
OPERATOR MANUAL

	Page
Preface	2
Safety Note	3
Chapter 1 Appearance of the Machine and Its Optional Attachments	5
Chapter 2 Machine Installation	10
Chapter 3 Operating the Cutting and Engraving Machine	24
Chapter 4 Beam Path Adjustments	33
Chapter 5 Instructions of Laser Cutting Software	37
Section 1 Basal Concept, Function and Operation of the Software	37
Section 2 The Application of PLT Format File	53
Section 3 The Application of BMP format File	69
Section 4 The Application of DXF Format File	76
Section 5 Complementary instruction of DXF file	82
Chapter 6 Instruction of YMFILE Download Software	85
Chapter 7 Parameter Setting of The Machine	88
Chapter 8 Operational Method for Direct Output of AutoCAD	99
Chapter 9 Daily maintenance and basic fault analysis	112
Chapter 10 Warranty	116

Preface

Thank you for buying a Laser engraving and cutting machine. This machine is a high-tech product of laser, mechanical, and electronic technologies. To allow customers to use this machine to its fullest potential, we have written this manual.

This manual will show you how to install, debug, operate and maintain your machine. To this end we have incorporated many easily understandable icons. We have also addressed the safety issues concerning lasers to allow you to safely operate your equipment. Please therefore read and understand this manual well before operating your machine.

Laser Cutter

Safety Notice

1. Users must read this manual carefully and understand it fully before using the machine. Operational instructions must be strictly followed and staff, not fully trained, must not be allowed to use the machine.
2. The machine is equipped with a class 4 laser (strong laser radiation), and the laser radiation may cause following problems: 1, ignite flammable material 2, release toxic gases 3, cause severe skin burns 4, severely damage your eyesight.
3. Fire extinguishers must be available at the machine and no flammable material must be stored close by. Exhaust from the machine must be properly filtered or ducted outside according to local ordinances. Untrained personnel must be kept away from the machine.
4. Beware of high voltage in the laser and electrical compartments. These must be accessed only by trained personnel.
5. Do not leave a running machine unattended. The operator must turn the machine off before leaving.
6. Do not open any doors while the machine is running.
7. The machine and its peripheral devices must be electrically grounded.
8. The operator must constantly monitor the machine when it is in operation and turn it off if abnormal conditions occur.
9. The machine must be operated in dry conditions and away from pollution, vibration or strong electrical and magnetic fields. The ambient temperature should be between 5 and 40 degree centigrade (40-104 degree Fahrenheit) at a humidity 5-95% with no condensation.
10. Do not install this machine near electro-magnetically sensitive instruments.
11. Electrical connection: 220VAC, single phase, 50/60Hz; total connected load <1250W.

Please note, Laser Technologies will not be responsible for any improper use of the machine.

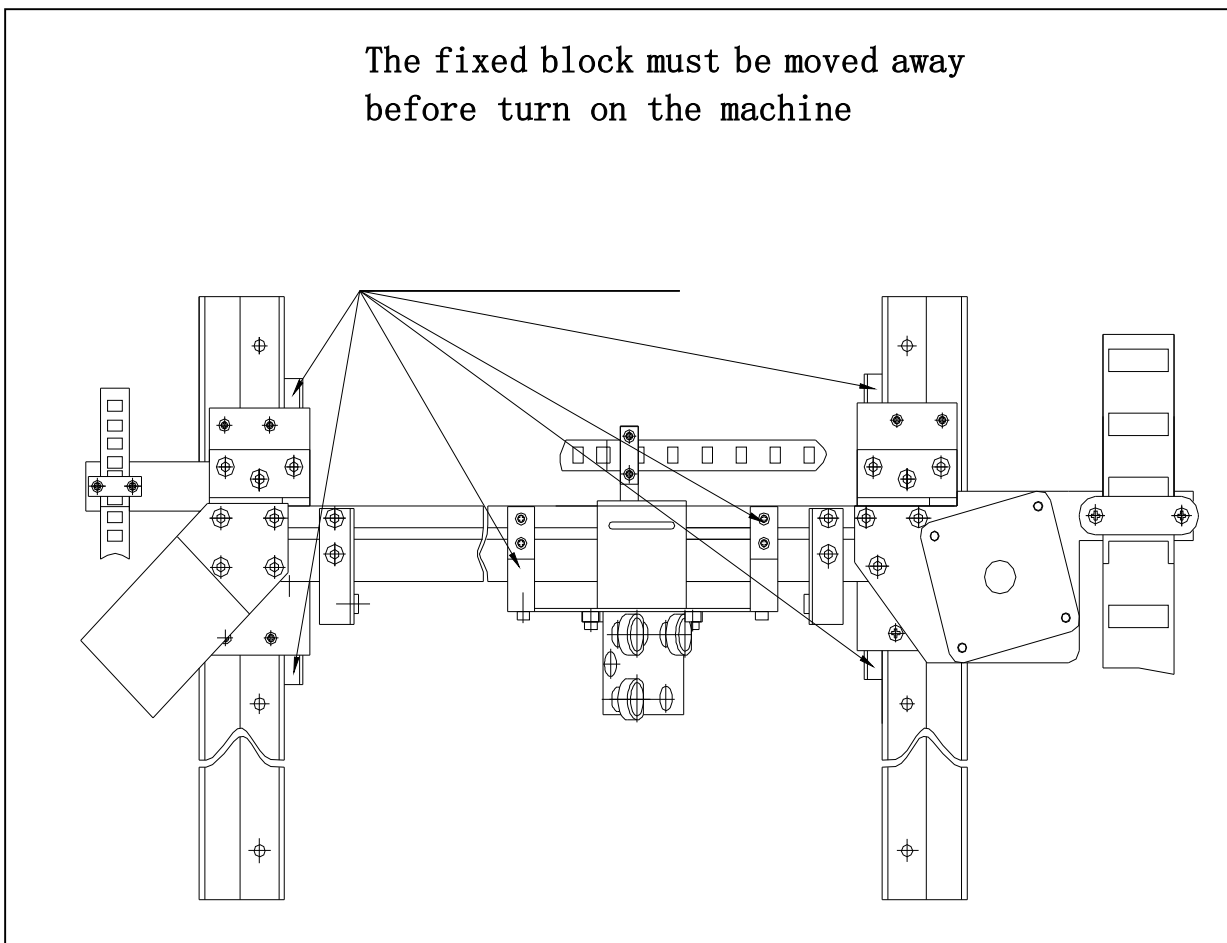
Declaration

1. Because of the improvement of the product, the content of the manual maybe is a little different with the fact; besides, the content may have some change! Excuse for be not informed before!

2. For the improvement of the product, the product you bought may different with the figure in the manual, subject to factual product you bought.

Notice affair before operate the machine

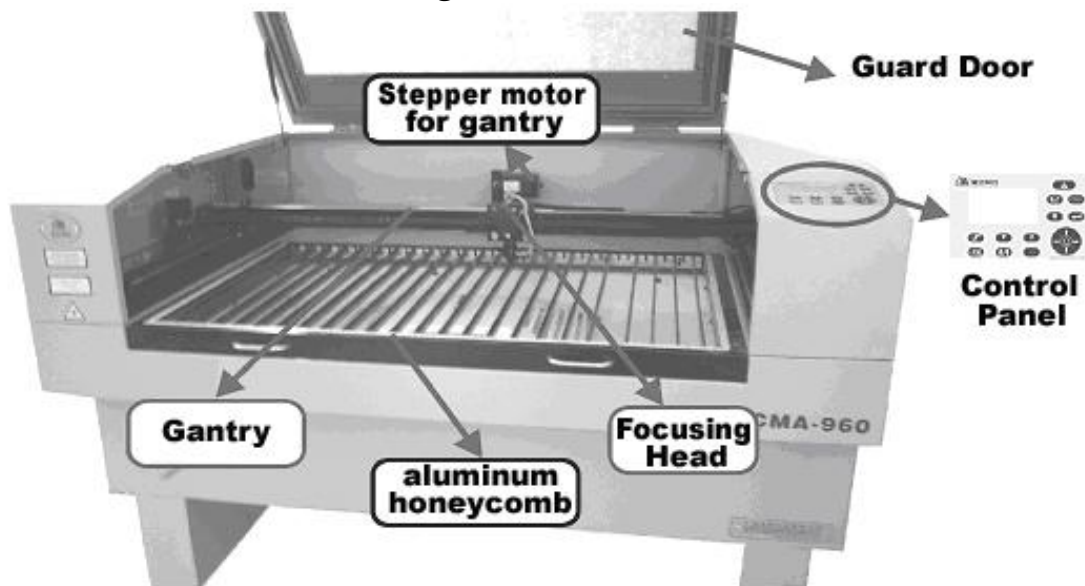
The fixed block must be moved away before turn on the machine, as the following figure showed.



