User's Manual for AutoLaser Software

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Introduction

AutoLaser software is a kind of brand-new upper computer software.

- ✓ Assist in design and support drawing; support node edit and enable users to more conveniently and finely adjust graphs; support advanced edit functions with respect of graphs, such as translation, rotation, mirror image, stretching, shear mapping, alignment, cloning, arrangement, gradient treatment, etc.
- ✓ As a graphic format, support such file formats as **plt, dxf, dst, dsb, ai, bmp and out**.
- ✓ Theoretically support the languages of all countries and fully support Unicode. At present, default languages of the software include simplified Chinese, traditional Chinese, English and French, which users can add or delete as needed.
- ✓ Support the coverage edits of 256 colors and the edits of scaleplate, zooming, revocation/ rework, etc. as well s the preview of processing files.

Chapter I Installation and Un-installation

1.1 Installation Requirements

Operating system: 32-bit and 64-bit operating systems of Windows series (Windows 98, Windows 2000, Windows XP, Windows vista, Windows 7, Windows 8 and Windows 8.1).

- ✓ CPU: editions higher than Pentium 4.
- ✓ Video card: no special requirements; it is recommended to use independent video card at least with 512MB cache in order to facilitate graphic edits.
- ✓ RAM: above 1GB.
- ✓ Hard disk: above 20GB.

1.2 Installation

1.2.1 Installation of AutoLaser

1) When fabricating optical disk, please automatically or manually run [Setup.exe]. Double click to run [AutoLaser V X.X.X.exe] (X.X.X is the version number) for direct installation in the hard disk.

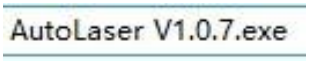


Figure 1-1

2) Automatically extract files and start to install. If the software is installed in 64-bit Windows system, the dialog box for users to control and select will appear; click [YES] to enter the language selection interface; afterwards, the software will select a kind of default language according to the languages provided in the operating system, namely simplified Chinese, traditional Chinese or English.

Figure 1-2

3) Select language.

4) Click [Next Step] to select the product.

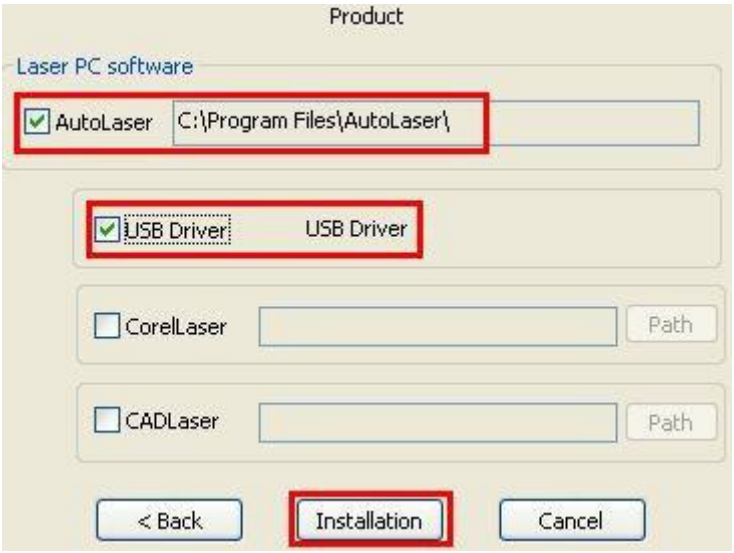


Figure 1-3

5) Select [AutoLaser].

6) Select [USB Driver].

7) Click [Install] to run the installation program.

AutoLaser is being installed…

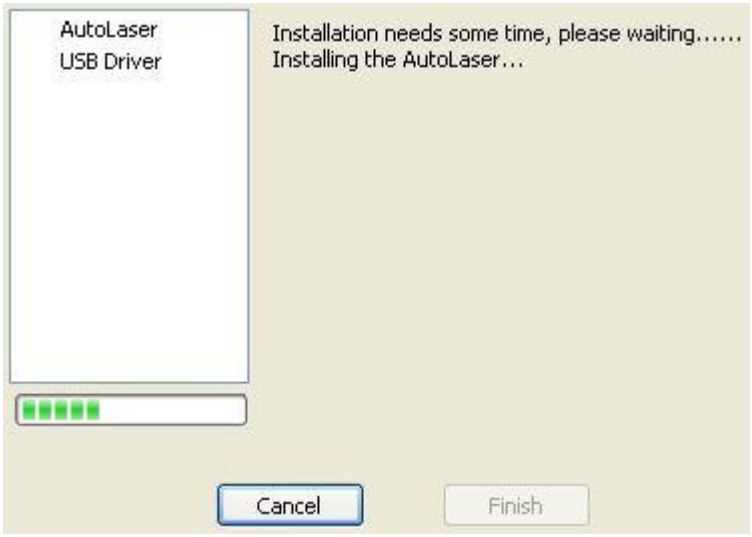


Figure 1-4

USB Driver is being installed…

Figure 1-5

8) Click [Extract].

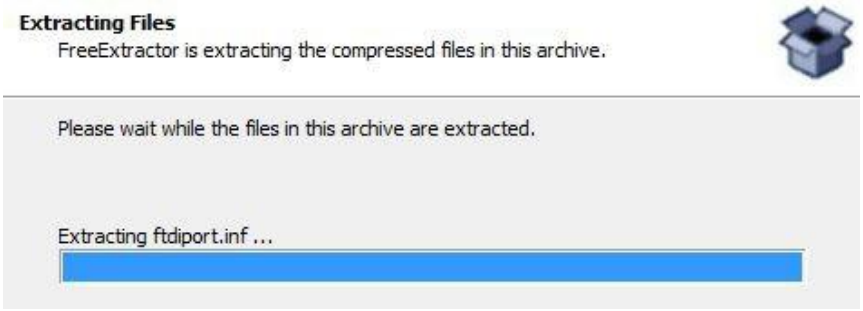


Figure 1-6

9) Click [Next Step].

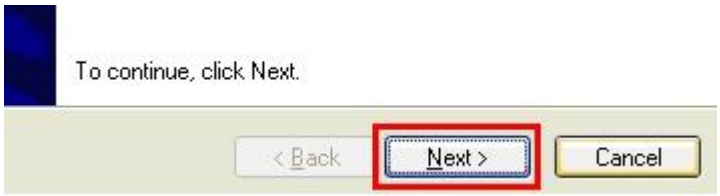


Figure 1-7

10) Click [Complete] to complete the installation of USB Driver.

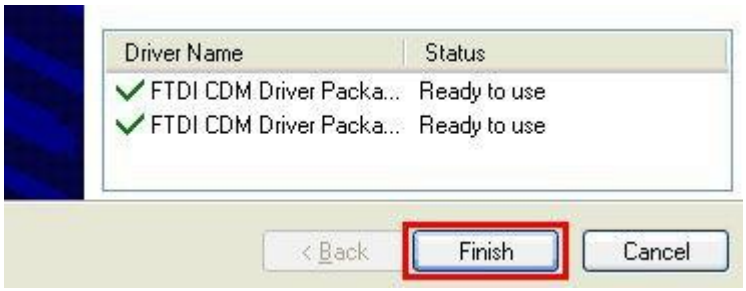


Figure 1-8

11) Click [Complete] to complete the installation.

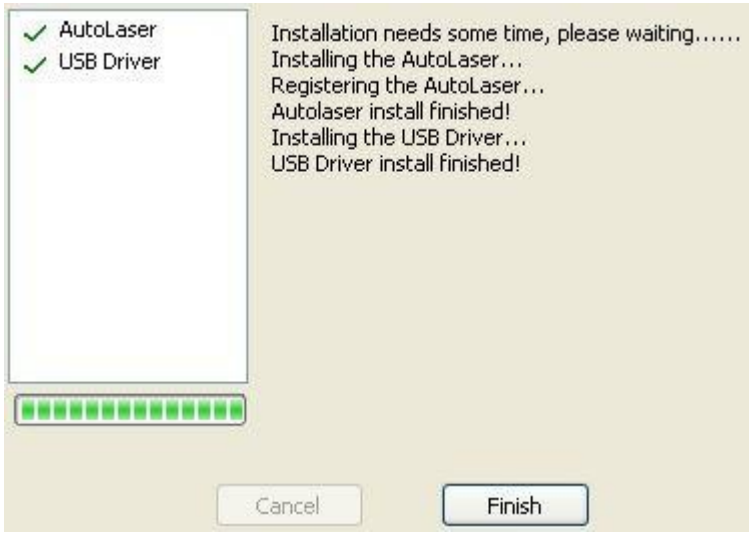


Figure 1-9

1.2.2 Installation and starting of CorelDraw plug-in

a) Installation for the first time

The installation method is similar to that of “1.2 Installation of AutoLaser for the First Time”, and users only need to pay attention to the following parts at the step of product selection:

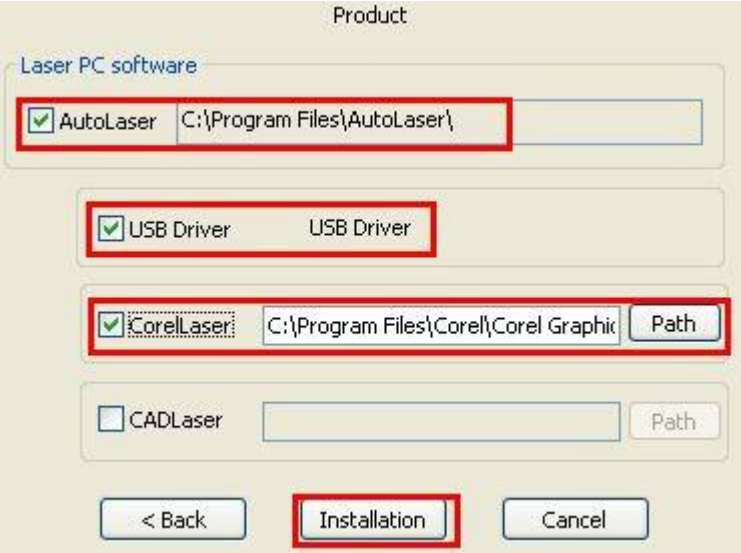


Figure 1-10

1) Select [AutoLaser].

2) Select [USB Driver]

3) Select [CorelLaser].

4) Click [Install].

If it is installed for the first time (after installation, the menu button cannot be displayed at the main menu of CorelDRAW), and the following operations should be executed after completing installation:

1) Start CorelDRAW;

2) Orderly click the menu items: [Tool]→[Macro]→[Run Macro] to pop up the dialog box of “Run Macro”.

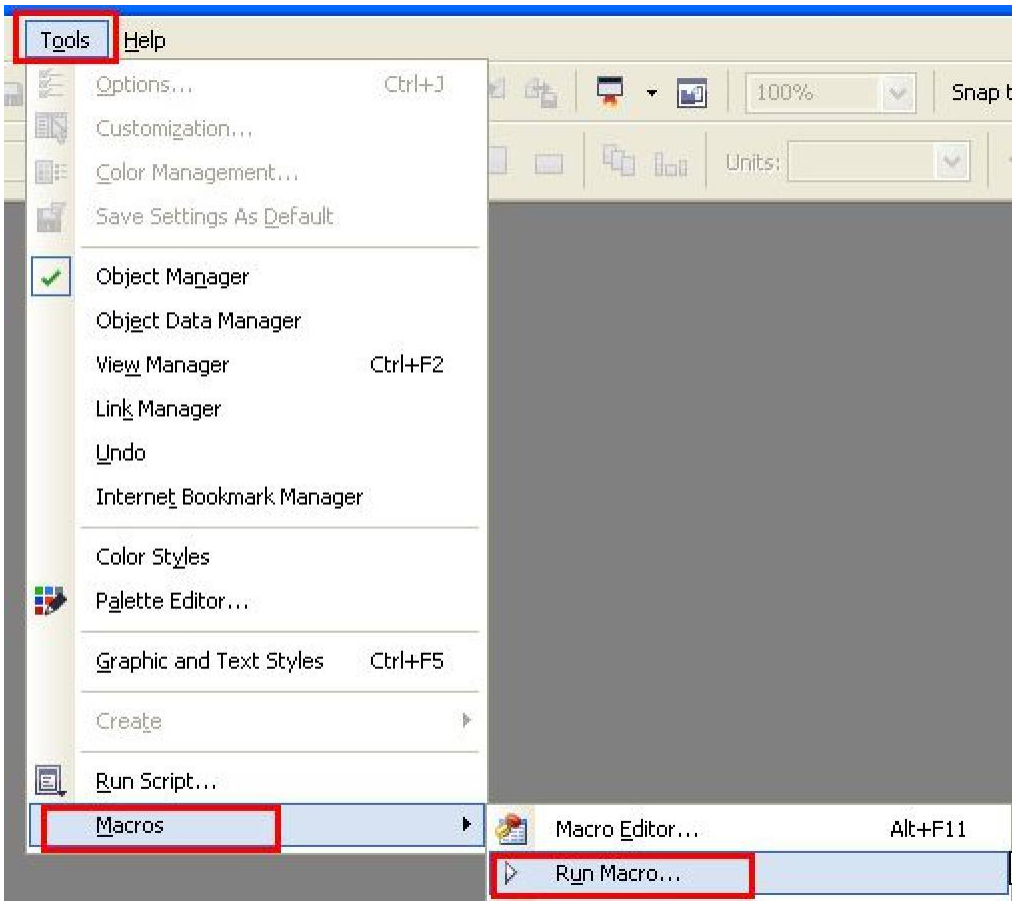


Figure 1-11

3) Select “JGDK(JGDK.GMS)” as the macro location in the drop-down box in the dialog box of “Run Macro”.

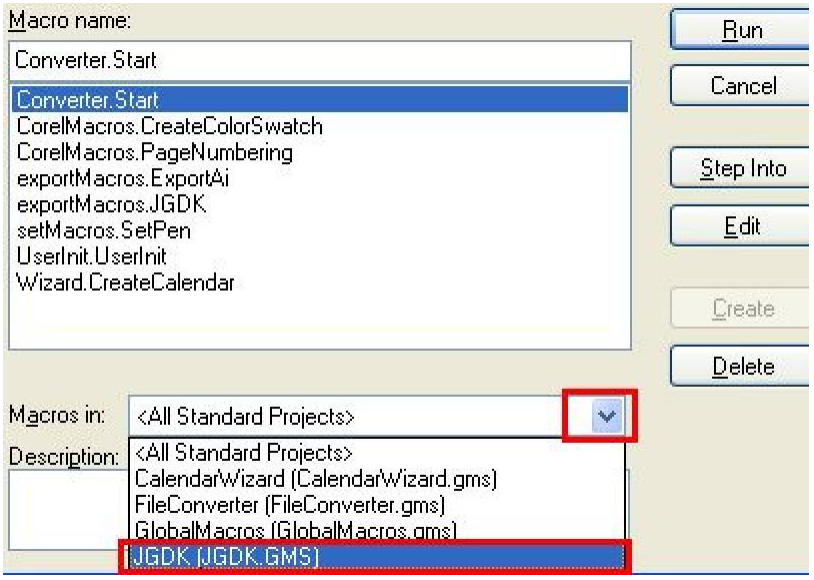


Figure 1-12

4) Select “UserInit.UserInit” in the list box of macro names and click [Run].

Figure 1-13

5) The appearance of the small icon as shown in the following figure means the successful installation and starting; at this time, please drag the icon to the indicated position on the menu.

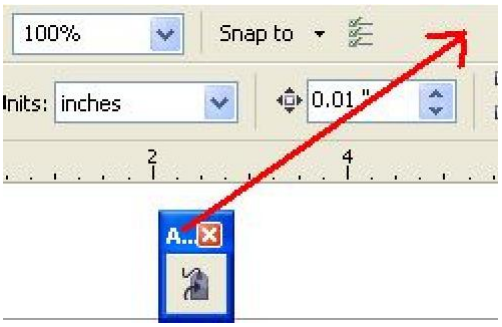


Figure 1-14

b) Installation not for the first time

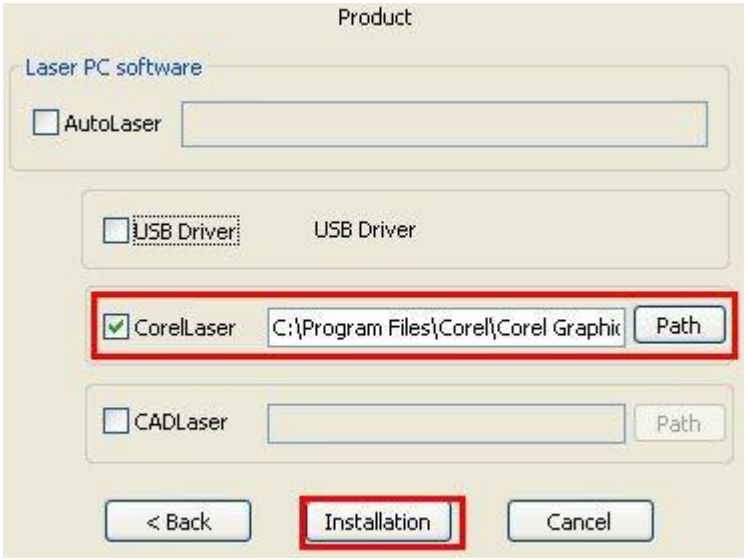


Figure 1-15

As shown in Figure 1-15, the installation method is similar with that of “1.2 Installation of AutoLaser for the First Time”, and users only need to pay attention to the following parts at the step of product selection:

1) Select [CorelLaser].

2) Click [Install].

Note: the installation directory of CorelLaser must be the sub-directory under that of CorelLaser, namely "\Draw\GMS\". Please check whether the installation directory of CorelLaser is correct or not during installation.

For example, if CorelDRAW X6 is installed at Disk C, the installation directory of CorelLaser is "C:\Program Files\Corel\CorelDRAW Graphics Suite X6\Draw\GMS\".

1.2.3 Installation of AutoCAD plug-in

a) Installation for the first time

The installation method is similar with that of "1.2 Installation of AutoLaser for the First Time", and users only need to pay attention to the following parts at the step of product selection:

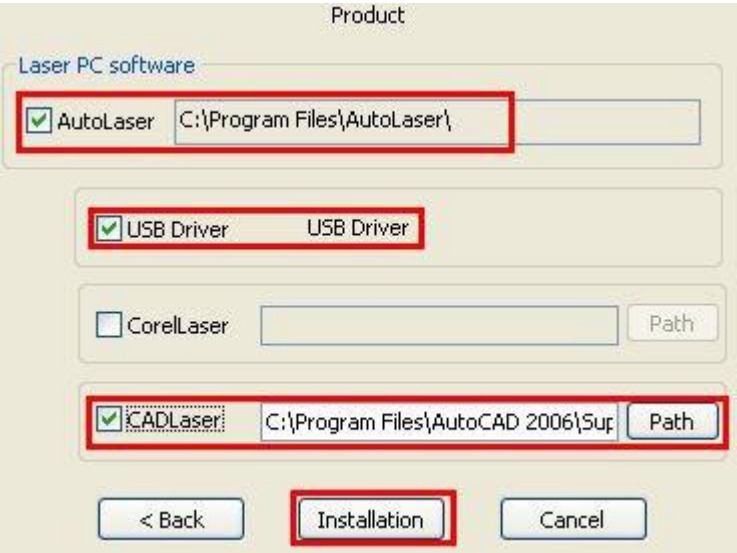


Figure 1-16

1) Select [AutoLaser].

2) Select [USB Driver].

3) Select [CADLaser].

4) Click [Install].

b) Installation not for the first time

The installation method is similar with that of "1.2 Installation of AutoLaser for the First Time", and users only need to pay attention to the following parts at the step of product selection, as shown in Figure 1-17:

1) Select [CADLaser].

2) Click [Install].

Note: please check whether the installation directory of CADLaser is correct or not during installation. The installation directory of CADLaser must be the sub-directory under that of AutoCAD, namely “\ Support \”.

For example, if AutoCAD 2013 is installed in Disk C, the installation directory of CADLaser is “C:\Program Files\Autodesk\AutoCAD 2013\Support\”.

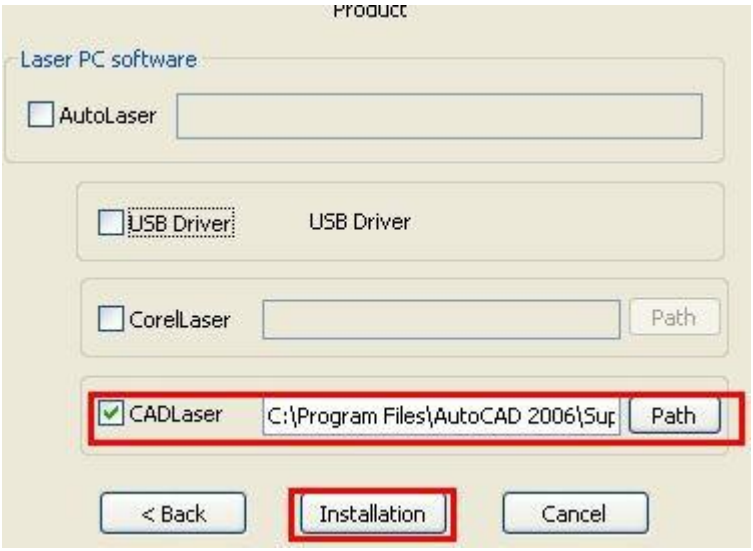
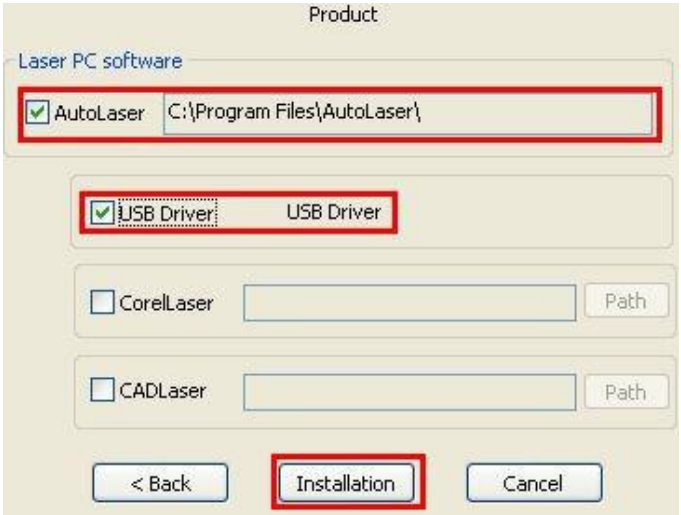


Figure 1-17

1.2.4 Installation of USB Driver

a) Installation for the first time

As shown in Figure 1-18, the installation method is similar with that of “1.2 Installation of AutoLaser for the First Time”, and users only need to pay attention to the following parts at the step of product selection:



1) Select [AutoLaser].

2) Select [USB Driver].

3) Click [Install].

b) Installation not for the first time

The installation method is similar with that of “1.2 Installation of AutoLaser for the First Time”, and users only need to pay attention to the following parts at the step of product selection:

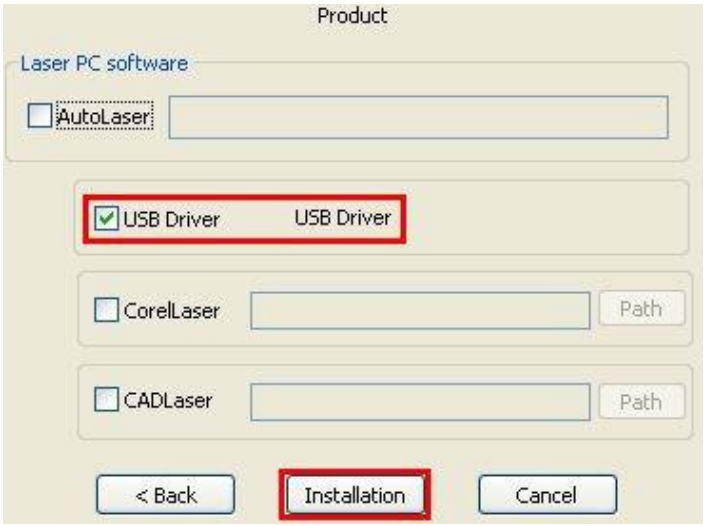


Figure 1-19

2) Select “USB Driver”.

3) Click “Install”.

1.3 Un-installation

This software supports two kinds of un-installation modes: complete un-installation and un-installation with reserved user data.

1.3.1 Uninstall in start menu

1) [Start]→[All Programs]→[AutoLaser]→[Uninstall.exe].

Figure 1-20

2) After the dialog box is popped up, it needs to select [Reserve User Data] or not as needed and click [Uninstall] to complete the un-installation.

Figure 1-21

1.3.2 Un-installation in Add/Delete Programs

1) Open the [Control Panel].

Figure 1-22

2) Double click to open [Add/Delete Programs] tool.

Figure 1-23

3) Find [AutoLaser] in [Modify or Delete Programs] as shown in Figure 1-24 and click the “Modify/Delete” button at the right side.

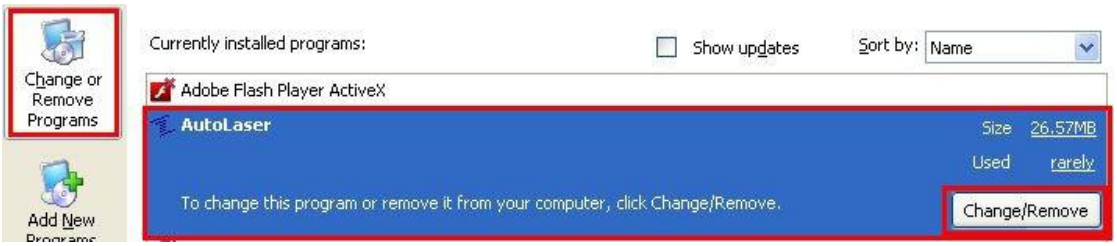


Figure 1-24

4) Complete un-installation according to the method mentioned in the second step of “1.3.1”.

