



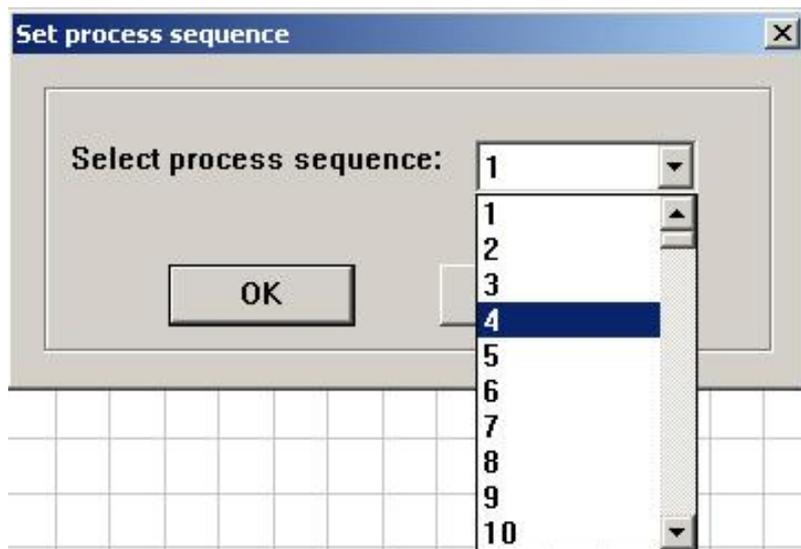
Input relative parameters, then a number of graphics are copied as "number of rows X number of columns".

: Change the size of graphics. Click "choose" button , then choose the graphics you want to process and click the button again, you can see the dialog box as follows. Now, input the number you prefer on X and Y-axis. Click "OK", the size of graphics can be changed. If you don't want to change the proportion of X and Y-axis, you can input one of the number (X or Y), then click the button .



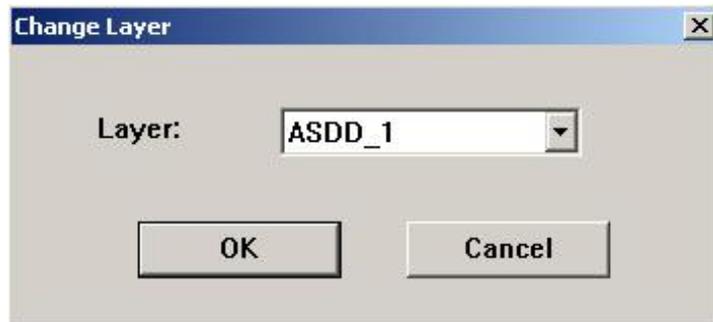
: Define process sequence. Define the process sequence of graphics. Click "choose" button , and then choose the graphics you want to change the processing sequence and click the button again, now

you find the following dialog box:



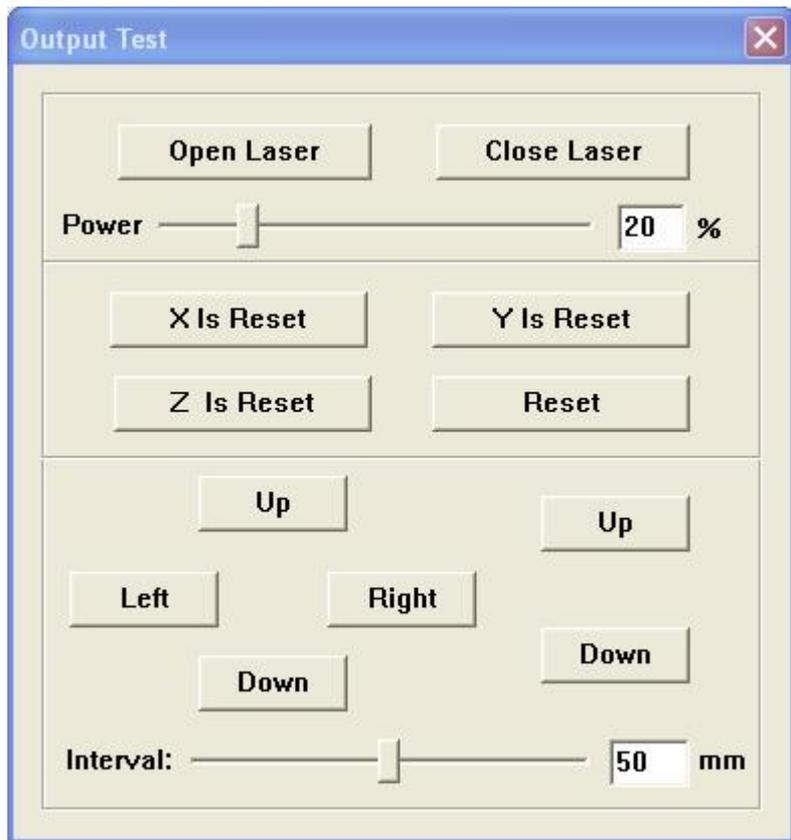
Input sequence number. Machine can process graphics from small sequence number to big sequence number.

: Change layers. Define the graphics you choose as a certain layer. Click "choose" button , and choose the graphics you want to change the layers, and then click the button again. You can see the following dialog box:



Change layer number in "Change layer" dialog box, and the layer can be changed.

: Testing machine. Click this button, and then you can see the following dialog box:



This can test: whether laser is on or off; modify laser power; movement direction on X, Y, Z. and reposition is normal or not.