Chapter 1 Appearance of the Machine and Its Optional Attachments.

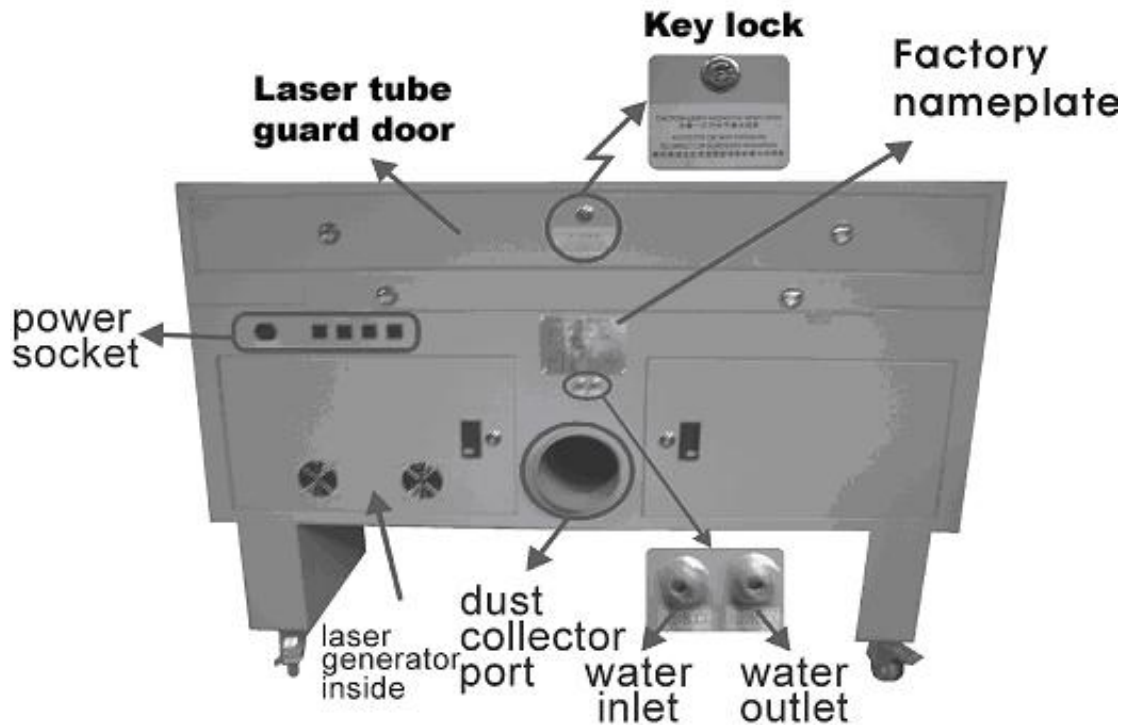
1, Appearance of the machine (may change somewhat for different models)

Front View of the machine, figure F1-1:



F1-1

Rear view of the machine, as shown in figure F1-2:



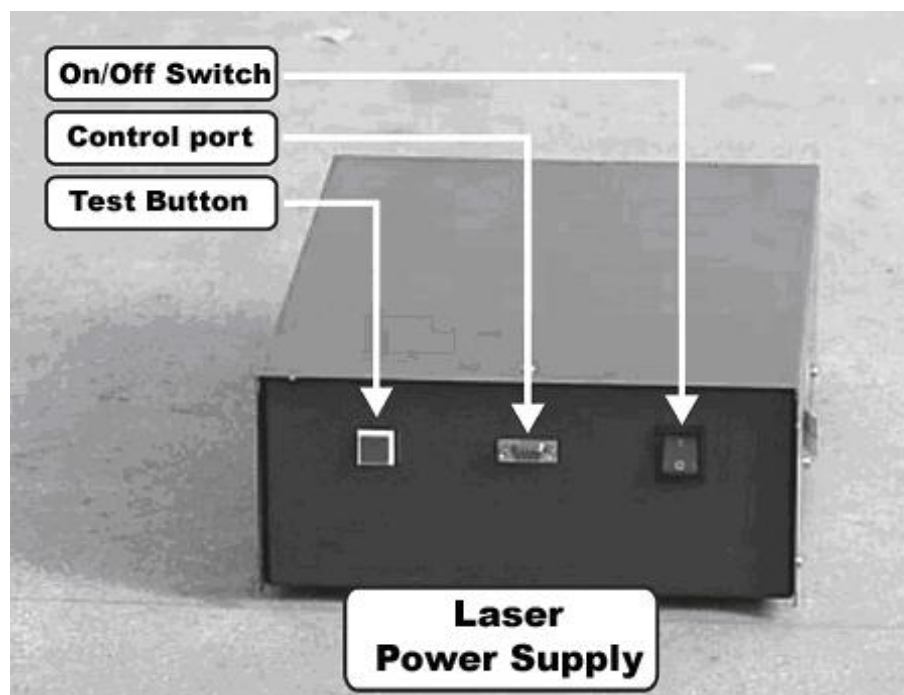
F1-2

2, Your machine may or may not include the attachments shown below.

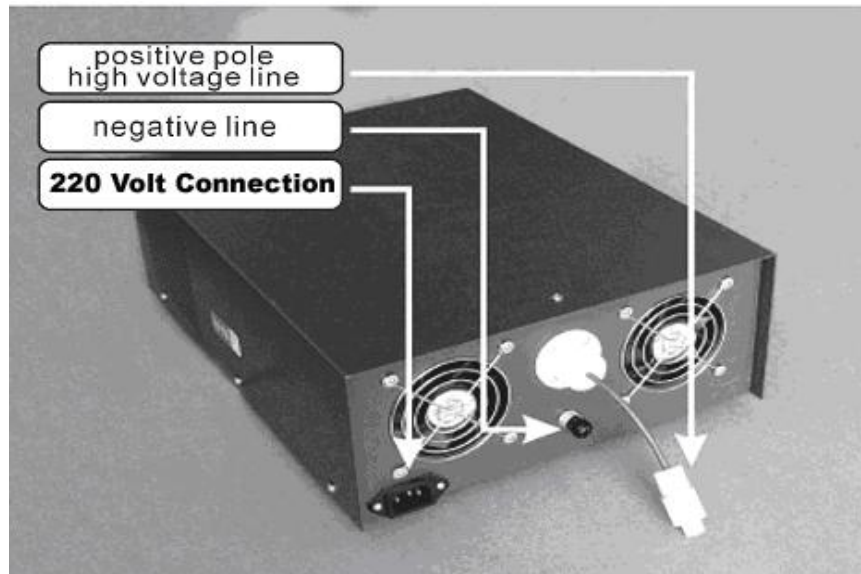
A, Laser Power Supply:

Front view of laser power supply F1-3, rear view of the laser power supply

F1-4

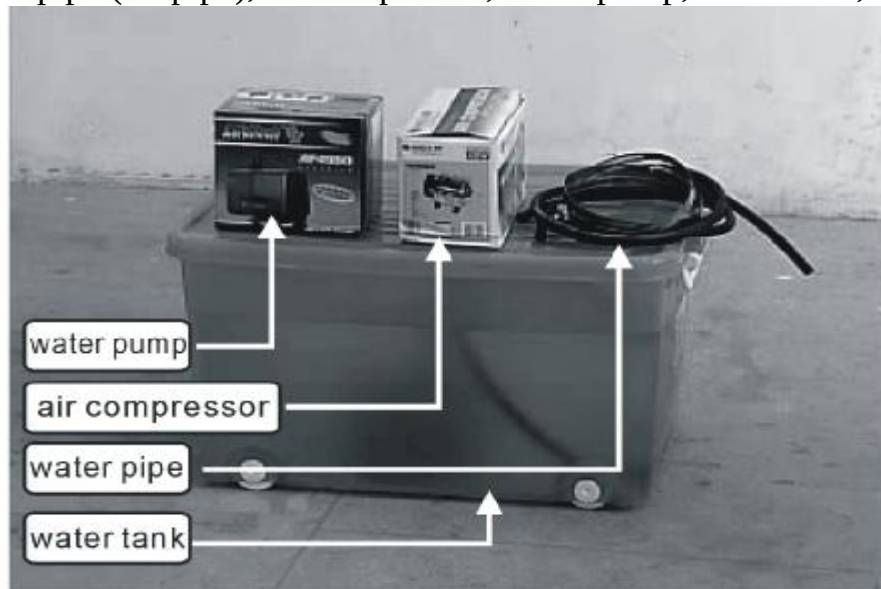


F1-3



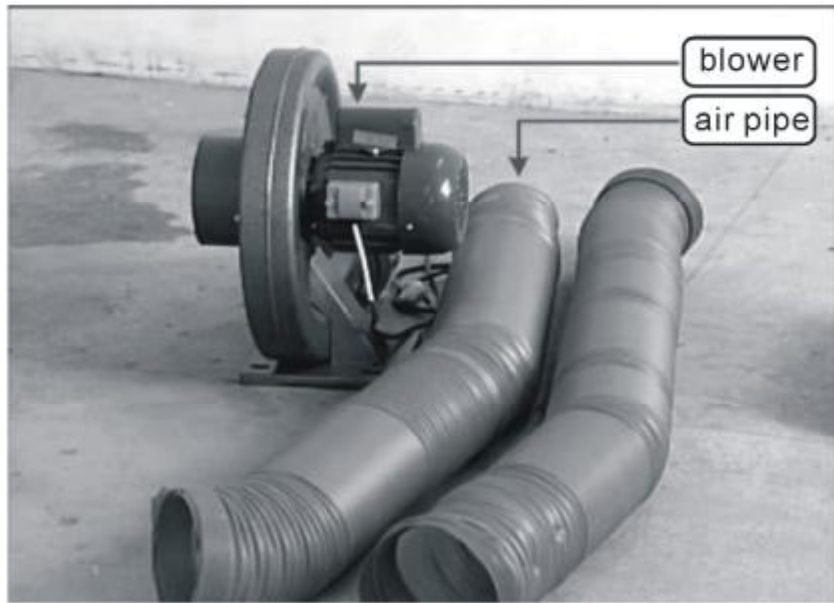
F1-4

B, water pipe (air pipe), air compressor, water pump, water tank, as in F1-5



F 1-5

C, Exhaust Blower, Air Hose, as in F1-6



F1-6

D, laser tube, as in F1-7



F1-7

E, Water Chiller (selective option), as in F1-8



F1-8

F, Optional Aluminum Honeycomb Work Support, as in F1-9



F1-9

G, Sword bar motherboard (selection fitting), as shown in figure F1-10



F1-10

Chapter 2 Machine Installation

A working laser cutting and engraving machine consists of the basic machine, a laser power supply, an exhaust fan, an air compressor, and a water tank with pump (or water chiller). Also included are the necessary pipes, hoses and a communication cable.

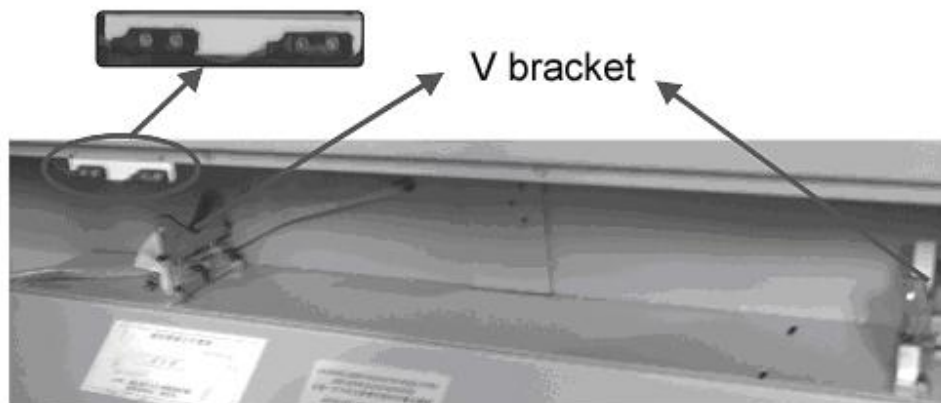
A. Installation Procedure:

1 Installing the laser tube

As the laser tube is made of glass, we pack it separately to keep it safe during shipping. Therefore the laser tube needs to be installed before the machine can be used.

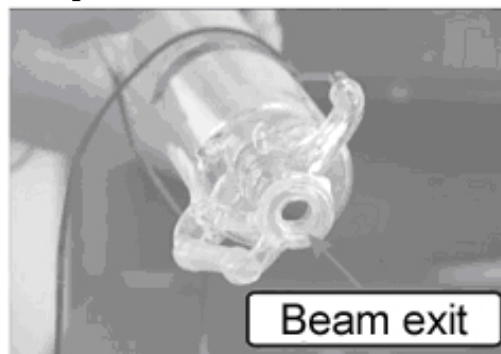
As shown in picture F2-1, the laser tube fits into the top compartment in the rear of the machine. The picture also shows 2 safety switches. These switches will shut down the laser if the guard door is opened while the laser is on.

Safety Switches
(Laser will shut down if guard is opened)



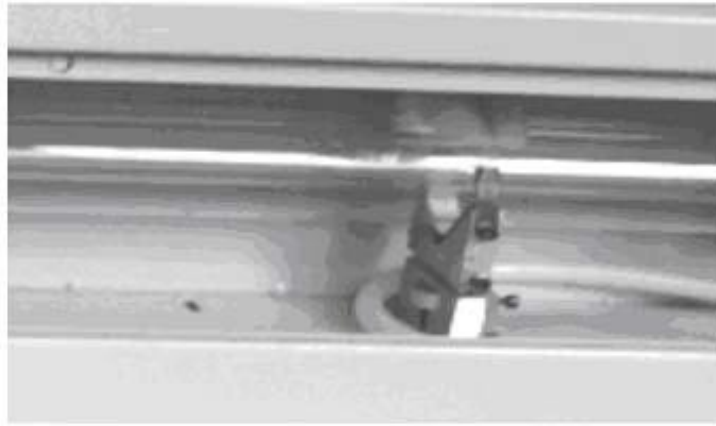
F2-1

Untie the hold down straps of the V brackets and carefully place the laser tube into the vees with the negative pole toward the #1 mirror. See picture F2-2:



F2-2

Fasten the hold down straps over the laser tube. See picture F2-3



F2-3

Note: The distance between the laser tube nozzle and the #1 mirror must be about 1 cm (.40")

Attention: 1 Do not over tighten the hold down straps over the laser tube and cushion the vee brackets with foam rubber. 2. Make sure that the water inlet (at beam exit side of the laser) is at the bottom of the tube.

After installing the laser tube, connect the water inlet of the laser tube (at beam exit side, picture F2-4) to the water outlet of the chiller (or water pump) and connect the water outlet of the laser tube (picture F2-5) with the return port on the chiller.

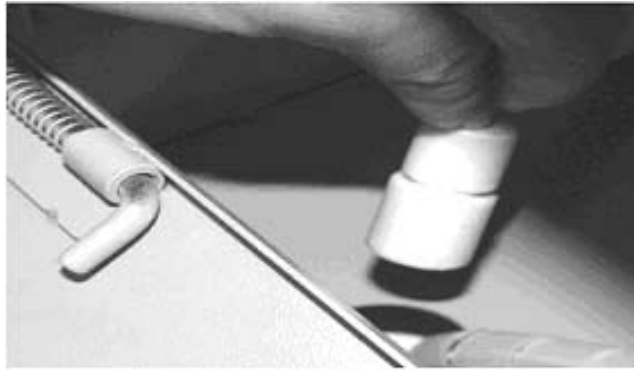


F2-4



F2-5

Each water hose must be connected firmly in order to avoid leaking. Finally string the laser tube electrical wires through the small hole and connect with laser power supply. As in F2-6



F2-6

2. Installation of the laser power supply

Place the laser power supply into the machine compartment under the worktable. Connect the positive wire first by loosening the white screw cap on the positive wire coming from the laser power supply. Picture F2-7



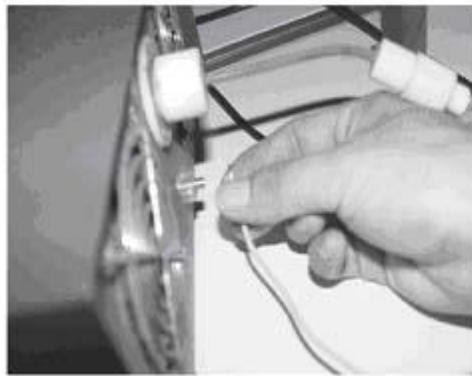
F2-7

Connect the brass plug to the brass receptacle and carefully replace the white screw cap. F2-8:

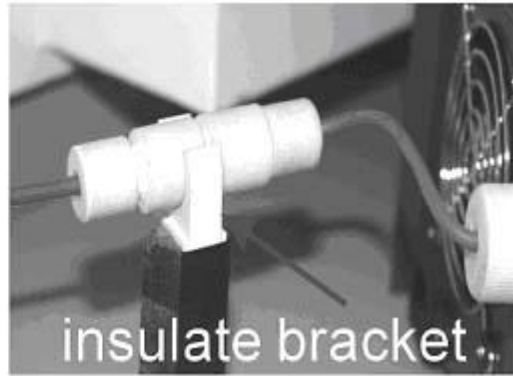


F2-8

Then connect the negative line with laser power supply and snap the high-voltage connection into the insulator bracket, as in figure F2-9, F2-10:



F2-9



F2-10

Finally open the side cover of the engraving machine and string the control cable, coming from the motherboard, through the opening to connect to the control port of laser power supply. The electrical installation is now finished, as in figure F2-11, F2-12



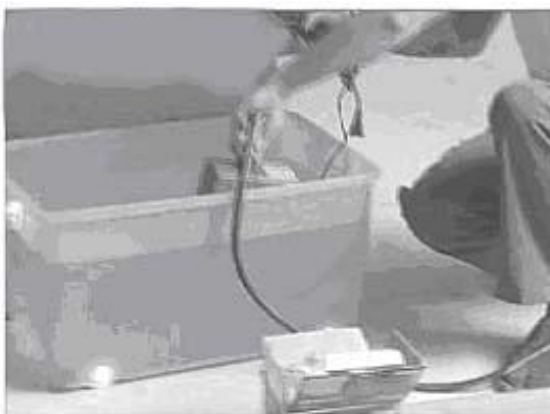
F2-11



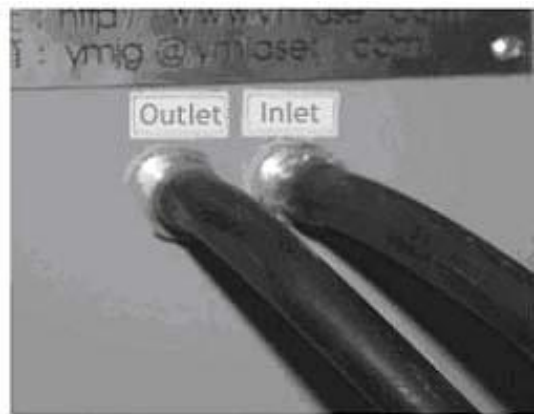
F2-12

3. Water pump installation

Fill the water tank with pure water, connect the pump with the water outlet connection and insert the water pipe, put them in the water tank and connect the water pipe to the engraving machine water inlet, use another water pipe connect to engraving machine water outlet. As in figure F2-13, F2-14:



F2-13



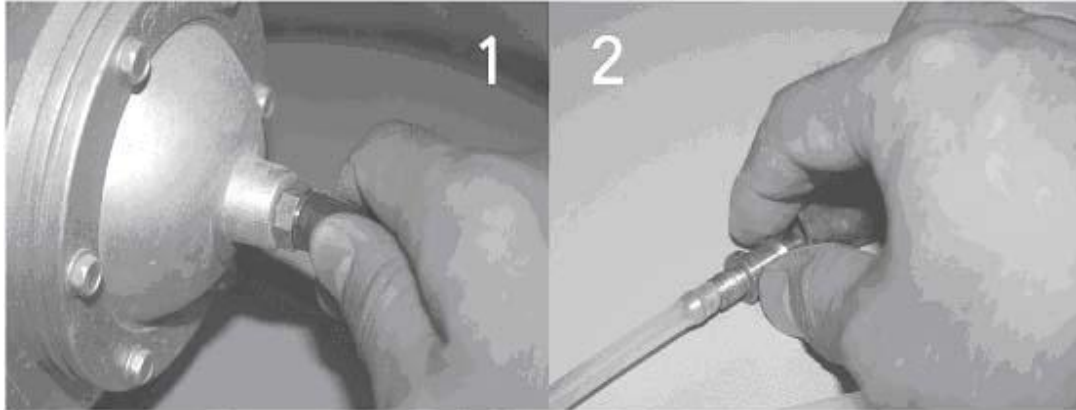
F2-14

Turn on the power to the water pump. You should see that water will gradually

fill the laser tube. The water flow is monitored by a flow switch, which will prevent the laser from operating if the flow of water has ceased or is insufficient. Water level and cleanliness need to be checked as part of daily maintenance.

4. Installation of the air compressor:

Connect the air compressor outlet with the inlet of the engraving machine and turn on the power to make sure that air flows normally. As in figure F2-15:

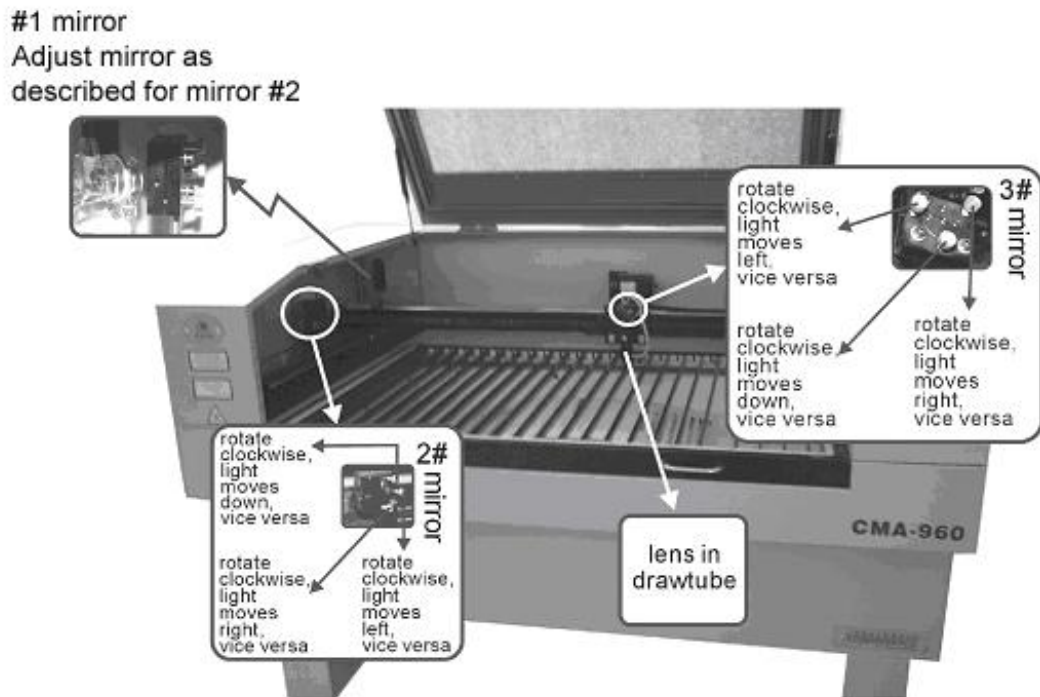


F2-15

When cutting and engraving, pressurized air will exit through the focusing nozzle on the laser focusing head. This will keep the focusing lens clean and protect the work material from being ignited. The air flow will affect the quality of your work. You should therefore periodically inspect the air hoses and keep them in good working order.

5. Laser Beam Adjustment:

Connect all electric lines and turn on the power of engraving machine. The machine will reset and return to the last origin (starting position). This indicates that the machine works normally. Now, turn on the power of laser generator to adjust the beam path. First, we will adjust the #1 mirror. Move the gantry and the focusing head to the rear left, which brings them closest to the #1 mirror. Place a piece of masking tape over the beam entry on the focusing head and pulse the laser with the PULSE button on the operator panel. The beam will leave a mark on the masking tape. Now move the gantry and the focusing head to the front left position and pulse the laser again. If the two marks are not in the same spot you need to adjust the mirror using the three screws at the back of the mirror. F2-16



F2-16

After adjusting the first mirror, #2 mirror is adjusted in the same way, except that you will move the focusing head left and right while leaving the gantry unmoved.

Notice: the position of the beam should be in the center of the mirror. If it is not in the center of the mirror, please adjust the mirror again until it moves to the center.

Finally, check whether the burn marks from all four corners of the table are superimposed. If the four marks are not superimposed you will need to readjust mirror 1 and 2.

After the four points are in the same spot, let's make sure the beam is in the center of the opening of the laser focus head. If it is not at the center of the beam entrance, turn off the laser power supply and adjust the position of the laser tube. If the beam is offset horizontally, adjust the laser tube in the same direction. For instance, if the beam is off to the left, adjust the laser tube to the left.

If the offset is vertical, adjust the laser tube in the opposite direction. For instance,

If the offset is vertical, adjust the laser tube in the opposite direction. For instance, if the offset is up, adjust the tube down (equally on both brackets). If the offset is down, adjust the laser tube up. (Picture F2-16)

Note: If only small corrections are required you may only adjust the right hand

vee bracket (at the beam exit side of the laser) in the way described above. If you need to adjust the left bracket, the adjustments are in opposite direction.