Chapter II System Setting

2.1 Machine Management

As shown in Figure 2-1, click the [Equipment Information] button at the upper part of the working area at the right side to enter the machine management interface.

Figure 2-1

Machine-related information includes machine breadth, process parameters and machine parameters.

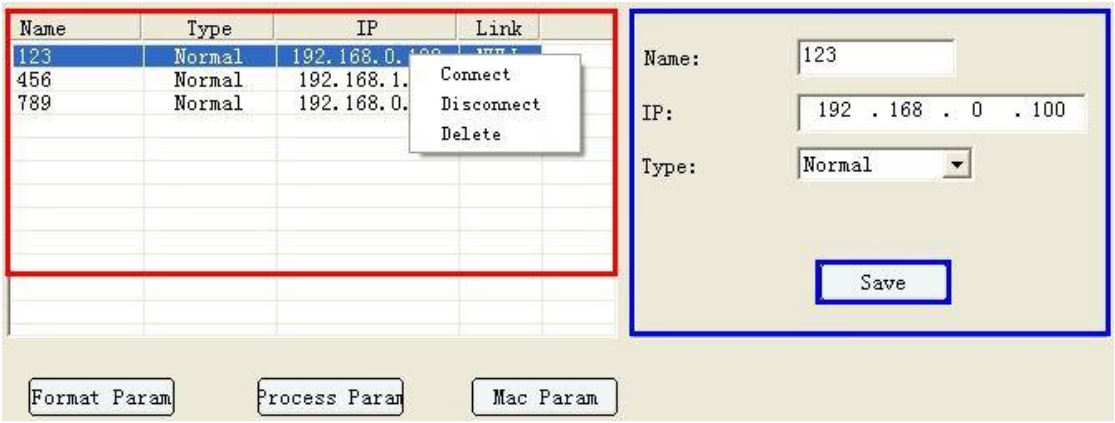


Figure 2-2

[Equipment Name]: different machines may have the same IP address, so we use equipment names for distinguishing. In a sheet, each set of equipment must have a unique name.

[Equipment Type]: if the machine is not used and involves in camera relevant equipment, the equipment type thereof shall be set as Common Type.

[IP Address]: the IP address must be consistent with that displayed on the machine; or else, independent software cannot be connected to the machine.

[Connection/Disconnection]: the independent software is able to be reconnected again at the time of downloading files, reading/saving machine parameters and conducting online joint control, so there is no need to

configure such setting and this setting can be ignored.

[Save]: click the records in the selection list and the selected record information will appear at the right edit box, wherein [Equipment Name] in the list is the unique identification. If the equipment name is the same as certain record(s) in the list, please click the [Save] button to modify in the list; if the equipment name does not exist in the list, please click the [Save] button to add records in the list.

[Delete/Add]: the red area is a register list of all machines. If one machine is not used any more, it is able to select it in the table, click the [Right-hand Button] to open the menu and click the [Delete] button to delete it. If a machine is newly purchased, please edit the information thereof in the blue area and then click the [Save] button at the lower part to add it in the list.

Click the records in the list to display the three buttons, namely, [Breadth Parameters], [Process Parameters] and [Machine Parameters]which are the information of the machine currently selected in the table.

The register list greatly facilitates the machine selection.

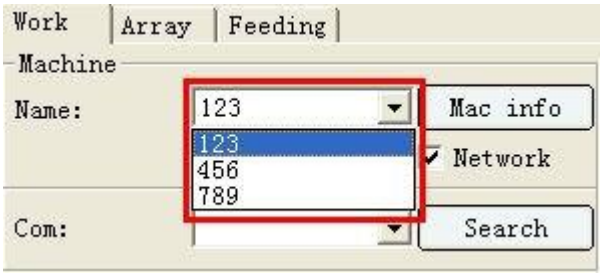


Figure 2-3

2.1.1 Breadth Parameters

Select a machine and click [Breadth Parameters] to open the dialog box of breadth parameters about the machine.

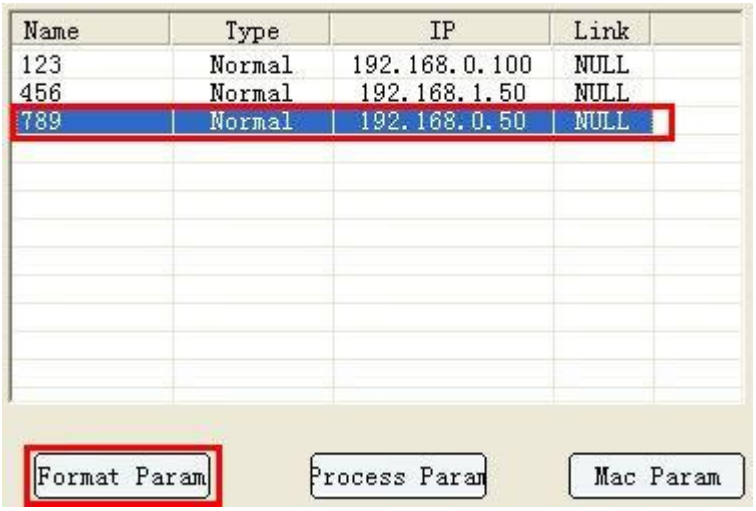


Figure 2-4

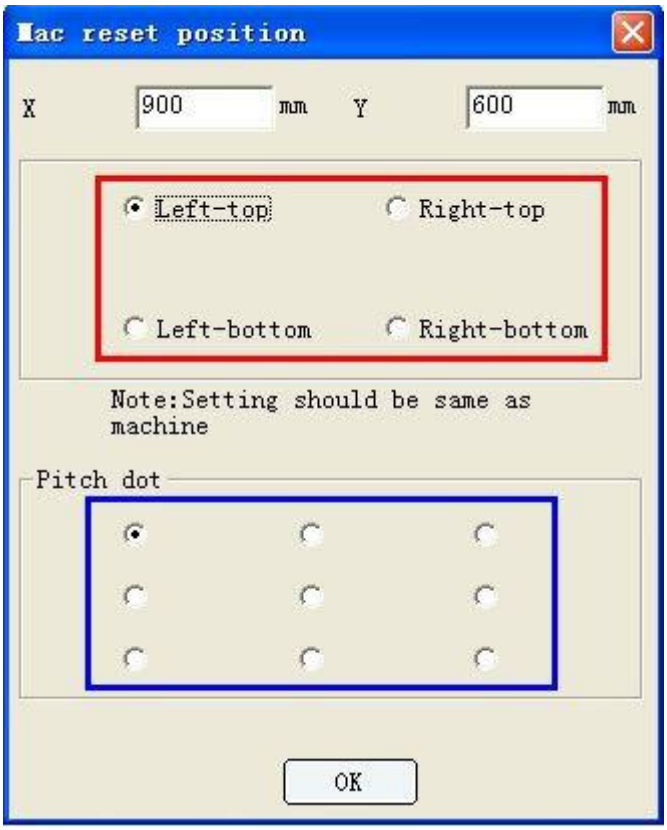


Figure 2-5

[Machine Restoration Point]: it refers to the point to which the laser head restores after the machine is started or the “Restoration” button is pressed. It can be set as one point at the top left corner, lower left corner, top right corner and lower right corner of the machine, but shall be set consistently with the machine.

[X Breadth]: it refers to the maximum distance that the machine can have along the X-axis from the machine restoration point (namely the machine

origin). If this value is larger than the actual movement distance of the machine along the X-axis, axis collision might occur at the X-axis direction.

[Y Breadth]: it refers to the maximum distance that the machine can have along the Y-axis from the machine restoration point (namely the machine origin). If this value is larger than the actual movement distance of the machine along the X-axis, axis collision might occur at the Y-axis direction.

[Locating Point]: it refers to the point where the laser head is located after the “Locate” button is clicked. The nine points in the blue area are corresponding to the nine points on the exterior rectangle of the graphic file of the machine (namely the maximum outline border of present graphic file of the machine); so selecting a certain point among these points means that the locating point is the position selected on the exterior rectangle of the graphic file. For example, in the above figure, the locating point is the point at the top left corner of the exterior rectangle of the present graphic file.

2.1.2 Process Parameters

Select a machine and click [Process Parameters] to enter the process parameter setting interface, as shown in Figure 2-6.

[Start]: start corresponding process.

[Add]: add corresponding process parameters.

[Delete]: delete corresponding process parameters.

[Save]: save all parameters in various process parameter lists.

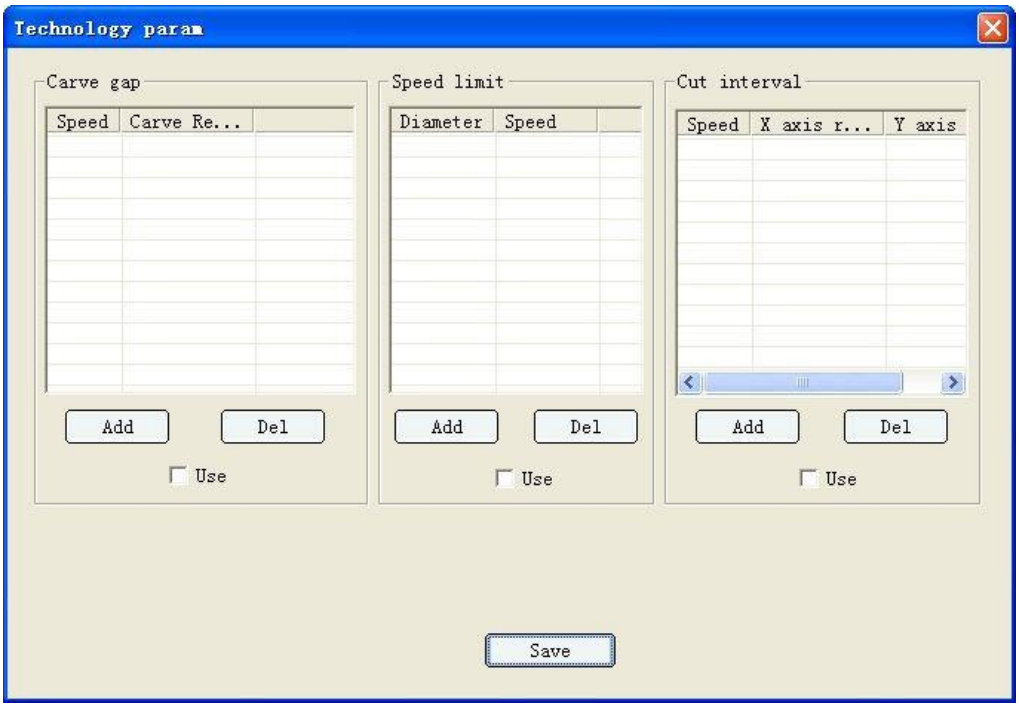


Figure 2-6

2.1.2.1 Carving clearance

Due to the existence of different machine types, the reverse motion can cause clearance error when a machine conducts bidirectional carving, thus causing the double-image or unclear carving effect. The software provides carving clearance compensation which is used for eliminating the different clearances caused by different machines, as shown in Figure 2-7.

[Start]: click the check box of [Start] at the lower part of the list to start carving clearance compensation.

[Add]: click [Add] button to pop up the dialog box of parameter edit, as shown in Figure 2-8.

[Delete]: select the records to be deleted in the list and click the [Delete] button at the lower part.

After completing parameter edit, click [OK] to add a new item.

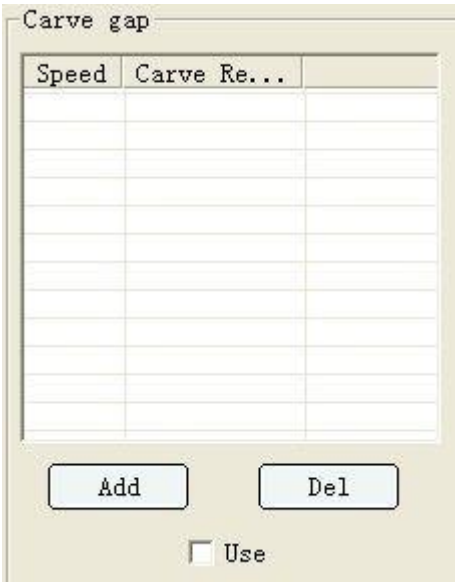


Figure 2-7

Figure 2-8

Debugging method:

- Firstly, set the compensation under corresponding carving speed as 0;
- Debugging process of clearance compensation: fabricate three 20×10 rectangles, with the interval as 5mm; set the working mode as carving, with the carving precision as 1mm, and then output.

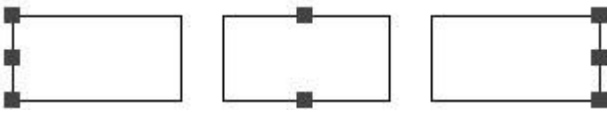


Figure 2-9

- Carve to have ideal effects.

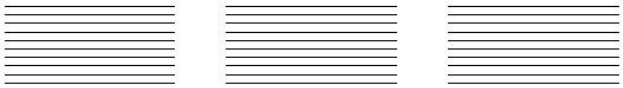


Figure 2-10

- If the carving effect is not ideal, there is no need to compensate, without debugging and starting the carving clearance parameter.
- Carve to have possible effects.

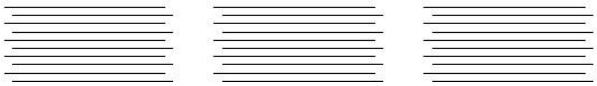


Figure 2-11

- Intermediate compensation is used for adjusting the alignment of the middle sweeping lines, wherein such intermediate compensation is usually as negative value, but the positive value might also exist, and the value is depended on the type of the carving machine. The negative and positive values used for compensation are also the compensation for the positive and negative adjustment and are depended on the type of the carving machine. Generally, the compensation is firstly set as 0 to check the carving effect, and then set a large compensation value such as 3mm to check the carving effect, and finally determine the negative value or the positive value for compensation.

2.1.2.2 Small circle speed limit

Since the machine has different types, belts, pulley wheels, electric motors, etc., the same graph can have different processing effects at the same speed. Due to the existence of these objective reasons in processing process, the software provides a speed limit list for different machines in order to record the

maximum operating speed (under the condition of ensuring effects) of the machine for processing different circles, as shown in Figure 2-12.

[Start]: the [Start] button at the lower part of the list allows users to decide whether or not to use the speed limit function for the machine during working.

[Add]: click the [Add] button to pop up the dialog box of “New Add”, as shown in Figure 2-13.

[Delete]: Select the records to be deleted in the list and click the [Delete] button at the lower part.

After completing edit, click [OK] to add a new item.

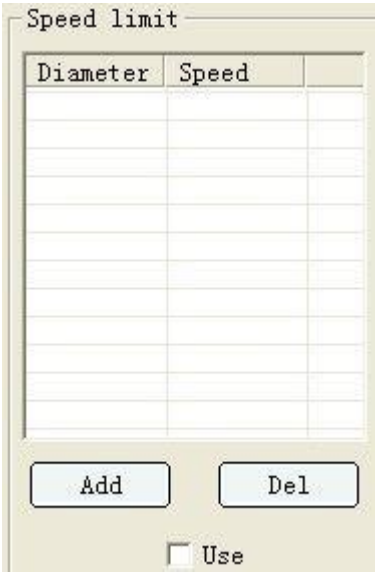


Figure 2-12

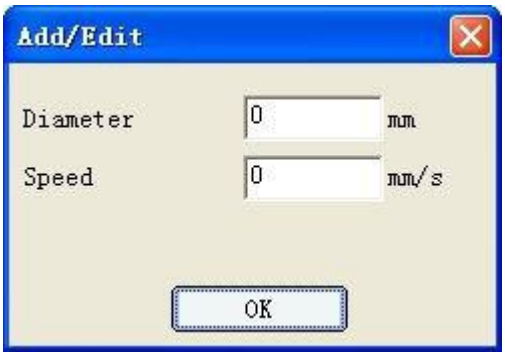


Figure 2-13

2.1.2.3 Cutting clearance

If the processing effects as shown in Figure 2-17 and Figure 2-19 appear, users can start the cutting clearance;

[Start]: the [Start] button at the lower part of the list allows users to decide

whether or not to use the speed limit function for the machine during working.

[Add]: click the [Add] button to pop up the dialog box of “New Add”, as shown in Figure 2-13.

[Delete]: Select the records to be deleted in the list and click the [Delete] button at the lower part.

After completing edit, click [OK] to add a new item.

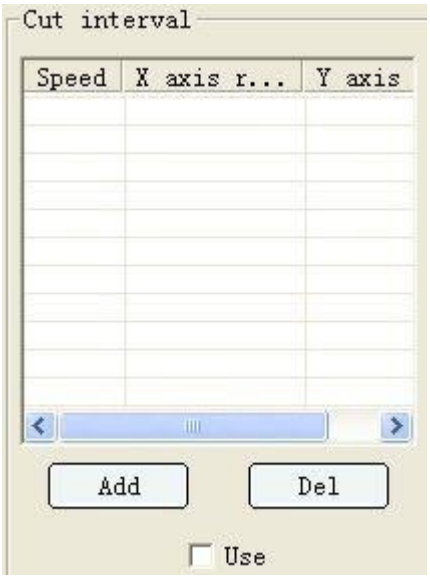
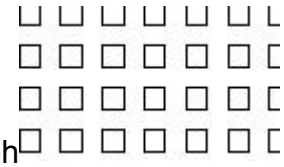


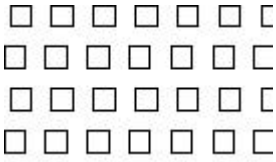
Figure 2-14

Figure 2-15



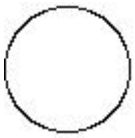
Original graph

Figure 2-16



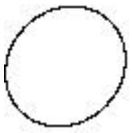
Processed effect

Figure 2-17



Original graph

Figure 2-18



Processed effect

Figure 2-19

2.1.3 Communication

The top right part of the software interface is as shown in Figure 2-20, displaying equipment information. Independent software will communicate with the machine through network or USB wires at the time of downloading graphic files, reading/writing machine parameters and conducting the online joint control. Therein, the red area is used for the network connection, while the blue area is used for USB connection. The network connection is prior to USB connection, so under the co-existence of these two kinds of communication, independent software will preferably select network communication.

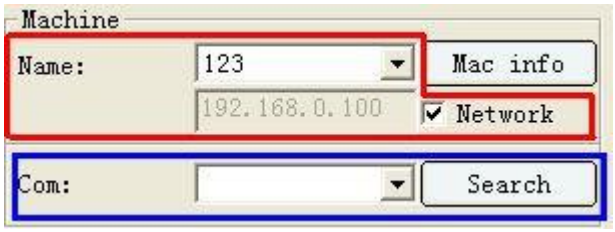


Figure 2-20

Network communication: the key point of network communication is the IP address of the machine. If the check box of [Start Network] in the red area is selected, the independent software will communicate with the machine in network mode. If the selection is removed, network communication is closed. (Note: do not forget to insert the network cables for the communication between the upper computer and the machine). When using the network communication, the user must set the IP address of the computer and that of the machine in the same network segment, for example, 192.168.0.XXX, which means that the first three parts of the IP address must be same. Typical setting is as follows: the IP address of the computer is 192.168.0.100 while that of the machine is 192.168.0.50. Please refer to the user manual of the control card for manually setting the IP address of the machine.

USB communication: the key point of USB communication is the communication port. Select the [Search] button in the blue area to enable the software to search the communication port number of the communication between the upper computer and the machine. If no communication port

number is displayed, it means that there is no connection to the upper computer. (Note: do not forget to install USB Driver and insert USB communication lines.)

2.1.4 Machine parameters

A) Equipment parameters

After selecting network communication or USB communication, enter the dialog box of [Machine Management], then select the machine and click the [Machine Management] button to enter the machine parameter setting interface, as shown in Figure 2-21.

[Read Parameters]: click the [Read Parameters] button to initiate the communication between independent software and the machine; meanwhile, read machine parameters from the machine to independent software.

[Save Parameters]: save the parameters after they are successfully read or imported. If necessary, modify the read or imported parameters and click the [Save Parameters] button to configure qualified parameters to the machine.

[Clear]: zero clearing of the machine parameters of independent software will not influence the machine. Click the [Clear] button to clear the machine parameters of independent software. If users also want to clear the parameters on the machine, it needs to manually clear the parameters one by one after the parameters are successfully read or imported, set them as 0 and then save such setting, or manually modify these parameters one by one on the control panel of the machine.

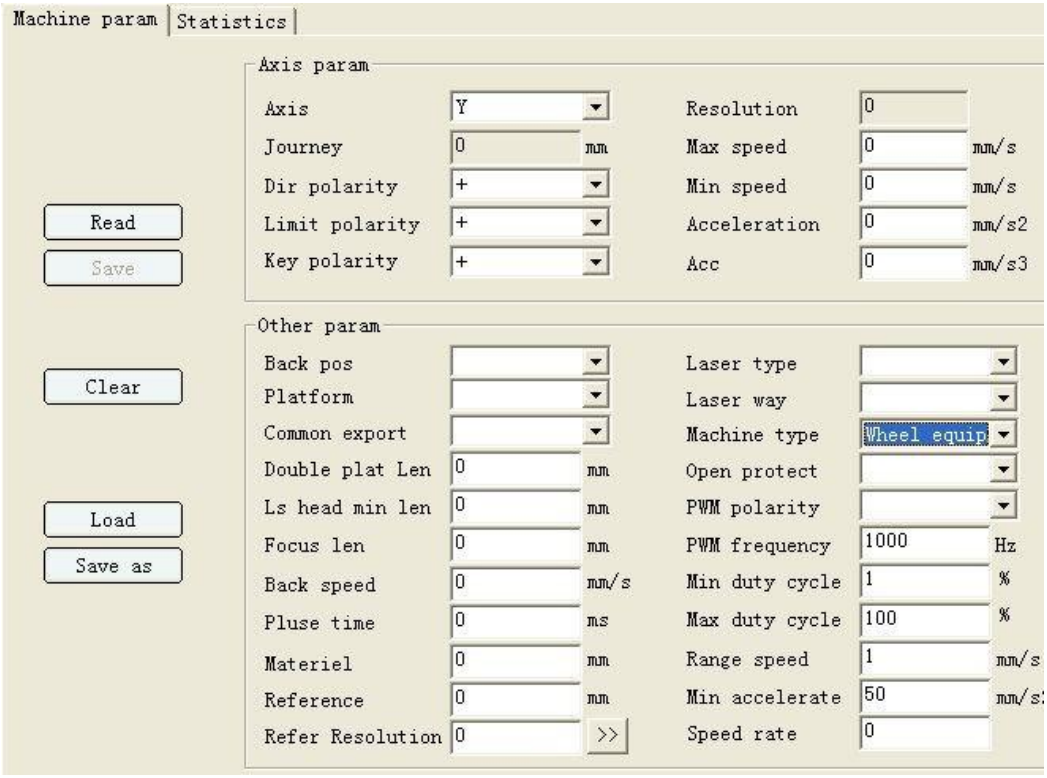


Figure 2-21

[Import Parameters]: read machine parameter from the files of which the name suffix of these files is “machine”. Click the [Import Parameters] button to pop up the dialog box as shown in Figure 2-22, then select the needed parameter files and click [Open] to read machine parameters.

[Export Parameters]: save the machine parameters as file. Click the [Export Parameters] button to pop up the “Save” dialog box as shown in Figure 2-23, then select the save path and input the file name; afterwards, click [Save] to save the file.

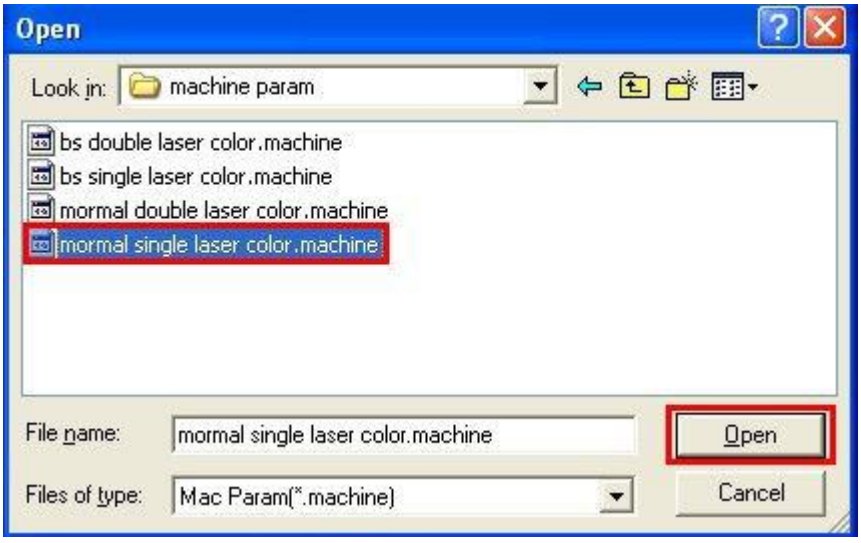


Figure 2-22

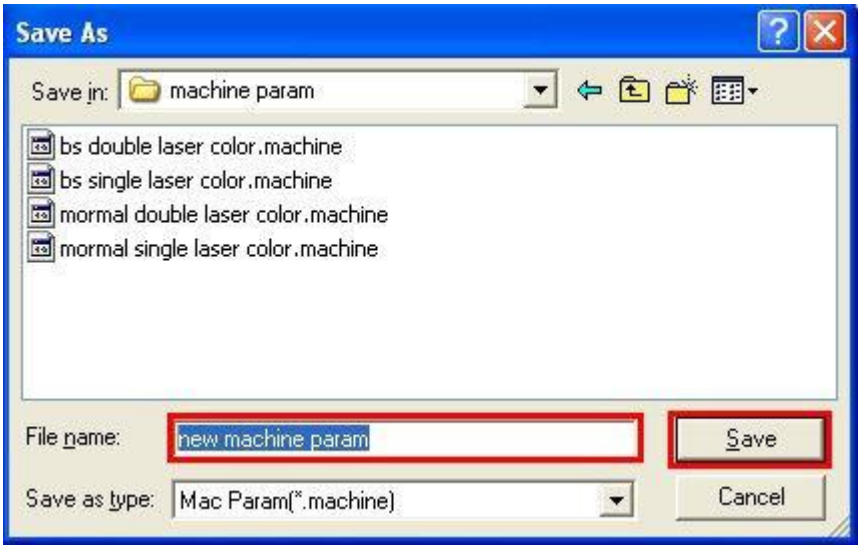


Figure 2-23

[Present Axis]: the machine totally has 5 axes, namely, X-axis, Y-axis, Z-axis, U-axis and V-axis. Axis parameters of each axis are dependent of each other, and users can specify the parameters of a certain axis through [Present Axis].