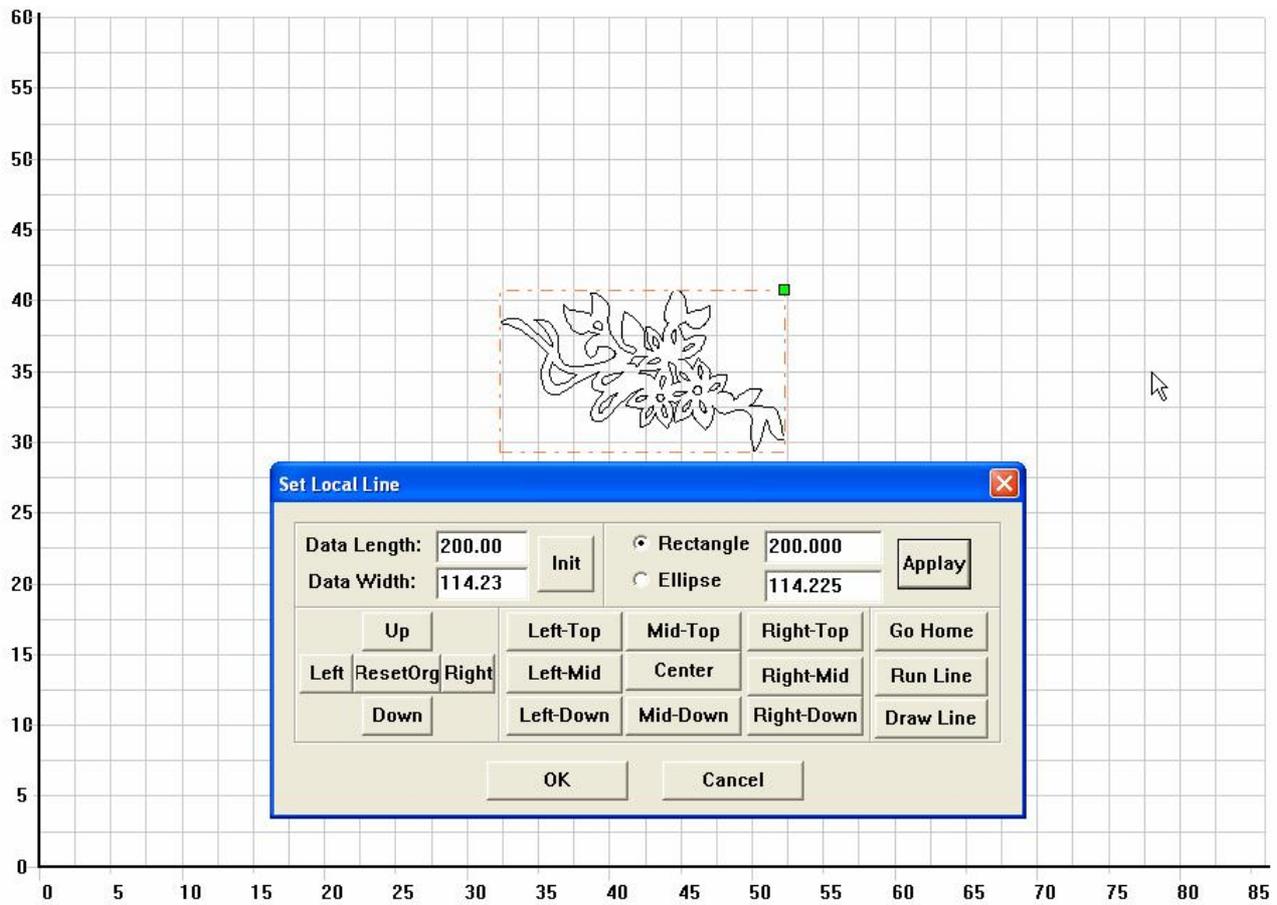
: Set local line

Click this button; you can see the following dialog box:



The "Data Length" and "Data Width" are the size of the data.

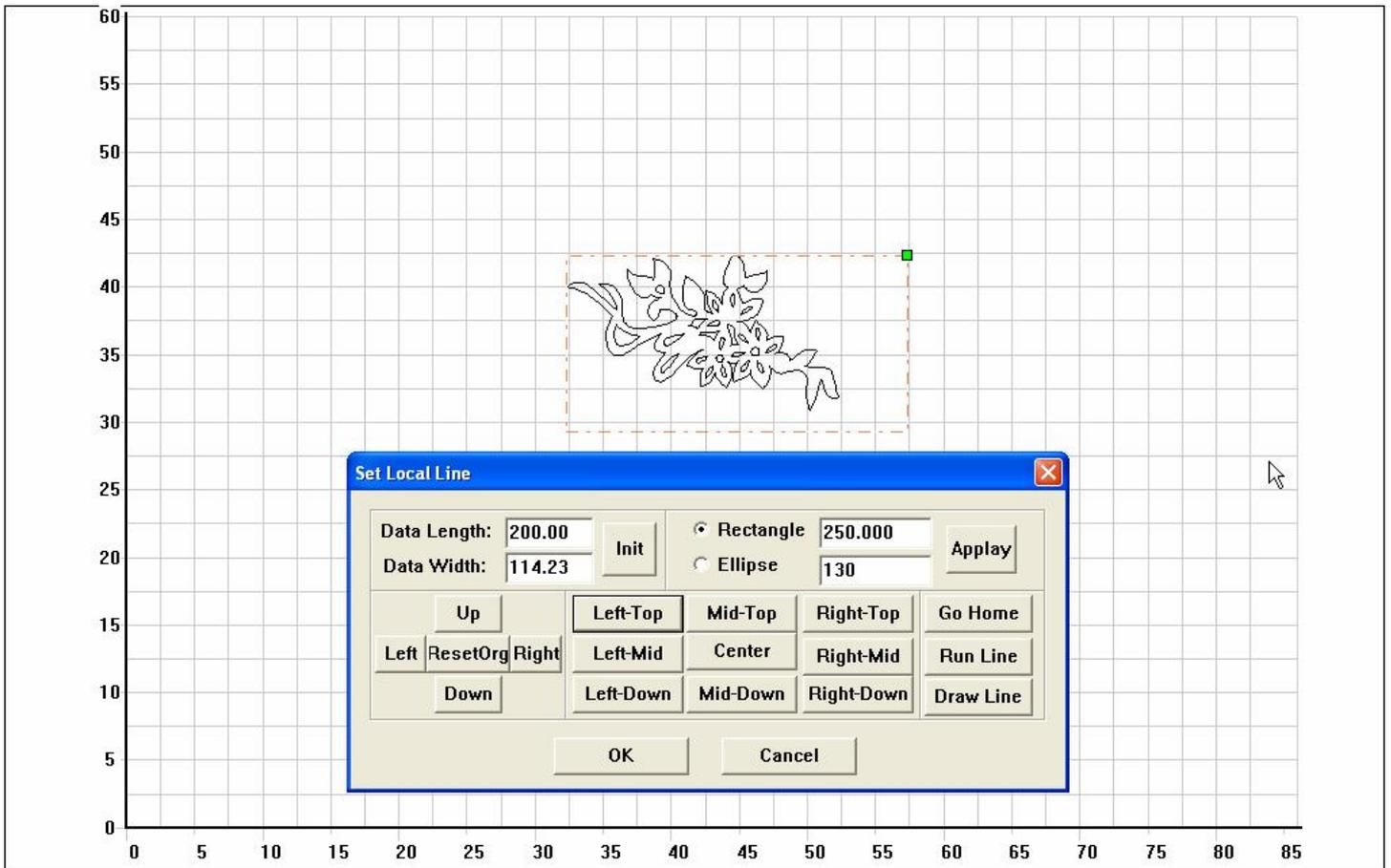
Click "Init", you can see the following dialog box:



You can see there is a broken line frame around the data. And at the top right corner, there is a small quadrate dot. The dot represents the laser head.