Detailed instructions about adjustment are also found in chapter 4 < Beam Path Adjustment Standards>.

After adjustment, please close the guard door to protect the laser tube.

6. Installation of the Exhaust Fan

First, use the furnished air hose to connect the fan to the exhaust port on the engraving machine and tighten it firmly with a hose clamp. Then use another air hose, to connect the outlet of the fan to an outside vent. Some local regulations might require exhaust filters (not included with the machine) when cutting and engraving toxic materials. Please check with your local authorities. Finally plug the power cord into the distributor and the exhaust fan is connected. See Picture F2-17:



F2-17

7A. Computer Requirements.

A Windows based computer is required to prepare programs and download them into the machine memory. Here is the suggested computer configuration for Laser Machines

Hardware:

Motherboard: Intel 854 chip set series(ASUS,MSI)

CPU: frequency 1600HZ or above (P4 1.6G or Celeron 1.7G)

Memory: DDR256M or above (HY.SUMSUNG)

Graphic card: 32M memory (LEADTEK GF200,GF400)

Hard disk: 40G 7200 above (Diamond seven series, IBM series)

Monitor: 17" flat CRT display (BENQ.SUMSUNG)

Floppy drive: 1.44 M (SONY, NEC)
CD driver: 52 speed series (SUMSUNG, MSI)
Power: 300W series brand (GREAT WALL, STAR)
Scanner: 600dpi or above (UNISCAN A700.A800)
Printer: 8.5"x11" or A4 series (HP3325. EPSON C41)
UPS: 500W or above (SANTAK,KSTAR)

Software:

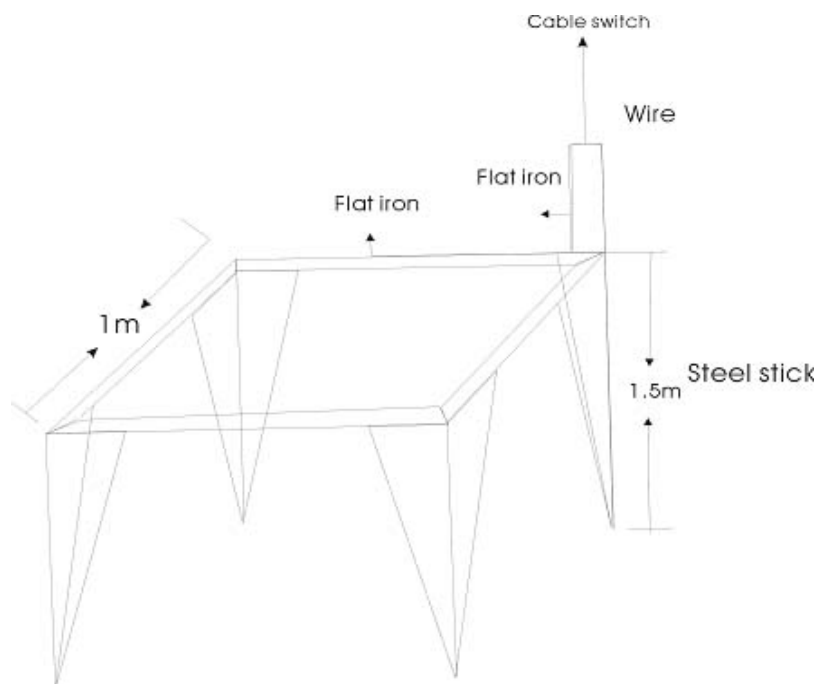
Operating system: Microsoft Win 2000, Windows XP (purchased by customer)
Application software: Microsoft Office Series, tools (optional)
Graphic software: Corel Draw 9.0, Corel Draw 11, Photoshop 6.0, AutoCAD 2000
Patented software: Authorized Eastern software (furnished with the machine)
The above configuration is for customer reference only!

7B Grounding the machine

In order to function properly, the machine must be electrically grounded via the electrical ground wire in your electrical system. If your wiring does not include a ground wire you need to install a ground to the following specifications:

Ground cable technical requirements

1. The ground device must use 4 pieces $4 \times 35\text{mm}$ steel rod to dig into a moist place around your building. Two pieces are 1 meter distance and each piece reach down to 1.5 meter. Then use $3 \times 30\text{mm}$ flat iron to connect each piece to combine to an efficient ground network.
2. Make sure the resistance of ground device is 3-5 ohm
3. A RVV 2.5MM² copper wire will connect the ground device and the entrance of the cable switch of the customer's electrical machine.
4. Please make sure the wire is properly grounded to our technical requirements in this working sheet, to assure that our laser machine can work properly.

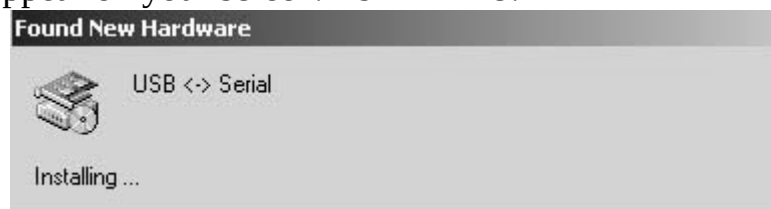


8. Installing the Device Driver

Our Eastern engraving machine uses a USB port to connect to your computer and to transmit data. You need to install the device driver before using the machine.

Setup methods:

Start your computer first and turn on the power of engraving machine. Use the USB cable to connect the computer with the machine. Then “Found New Hardware” will appear on your screen. As in F2-18:



F2-18

Next, insert the Eastern software disk into the CD-ROM drive, a dialogue box will appear as in figure F2-19:



F2-19

Click “next”, to continue the installation. As in F2-20:



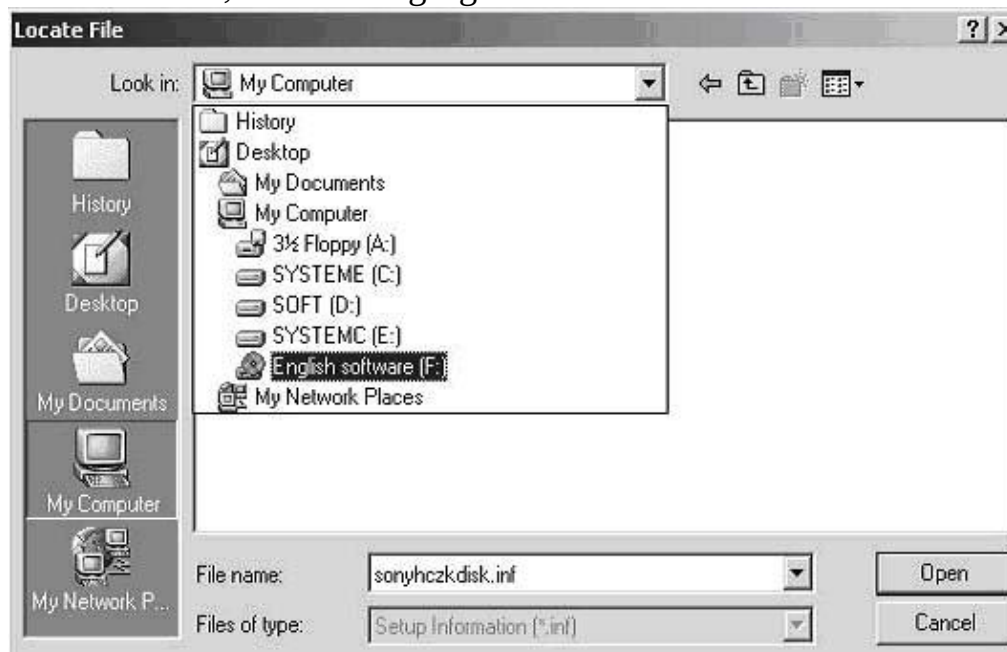
F2-20

Please select “Specify a location”, and click “next”. The following window will appear. As in figure F2-21