[Maximum Stroke]: the maximum stroke is the maximum movement distance on the axis,

[Direction Polarity]: when the axis is opposite to the direction of machine origin, users need to modify the polarity.

[Limit Polarity]: The limit polarity can be negative or positive; when the limit polarity is set as positive, the high level of the limit signal is effective; and when the limit polarity is set as negative polarity, the low level of the limit signal is effective.

[Key Polarity]: when the button direction is inconsistent with the movement direction of the axis, users need to modify the polarity.

[Resolution Ratio]: resolution ratio = the movement length of the laser head during one circle of rotation of the electric motor × 1000/ pulse count needed by the driver during one circle of rotation of the electric motor. Press the [>>] button to pop up the input box of actual length and theoretical length, wherein the theoretical length refers to the length displayed on the equipment while the actual length refers to the length measured by rulers; use the button to shift the laser head so as to input corresponding length in the corresponding item. Then, press the [Calculation] button to enable the system to automatically calculate the correct resolution ratio.

Size measurement is as follows:

Users can cut a rectangle as the test reference for calculating the resolution

ratio; meanwhile it needs to consider the width of the laser beam. For example, draw a 30×30 rectangle according to the following steps: cut a rectangle with the size as shown in Figure 2-24, take the measurement value of X-axis as 34 and input 34MM in the dialog box of actual length; afterwards, set the expected length as 30, and click OK to obtain the expected rectangle in the scale of 1:1. The method for calculating the resolution ratio of other axes is the same.

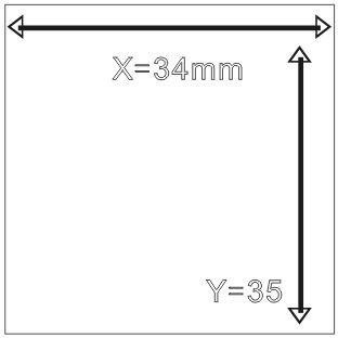


Figure 2-24

When calculating the accurate resolution ratio of Y-axis, the actual length refers to the track of the beam.

[Limit Speed]: limit speed is the maximum allowable operating speed of the axis, used for speed limiting.

[Stop Speed]: stop speed is the speed when the axis is started or stopped.

[Accelerated Speed]: accelerated speed is the maximum allowable accelerated speed when the axis is operating. The greater the accelerated speed is, the shorter the time is required for speed acceleration and the greater the vibration will be.

[Jerk]: jerk is the accelerated speed of the axis from the minimum to the maximum accelerated speed (at the time of deceleration, it is the accelerated speed from the maximum to the minimum accelerated speed). The smaller the jerk is, the smaller the vibration and the lifting speed will be; on the contrary, the larger the jerk is, the larger the vibration and the lifting speed will be.

[Home Point]: home point is the position where the laser head stays after system resets or processing is finished. Three choices are available: mechanical original point, none and locating point. If “mechanical original point” is selected, the laser head will return to the mechanical original point after processing is finished; if “none” is selected, the laser head will stay at the point where the processing is finished; and if “locating point” is selected, the laser head will return to the position where the [locating] button is clicked before the processing after processing completion.

[Platform Mode]: platform mode can be divided into general platform and double platform. The difference lies in the number of the processing heads.

General platform has only one processing head, while double platform has two platform heads.

After double platform mode is selected, the distance between these two platforms shall be determined, which shall be subject to the distance from the upper left corners of the two platforms. Double-platform type machine has two platforms and moves to-and-fro via Z-axis, with one platform at the working position and the other appearing in turn on the two sides of the machine. Material feeding and picking can be conducted without interference with the working time, thus improving the working efficiency (this function should be used together with the machine that has such component). After double-platform mode is selected, Z-axis will move once the double platform distance determined each time after the work is finished.

[General Output Polarity]: general output polarity refers to that whether low or high output level of “OUT7” and “OUT8” is effective.

[Double-platform Distance]: double-platform distance is subject to the distance from the upper left corners of the two platforms.

[Minimum Spacing of Double-platform]: minimum spacing of the two platforms is the distance between the original points of the two laser heads.

[Focal Distance]: refer to the distance from the bottom surface of the laser head to the upper surface of the material.

[Homing Speed]: homing speed is the speed of the system moving to the home point upon restoration or operation completion.

[Radiating Time]: radiating time refers to the time taken by the laser head to eject light at certain point.

[Material Diameter]: this is the parameter specially designed for roller device, instead of general devices. Material diameter is the maximum outer diameter of the material to be processed, which is obtained from actual measurement.

[Reference Diameter]: this is the parameter specially designed for roller device, instead of general devices. It is a theoretical value.

[Reference resolution]: this is the parameter specially designed for roller device, instead of general devices. It is a theoretical value.

[Laser Type]: suitable laser type is selected based on the type of laser tube used for the machine. Laser tubes are divided into general (CO_2 laser tube), coherent and RF laser tubes. Coherent laser tube is selected in case of RF laser that requires no pre-combustion; RF laser tube needs to be selected in case of RF laser that requires pre-combustion (at this time, the control card will constantly sent pulse signal of 1us wide to the laser for pre-combustion).

[Laser Head Mode]: it includes single-head, double-head 1 and double-head 2.

Single-head refers to that the machine has only one laser head; double-head 1 refers to that the machine is of single-belt double-laser head, while double-head 2 refers to that the machine is of double-belt double-laser. After double-head mode is selected, the minimum spacing of the two heads should be determined, which is the distance between the original points of the two laser heads. Double-head machine use X-axis and V-axis to control the left and right movement of laser heads respectively. X-axis controls the laser head installed near the original point of the machine, while V-axis controls the laser head installed far from the original point of the machine. The maximum stroke of X-axis is designed to be the maximum width that can be processed by the double-head machine and that of V-axis is designed to be the difference of the maximum stroke of X-axis minus the minimum spacing of the two heads.

[Machine Type]: machine type is determined based on its uses, which can be divided into general device, metal cutting device and roller device.

[Cover Opening Protection]: when the cover opening protection is in effect, any time when users open the protection cover, the carving machine will start the safety protection measures and stop operation. Users may also shield the “cover opening protection” function as needed under the condition that the device is provided with safety protection, that is, users may choose not to use the cover opening protection and set the cover opening protection as “none”, in such processes as device detection and testing. However, such operation must be executed by professional personnel and customers are not recommended to take such action.

[PWM Polarity]: if it is found that the light intensity is adjusted low, but the actual intensity of the light injected is strengthened, PWM polarity shall be reversed.

Note: if “RF or coherent” laser tubes are used, please change the “PWM frequency” in the controller to be “50”, and change the maximum duty ratio to be “95%” or lower, but by no means to “100%”, otherwise the light will be ceaselessly sent or no light will be sent.

[PWM Frequency]: it is the frequency of light intensity of laser tube, which varies with the different models of laser tubes. See manuals of various laser tubes for details.

[Minimum Duty Ratio]: the minimum duty ratio the laser can support.

[Maximum Duty Ratio]: the maximum duty ratio the laser can support.

[Border Speed]: the speed on the border.

[Minimum Accelerated Speed]: the minimum accelerated speed when the machine is started and stopped. The smaller the value is, the smaller the vibration will be when machine starts and stops, and the longer the speeding up and slowing down time will be; vise versa. It is generally 400mm/s2 and if

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faster processing speed is required, the minimum accelerated speed may be set to be more than 850mm/s2 (subject to actual machine and the value here is the recommended value).

[Speed Coefficient]: it is used to adjust the stability of machines when turning around. It ranges from 0.00 to 5.00 and the larger the value is, the greater the turning around speed, the shorter the processing time and the greater the impact and vibration will be, vise versa. It is generally 2.5 and when the accelerated speed of Y-axis is set to be high (e.g. higher than 2500mm/s2), the speed coefficient may be set to be lower than 1.0. In this way, vibration will be significantly reduced.

B) Statistical information

Statistical information is to make statistics for the summation of the processing time, times, startup time (the time when the machine remains at operating status) and other parameters. Click the [Read Information] button to get the parameter.

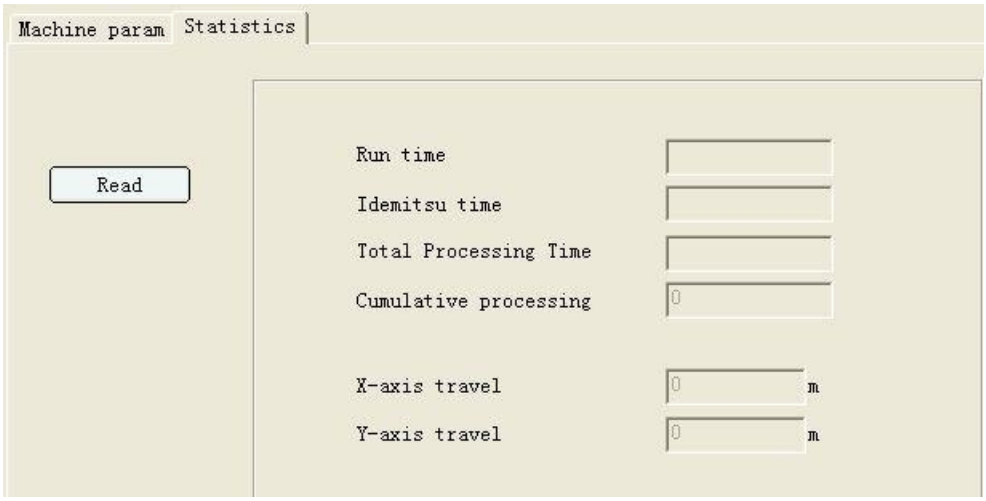

Figure 2-25

[Startup Time]: the total of the startup time of the machine.

[Lighting Time]: the total of the lighting time of the machine.

[Total Processing Time]: the total of the processing time of the machine.

[Total Processing Times]: the total of the processing times of the machine.

[X-axis Stroke]: the total of the distance that X-axis has traveled.

[Y-axis Stroke]: the total of the distance that Y-axis has traveled.

2.2 Curve Parameters

Click [Setting] → [Curve Setting] in menu bar to enter the setting interface of curve parameters. The precision is only specific to round, ellipse, arc and elliptic arc.

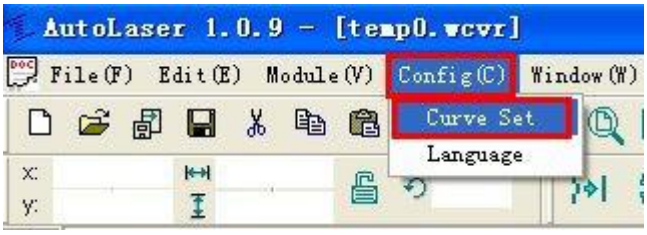

Figure 2-26

2.2.1 Import precision of curve

Import precision refers to the amount of segments to fit the curves when importing or opening graphic files with round, ellipse, arc and elliptic arc. The higher the precision is, the more the amount required will be. There are five levels of highest, high, middle, low and lowest. Choose the level based on needs and click [OK].

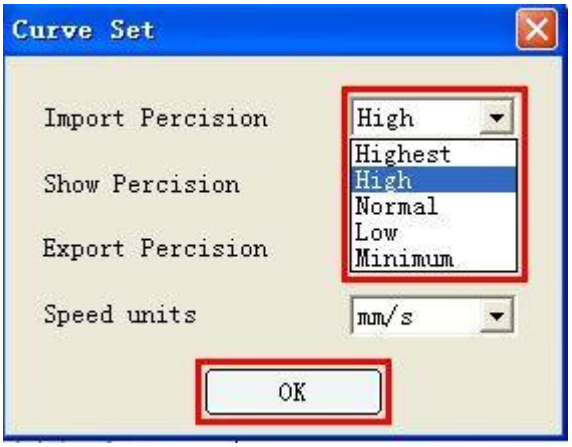

Figure 2-27

2.2.2 Display precision of curve

Display precision of curve is similar to import precision, which functions at the time of displaying images. There are five levels of highest, high, middle, low and lowest. Choose the level based on needs and click [OK].

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Figure 2-28

2.2.3 Export precision of curve

Export precision of curve refers to the amount of segments to fit the curves when exporting images or saving images. The higher the precision is, the more the amount required will be. There are five levels of highest, high, middle, low and lowest for export precision. Choose the level based on needs and click [OK].

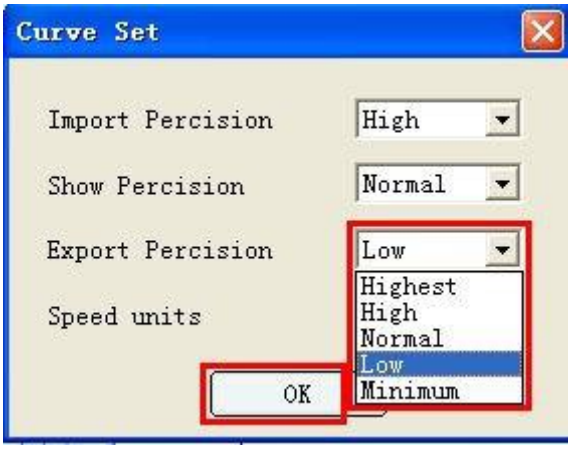


Figure 2-29

2.2.4 Speed Unit

Speed unit refers to the unit indicating speed in the dialog box of “Processing Parameters” and the right-hand coverage list and is divided into m/min and mm/s, which can be chosen based on needs and click [OK].

Figure 2-30

2.3 Language

If the current language is not desired, it is allowed to either change software language or add any other languages. If there is any error spotted in characters of current language, modification is allowed.

2.3.1 Changing language

1) Find and click [Setting] → [Language Selection] in menu bar.

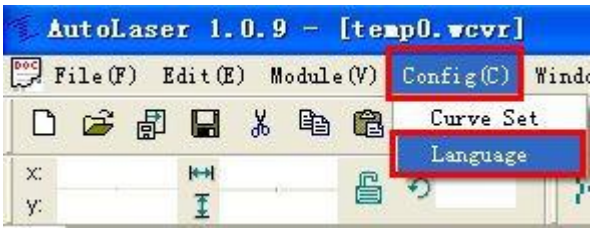


Figure 2-31

2) Pop up the dialog box of language and select required language.

Figure 2-32

Figure 2-33

3) Click [OK] as shown in Figure 2-34 and software language will take effect after machine rebooting.

Figure 2-34

2.3.2 Adding Languages

1) Find the installation dictionary of the software, i.e., “C:\Program Files\AutoLaser\” and the “Language” folder.

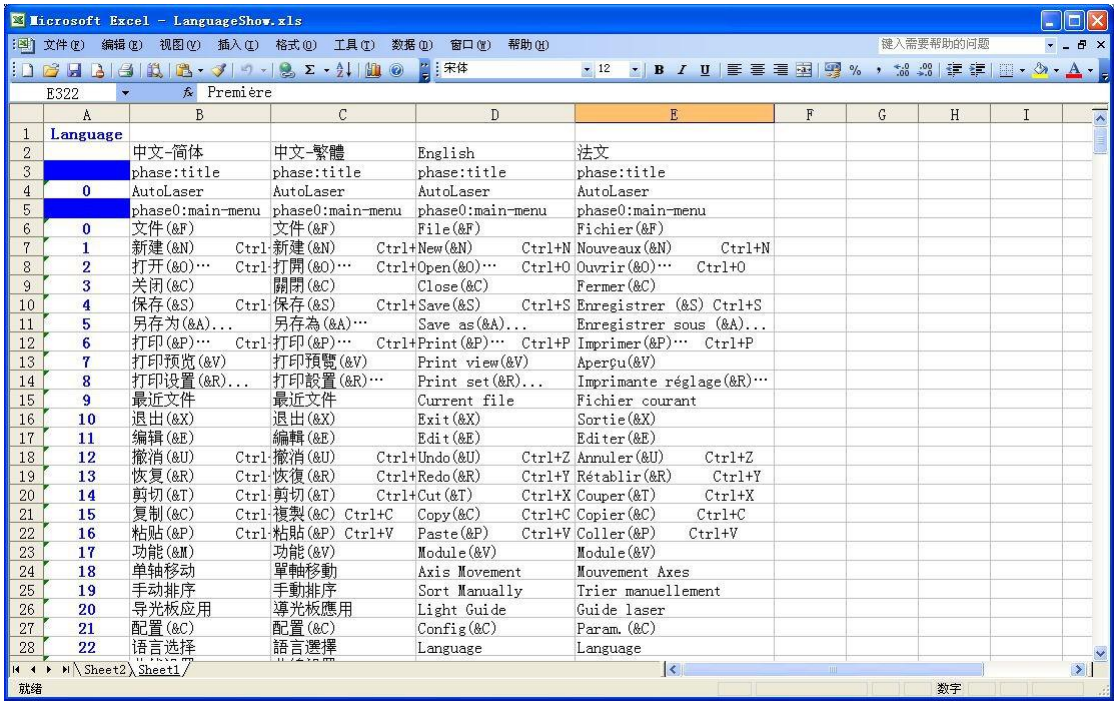
Figure 2-35

2) Double click the “Language” folder and open the “LanguageShow.xls” table.

(Note: it will need to install Excel in the computer for the purpose of opening the table.)

Figure 2-36

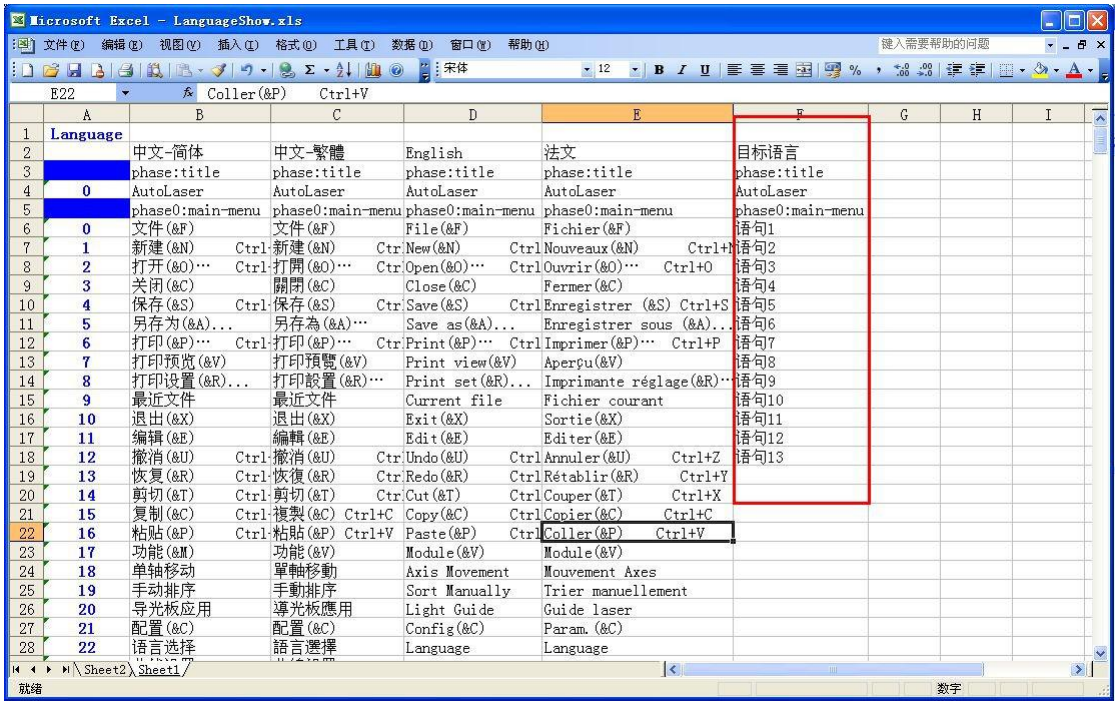
3) Open the table and the four build-in languages of the software will be seen, including simplified Chinese, traditional Chinese, English and French.



	A	B	C	D	E	F	G	H	I
1	Language								
2		中文-简体	中文-繁體	English	法文				
3		phase:title	phase:title	phase:title	phase:title				
4	0	AutoLaser	AutoLaser	AutoLaser	AutoLaser				
5		phase0:main-menu	phase0:main-menu	phase0:main-menu	phase0:main-menu				
6	0	文件(&F)	文件(&F)	File(&F)	Fichier(&F)				
7	1	新建(&N) Ctrl+	新建(&N) Ctrl+	New(&N) Ctrl+N	Nouveaux(&N) Ctrl+N				
8	2	打开(&O)… Ctrl+	打開(&O)… Ctrl+	Open(&O)… Ctrl+O	Ouvrir(&O)… Ctrl+O				
9	3	关闭(&C)	關閉(&C)	Close(&C)	Fermer(&C)				
10	4	保存(&S) Ctrl+	保存(&S) Ctrl+	Save(&S) Ctrl+S	Enregistrer (&S) Ctrl+S				
11	5	另存为(&A)...	另存為(&A)…	Save as(&A)...	Enregistrer sous (&A)...				
12	6	打印(&P)… Ctrl+	打印(&P)… Ctrl+	Print(&P)… Ctrl+P	Imprimer(&P)… Ctrl+P				
13	7	打印预览(&V)	打印預覽(&V)	Print view(&V)	Aperçu(&V)				
14	8	打印设置(&R)...	打印設置(&R)…	Print set(&R)...	Imprimante réglage(&R)…				
15	9	最近文件	最近文件	Current file	Fichier courant				
16	10	退出(&X)	退出(&X)	Exit(&X)	Sortie(&X)				
17	11	编辑(&E)	編輯(&E)	Edit(&E)	Editer(&E)				
18	12	撤消(&U) Ctrl+	撤消(&U) Ctrl+	Undo(&U) Ctrl+Z	Annuler(&U) Ctrl+Z				
19	13	恢复(&R) Ctrl+	恢復(&R) Ctrl+	Redo(&R) Ctrl+Y	Rétablir(&R) Ctrl+Y				
20	14	剪切(&T) Ctrl+	剪切(&T) Ctrl+	Cut(&T) Ctrl+X	Couper(&T) Ctrl+X				
21	15	复制(&C) Ctrl+	複製(&C) Ctrl+C	Copy(&C) Ctrl+C	Copier(&C) Ctrl+C				
22	16	粘贴(&P) Ctrl+	粘貼(&P) Ctrl+V	Paste(&P) Ctrl+V	Coller(&P) Ctrl+V				
23	17	功能(&M)	功能(&V)	Module(&V)	Module(&V)				
24	18	单轴移动	單軸移動	Axis Movement	Mouvement Axes				
25	19	手动排序	手動排序	Sort Manually	Trier manuellement				
26	20	导光板应用	導光板應用	Light Guide	Guide laser				
27	21	配置(&C)	配置(&C)	Config(&C)	Param.(&C)				
28	22	语言选择	語言選擇	Language	Language				

Figure 2-37

4) Pick a blank column at the back to save target language, translate any list of B, C, D and E into target language and fill in the corresponding table.