The default is "Rectangle", and you can also select "Ellipse".

You can change the size of the local line as the following dialog box:



After you set the number, please click "Apply" and the number will be saved.

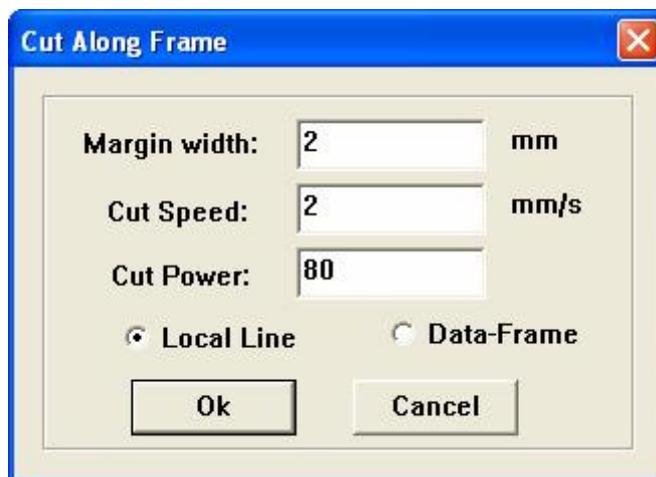
You can adjust the position of the data in the local line by click the buttons such as "Center", "Right-Top" etc.

Then click "Go Home" please, the laser head will go home and move to the position determined by the coordinate position of the small quadrade dot. So, the actual position of the laser head is connected with the reference frame.

You can move the laser head to any place you prefer by click "Up", "Down", "Left", "Right". Then click "ResetOrg" and the position of the data on the reference frame will change accordingly.

Click "Run Line", the laser head will run along the local line without laser.

Click "Draw Line", you can see the following dialog box:



Margin width: distance between processing graphics and the edge of cutting piece.

Cut speed: you can choose different speed according to different material. It's better to confirm

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proper speed through testing.

Cut Power: Set up cutting power.

Local Line: the laser head will move along the broken line.

Data-frame: the laser head will move along the data frame.



: Layer manager. You can add, delete or modify layers.



: Simulating output. When parameters set is finished, please click this button. It can simulate the procedure of output for checking the result of output.



: Data output. After confirming the result of simulating output, please click this button to output the data to laser machine.

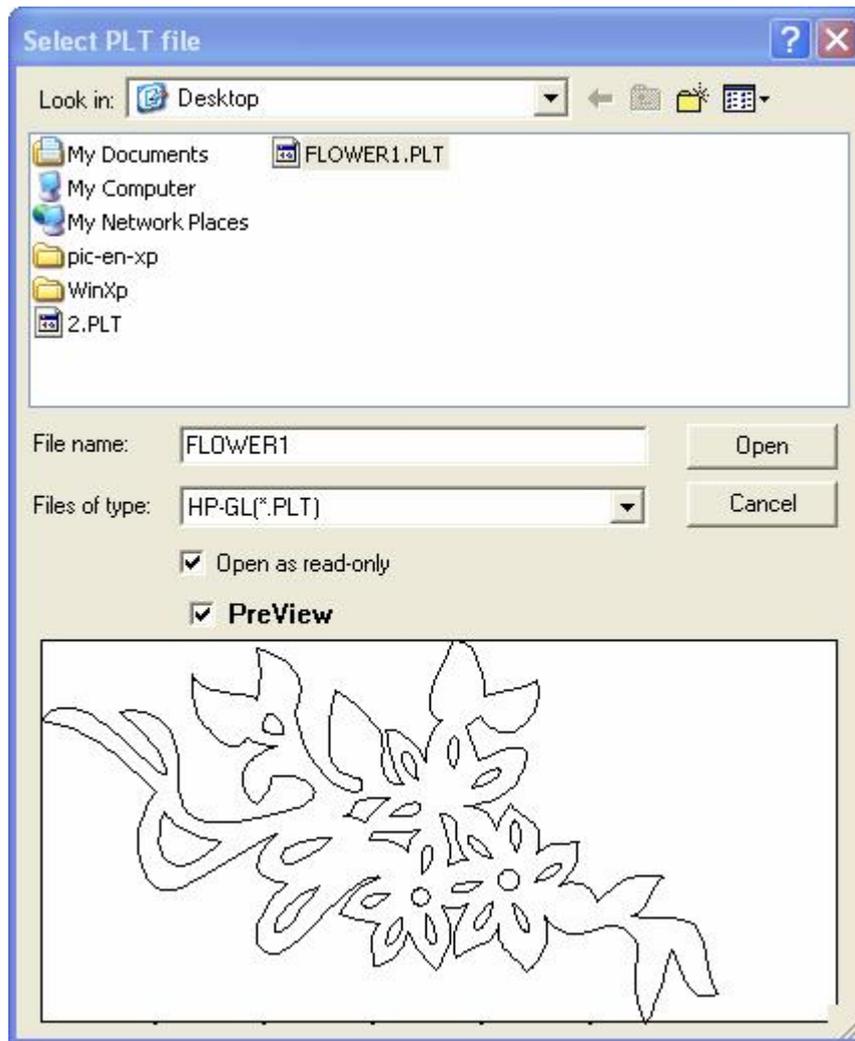
## Make processing data

This system only provides easy editing. Processing graphics should be finished in CorelDraw、PhotoShop、AutoCAD and etc. At present, this system support BMP, PLT, DXF (AUTOCAD2000 version), DST (embroidery software) and etc. You must save your graphics in design software as the ones that can be supported by this software system. After this, input the finished graphics to software through “input data” in our software.