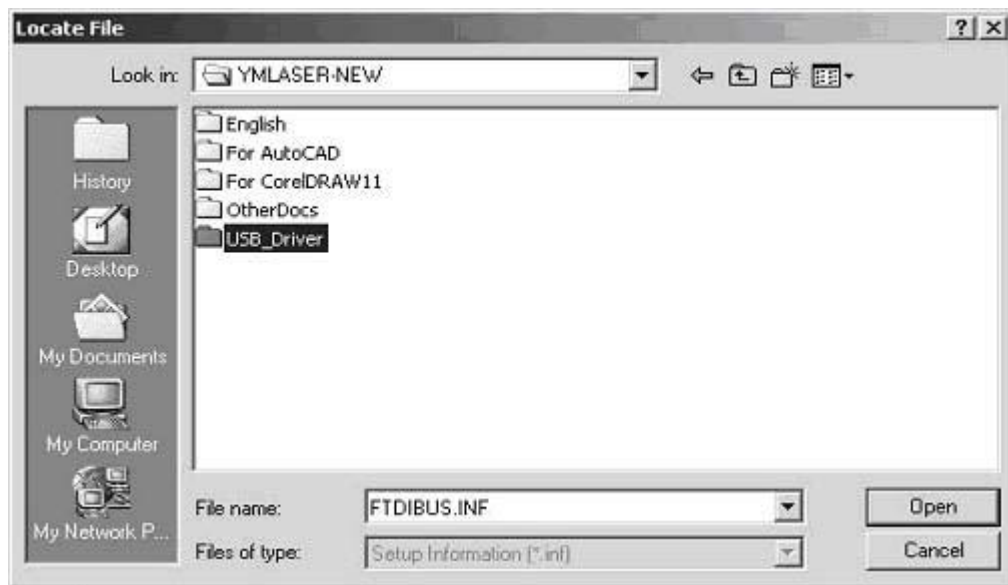
F2-21

Here, the system requires you to specify the location of the driver program. You can click “ browse”, as following figure:



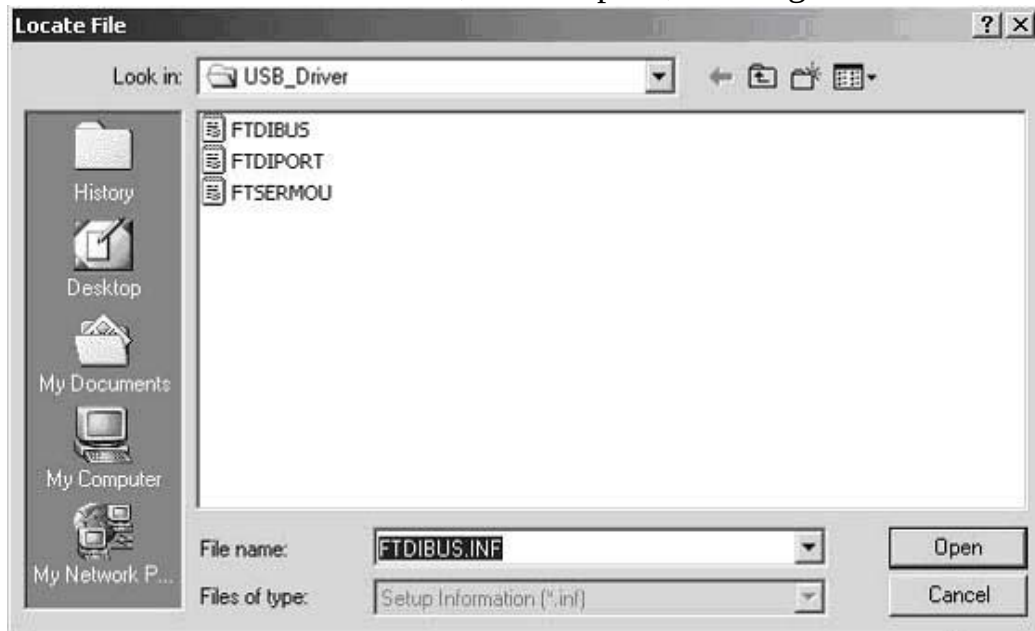
F2-22

Notice: The drive name may be different for different computers. The CD-ROM drive is the G drive in above figure while not every CD-ROM drive is designated G, so please select the correct drive letter.



F2-23

Select "USB-DRIVER" document, click "open", as in figure F2-24:



F2-24

Click "open" in F2-24, the following hint information will appear:



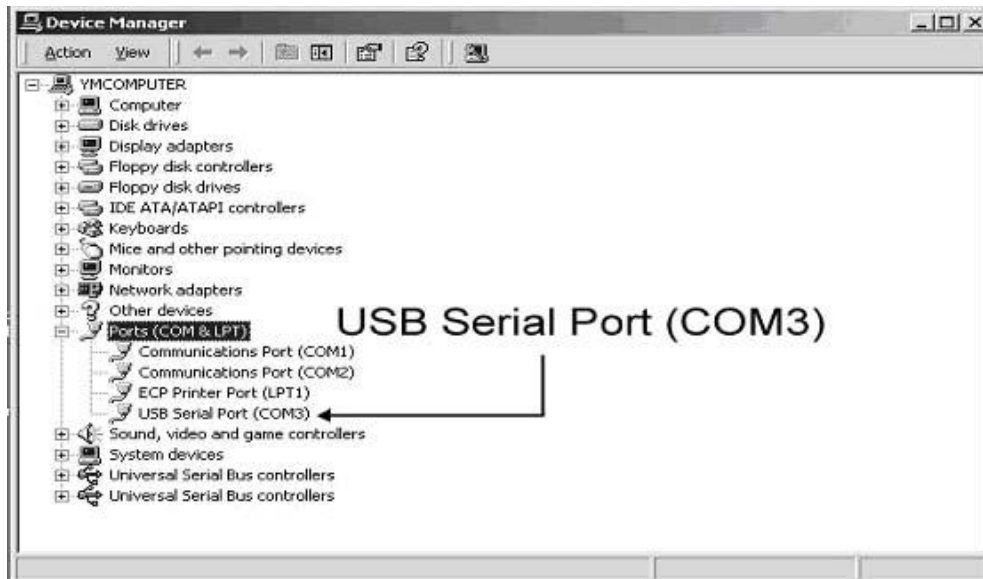
F2-25

Click “next”, and the software will be automatically installed. After it is finished, F2-26 will appear on screen:



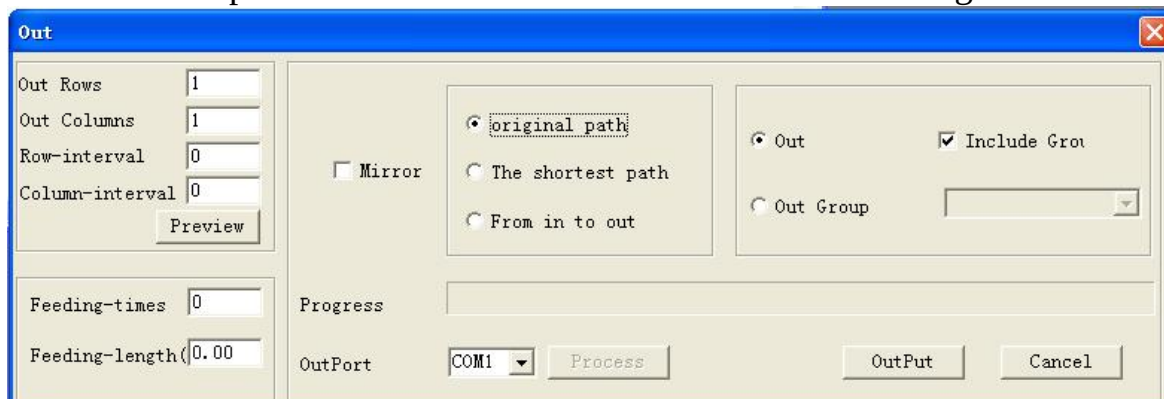
F2-26

Click the “Finish” button to complete the installation of the device driver program. Restart your computer, point the mouse to “My computer” and click the right button. Then click ”Property” and select “Hardware”, examine “Port (COM or PLT)” in the “Device Manager”. You can see information produced by drive program “USB SERIAL PORT COM3”, that is to say the port, which the engraving machine will use, is serial port COM3, shown in figure F2-27:



F2-27

COM3 is the port from which the computer will transmit data to the engraving machine. When you use the Eastern engraving software to output graphics, you have to choose this port in order for communications to work. See figure F2-28:



F2-28

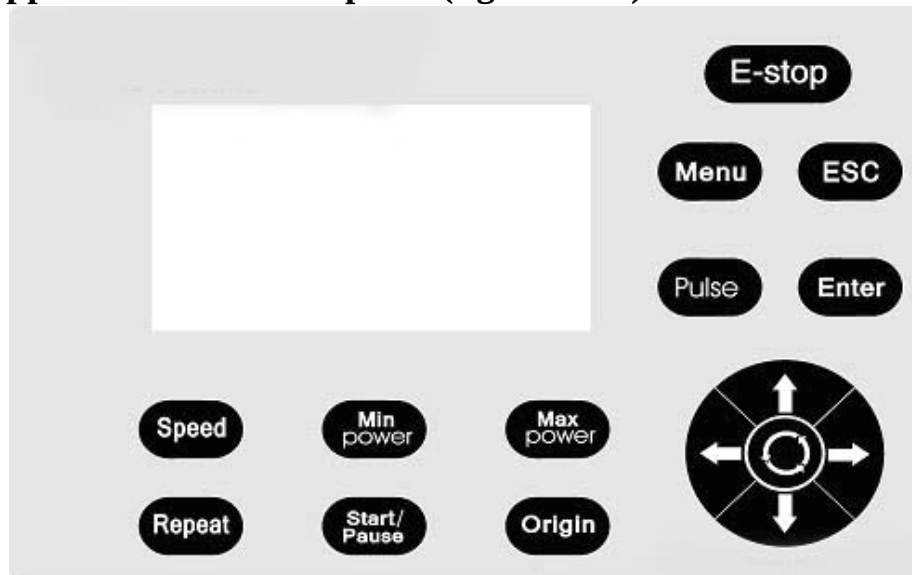
Generally speaking, once you have installed the driver, you have no need to reinstall it. If you can't find the serial port, it may be due to other reasons. If you install the above driver repeated times, COM5, COM6 may appear and your computer may not find the correct port to transfer your program. This means, you would have to run "ftdiunin.exe" to uninstall the driver and then reinstall it again.