	A	B	C	D	E	F	G	H	I
1	Language								
2		中文-简体	中文-繁體	English	法文	目标语言			
3		phase:title	phase:title	phase:title	phase:title	phase:title			
4	0	AutoLaser	AutoLaser	AutoLaser	AutoLaser	AutoLaser			
5		phase0:main-menu	phase0:main-menu	phase0:main-menu	phase0:main-menu	phase0:main-menu			
6	0	文件(&F)	文件(&F)	File(&F)	Fichier(&F)	语句1			
7	1	新建(&N) Ctrl+	新建(&N) Ctr	New(&N) Ctrl	Nouveaux(&N) Ctrl+	语句2			
8	2	打开(&O)… Ctrl+	打開(&O)… Ctr	Open(&O)… Ctrl	Ouvrir(&O)… Ctrl+O	语句3			
9	3	关闭(&C)	關閉(&C)	Close(&C)	Fermer(&C)	语句4			
10	4	保存(&S) Ctrl+	保存(&S) Ctr	Save(&S) Ctrl	Enregistrer (&S) Ctrl+S	语句5			
11	5	另存为(&A)...	另存為(&A)…	Save as(&A)...	Enregistrer sous (&A)...	语句6			
12	6	打印(&P)… Ctrl+	打印(&P)… Ctr	Print(&P)… Ctrl	Imprimer(&P)… Ctrl+P	语句7			
13	7	打印预览(&V)	打印預覽(&V)	Print view(&V)	Aperçu(&V)	语句8			
14	8	打印设置(&R)...	打印設置(&R)…	Print set(&R)...	Imprimante réglage(&R)…	语句9			
15	9	最近文件	最近文件	Current file	Fichier courant	语句10			
16	10	退出(&X)	退出(&X)	Exit(&X)	Sortie(&X)	语句11			
17	11	编辑(&E)	編輯(&E)	Edit(&E)	Editer(&E)	语句12			
18	12	撤消(&U) Ctrl+	撤消(&U) Ctr	Undo(&U) Ctrl	Annuler(&U) Ctrl+Z	语句13			
19	13	恢复(&R) Ctrl+	恢復(&R) Ctr	Redo(&R) Ctrl	Rétablir(&R) Ctrl+Y				
20	14	剪切(&T) Ctrl+	剪切(&T) Ctr	Cut(&T) Ctrl	Couper(&T) Ctrl+X				
21	15	复制(&C) Ctrl+	複製(&C) Ctrl+C	Copy(&C) Ctrl	Copier(&C) Ctrl+C				
22	16	粘贴(&P) Ctrl+	粘貼(&P) Ctrl+V	Paste(&P) Ctrl	Coller(&P) Ctrl+V				
23	17	功能(&M)	功能(&V)	Module(&V)	Module(&V)				
24	18	单轴移动	單軸移動	Axis Movement	Mouvement Axes				
25	19	手动排序	手動排序	Sort Manually	Trier manuellement				
26	20	导光板应用	導光板應用	Light Guide	Guide laser				
27	21	配置(&C)	配置(&C)	Config(&C)	Param.(&C)				
28	22	语言选择	語言選擇	Language	Language				

Figure 2-38

(Note: The row with character “phase” does not need to be translated, and simple copy is enough, such as “phase0: min-menu”)

5) Use the build-in tool “strFile.exe” to make languages into language file. (Tools with “_CN” as suffix are Chinese interface tools and that with “_EN” are tools for English interfaces)

Figure 2-39

A) Open the authoring tool

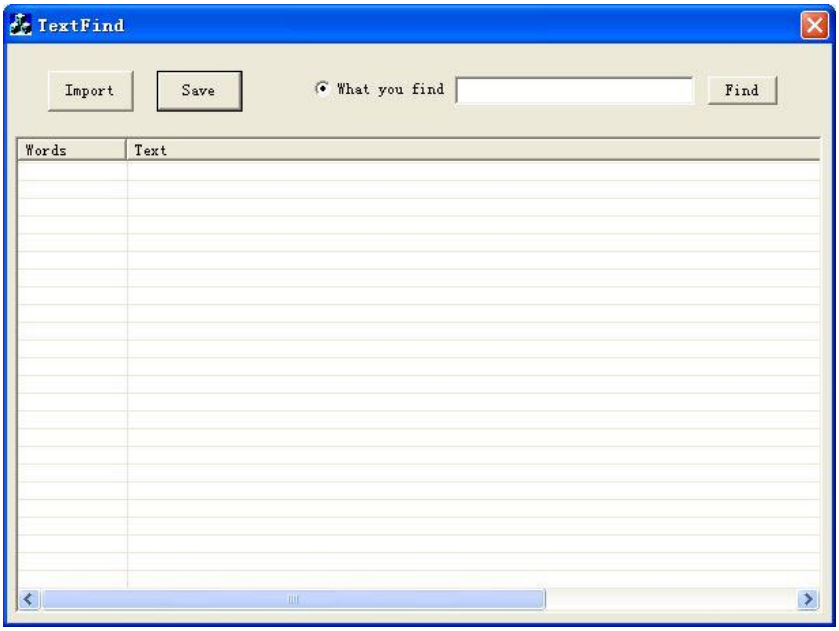


Figure 2-40

B) [Double Click] the blank and add language item; or choose one of the items, [Right Click] the [Add] button and add language item.

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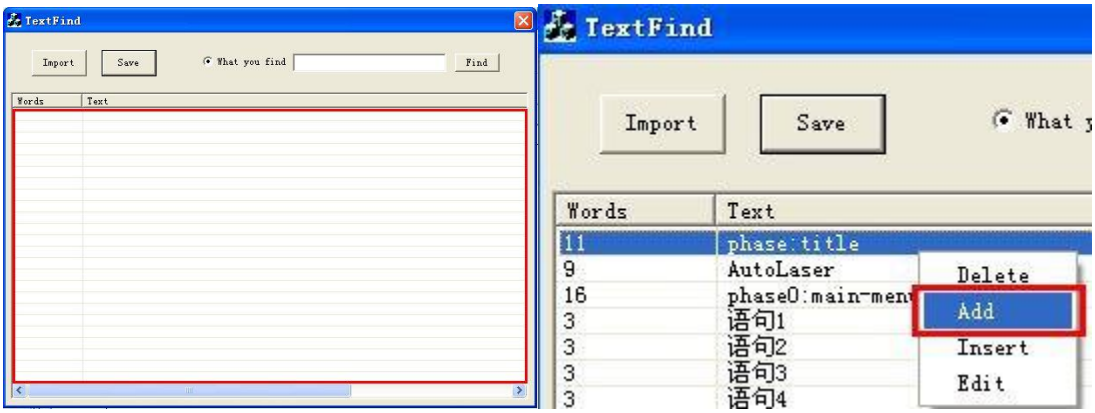


Figure 2-41

C) Add contents one by one based on contents in the table.

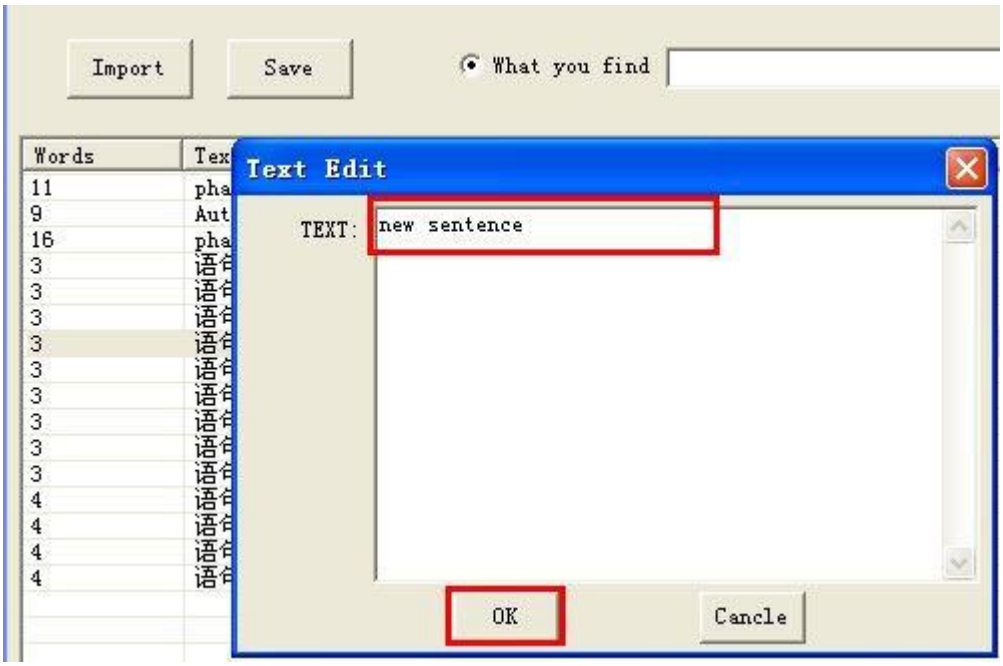


Figure 2-42

E) After the operation of adding language items is finished, click [Save] and insert the name of the target language and click [Save] again to finish the establishment of language file.

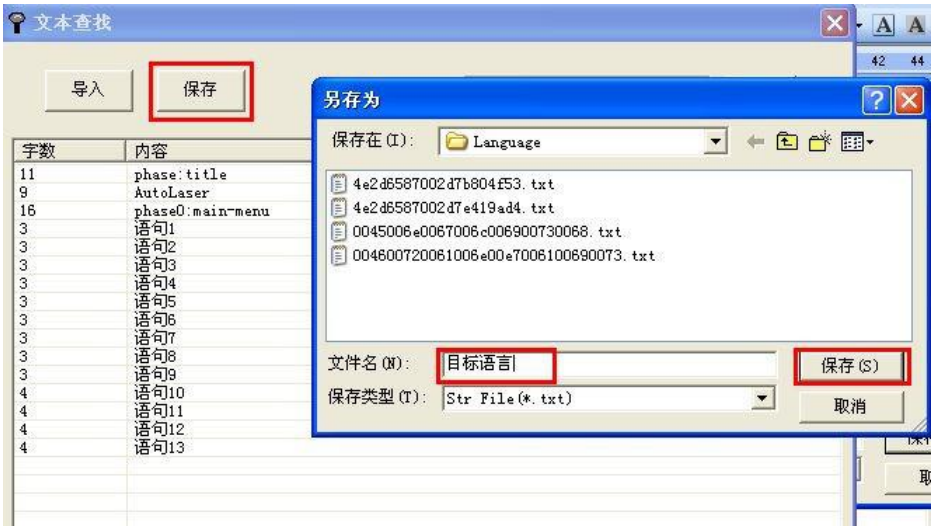


Figure 2-43

At the time, there will be an additional file which is exactly what we just established.

Figure 2-44

There will also be an additional option in the language selection interface of the software, which indicates that our establishment is successful. (Note: If the independent software is in opening state during the process of adding, the contents will only be displayed after rebooting the independent software)

Figure 2-45

2.3.3 Modifying language

1) Open the language folder in the installation dictionary, i.e., “C:\Program Files\AutoLaser\Language” and open the language tool “strFile.exe”.

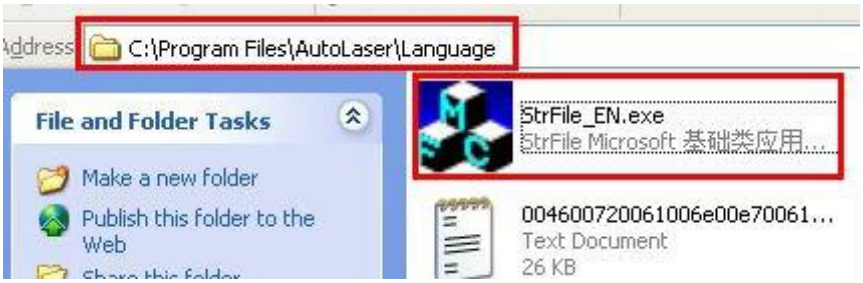


Figure 2-46

2) Open the language editing tool, click [Import], select the language file to be modified and click [Open].

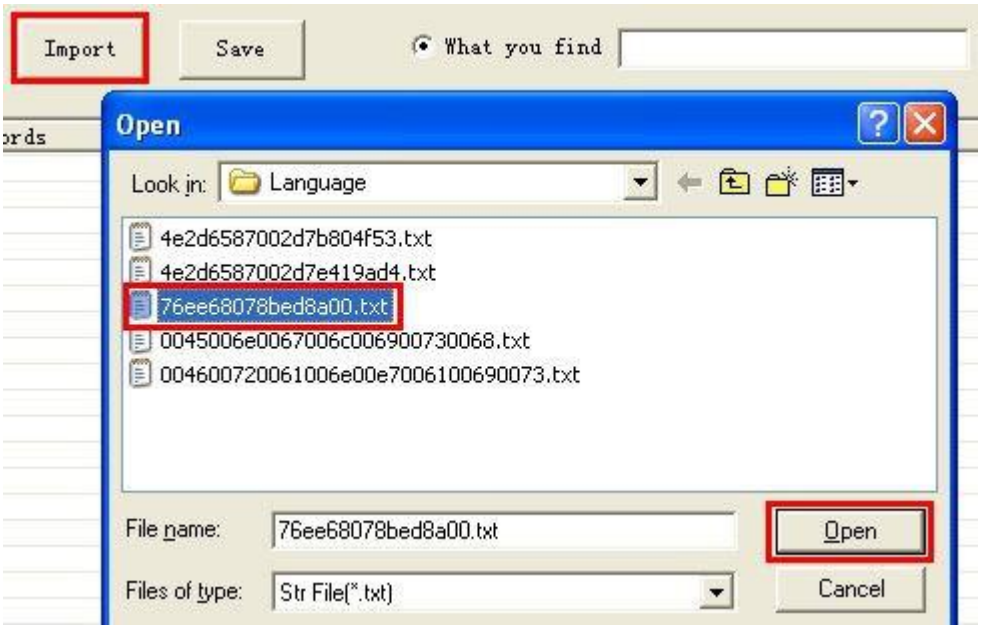


Figure 2-47

3) For example, “statement 13” is wrong and we are going to modify it. Select “statement 13” and click [Right Click] → [Edit] successively.

Figure 2-48

4) Pop up the dialog box of edit and modify “statement 13”, after which

click [OK].

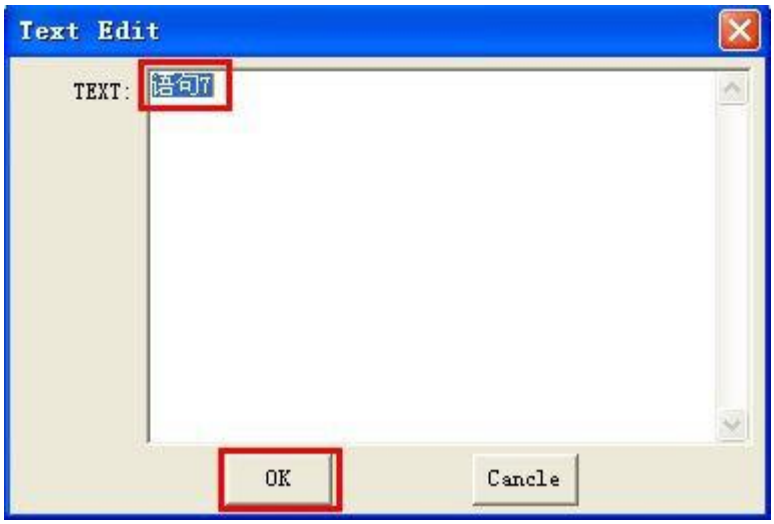


Figure 2-49

5) Modification is accomplished and save the language file. Click [Save], choose the language file and click [Save] again.

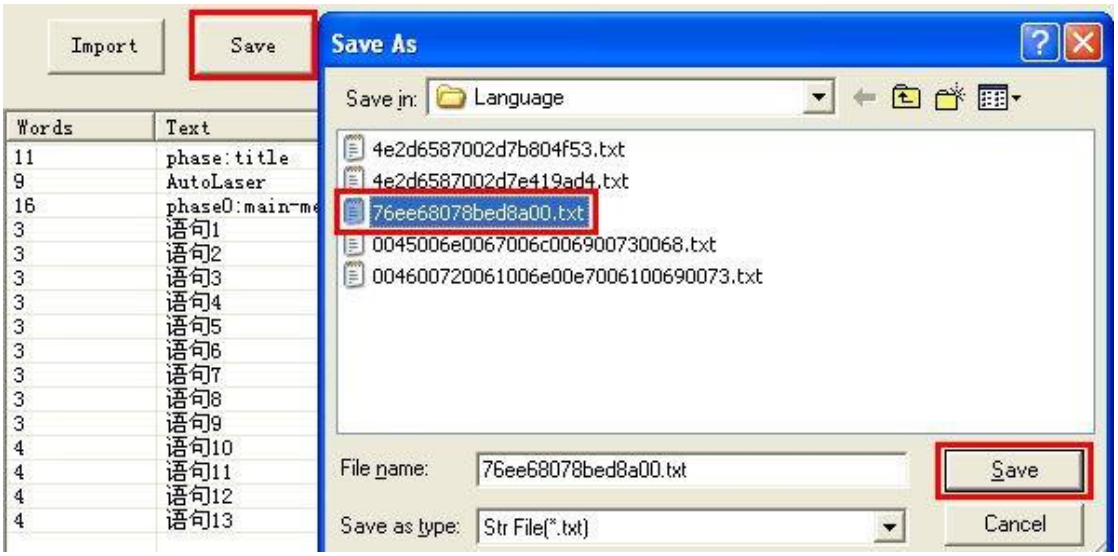


Figure 2-50

6) If there are many items in language files, it is allowed to use [Search] to quickly locate the item to be modified. (Note: the searched content is allowed to be some characters or words in the language item)

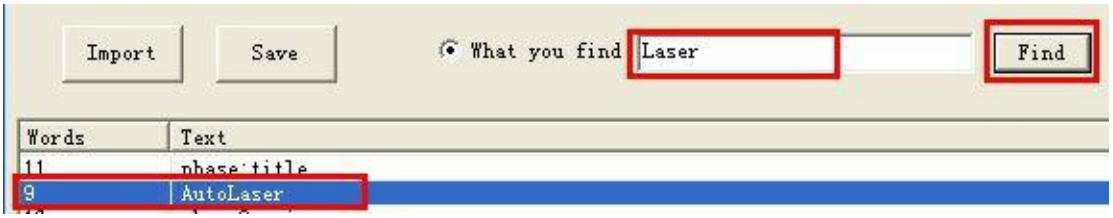


Figure 2-51

7) If the searched content does not exist in the files, prompt will be given.

Figure 2-52

2.3.4 Deleting language

1) Open the language dictionary of "C:\Program Files\AutoLaser\Language", find corresponding file and click [Delete].

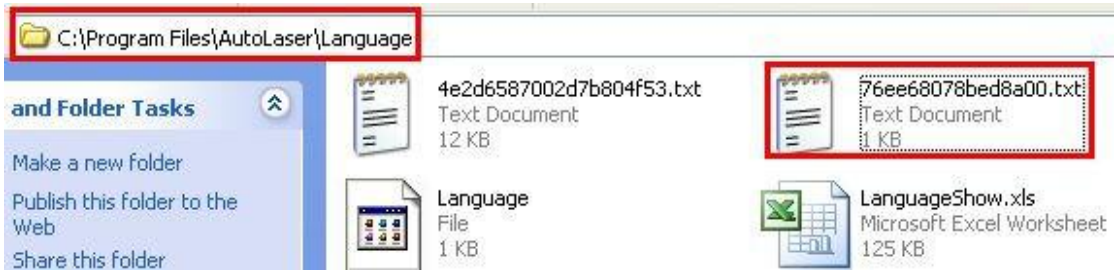


Figure 2-53

2) Open the table of "LanguageShow.xls" and [Delete] corresponding rows.

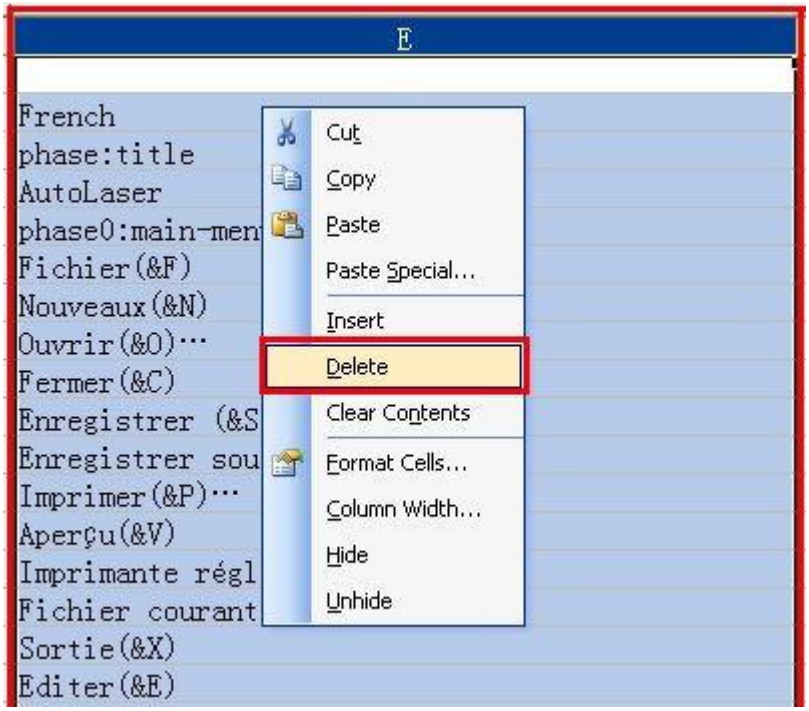


Figure 2-54

3) Delete accomplished.

Chapter III Basic Operation

3.1 New Document

New document: if there is no document before drawing image, many instructions of the software may be unusable and drawing cannot be carried out. Click [File] in menu bar → [New] order or click the “New” button in tool bar to newly establish a document.

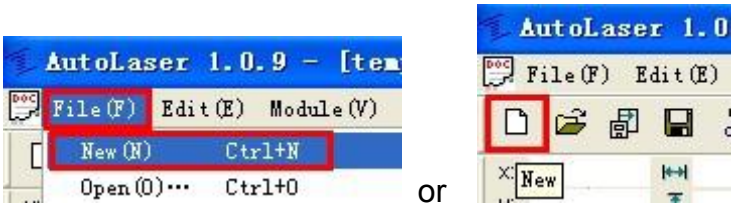


Figure 3-1

3.2 Open

Open files: if there are already drawn PLT, AI, DXF, BMP, DST and DSB graphic files, click [File] in the menu bar to [Open] order or click the “Open” button in the tool bar to pop up the dialog box.

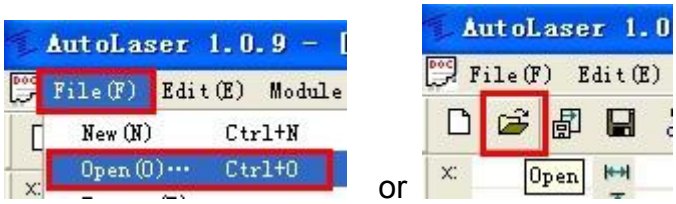


Figure 3-2

Find the location in dialog box to save files, select a file and open it. There is a preview check box in the dialog box, which could preview the files that are checked.

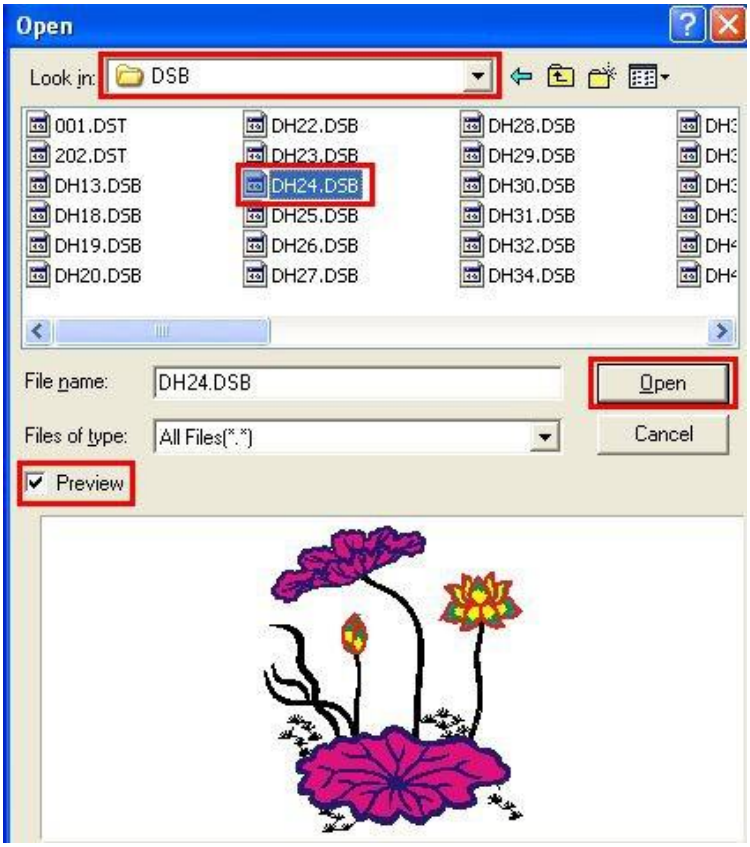


Figure 3-3

3.3 Import

It is able to apply the import function to merge several files into one. Click [File] → [Import] order in the menu bar or click the “import” button in the tool bar to pop up the import dialog box.

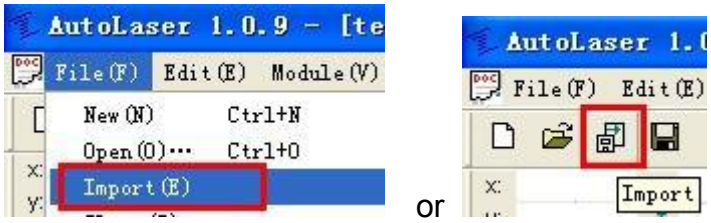


Figure 3-4

Find the location in the import dialog box to save files and import them.