## Define processing parameters

### 3. 1. 1 Input processing data:

Click , you will see the following dialog box:



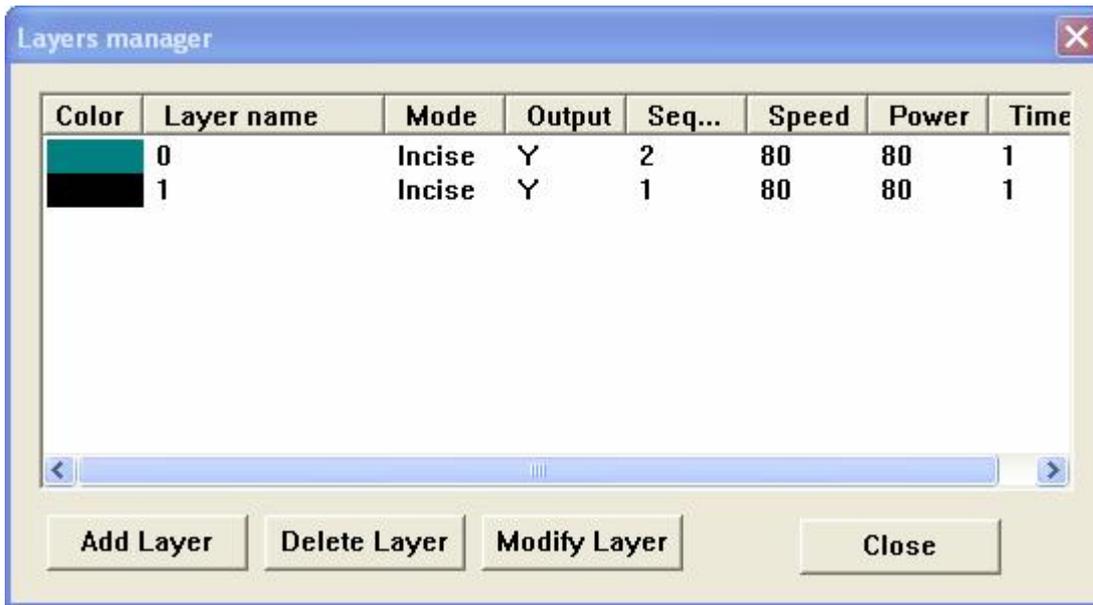
You can choose graphics mode from Files of type (T), open it, then the system can read the data in file on view.

### 3. 1. 2 Edit processing data

After input processing data or data of array copy, processing data may exceed reference frame. At this time, processing data should be modified within reference frame. According to different output modes, the way of letting processing data should be deferent. Reference frame in software corresponds with reference frame of working table.

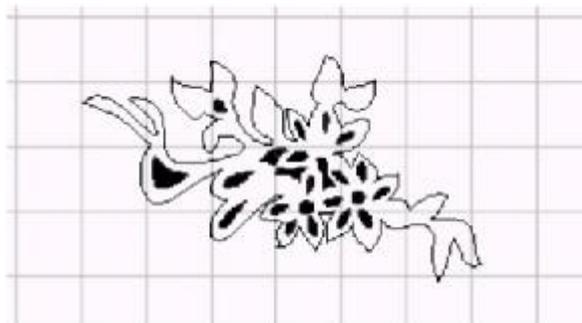
### 3. 1. 3 Define processing parameters

Click  to enter "layer manager". Functions details are as following:

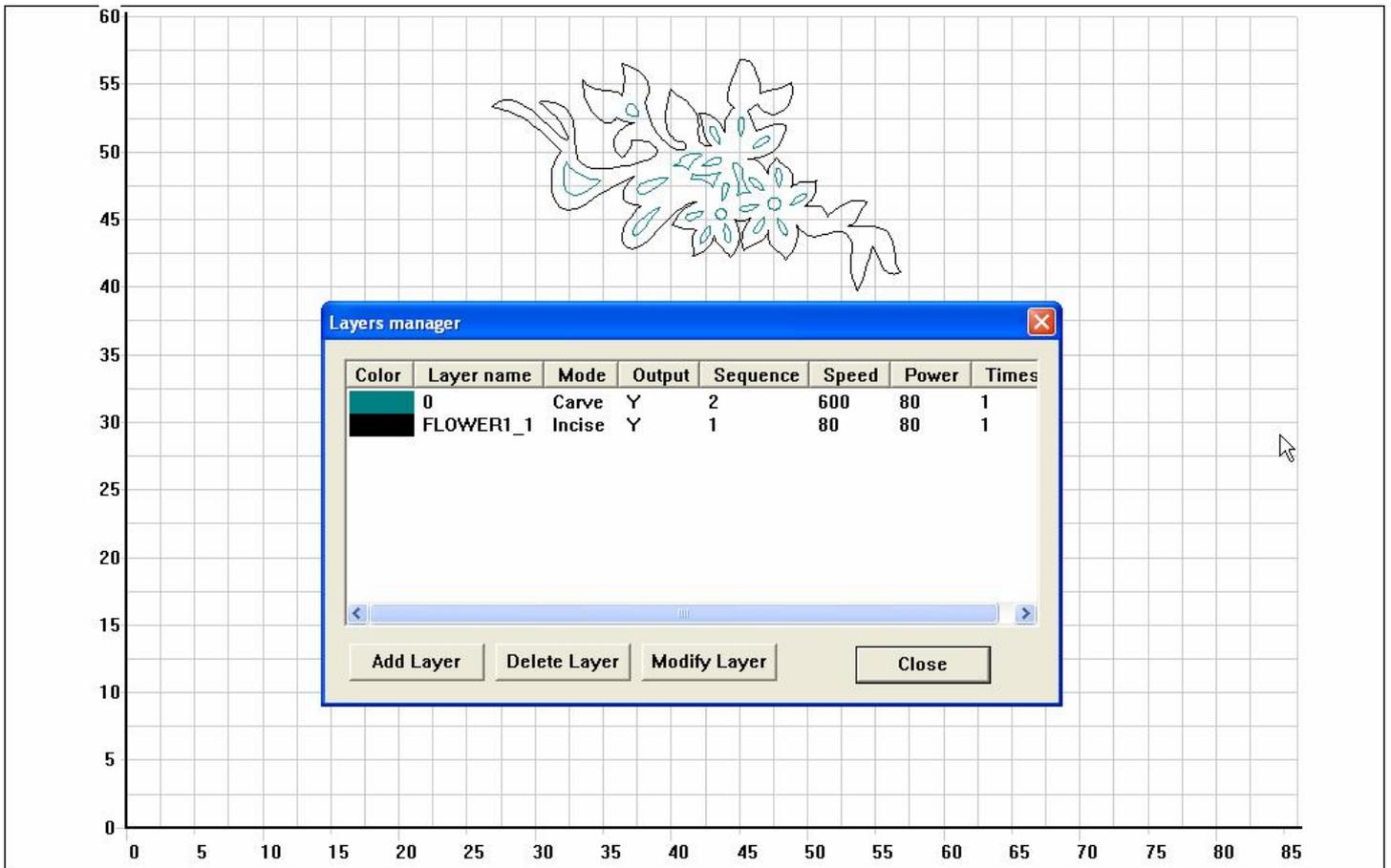


Let's set up two layers as an example to introduce this function (processing requirement: draw outline, the other graphics inside should be engraved).