The entire installation of the engraving and cutting machine system is now finished. In the following chapters, we will teach you how to operate the system.

Chapter 3 Operating the Cutting & Engraving Machine

Besides a computer, the machine control panel is the main means of running the machine. All functions of the control panel will be introduced to you in the following paragraphs.

1. The appearance of control panel (figure F3-1)



F3-1

There are 16 buttons on the control panel of the Eastern engraving machine and a LCD (Liquid Crystal Display).

These 16 buttons are: E-Stop, Menu, Esc, Pulse, Enter, Speed, Min Power, Max Power, Repeat, Start/Pause, Origin, up, down, right, left and center button.

File names and working parameters are displayed on the LCD. They are speed, depth and status (initiating, waiting, working and pausing etc.)

2. Term explanation:

A, Machine Origin: This is the basic reference point of all motions (cannot be modified by the user). It is in the rear-right corner of the work area. The focusing optics of the cutting and engraving machine will “home” at the machine origin if you turn on the machine or use “Reset”. This is followed by an automatic move to the Origin (starting point) of the last job.

B, Cutting and Engraving Origin. A downloaded job will start here. The user can define the location of the Origin at any place within the work area. This Origin will remain valid until redefined.

If you set returning point mechanic point in parameter setting, laser head will

stay at mechanic point after work finishes or reset finishes.

3. Definition of Directions: (operator faces the machine work area).

Up: the direction in which the beam moves away from operator.

Down: the direction in which the beam moves toward the operator.

Left: The focusing optics move left.

Right: The focusing optics move right.

4. The Function of each Button on the Operator Panel

E-stop

Pushing the E-stop will stop the present job, the machine will home (reestablish the machine origin) and return to the origin of the last job.

Pressing the “E-stop” while the system is working will cause an abrupt termination of motions and should only be used in emergencies. If you want to interrupt a running program temporarily use the “Start/Pause” button. If you want to terminate a program use the “ESC” button.

Pressing the “E-Stop” and holding it down will terminate all motions, stop the laser and its power supply. Releasing the “E-Stop” will then allow the system to reset as described above.

Menu

Menu: Shows the files which are stored in the machine memory.

ESC

ESC: Cancels operation. When you set parameters, it cancels the set you have selected; select files, cancels the select; pause state, return to waiting state. This button is inoperative in other state.

Enter

ENTER: Confirms the operation. It is only usable for setting the speed, setting the power and for selecting files.

Pulse

PULSE: When power to the laser is on, pushing the “PULSE” button will allow a laser emission for 0.5 seconds. For a repeated pulse, the button has to be pushed again. This button is only active in the waiting and pause states.

Speed

Speed: Set the engraving or cutting speed of the machine, range from 0 to 100. It is usable in the waiting and pause states. 100% is the maximal speed of the machine.

Min power

Min Power: Minimum power, range from 0 to 100%, it is usable in the waiting and pause states.



Max Power: Maximum power, range from 0 to 100%, it is usable in the waiting and pause states.

Note: To use the above features, you must have chosen “default” in the engraving software for speed and depth. If you program speed and depth in the software, the machine will use those values.



Repeat: Repeats the last program without the need to download it again from the computer.

It is usable in the waiting state when engraving data is stored in machine, while unusable in other states.



Start/Pause: When the system is running and this button is pressed, the system will pause. Press this button again, and the system will continue where it left off. This button is valid in the work and pause states.



Origin (Starting Point): This button is used to define (or change) the engraving (cutting) origin. If you want to change the engraving origin, you need to use the direction keys to move the laser head to the point where you want the program to start and then press this button.

A short press means defining the origin.

A long press, more than 3 seconds, means defining the engraving origin, system check and outputting check graphic.

This button is valid in the waiting state.

Direction Keys (up, down, left, right, center): move the focusing optics, select work files, change engraving speed and set minimum/maximum power values.



Up: Moves the laser head to the rear.

Pressing this button and holding it causes the laser head to move to the rear. When the laser head arrives at the rear end of the Y axis stroke, it will stop and this button will become inactive.

When you set speed and power, press this button repeated times, the value of the speed or the power will increase 1 percent each time.

When you select files, this button will move you up the menu.



Down: Moves the laser head toward the operator.

Pressing this button and holding it causes the laser head to moves forward. When the laser head arrives at the forward end of the Y axis stroke, the laser head stops and this button will become inactive (the max stroke of the Y-axis can be set in the parameter settings of the software to the max of the work area)

When you set speed and power, press this button repeated times, the value of the speed or the power will decrease 1 percent each time.

When you select files, this button will move you down the menu.



Left: Laser head (focusing optics) moves left.

Press this button to move the laser (focusing) head to the left. When laser head arrives at the end of the X axis stroke, motion will stop and this button will become inactive. The max stroke of the X-axis can be set in the parameter settings of the software to the max width of the work area)

When you set speed and power, press this button repeated times, the value of the speed or the power will increase 10 percent each time.

When you select files, this button will move you to the previous page of the menu.



Right: Laser head (focusing head) moves right.

Press this button to move the laser (focusing) head to the right. When laser head arrives at the end of the X axis stroke, motion will stop and this button will become inactive. The max stroke of the X-axis can be set in the parameter settings of the software to the max width of the work area)

When you set speed and power, press this button repeated times, the value of the speed or the power will decrease 10 percent each time.

When you select files, this button will move you to the next page of the menu.



Center Key: This button is a backup button and will be used to expand functions of the machine in the future and is not defined yet.

5. Starting the Machine

5.1 Safety Note

Please confirm the following conditions before you turn on the engraving &

cutting machine for the first time.

A, The electric power supplied must be: 220 Volt AC, Single Phase, 50 HZ (60 HZ in USA and Canada).

B, Every electric line must be firmly connected, especially the high voltage lines.

C, The machine and its computer must be safely grounded.

D, The water inlet and the water outlet on the laser tube and the chiller must be connected correctly in order to assure proper cooling of the laser tube.

E, The air compressor and its air tubing must be connected correctly.

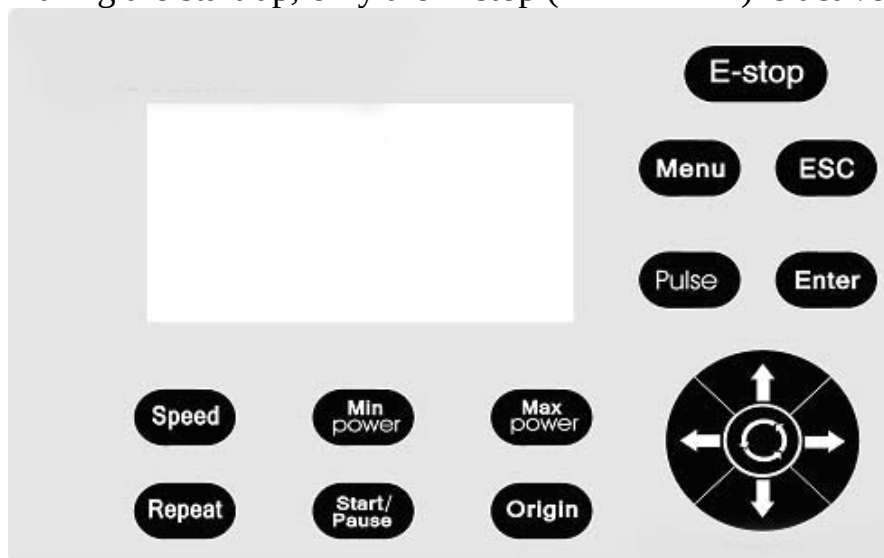
F, The work area must be clear except for the material to be engraved or cut.