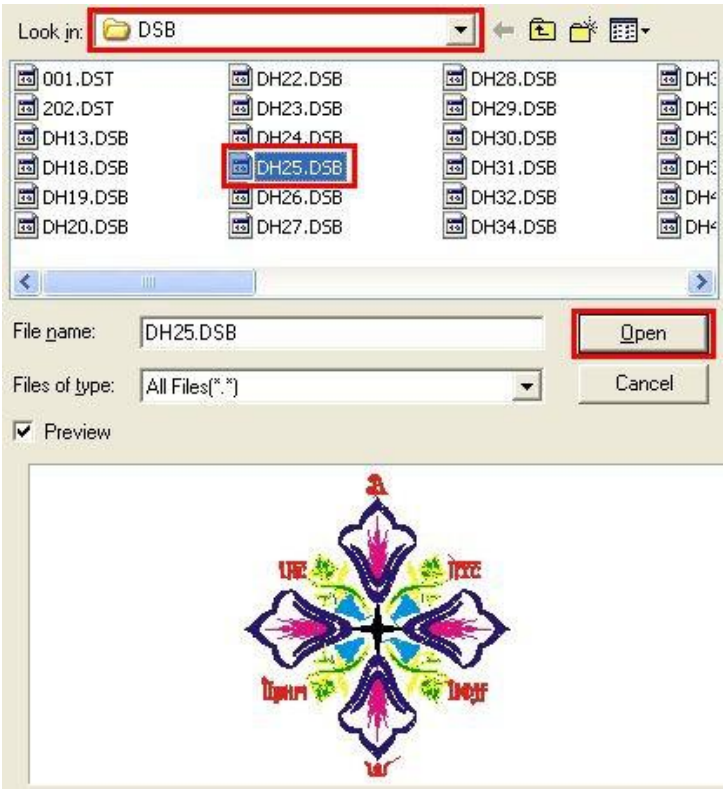


Figure 3-5

Successively import each file and arrange their locations, which could merge all imported files. For instance, merge the two images in the example and the result as follows can be realized.

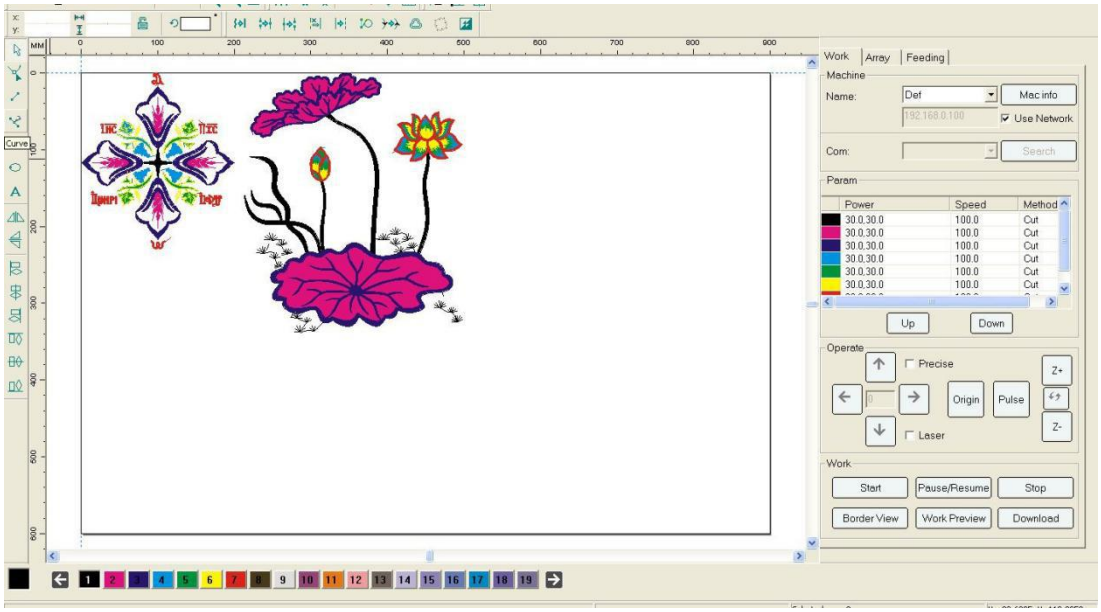


Figure 3-6

The difference between importing and opening:

- ✓ Open file: there will be a new document established every time when opening a file which cannot be combined with current files.
- ✓ Import file: there will not be a new document established every time when importing a file and it's able to add image data in current document.

3.4 Drawing Lines

Click the button in the tool bar on the left to start drawing lines.

Click at the drawing area as the beginning of the line and successively click N times to form a line consisting of N-1 segments. [Right Click] to pop up the menu and click [End] or [Enter] or the [Space] button to end drawing.

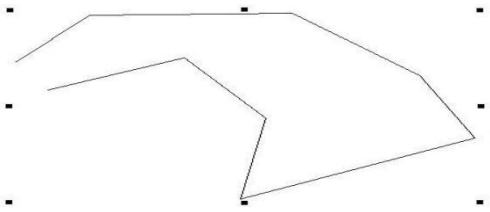


Figure 3-7

3.5 Drawing Rectangles

Click the tool in tool bar on the left to start drawing rectangles.

Press the left button of the mouth in the drawing area as a point of rectangle, drag the mouth while keeping pressing the left button till another point to form a rectangle with the diagonal of starting and ending points of the left button of the mouth.

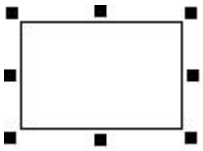


Figure 3-8

3.6 Drawing Ellipses and Rounds

Click the tool in tool bar on the left to start drawing rounds or ellipses

Press the left button of the mouth in the drawing area and drag to form a ellipse.

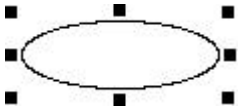


Figure 3-9

Keep pressing the [Ctrl] button in keyboard; afterwards, press the [Left Button] of the mouth and drag to form a round.

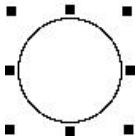


Figure 3-10

3.7 Entering Texts

Click the A tool on the left side of the tool bar, click the left button of the mouse in the drawing area; afterwards, the dialog box of entering text will appear. Enter texts in the dialog box, set the font and size and then click OK for entering text.

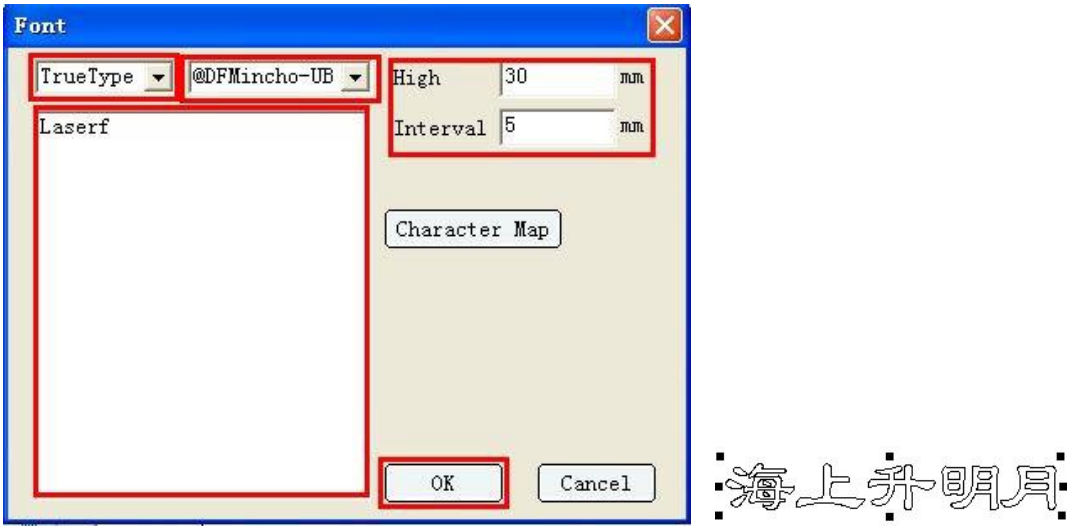


Figure 3-11

3.8 Selection

Before editing, select the graph first. Click selection and border selection are optional for selection.

3.8.1 Click selection

Click the tool on the left side of the tool bar, move the cursor to the contour line of the pixel and click the left mouse button; afterwards, eight small black squares will appear in the periphery of the pixel, representing that the pixel that has been selected. Press the [Shift] button on the keyboard, and perform click selection continuously to select multiple pixels.

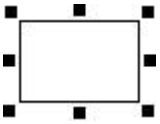


Figure 3-12

3.8.2 Border selection

Click the tool on the left side of the tool bar, and click the mouse in the drawing area to draw a dotted rectangle by drag the mouse.

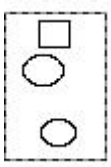


Figure 3-13

After the pixels are framed by the rectangle, release the left mouse button and the pixels are selected, as shown in Figure 3-14.

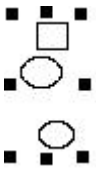


Figure 3-14

3.9 Mirror Image

Mirror image falls into horizontal image and vertical image.

Figure 3-15

3.9.1 Horizontal mirror image

After the selection of pixels, click the “horizontal mirror image” and all the selected pixels will regard the horizontal center line of the exterior rectangles as the mirror surface to make mirror image.

Front View of the Mirror Image Figure 3-16

Rear View of the Mirror Image Figure 3-17

3.9.2 Vertical mirror image

After the selection of pixels, click the “vertical mirror image” and all the selected pixels will regard the vertical center line of the exterior rectangles as the mirror surface to make mirror image.

Front View of the Mirror Image Figure 3-18

Rear View of the Mirror Image Figure 3-19

3.10 Rotation

After the selection of pixels, enter the angle in the tool bar

in the upper side of the drawing area. Entering positive pixel will lead to clockwise rotation, while entering negative pixel will lead to counterclockwise

rotation. Afterwards, press the “Enter” button, and all the selected pixels will rotate with the central point of the exterior rectangles as the rotation point.

Before Rotation Figure 3-20

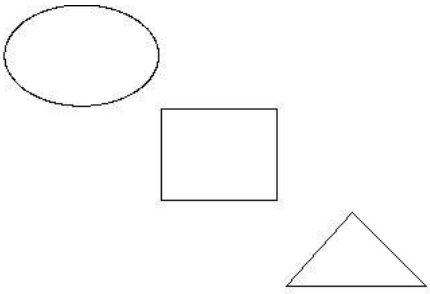
After Rotation Figure 3-21

3.11 Pixel Alignment

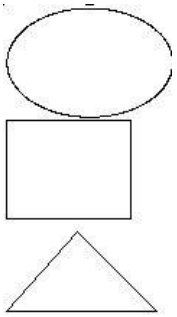
Pixel alignment is the operation for two or more pixels.

3.11.1 Left horizontal alignment

After selection of more than two pixels, click the [left horizontal alignment] on the left side of the tool bar or press the [L] button on the keyboard and all the selected pixels will be left-aligned.



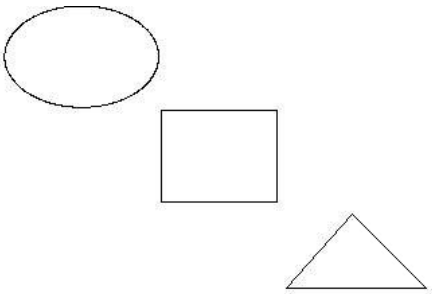
Before Alignment Figure 3-22



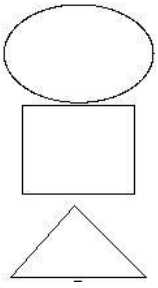
After Alignment Figure 3-23

3.11.2 Center horizontal alignment

After the selection of more than two pixels, click the [center horizontal alignment] on the left side of the tool bar or press the [E] button on the keyboard and all the selected pixels will be horizontally center-aligned.



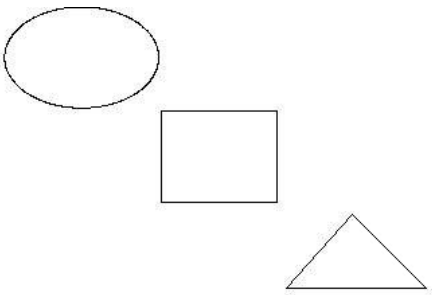
Before Alignment Figure3-24



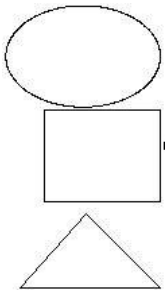
After Alignment Figure3-25

3.11.3 Right horizontal alignment

After the selection of more than two pixels, click the [right horizontal alignment] on the left side of the tool bar or press the [R] button on the keyboard and all the selected pixels will be right-aligned.



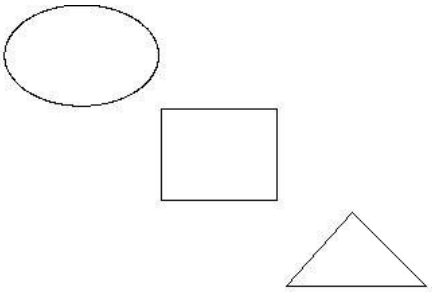
Before Alignment Figure3-26



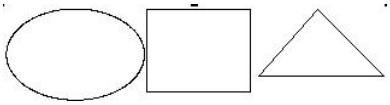
After Alignment Figure3-27

3.11.4 Top vertical alignment

After the selection of more than two pixels, click the [top vertical alignment] on the left side of the tool bar or press the [T] button on the keyboard and all the selected pixels will be top-aligned.



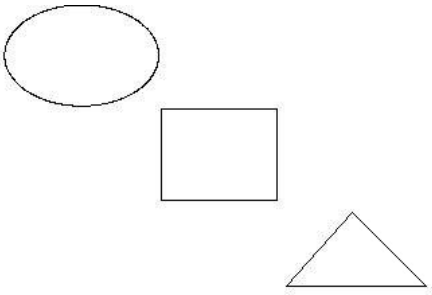
Before Alignment Figure3-28



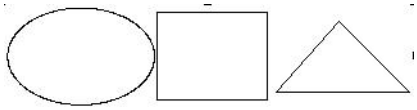
After Alignment Figure3-29

3.11.5 Center vertical alignment

After the selection of more than two pixels, click the [center vertical alignment] on the left side of the tool bar or press the [C] button on the keyboard and all the selected pixels will be vertically center-aligned.



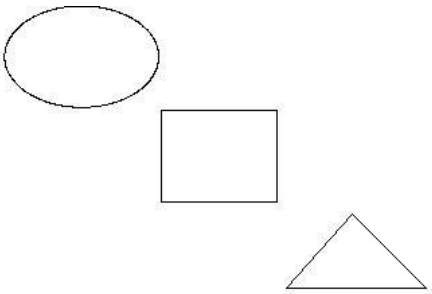
Before Alignment Figure3-30



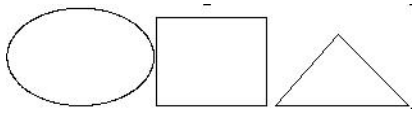
After Alignment Figure3-31

3.11.6 Bottom vertical alignment

After the selection of more than two pixels, click the [bottom vertical alignment] on the left side of the tool bar or press the [B] button on the keyboard and all the selected pixels will be bottom-aligned.



Before Alignment Figure3-32



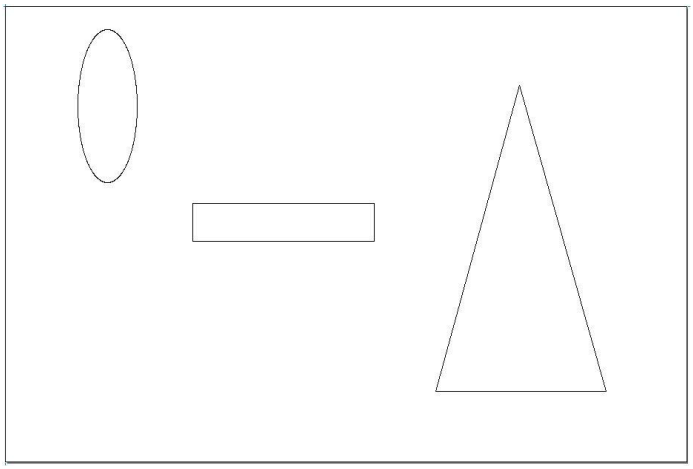
After Alignment Figure3-33

3.12 Alignment of pixels with breadth

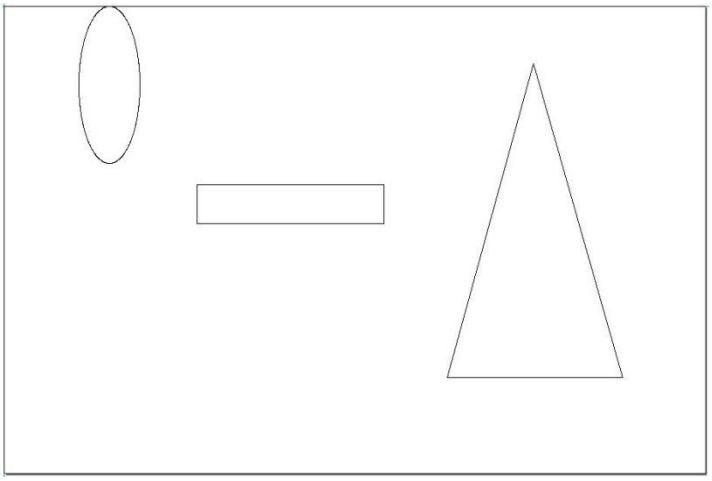
Align all selected pixels and formats with all exterior rectangles of the selected pixels as the reference. In case of no pixels being selected, all pixels will be defaulted as being selected.

3.12.1 Top alignment of pixels with breadth

Click the “top alignment” tool on the left side of the top tool bar and the selected or all pixels will be aligned with the top of the breadth with the exterior rectangle as the reference.



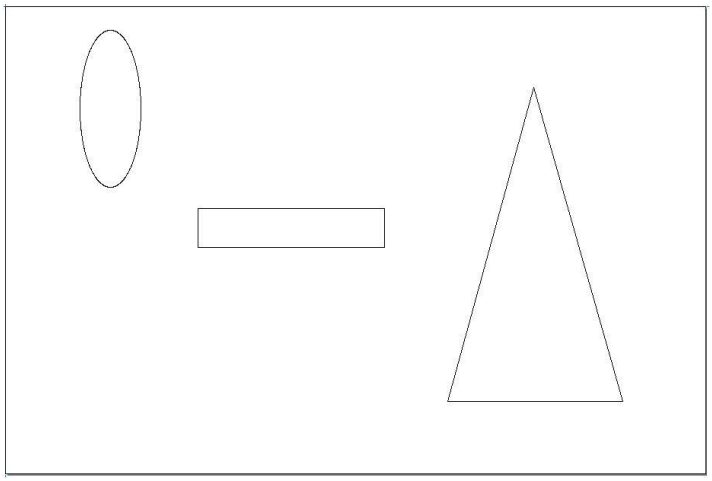
Before Alignment Figure3-34



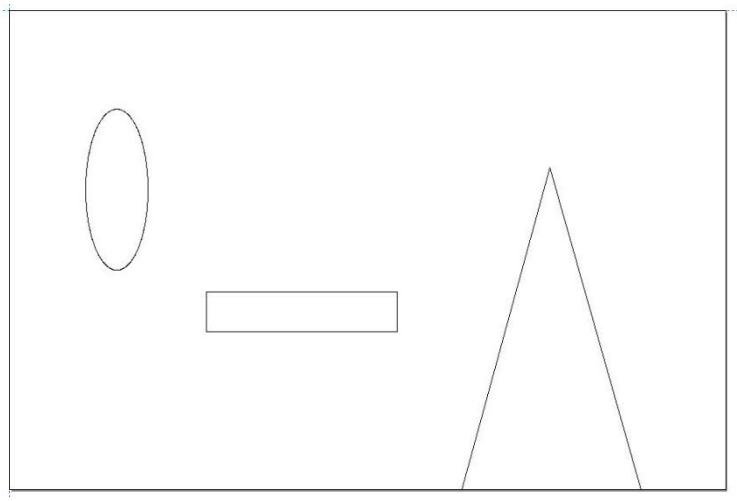
After Alignment Figure3-35

3.12.2 Bottom alignment of pixels with range

Click the “bottom alignment” tool on the left side of the top tool bar and the selected or all pixels will be aligned with the bottom of the breadth with the exterior rectangle as the reference.



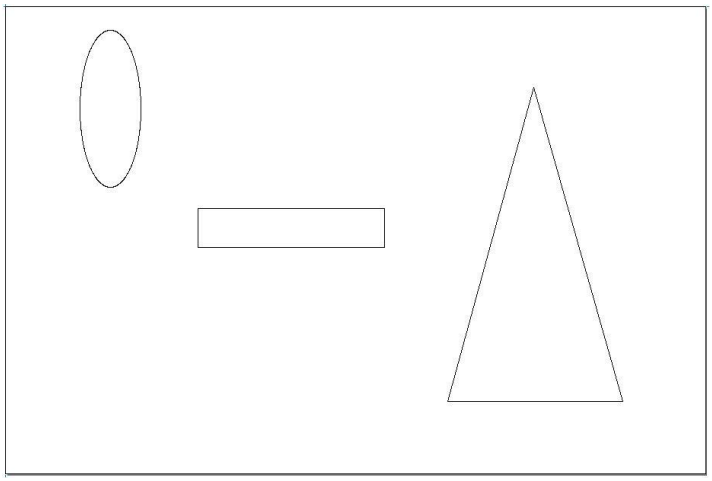
Before Alignment Figure3-36



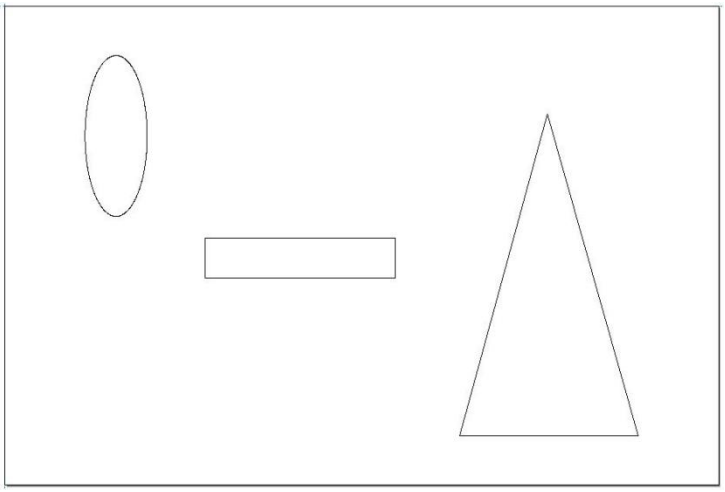
After Alignment Figure3-37

3.12.3 Alignment of pixels with breadth center

Click the “center alignment” tool on the left side of the top tool bar and the selected or all pixels will be aligned with the center of the breadth with the exterior rectangle as the reference.



Before Alignment Figure3-38



After Alignment Figure3-39

3.13 Group

The group toolbar is as shown in Figure 3-40:

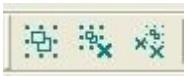


Figure 3-40

From left to right, they are Group, Dissolve Group and Dissolve All Groups

is the group tool, making all currently selected pixels into one group and does not support nested group; if there is groups in currently selected pixels, the groups will be scattered for regrouping.

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is the tool for canceling groups, dissolving currently selected groups. The "dissolution" function is only for dissolving currently selected groups.

is the tool for canceling all groups, being able to dissolve all groups in the selected graphs (including group nesting).

3.14 Graph Array

3.14.1 Virtual array

Dialog box toolbar on the right side of the software's main interface, the "Array" of the second page is as shown in Figure 3-41. **If double-laser head is needed for processing, please select virtual array for typesetting:**

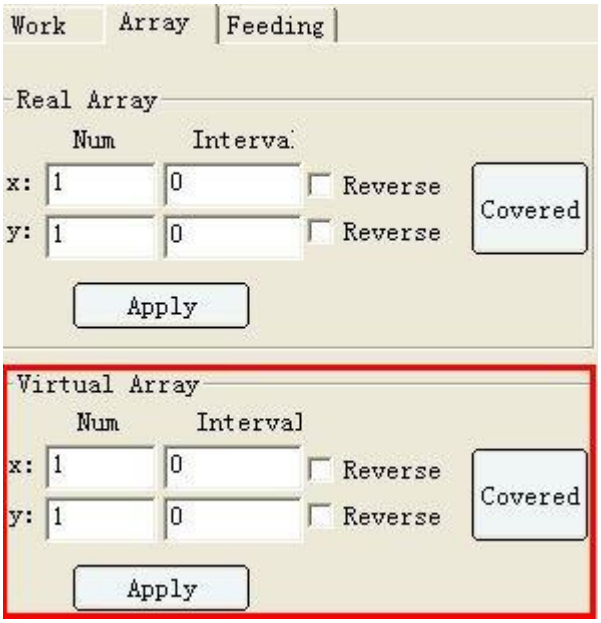


Figure 3-41

After the selection of pixels, enter the interval (the interval among pixels) and click the [Fully Occupied] button to pop up the dialog box of automatic fully-occupied setting. As shown in Figure 3-42, enter the breadth to be arrayed (width and height) and click the [Application] button and the software will calculate the row number, the column number and the remaining size in the designated breadth according to the width, height and interval entered by users; refresh the calculated row and column number to the "Array" page, as shown in Figure 3-43 and generate virtual pixels, as shown in Figure 3-44.