- Ø Add layer



Click "add layer", you can see the dialog box as following:



Black and blue represent a layer respectively, and they are called ASDD\_1 and 2, close the dialog box.

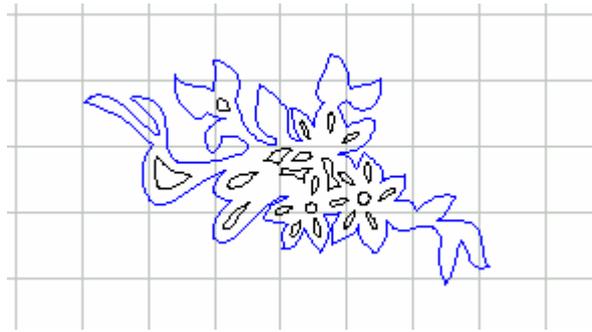
∅ Define layers

Click "choose" button . Choose the outline of graphics (after choosing, the outline become gray),

then click "Modify layer" button , set up layer as 2 as following showed:

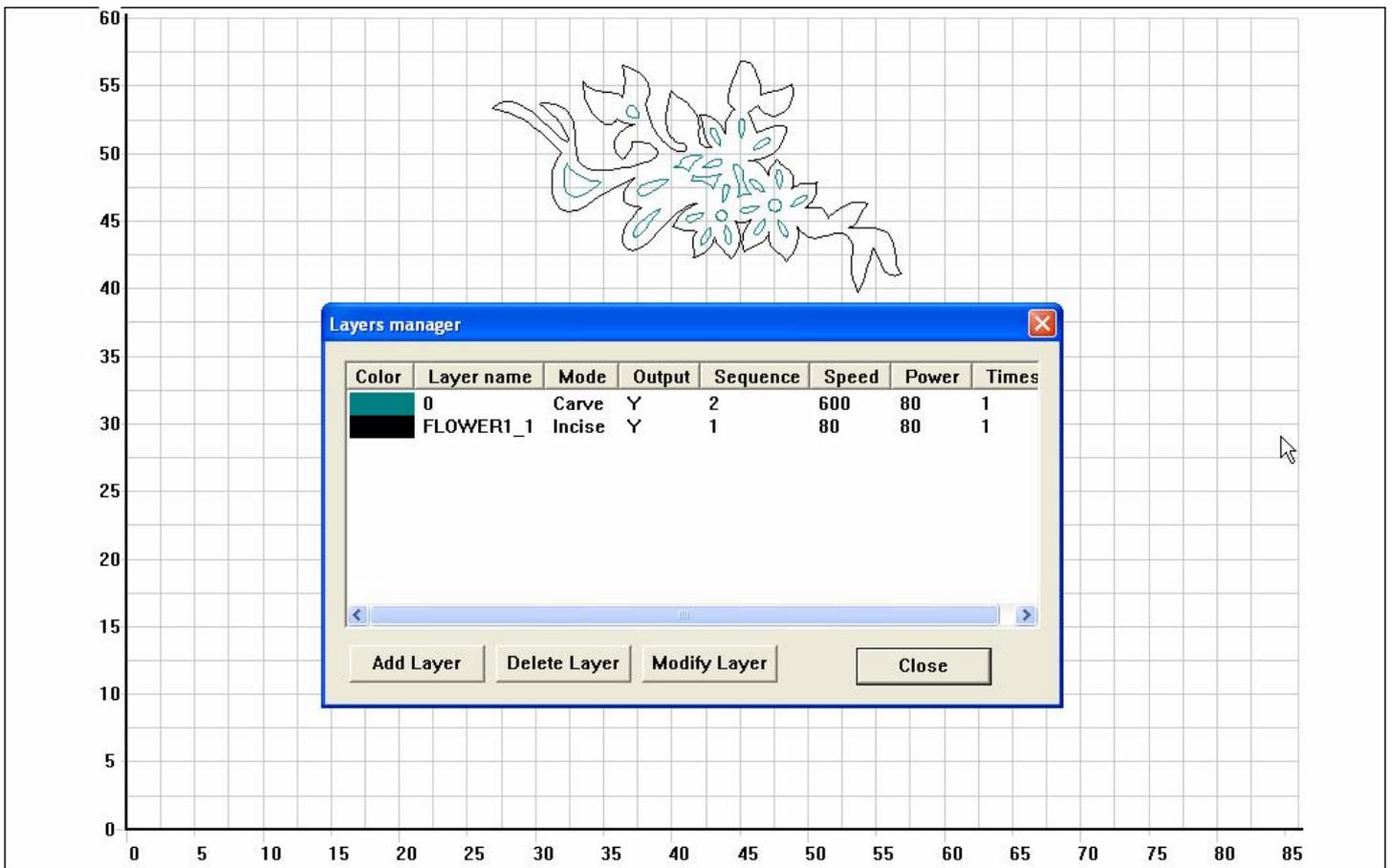


Now, return to main interface, you can see that the whole graphics is consists of black part and blue part.



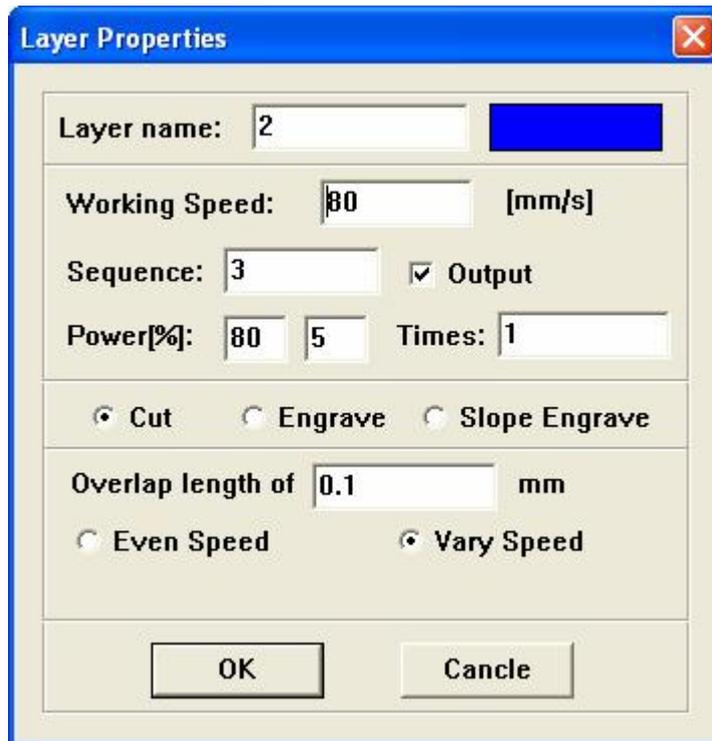
Ø Collocate attributes of layers

Click , you can see the following dialog box:



Color	Layer name	Mode	Output	Sequence	Speed	Power	Times
	0	Carve	Y	2	600	80	1
	FLOWER1_1	Incise	Y	1	80	80	1

Double-click the first column in the dialog box (Or after choosing, click "modify layer"), and then the dialog box as following is shown. Now you can set up output parameters of this layer. (According to requirement, layer "2" is cutting, ASDD\_1 is engraving).



Define each parameter as following:

**Working speed:** For even-speed cutting, the speed is actual working speed; for Vary Speeding cutting, the speed is maximum speed.

**Sequence:** For graphics which has several layers, the parameters represent processing sequence.

**Output:** whether output the layer or not.

**Power:** modify the laser power of processing layer.

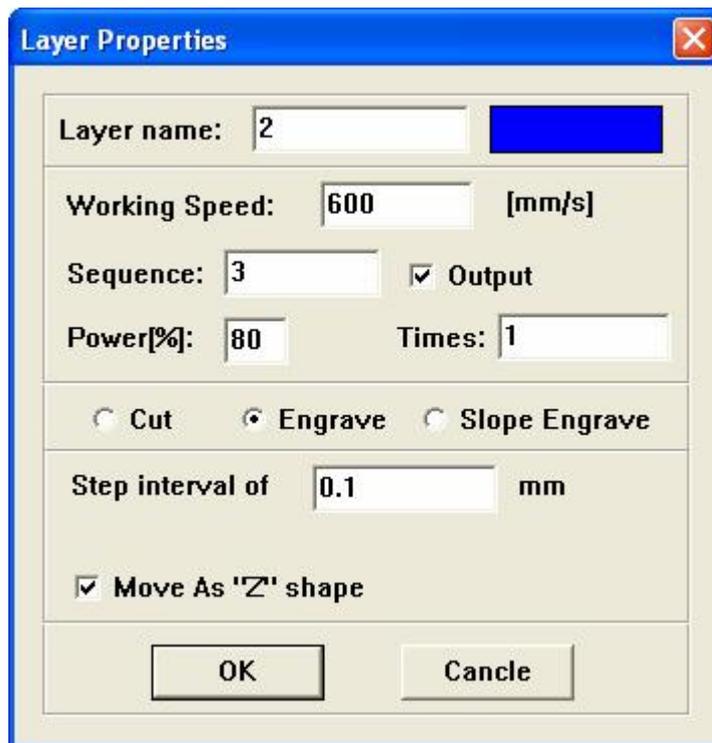
**Times:** processing times for this layer. For example: sometimes you can cut well after two times for the shortage of power. Then you should set 2.

**Overlap Length:** close graphics may not be cut for mechanical error. This parameter can solve this problem. But the parameter cannot be much big. We suggest you to solve this problem through adjusting mechanical precision.

**Even speed:** during the procedure of cutting, working speed is just the speed you set.

**Vary Speed:** during cutting, the speed will be changed according to the shape of graphics. The maximum speed is the set-up speed. Under this mode, machine runs reposefully, but the depth may not be the same. This mainly used for cutting through, such as fabric cutting.

Double click the second row, Set "FLOWER\_1" as "engrave" as the following showed:



Definition of each parameter:

Working speed: engraving speed on X-axis

Sequence: for the graphics with various layers, the parameter represents the sequence of process.

Output: Processing layer is output or not.

Power: modify the power when you process a certain of layer

Times: choose processing times when you process a certain of layer

Step interval: movement distance on Y-axis when engrave a row on X-axis

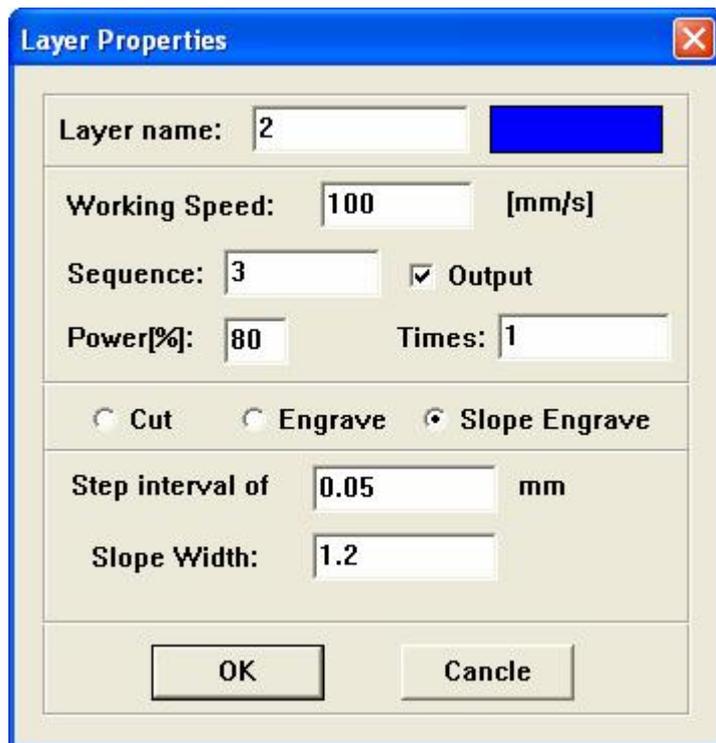
Convex and Concave: just for BMP engraving.

Move as "Z" shape: When engraving, laser emit on both negative X-axis and positive X-axis. When cancel this function, laser emit on only one direction.

After Setting up the above parameters, press "output" button, then processing begins according to engraving first and cutting second.

If you want to process three or more layers, you can repeat the above operation.