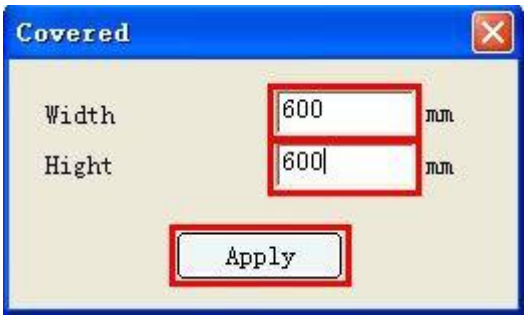


Figure3-42

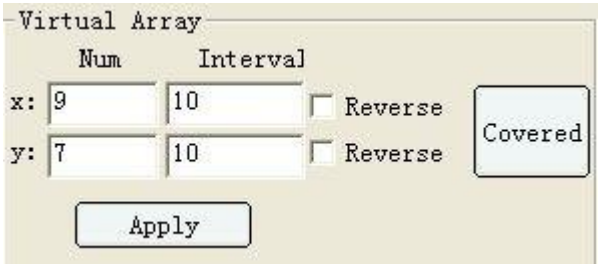


Figure 3-43

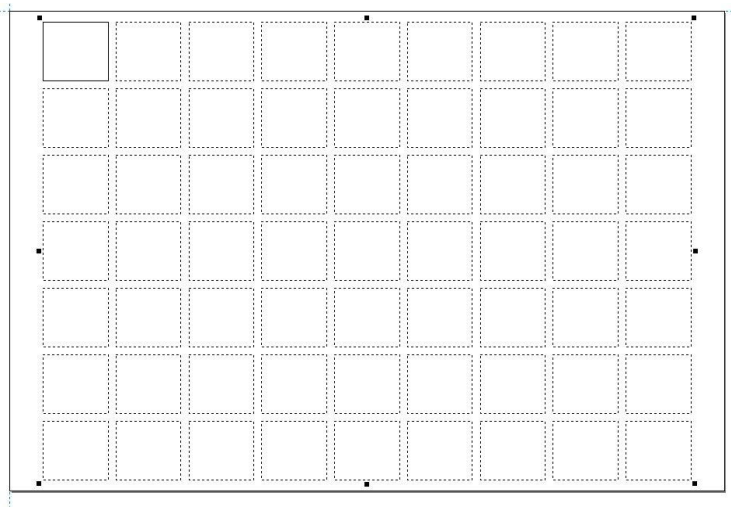


Figure 3-44

As shown in Figure 3-41, if full occupancy is not required, after entering the row number y & interval and column number x & interval after the selection of the pixels, click [Application] and pixels will be generated.

3.14.2 Real array

Select the pixels to be arrayed. Real array is at the top of the second “Array” of the dialog box on the right side of the software’s main interface, as shown in Figure 3-45:

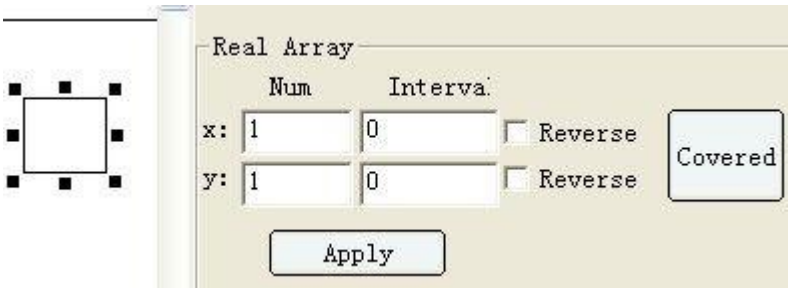


Figure3-45

[Fully Occupied]: the application method of real array is the same as that of virtual array. What makes them different is that the pixel finally generated is real pixel in real array, while that in virtual array is virtual.

3.15 Color Attribute

Color toolbar in the software is as shown in Figur3-46:

Figure 3-46

There are 256 colors optional for users. One color represents one layer and each layer can be set with different processing parameters and different layers as well, reaching the processing sequence of setting different graphs for different layer.

Figure 3-47

3.15.1 Graph color

The software has its own color list. If the opened graph document has color information, the software will select the most similar color in the list according to each color; if there is no color information in the opened graph (for example, PLT is only with pen number), the software will transfer its color as that in the color list of the graph in turn. Therefore, for documents with relatively complicated color or without color information, though the color displayed after being opened may be different from that in other software, the color type remains the same.

3.15.2 Creating new layers

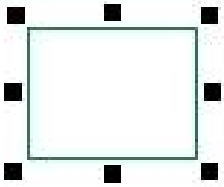
Click a certain color by the left mouse button to draw and the newly generated graph will use the selected color.

Select Color Figure 3-48

Draw Graphs Figure 3-49

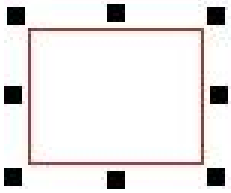
3.15.3 Modifying the color of pixels

In case of modifying the color of already existing pixels, select the graph to be modified by mouse and click the targeted color in the color list at the bottom by the left mouse button.



Select Graphs Figure 3-50

Click Color Figure 3-51



Color Change Figure 3-52

3.16 Data Processing

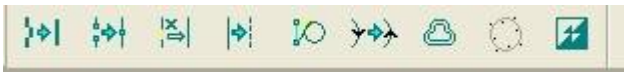


Figure 3-53

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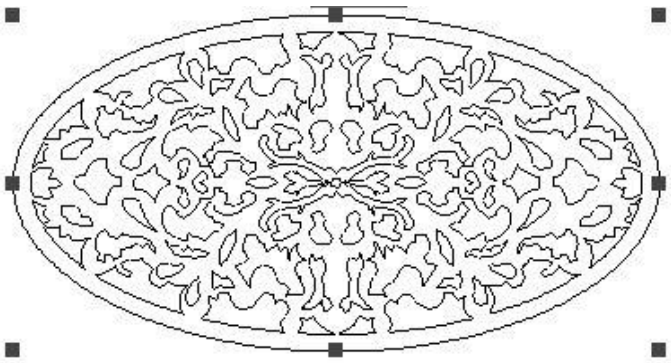
3.16.1 Combining multiple segments

The function of combining multiple segments is the pre-processing process of changing a curve in high precision into one that is more appropriate for processing. The operating process is as follows.



Graph to Be Combined Figure 3-54

Select the graphs to be combined and click [Combine Multiple Segments] with the symbol as .

3.16.2 Combine neighboring segments

The function of neighboring combining is a pre-processing process for nonstandard graphs. If a graph is an entity, but each segment of the graph is generated separately during authoring, as a result of which, the originally independent pixel with only one starting point and one terminal point becomes multiple independent segments. In such a situation, the function of “Combine Neighboring Segments” can be used.

Click the button and the dialog box of parameter setting will appear as Figure 3-55.

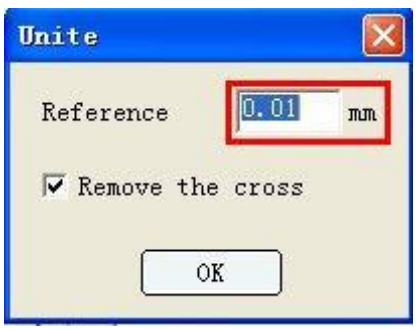


Figure 3-55

[Reference Distance]: Indicate the minimum distance between ends of two neighboring lines which this function allows, when the two lines can be treated as a whole.

[Remove Crossing]: If the ends of two neighboring lines meet the requirements of combination, but there is a crossing point between them, it needs to remove the crossing part. See Figure 3-56 and Figure 3-57 for the change.

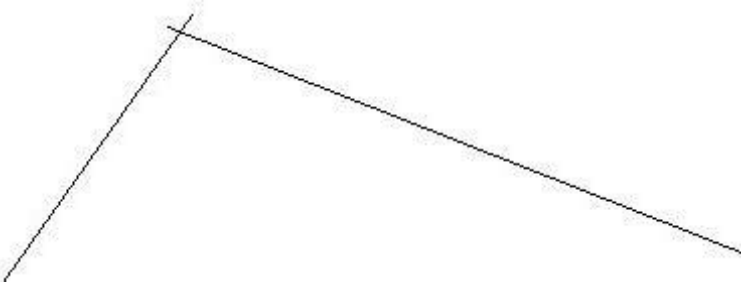


Figure 3-56

Change into:

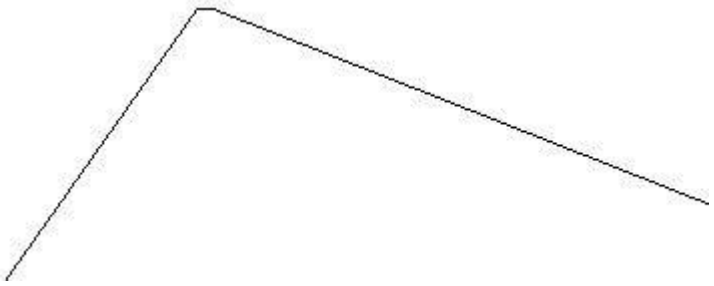


Figure 3-57

The two lines change into one fold line.

3.16.3 Removing overlaps

When three squares are joined together, each of them will have one boundary overlap with each other. Click the “Remove overlap” button with the symbol as , as shown in Figure 3-58.

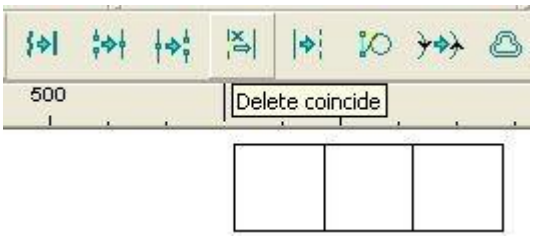


Figure 3-58

The following dialog box appears.

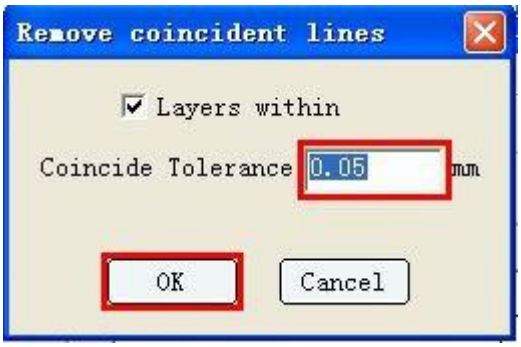


Figure 3-59

After executing the operation, use the mouse to drag the graph and it is able to get Figure 3-60:

Figure 3-60

For laser cutting, removing redundant common lines can enhance the processing efficiency.

3.16.4 Processing lead

Click the “Cut Lead” button with the symbol as and the following dialog box will appear.

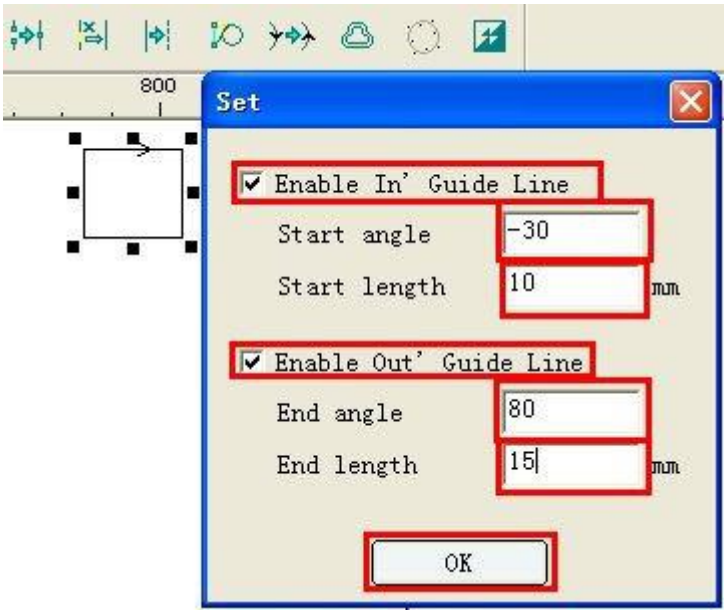


Figure 3-61

After clicking [OK], it will change into:

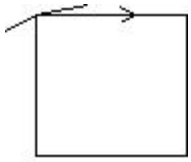


Figure 3-62

It is allowed to define the direction angle and length of the lead as required.

3.16.5 Pixel direction

Edit the processing direction of the graph. The operation is as shown in Figure 3-63:

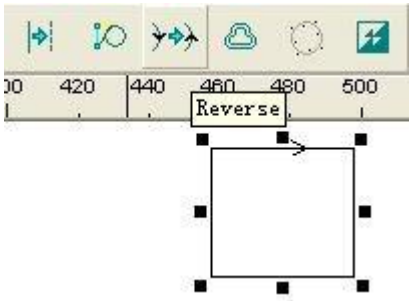


Figure 3-63

Click reverse and it turns into:

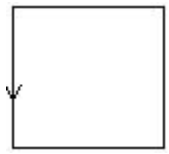


Figure 3-64

3.16.6 Profile zooming

Make uniform profile modification against the original graphs in order to counteract the errors caused by laser spots. The above toolbar buttons are as the following.

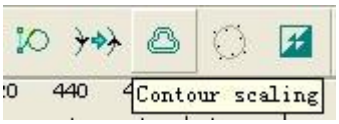


Figure 3-65

After selecting the graph, click the button and the following dialog box as Figure 3-66 will appear.

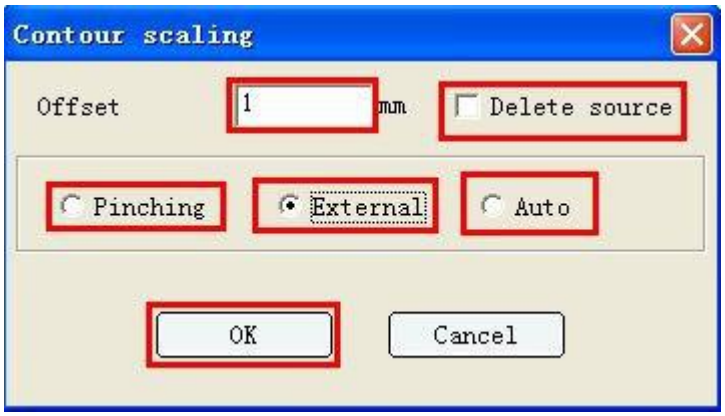


Figure 3-66

Set the zooming mode and the parameters such as distance as required and click “OK”. The zooming effect is as shown in Figure 3-67.

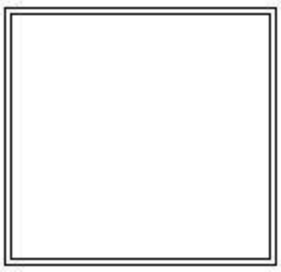


Figure 3-67

3.16.7 Fairing

Figure 3-68

For files in the formats of *.dst, *.dsb and *plt, the rims may be rough due to authoring, as shown in Figure 3-69.

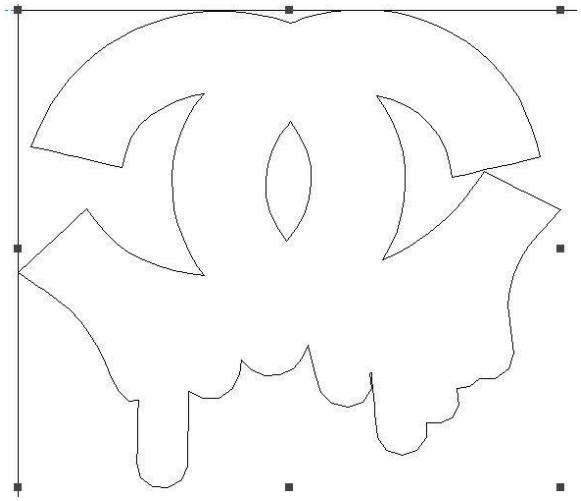


Figure 3-69

At this time, users can select the graph, and then click the “Fair” to smooth the rims. As a result, graph rims will get smooth, as shown in Figure 3-70.

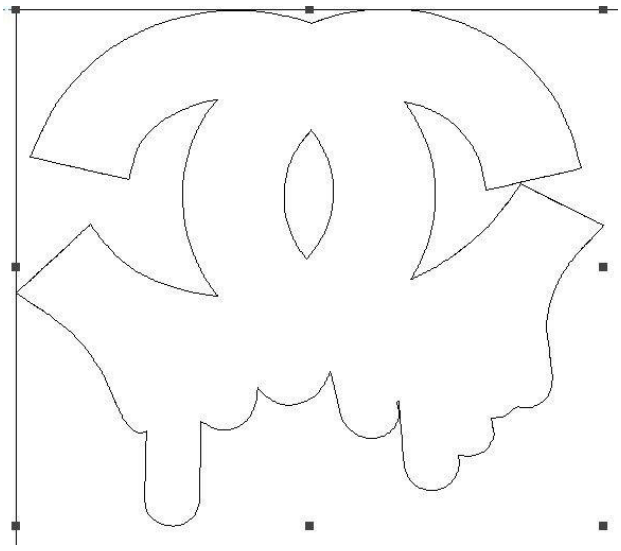


Figure 3-70

3.16.8 Color invert of bitmap

Process the bitmap in intaglio or in relief. See the following figure for the button on the toolbar.

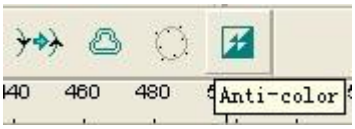


Figure 3-71

Select the bitmap pixel. Click the button and the following effect will be created.

Binary Image Figure 3-72

Change into:

Figure 3-73

Grey-Scale Map Figure 3-74

Change into:

Figure 3-75

3.17 Starting Point Setting

Setting the starting point of the graph for processing must be made under the state of node editing. Therefore, please enter node editing first.

Click the “Shape” button with the symbol as and select part or all of the pixel through border selection or click selection. It is able to clearly review the nodes on the pixel after appropriate zooming, as shown in Figure 3-76.

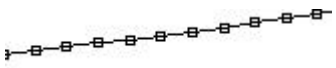


Figure 3-76

Move the mouse to a node; afterwards, click the right button and the following menu will pop up.

Figure 3-77

Click “Set the Starting Point” to finish the setting of the starting point.

3.18 Display

Pixel’s display toolbar is in the front of the drawing area. See Figure 3-78.

Figure 3-78

3.18.1 Display the processing sequence serial number

Click the “Display Serial Number” as , to display the pixel’s processing sequence serial number.

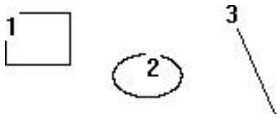


Figure 3-79

3.18.2 Display jumper

Click the “Display Jumper” button as , to display the jumper between pixels.

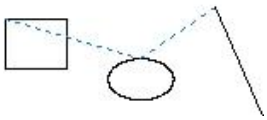


Figure 3-80

3.18.3 Display processing direction

Click the “Display Direction” button as and the pixel processing direction will be shown.

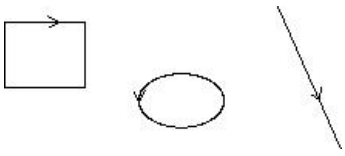


Figure 3-81

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3.18.4 Display the starting point

Click the “Display the Starting Point” button as and the starting point of processing of the pixel will be shown.

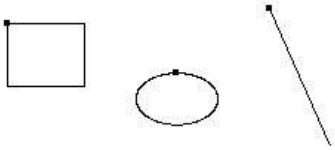

Figure 3-82

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Chapter IV Output Processing

4.1 Layer Parameters

Layer parameters are relevant to colors. The same kind of colors uses the same layer parameter. There is a list of layer parameters at the bottom of the “Working” page in the dialog box toolbar in the right part of main interface of the software. See Figure 4-1.

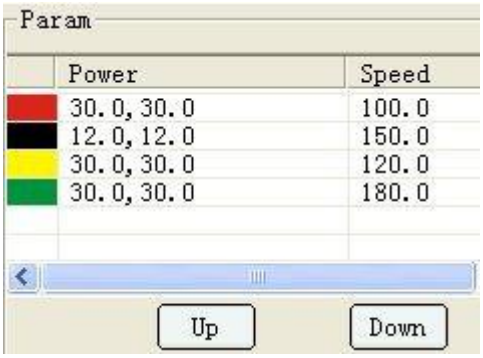

Figure 4-1

As shown in Figure 4-1, the layers from top to bottom in the list indicates the sequence of processing. Red layer pixels are the first to be processed, followed by black layer, yellow layer and green layer successively. After selecting a layer, it is allowed to change the processing sequence by clicking the [Move up] or [Move down] buttons.

Pitch on a certain layer and double click the mouse, to open the parameter setting dialog box, as shown in Figure 4-2.

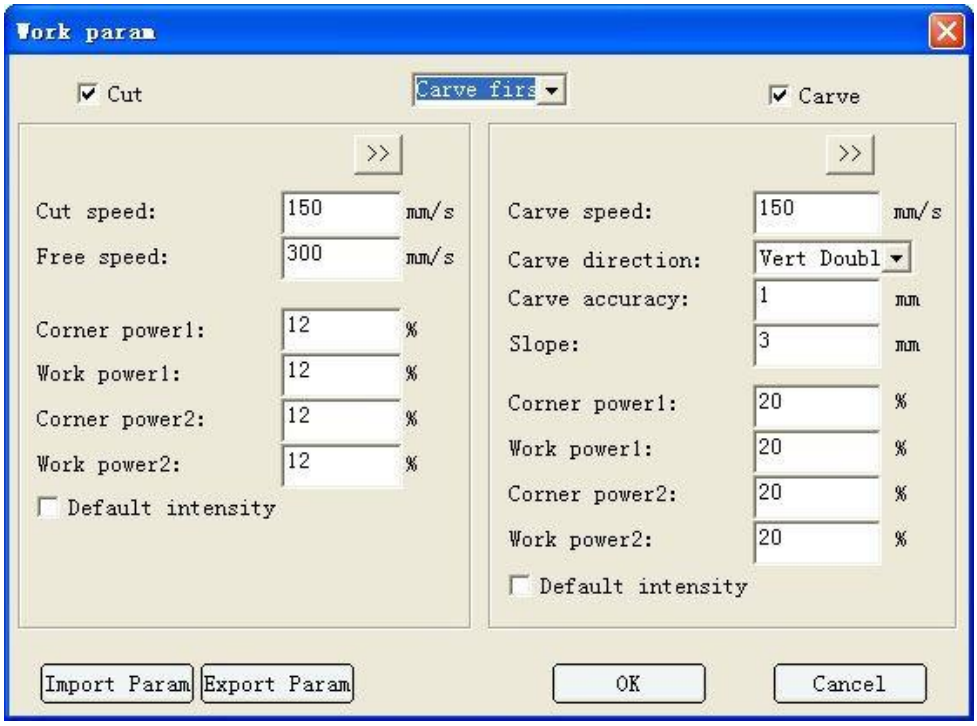

Figure 4-2

Set parameters for the current layer.

4.1.1 Cutting and carving priority setting

If a layer needs to go through cutting and carving, it is allowed to set the sequence of them two. Click the list box as shown in Figure 4-3 to set their priority.

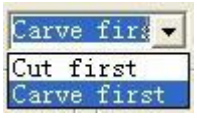

Figure 4-3

4.1.2 Cutting parameters

When setting cutting parameters as shown in Figure 4-4, it needs to click the [Cut] option as first.

The parameter of Light Intensity 1 is corresponding to the first laser head and that of Light Intensity 2 to the second one.

[Cutting Speed]: refers to the movement speed of laser heads during bright dipping processing. When it is set as 0, the default processing speed of the control card will be used.

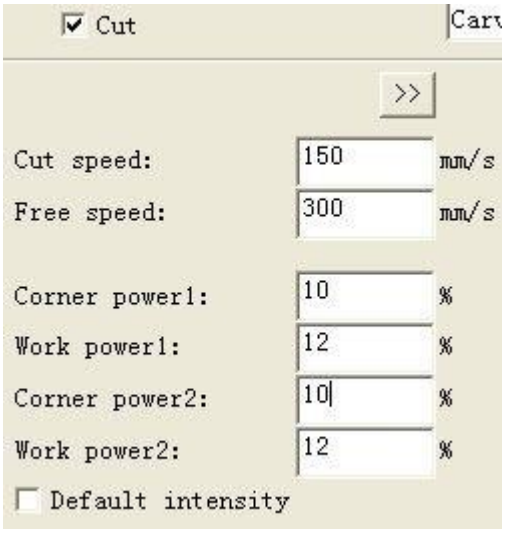

Figure 4-4

[Traveling Speed]: the movement speed of laser head under non-bright dipping non-processing state. When it is set as 0, the default traveling speed of the control card will be used.

[Turning Light Intensity]: the light intensity sent out by laser at corners.

[Working Light Intensity]: the light intensity sent out by laser when reaching the cutting speed.

[Default Light Intensity]: when default light intensity is selected, default light intensity parameter set on the control card will be used.

[>>]: click the “extend” button and a dialog box for setting of the cutting extension function will pop up. See Figure 4-5.

[Blow]: it defines whether the draught fan is working or not when the device is in operation; if [Blow] and [Auto Control] are selected, only when laser sends out light, will the device “blow”; if [Blow] is selected but not [Auto Control], the device will “blow” in the whole process.

[Start-up Delay]: it defines the time that a laser waits for light dipping in situ at the beginning of a pixel.

[Finish Delay]: it defines the time that a laser waits for light dipping in situ at the end of a pixel.

[Dot]: it allows users to make smooth line graphs work in discontinuous dot mode.

[Interval]: it refers to the distance between dots.

[Time]: it refers to the time of bright dipping in situ when doting a point.

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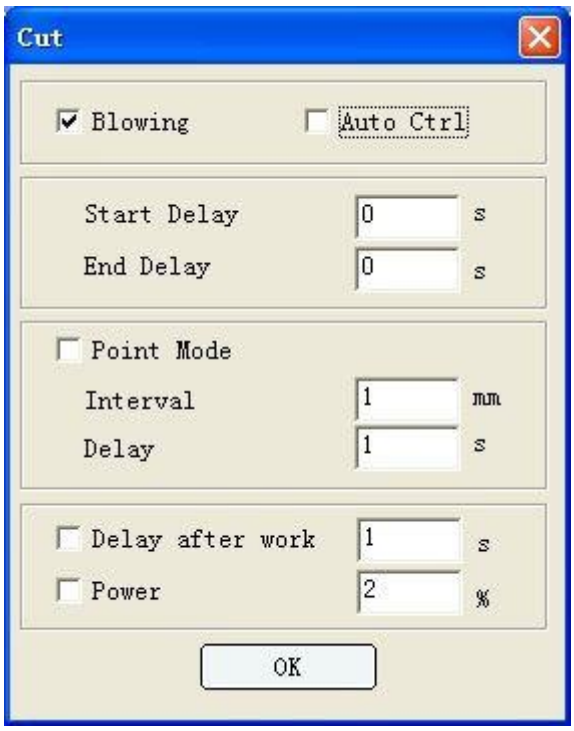
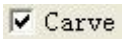


Figure 4-5

[Post-processing Delay]: it refers to the retention time after layer processing finishes.

[Light Intensity]: it refers to the light intensity kept by the laser tube during post-processing delay.

4.1.3 Carving parameters

Before setting carving parameters, please select the "Carve" button as 

first. See Figure 4-6：

[Carving Speed]: it refers to the working speed during normal bright dipping.

[Carving Mode]: it refers to the working mode during device bright dipping, which is divided into "horizontal & unidirectional", "horizontal & bidirectional", "vertical & unidirectional" and "vertical & bidirectional".

[Carving Precision]: it refers to the distance between two neighboring bright dipping lines.

[Slope]: set the slope length for slope carving. Turning light intensity determines top depth. The stronger the turning light intensity is, the deeper the top will be; working light intensity determines graph depth. The stronger the light intensity is, the deeper the graph will be; slope distance determines the distance from the slope top to the bottom. The larger the distance is, the gentler the slope will be.

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[Turning Light Intensity]: it refers to the laser light intensity in slope carving.

[Working Light Intensity]: it refers to the light intensity during bright dipping operation or the light intensity used at the deepest point of the graph in slope carving.

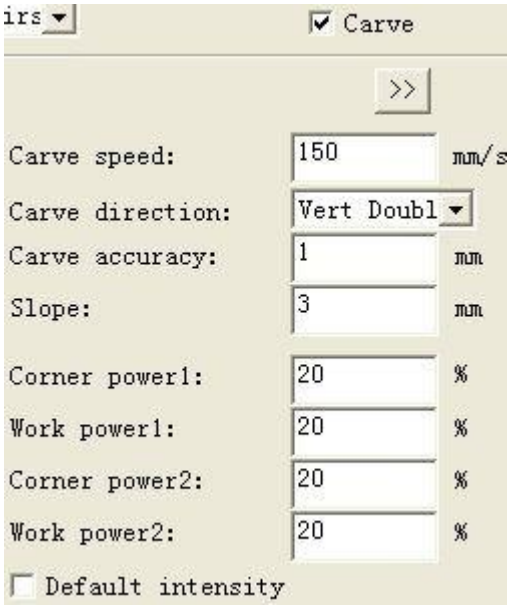


Figure 4-6

[>>]: click the “Extend” button and the dialog box for extended carving functions will pop up. Click to open it, as shown in Figure 4-7.

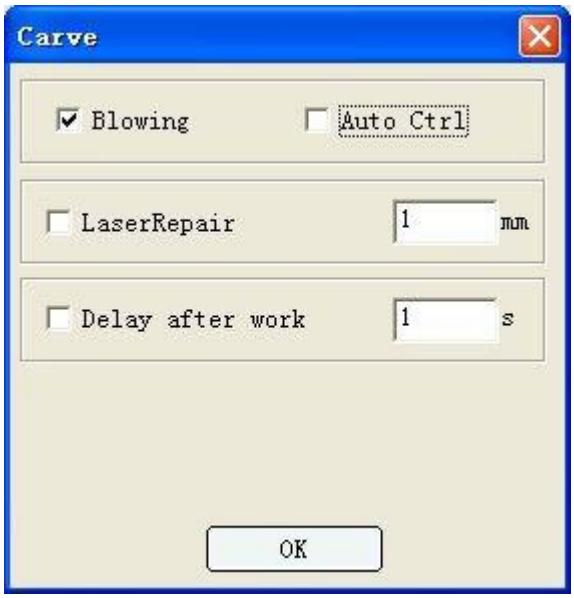


Figure 4-7

[Blow]: it defines whether the draught fan is working or not when the device is in operation; if [Blow] and [Auto Control] are selected, only when laser sends out light, will the device “blow”; if [Blow] is selected but not [Auto Control], the

device will “blow” in the whole process.

[Light Spot Compensation]: if the laser light spot compensated is too large, the size of graph will become smaller or blur. After setting the diameter of the light spot (in mm), select [Light Spot Compensation] to enable the function.

[Post-processing Delay]: it refers to the retention time after layer processing finishes. After setting the delay time (in second), select [Post-processing Delay] to enable the function.

4.2 Online Control

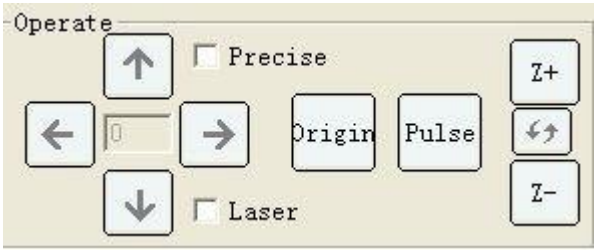


Figure 4-8

By making online control, independent software can control machine motion. Simple processing does not need drawing and can be finished by online control, such as single line cutting and rectangle cutting. Rising and falling of the lifting axis and feeding of the feed axis can be controlled online by independent software.

4.2.1 Control mode

A) Network

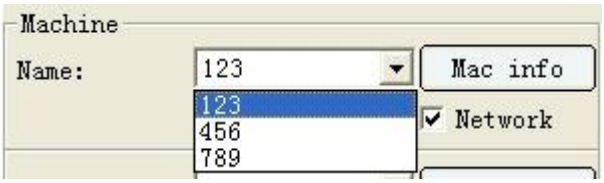


Figure 4-9

The procedures are as following.

1） Connect two ends of the network cable to PC and the machine respectively.

2） Select the [Working] page on the right side of the software interface.

3） Find the machine to be connected in [Equipment Name] (if there is no machine name, make machine management as introduced in 2.1) and select it.

4） Select [Start the Network].

5） Finish.

B）USB

Figure 4-10

The procedures are as following.

1） Connect two ends of the USB line to PC and the machine respectively.

2） Select the [Working] page on the right side of the software interface.

3） Click [Search] to search the port number.

4） Click the pull-down list of [Port Number] to select the port.

5） Finish.

4.2.2 Movement

After clicking the button, the laser head does not move in horizontal direction, but moves upwards for a certain distance in vertical direction. If the moving direction is found to be reversed, it is necessary to set the button polarity of the Y-axis in machine parameters. In case of long-term pressing, the laser head will keep moving until the button is released.

After clicking the button, the laser head does not move in horizontal direction, but moves downwards for a certain distance in vertical direction. If the moving direction is found to be reversed, it is necessary to set the button polarity of the Y-axis in machine parameters. In case of long-term pressing, the laser head will keep moving until the button is released.

After clicking the button, the laser head does not move in vertical direction, but moves leftwards for a certain distance in horizontal direction. If the moving direction is found to be reversed, it is necessary to set the button polarity of the X-axis in the machine parameters. In case of long-term pressing, the laser head will keep moving until the button is released.

After clicking the button, the laser head does not move in vertical direction, but moves rightwards for a certain distance in horizontal direction. If the moving direction is found to be reversed, it is necessary to set the button

polarity of the X-axis in the machine parameters. In case of long-term pressing, the laser head will keep moving until the button is released.

Click

to set the point where the laser head currently locates as the “locating point”,

Clicking

, the laser head will emit light in the original position without moving until releasing the button.

Click the control button in the up and down directions of the axis cyclic switching button to cyclically switch among [Z-axis] → [U-axis] → [V-axis].

Click

to make the Z-axis move in positive direction, and if the moving direction is reversed, set the button polarity of the Z-axis in machine parameters.

Click

to make the Z-axis move in negative direction, and if the moving direction is reversed, set the button polarity of the Z-axis in machine parameters.

Click

to make the U-axis move in positive direction, and if the moving direction is reversed, set the button polarity of the U-axis in machine parameters.

Click

to make the U-axis move in negative direction, and if the moving direction is reversed, set the button polarity of the U-axis in machine parameters.

Click

to make the V-axis move in positive direction, and if the moving direction is reversed, set the button polarity of the V-axis in machine parameters.

Click

to make the V-axis move in negative direction, and if the moving direction is reversed, set the button polarity of the V-axis in machine parameters.

[Bright Dipping]: after being checked, it will always emit light no matter which

direction it moves to, including [Up], [Down], [Left] and [Right].

[Precise Movement]: After being checked, it can input distance in the middle edit box of the up, down, left and right buttons, and after clicking direction buttons, the laser head will move from the current position for the input distance. If the input value is positive, the moving direction complies with the button direction; while if negative, the direction will be reversed.

4.3 Rout Optimization

Before downloading graphs, in order to process in the specific rout and increase processing speed, please optimize its rout; select [Download], check [Rout Optimizing] and click the button of [<<] to enter the rout setting dialog box:

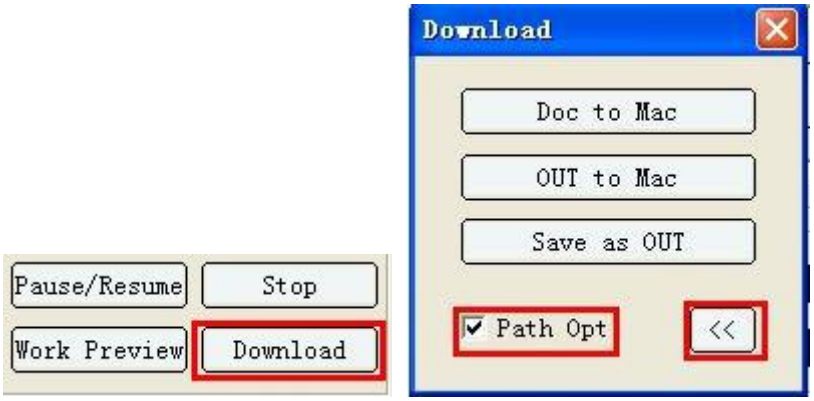


Figure 4-11

After clicking the button, the following interface appears:

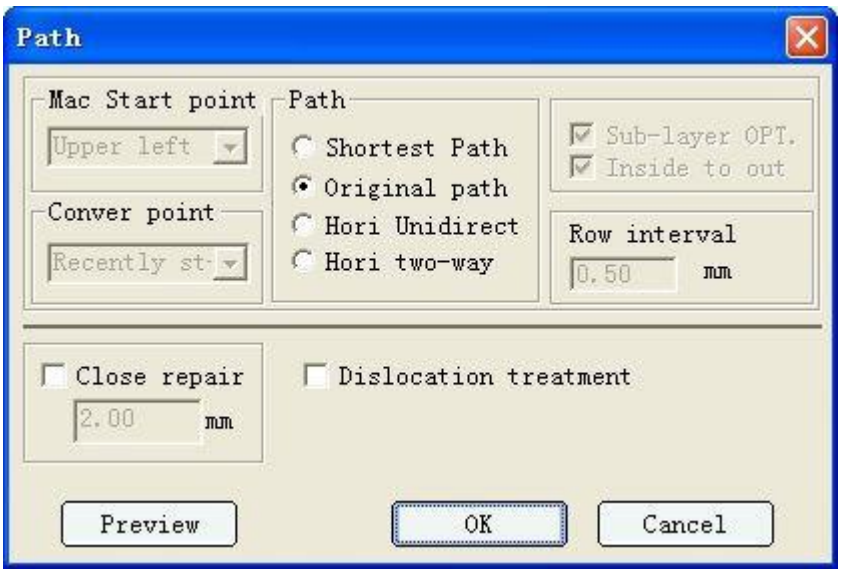


Figure 4-12

4.3.1 Optimization type

User-defined rout optimization includes: shortest rout, horizontal one-way and horizontal two-way.

[Shortest Rout]: for graphs in non-array model, take the shortest rout of laser head's moving distance as the processing rout.

[Horizontal One-way]: for array graphs or regularly arrayed graphs, process line by line from top to bottom and from left to right, with the processing direction of closed curves in the same line being the same, anticlockwise or clockwise.

[Horizontal Two-way]: for array graph or regularly arrayed graphs, process line by line from top to button in S shape, with the processing direction of closed curves in the same line being the same, anticlockwise or clockwise. (e.g.: process from left to right for one line, and process from right to left for the following line.)

[Original Route]: no any optimization is done.

4.3.2 Additional parameter

[Processing Starting Point]: indicates that it starts to work from certain position of the graph (top left, top right, low left, low right, etc.).

[Optimize by Layers]: whether to optimize in layers or it is allowed to optimize across layers.

[Inside Out]: Firstly process the smaller graphs inside, and then the larger graphs outside.

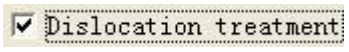
[Nearest Starting Point]: modify the starting point of the original graph to make the empty moving distance shortest.

[Smooth Starting Point]: modify the starting point of the original graph to make the speed varies gently.

[Original Starting Point]: do not modify the starting point of the original graph (which is suitable to manually assign starting point or graphs with lead).

4.3.3 Malposition disposal

In case of different processed component sizes or seal malposition making it impossible to be cut off, check this option for solution. Check the check box as



of "Malposition Disposal", and it will always dispose the malposition no matter whether or not route optimization has been done.

4.3.4 Closure compensation

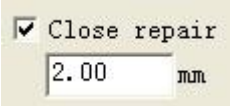
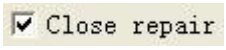


Figure 4-13

During material cutting, the potential inconformity between the minimum light intensity of laser tube and the material photonasty and processing speed may lead that though the sealing position of closed graph can emit light, it can not be cut off, for which, the function of “Closure Compensation” is provides in the software to over cut a certain distance to solve this problem. The distance value should be set as actually needed. After checking the check box as



of “Closure Compensation”, it will always conduct closure compensation no matter whether or not route optimization has been conducted.

4.4 Manual sorting

Click the menu of [Function], and click [Manual Sorting] as shown in the following:

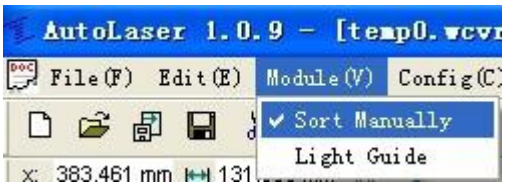


Figure 4-14

The following sorting interface appears in the toolbar of the dialog box on the right of the main interface:

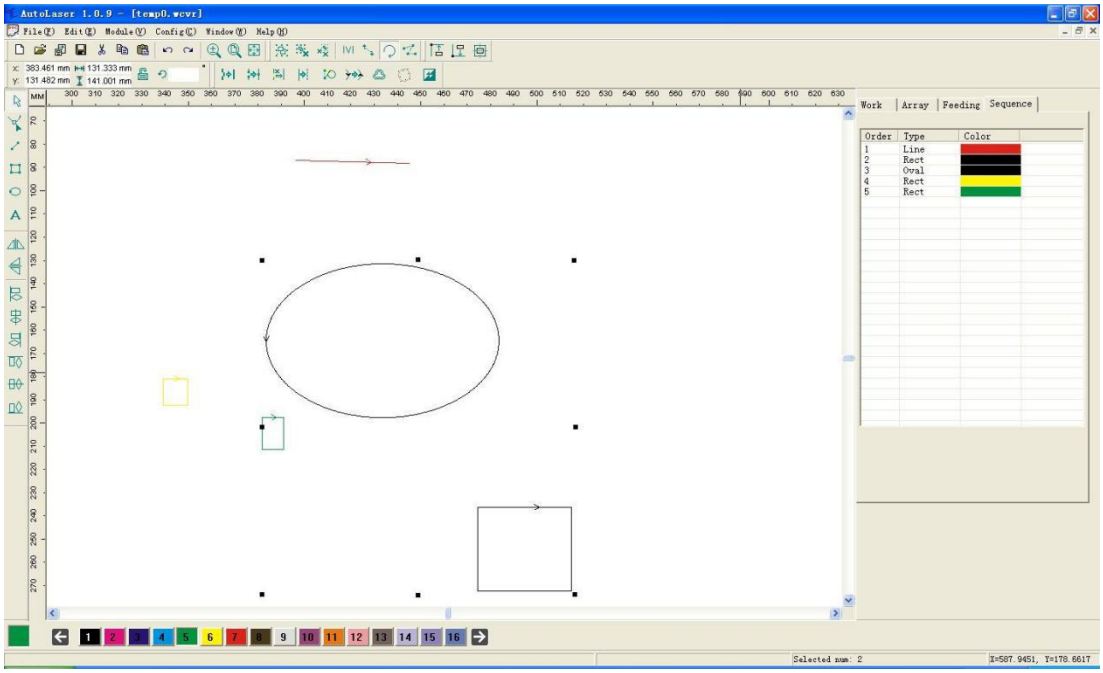


Figure 4-15

In the pixel list, left click one of the pixels and remain; drag the mouse to the target position and release it, when the position shown in the right list will be the processing sequence of the pixels in current file.

Note: After manual sorting, it does not need to optimize route, otherwise it will cause inconformity between the processing sequence and the setting.

4.5 Working Pretreatment

4.5.1 Border preview

Before processing, it is allowed to firstly select “Border Away” to check the breadth of the processing graph and the “Working” page of the toolbar in the right dialog box of the main interface of the software is as shown in the following

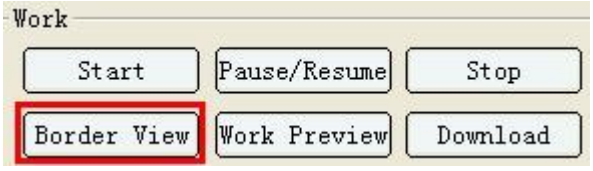
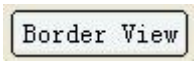


Figure 4-16

[Border Away]: Click the 

button, and the interface appears as follows:

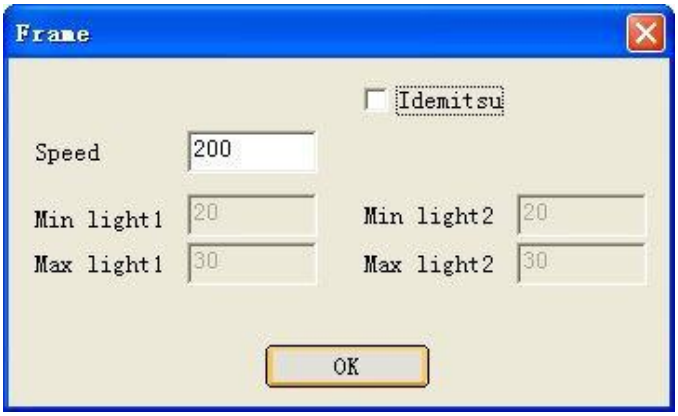


Figure 4-17

If there is graph file at present, the machine takes the current locating point as the benchmark point. Operate along minimum enclosing rectangle of the current file, and execute during the motion according to the defined speed and light intensity to see whether light comes out.

4.5.2 Working preview

The “Working” page of the toolbar of the right dialog box of the main interface of the software is as shown in the following figure:

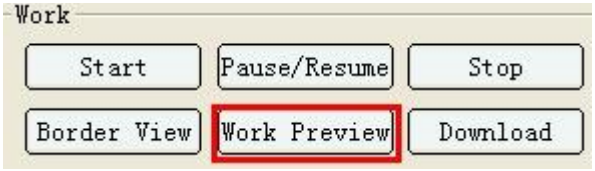


Figure 4-18

[Working Preview]: it is allowed to conduct simulating processing to the working file downloaded to the machine, check the process route, etc.

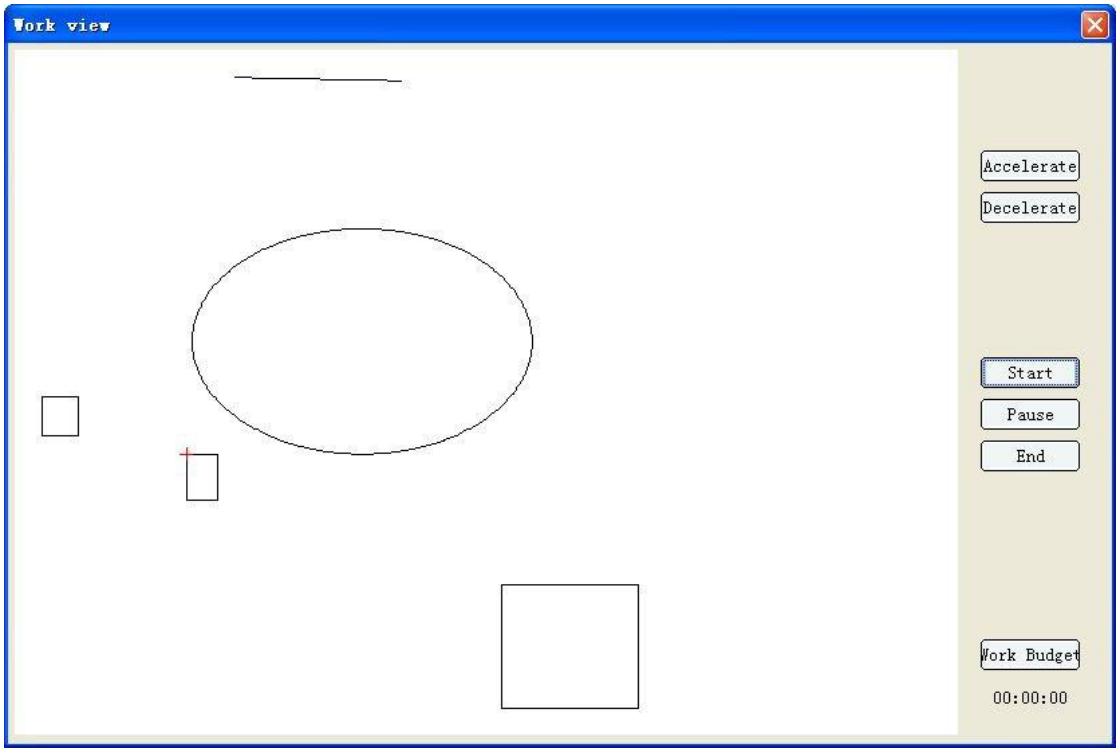


Figure 4-19

[Start]: start simulating processing.

[Suspend]: suspend simulating processing.

[Stop]: stop simulating processing.

[Accelerate]: accelerate simulating processing speed.

[Slowdown]: slowdown the simulating processing.

[Man-hour Prediction]: asset the processing time of the file.

4.6 Output Processing

After setting the processing parameters, it is allowed to execute output processing as shown in Figure 4-20:

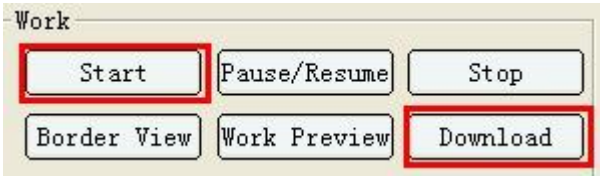


Figure 4-20

[Start]: download current file to the control card, and directly start to work, regarding current file as the processing file.

[Suspend/Continue]: continue or suspend the processing.

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[Stop]: stop the processing.

[Download]: click the download button to pop up the download dialog box as shown in Figure 4-21:

Figure 4-21

[Download]: download current file to the control card (it will not work directly).

[Offline File Output]: download the previously saved file to the control card (it will not work directly).

[Save Offline File]: save the current file in the processing format (out file) to the designated position of the computer.

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Chapter V Application Case

5.1 Common Output Processing

This section will give one application case to open a already-made graph for editing, fill in layer parameters, and download to the machine's processing procedures.

1） Open the file

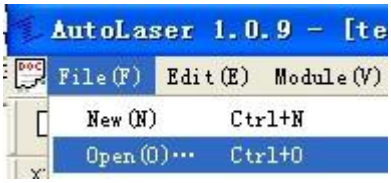

Figure 5-1

As shown in Figure 5-1, click [File]→[Open] on the main menu, popping up and opening the the dialog box as shown in Figure 5-2. Find out the saving rout "001.dst", check [Preview], click the file "001.dst" to see the graph, and click [Open] to open the file.

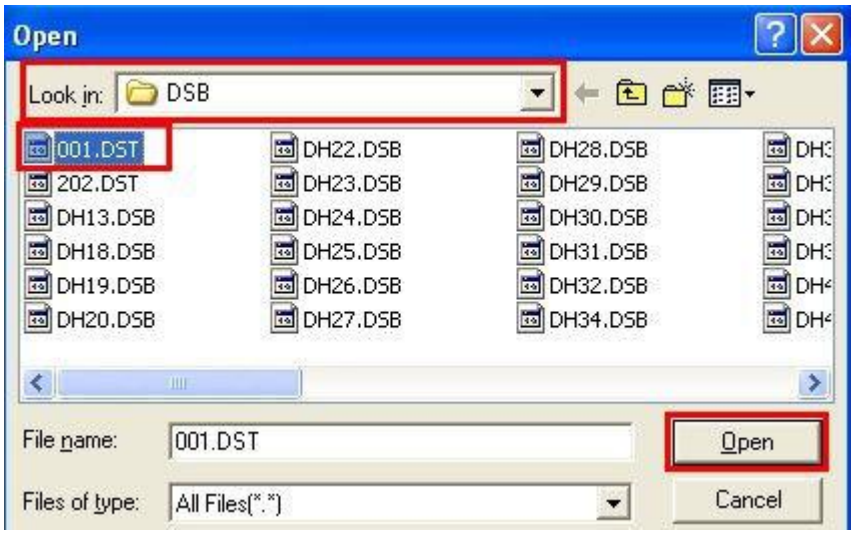

Figure 5-2

2） Edit

After opening the file as shown in Figure 5-3, the lower curved part of the graph is found to be line segments, with corners which can be clearly saw, which is not the expected round curve, when it is necessary to edit. Select the whole graph, and click [Fairing] on the toolbar to edit to gain the graph as shown in Figure 5-4, with a round curve. The next step is to edit layer parameters.