There is an additional function: slope engrave. If you want to engrave small words on rubber for printing, it is helpful. Check the "Slope Engrave", you will see following dialog box:



Definition of each parameter:

Working speed: engraving speed on X-axis

Sequence: for the graphics with various layers, the parameter represents the sequence of process.

Output: Processing layer is output or not.

Power: no use. The power will be set in the power table.

Times: choose processing times when you process a certain of layer

Step interval: movement distance on Y-axis when engrave a row on X-axis

Slope Width: the width of the slope.

## Create processing file (\*.LAS file)

Press button , the processing data of above working graphics will be created as processing file (\*.LAS file), and is saved under appointed directory. If you want to process the same graphics, just open it. It's not necessary to set up processing parameters again.

## Processing output:

Press "Output" button , you can see the dialog box as following:



Explanation of each parameter in dialog box:

**Rows, columns and gap:**

These functions are used for array output. The function is similar as array copy function on main interface. But when you start array output function, EMS memory will be occupied a lot. "Rows" and "columns" means the number of output rows and output columns; "Gap" is the distance between each row or each column.

**"Repeat times" and "Delay(s)"**

If you fill in 10 in "repeat times" and 20 in "Delay(s)", then press "start" again, you can get 10 same graphics. And it will stay for 20 seconds after every processing finished. The 20 seconds is for you to feed and take down material. You can set up different time according to your need. This function can increase efficiency a lot.

**Auto Feed (This function is provided based on customers' requirement. Or it is not provided)**

When you choose this function, feeding motor will give a certain space after every processing finished. This space is decided by the number filling in dialog box of "auto feed".

**Time**

Show the processing procedure.

**Layer Config:**

The same function as the .

**Test Machine**

This function is just the same as "test machine" on main interface.

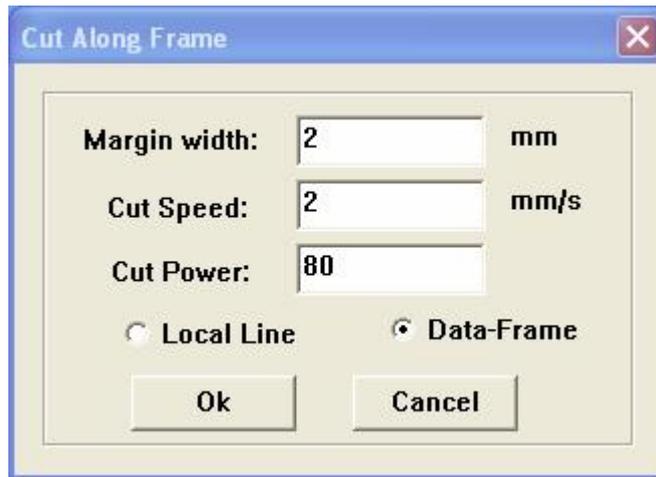
**Move Along Frame**

Laser head can move as a rectangle without laser according to the size you set up. This function is used for confirming the location of processing piece.

**Cut Along Frame**

Cut the pieces off that have been processed well.

After processed, press "Cut Along Frame" button, you can find the following dialog box:



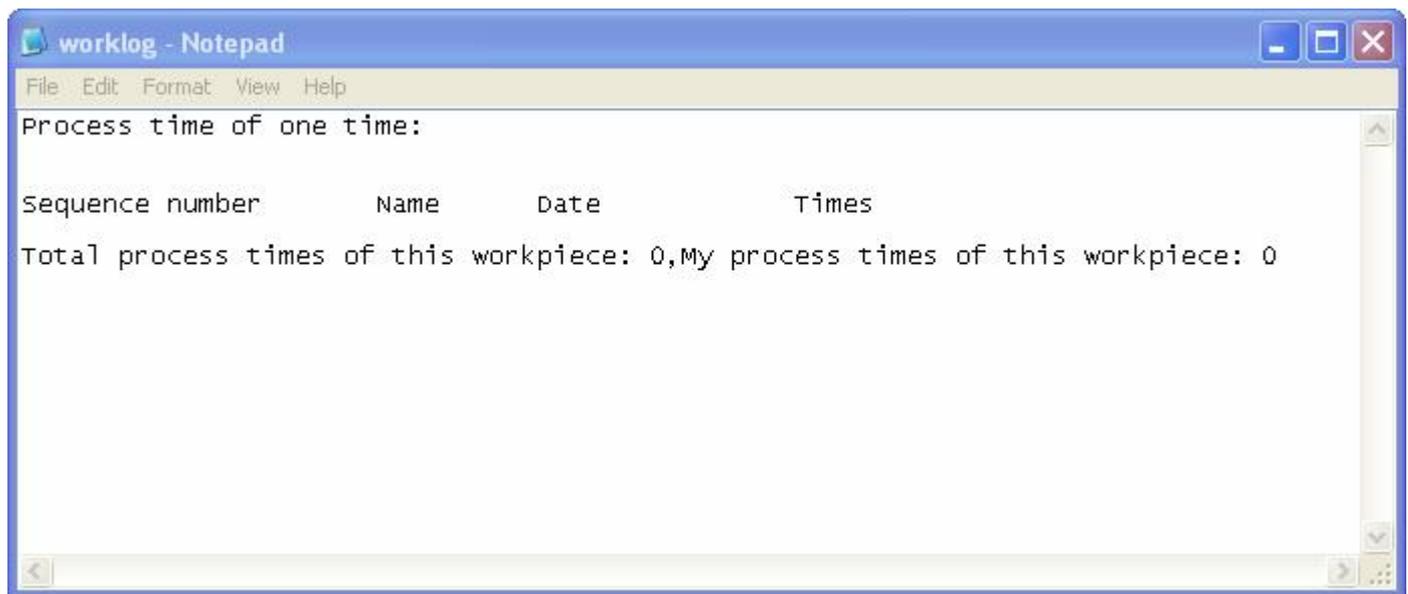
Margin width: distance between processing graphics and the edge of cutting piece.

Cut speed: customer can choose different speed according to different material. It's better to confirm proper speed through testing.

Cut Power: Set up cutting power.