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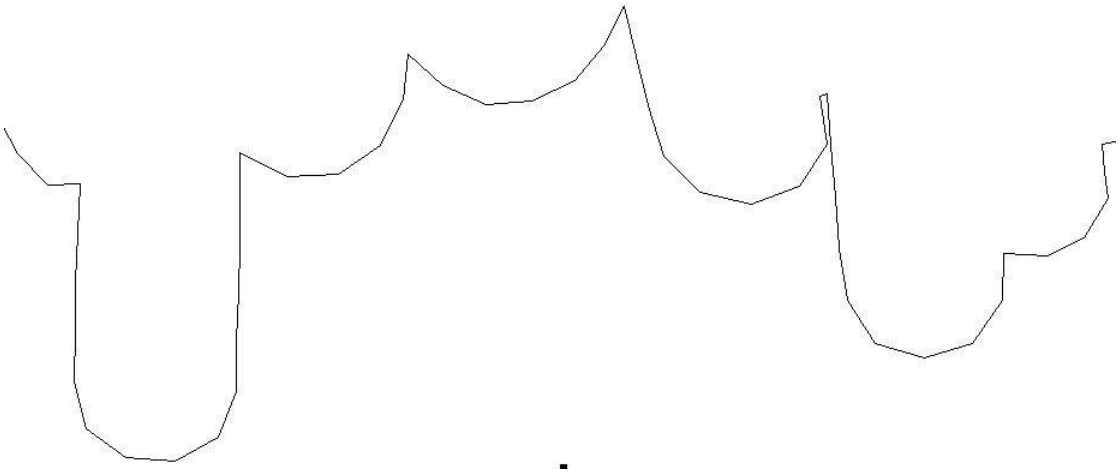

Figure 5-3

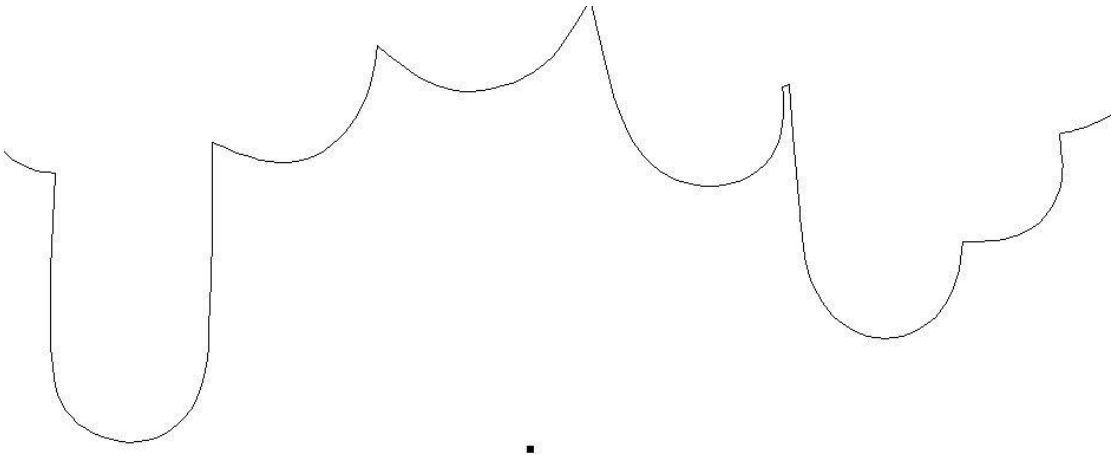

Figure 5-4

3） Fill in parameters

There is only one color on the complete graph, namely only one layer. Therefore there is only one kind of layer saw in the layer list, as shown in Figure 5-5. Double-click the first item of the list to open the dialog box for editing layer parameters, as shown in Figure 5-6. Check [Cut] to remove the check of [Carve] as shown in Figure 5-6, and click [OK] to complete processing parameter editing after filling the parameters of [Light Intensity] and [Speed].

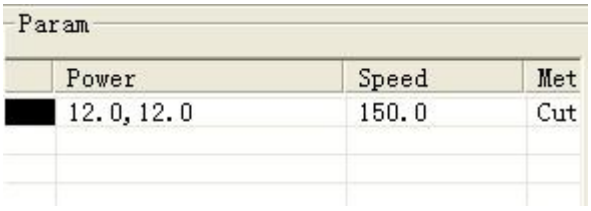

Figure 5-5

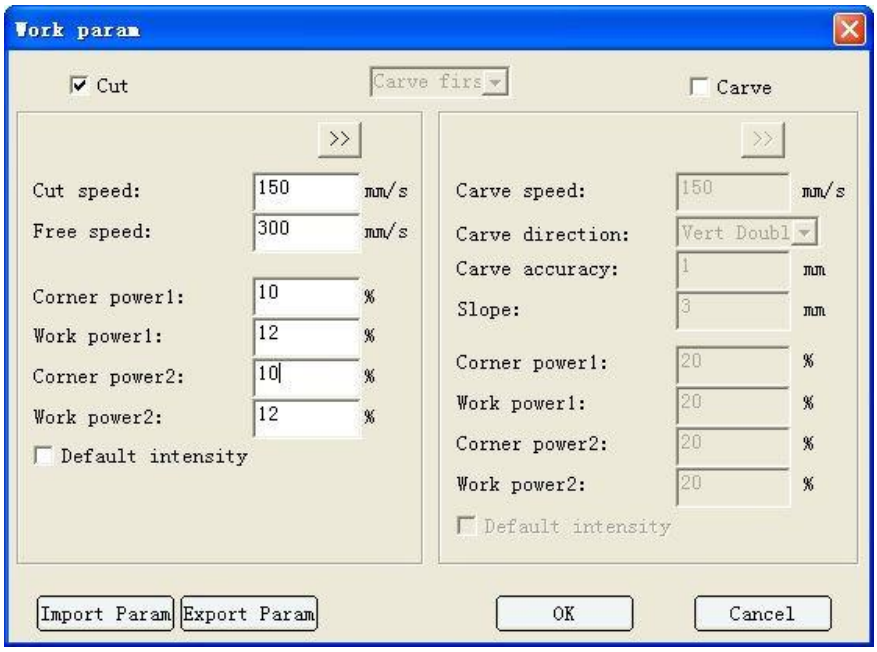

Figure 5-6

4） Download

It is allowed to download after editing the graph and fill in the processing parameters. It is necessary to select the communication method before download (refer to 2.3.3 Communication for details), and plug the corresponding communication lines.

Click [Download] as shown in Figure 5-7, popping up a download dialog box as shown in Figure 5-8.

Figure 5-7

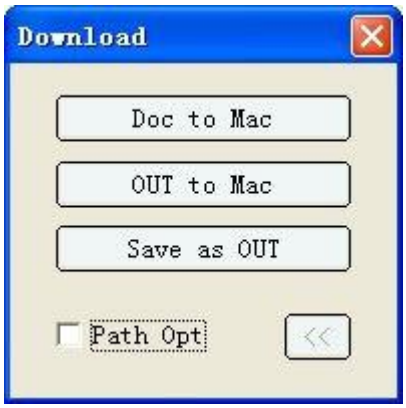

Figure 5-8

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As shown in Figure 5-8, if it needs to optimize the route, please check [Rout Optimization], otherwise use the original route. Remove this case, and click [Download] to pop up a dialog box to input file name as shown in Figure 5-9. The file name can either be the default-generated one, or be manually input, with the length of file name not exceeding 8 characters, to avoid the exceeding part being abandoned. Click [OK] to start download, and it means successful download if the graph can be seen on the control panel after going through the download progressing bar, otherwise it means that the download fails, when it is necessary to check whether the communication line is connected and repeat trying.

Figure 5-9

5.2 Processing of mutual motion of double heads

Use virtual array list and additional off-cut graph to realize the off-cut function, as shown in Figure 5-10:

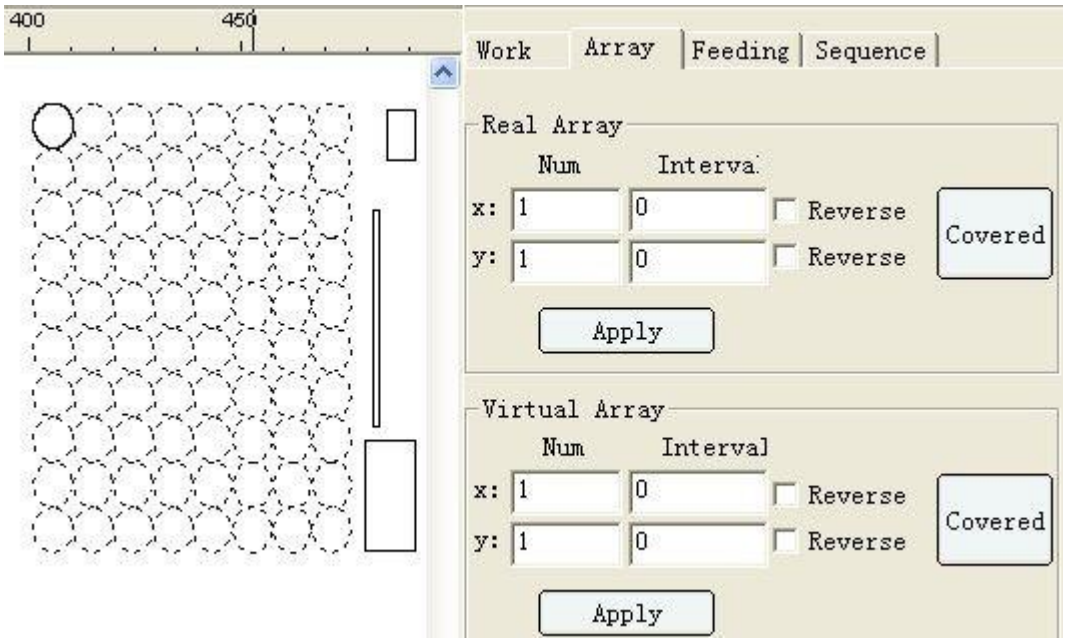

Figure 5-10

If the machine is of double heads, it automatically work individually during virtual array cutting, and automatically select the nearest laser head to work when cutting to the last off-cut.

If it is necessary to lay out in malposition, it is allowed to manually array two or several graphs and conduct grouping, after which conduct virtual array.

The array direction of the virtual array shows to be related to machine coordinate system and locating point, and it is allowed to change the array direction by selecting “reverse direction” or not.

5.3 Feeding Processing

Machines with feeding devices can realize the cyclical model of working-feeding-working, with the setting interface as shown in Figure 5-11:

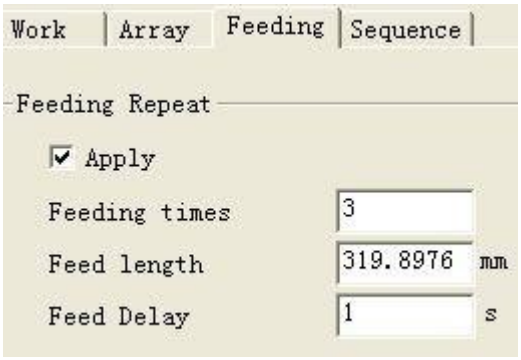

Figure 5-11

[Feeding Times]: indicates the times of working and feeding, with one time of feeding for one time of work, and so on.

[Feeding Length]: indicates the feeding length.

[Delay after Feeding]: indicates that it will delay for how many seconds after feeding to continue the next action.

It is necessary to check the “Application” button after parameter setting, and if not necessary, do not check “Application” or set “Feeding Times” as 0.

5.4 Processing of large file segmentation

When the length of the file to be processed is very large and exceeds the vertical dimension of the current machine, it can use the function of processing for large file segmentation if the machine has feeding function.

Parameters for large file segmentation are set as shown in Figure 5-12:

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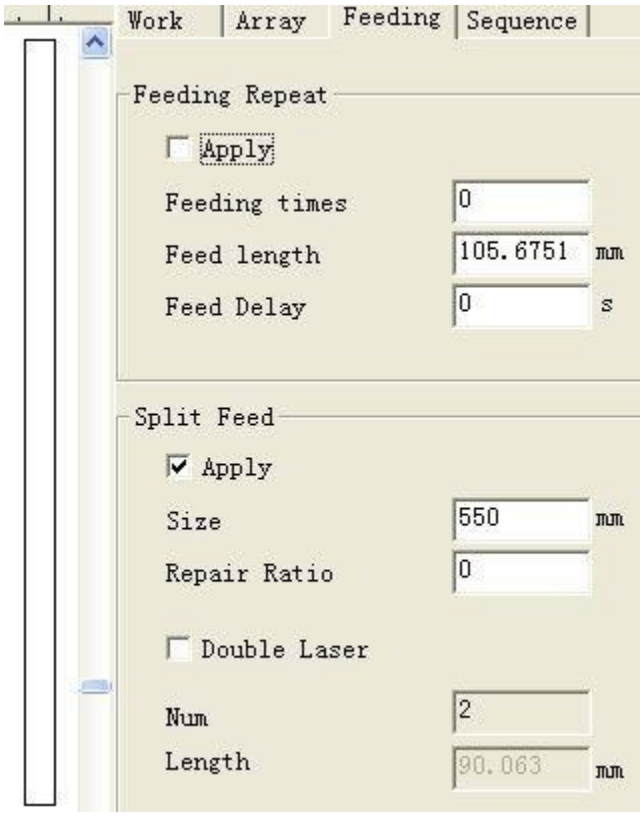

Figure 5-12

[Segmentation Reference]: parameters can not be larger than the vertical dimension of the machine.

[Compensation Coefficient]: when offset appears in horizontal direction during feeding motion and leads to graph malposition, set the compensation coefficient to make up for feeding offset, and test this parameter for one time.

Testing method:

The breadth is 600 in height. Draw a 600 vertical line, set segmentation reference as 590 and compensation coefficient as 0 and select “File Segmentation”, when the laser head will move to the middle position of the x-axis and the 0 position of the y-axis. The machine processing procedure includes: laser head emits light and cut to the 590 position of the y-axis, and feeding on z-axis moves to 590, returns back to 0 position on y-axis, and emits light to cut to the 10 position.

Check the testing result, as shown in Figure 5-13

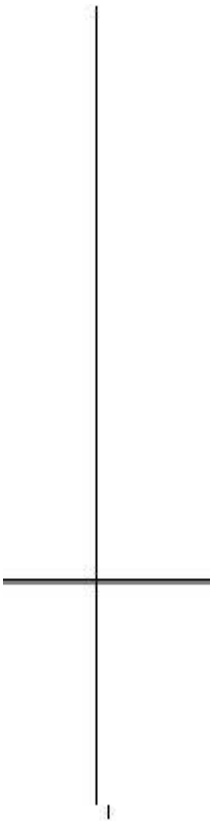

Figure 5-13

The upper longer line is 590mm, and the lower shorter line is 10mm. Assume that the deviation between them is a, and set the compensation coefficient as a/590.

After testing compensation coefficient, it is not necessary to re-test the compensation coefficient to modify different segmentation references every time of large file segmentation. It is allowed to test the compensation coefficient with the same method, when the machine structure changes or when the machine ages after being used for long time.

5.4.1 Separate head processing

If it is necessary to adopt double-head processing during file segmentation, check [Separate End Processing].

[Number]: indicates the number of laser heads.

[Distance]: refers to the distance between two lines when the graph is processed in two lines. The minimum value should be set as the width of the file minimum enclosing rectangle, otherwise the two laser head processing zones will be overlapped.

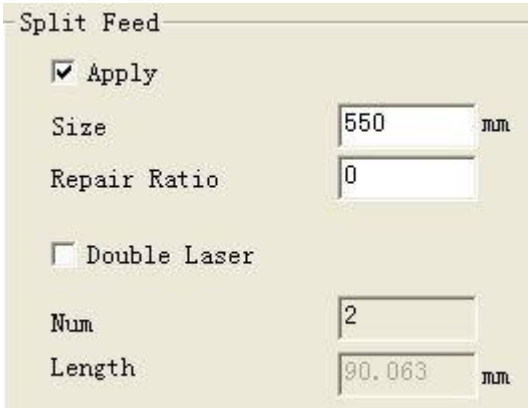

Figure 5-14

5.5 LGP (Light Guide Plate) Editing

On the main interface of the software, the main menu [Function]→[Light Guide Plate Application] is as shown in Figure 5-15:

Figure 5-15

Click the [LGP Application], and “LGP” page shows in the tool bar of the right dialog box as shown in Figure 5-16:

When designing LGP, firstly it needs an outline graphic which can be either drawn by the drawing toolbar or introduced after opening other files.

[Mode]: there are five modes including line, circle, square, triangle and grid, respectively referring to filling the outline with the corresponding graphs in the square matrix form.

[Width]: the width of graphs filled with line, circle, square and triangle.

[Height]: the height of graphs filled with line, circle, square and triangle.

[Gradient]: the variation of width or height of graphs filled from outline center to edges. If the gradient is positive, it progressively increases; while if the gradient is negative, it progressively decreases.

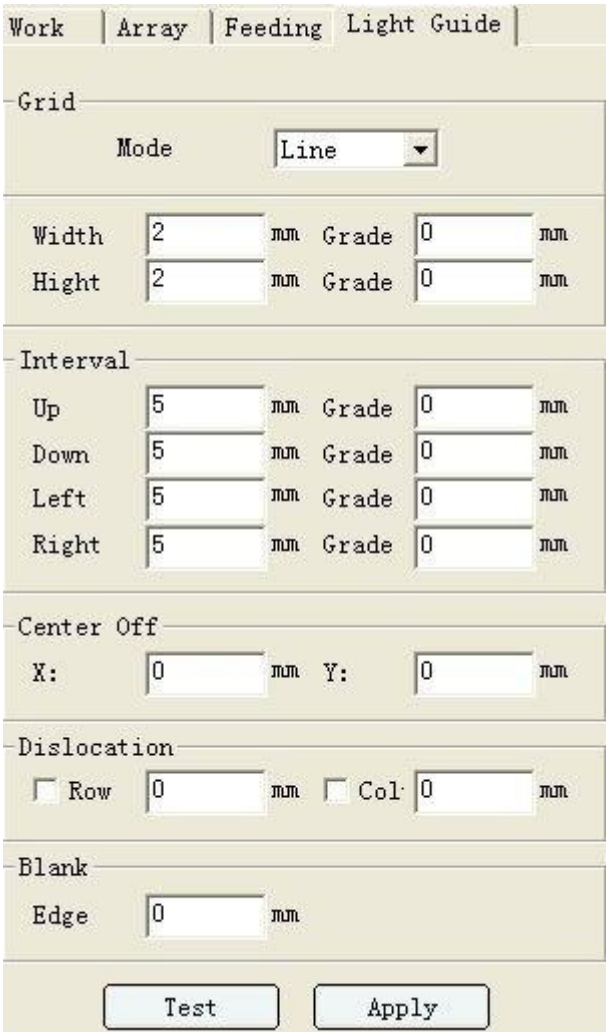

Figure 5-16

[Upper Line]: above the vertical center line, the distance between center lines of two lines.

[Lower Line]: below the vertical center line, the distance between center lines of two lines.

[Left Row]: on the left of the horizontal center line, the distance between center lines of two rows.

[Right Row]: on the right of the horizontal center line, the distance between center lines of two rows.

[Gradient]: refers to the distance variation. If positive, the distance progressively increases; while if negative, the distance progressively decreases.

[Off-centering]: refers to the offset of filling center to the outline center.

[Malposition]: the distance of right-left malposition between two adjacent lines; the distance of up-down malposition between two adjacent rows.

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[Siding Width]: the distance from outline to filling edges. Such as, a rectangle with 100 long width and 10 siding width, fill in within the range of 80*80.

[Test]: firstly select one outline graph, input parameters on the right “LGP” page, and click “Test” to check the design sketch. If not satisfied, directly change parameters, re-click “Test”, repeat the operation until being satisfied, and click “Application” to add the designed LGP in the edit area of the current file.

[Application]: after clicking “Application”, it can conduct all the operation of ordinary pixels to generated LGP data, including selection, deletion, translation, etc.

If the gradient of width and height is negative, the size of filling component will diminish from center to surroundings; if positive, the size will increase.

If the interval gradient is negative, it will form a filling graph with sparse center and dense surroundings, and it will stop filling until the variation range is 0 or reach to the scope boundary.

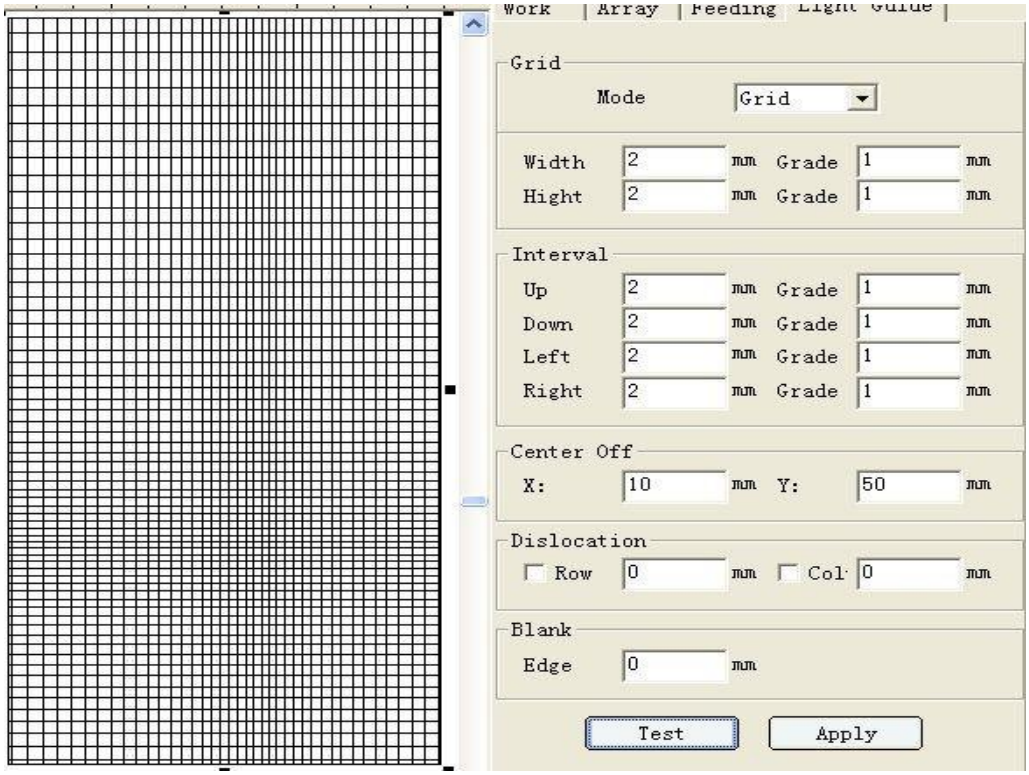

Figure 5-17

LGP edit supports the gradient in negative direction, as shown in Figure 5-18:

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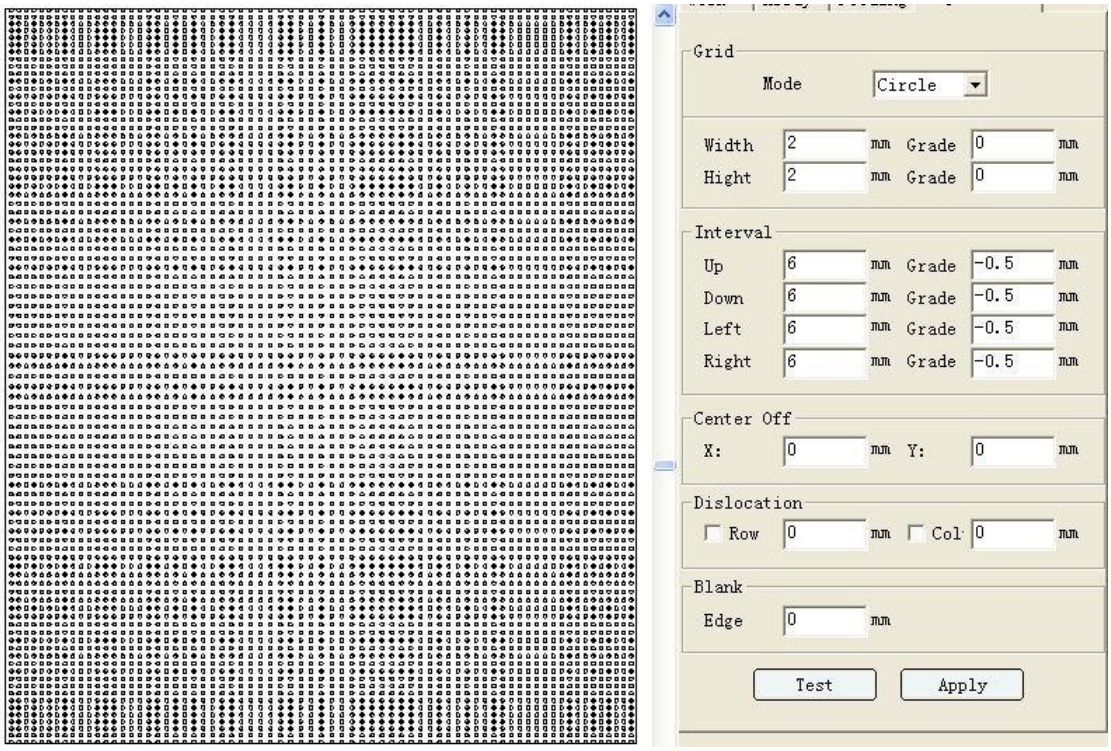

Figure 5-18