View log

Click this button, you can find the following dialog box:

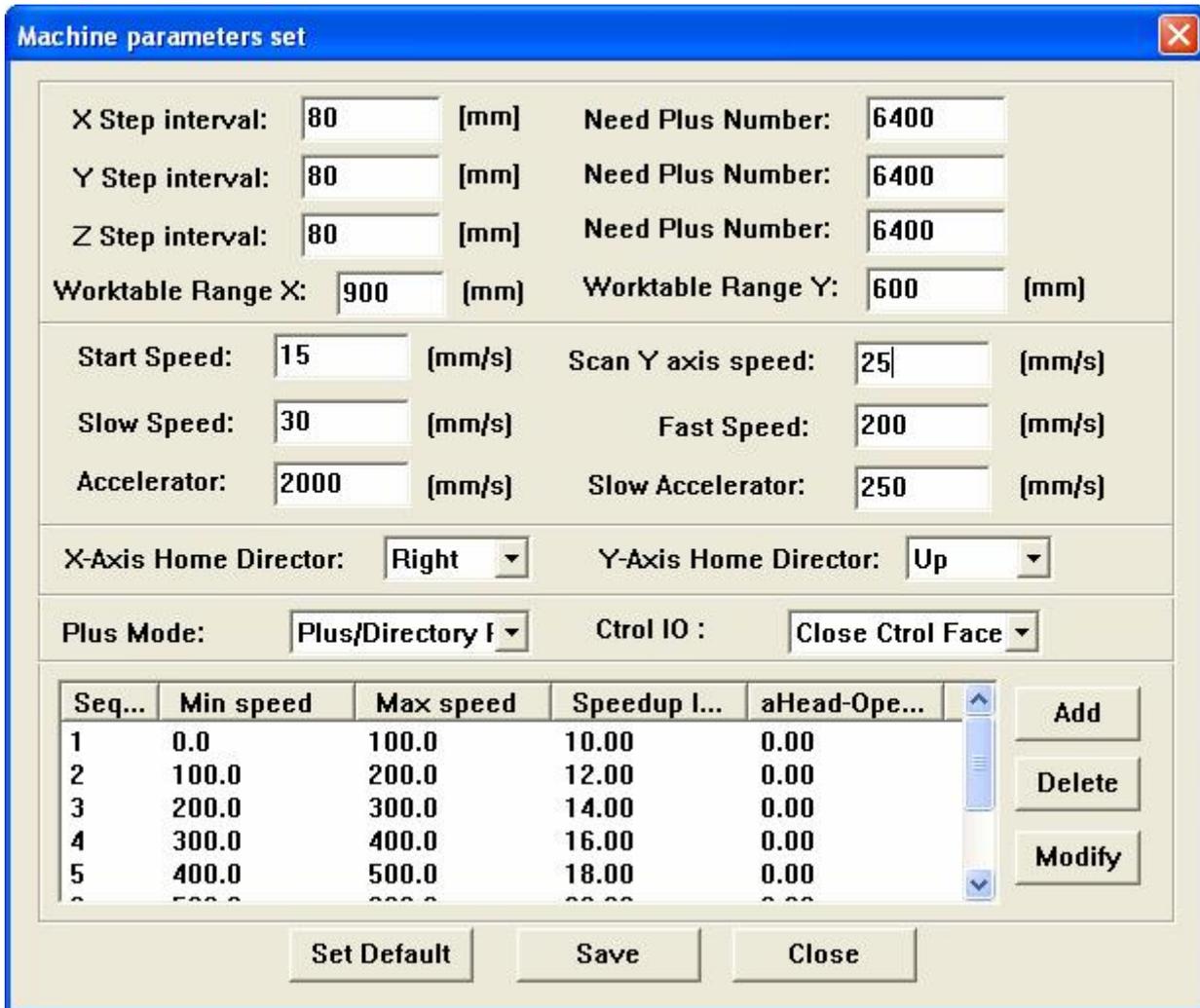


Reset

Return to origin

## Machine Parameters Setting

Press "File" button, choose "Archive set", you can find the following dialog box:



Explanation for the function of each parameter in above dialog box:

1、 X (Y, Z) step interval

When the stepping motor moves a circuit, the laser head will move a relative length. You need to input the number in it.

2、 Need Plus Number

The number is "driver's subdivision number" × 200.

3、 worktable range X (Y)

It is the available processing area of the machine. If you change the number, the reference frame of the main interface will be changed accordingly.

4、 Start speed

X, Y -Axis start speed means starting speed. When cutting, the number is the starting speed of acceleration on X, Y-axis. Normally, the number should be chosen from 5-20mm/s according to different graphics. If the number set up is too high, machine will shake intensively.

5、 Scan Y axis speed

When engraving, the Y-axis's moving speed.

6、 Slow speed

The starting speed of laser head moving without lasers emitting. If the number set up is too high, machine will shake intensively.

7、 Fast speed

The maximum speed of laser head moving without lasers emitting.

8、 Acceleration

It determines the time that starting speed reaches to maximum speed. If the number set up is too high, machine will shake intensively. If the number set up is too low, processing efficiency will be lowered. So modify it according to actual situation.

9、 Slow acceleration

It determines the processing precise when the processing route turns the corner.

10、 X(Y)-Axis Home Direction

It is determined by the position of original switch.

11、 Pulse mode

The system provides tow kind of pulse mode: pulse/direction and positive pulse/negative pulse. If you don't want to change the stepping motor driver, don't change it.

12、 Ctrol IO

There are two options:

Turnoff panel control: if there is not any panel, please check it, or the machine will be out of the way.

Open panel control: if you want to control the machine from the exterior button, please check it.

13、 List for set engrave parameters

There is a list on the second half of "archive set" dialog box. The engrave parameters of movement on X-axis can be set up in this list. We suggest you to choose Windows default.

Now let's use the first row as an example to explain each parameter:

No	Min spe...	Max sp...	Speedu...	Accorator	Add Space
7	1000.0	1200.0	20.00	13500.00	-0.10
6	600.0	1000.0	18.00	13500.00	-0.10
5	500.0	600.0	16.00	13500.00	-0.10
4	400.0	500.0	15.00	13500.00	-0.10
3	300.0	400.0	13.00	13500.00	-0.10
2	100.0	300.0	12.00	13500.00	-0.10

This row represents that when engraving speed (engraving speed is set up in "Layer Properties" which is in "Layers manager") is between 1000 to 1200, acceleration is 30mm. That is, the engraving length without laser. This function is used for conquering inertia of machine. If you find graphics error happens (that is, motor lost step), you can set up a bigger number in "Speed du..."

"Add Space" is used for compensating mechanical returning clearance. If you find the engraving edge is not orderly, you can set up number in "Add Space". This number can be a positive number or a negative number. The details are in the "Add Space Adjustment" part that is in the part "Modify" of Chapter Four.

When all the parameters are set, click "save" button please, then click "close" to escape.