After confirming the above, you are now ready to start up the machine.

5.2 Operating the Machine.

Turn on the power to the machine, and the system will begin to power up.

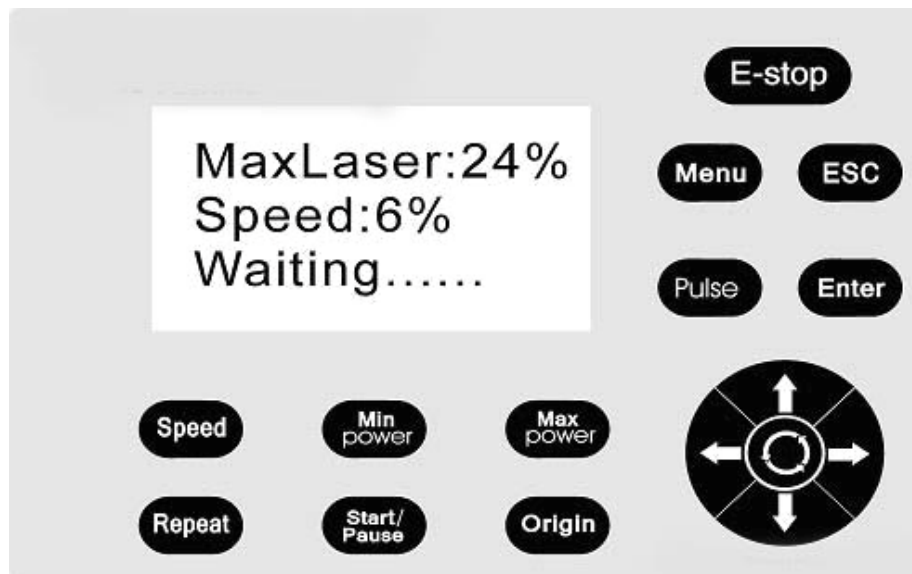
Generally speaking, the LCD will start with the screen shown below. (as in figure F3-2). During the start up, only the E-stop () is active.



F3-2

Observe the automatic homing routine of the focusing optics (laser head) to make sure that laser head first homes at the right rear corner of the work area (machine origin) and then moves to engraving origin (the start of the last job). If you observe any irregularities during the homing routine or during cutting or engraving, please turn off the power and contact your representative.

After the homing routine is finished, the system changes into a waiting state (as in figure F3-3). Now, the engraving and cutting machine can receive data and work files.



F3-3

Periodically you should check the following to assure proper engraving and cutting:

A. Make sure that mirrors are clean and the beam exits properly through the beam nozzle at the bottom of the focusing optics.

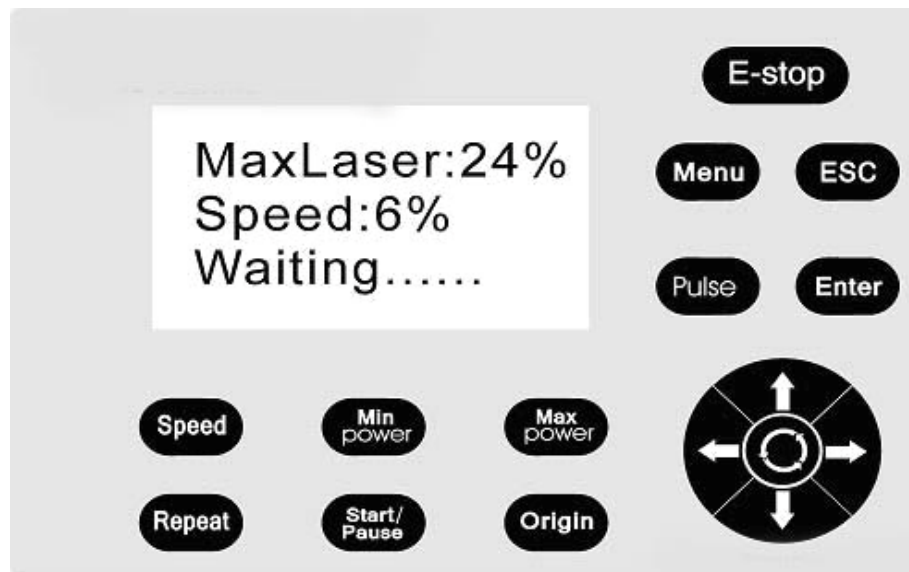
B. Set correct working parameters.

If you have used “default speed” in the parameter setting section of the engraving software, the actual value must be set on the control panel: press

“speed”(**Speed**) to set the engraving or cutting speed (as in figure F3-4): press the direction keys to change the value of the speed, the left-right keys make changes in 10 percent increments, while the up-down keys make changes in 1 percent

increments. After setting your values, you can press “Enter”(**Enter**) to store the

setting or press “ESC”(**ESC**) to cancel.

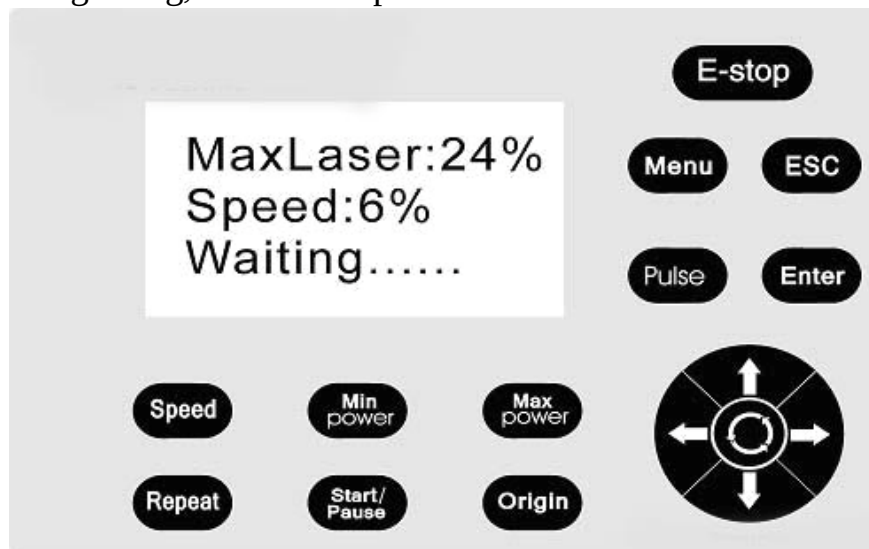


F3-4

If you have used “default power” in the parameter setting section of the engraving software, the minimum power needs to be set on the operator control panel. Press “Min Power” () to set minimum power (as in figure F3-5): (This works the same way as the speed setting).

When laser cutting, “minimum power” means the laser power at turning points.

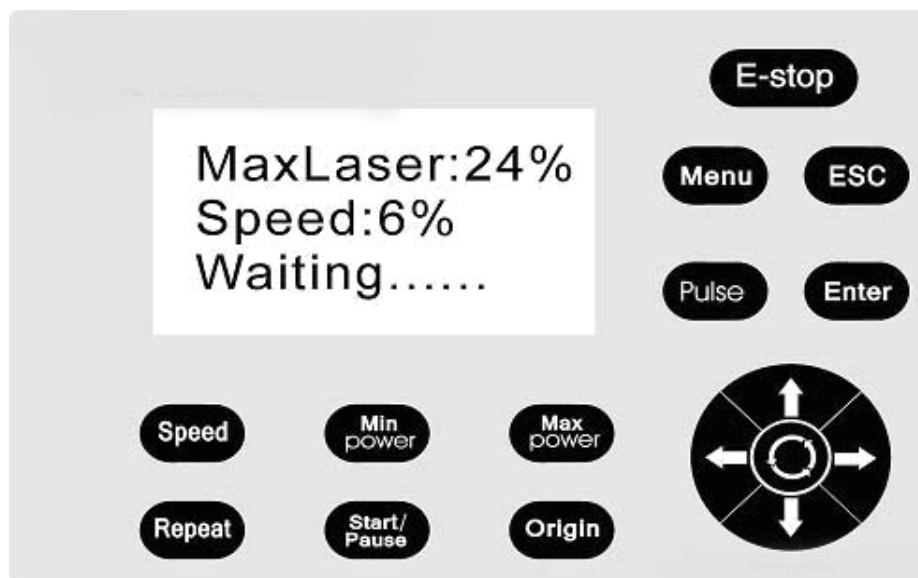
When laser engraving, “minimum power” means the minimum laser power.



F3-5

Likewise, if you have used “default power” in the parameter setting of the engraving software you also need to set the maximum power on the operator panel.

Press “Max Power” () to set maximum power (as in F3-6)

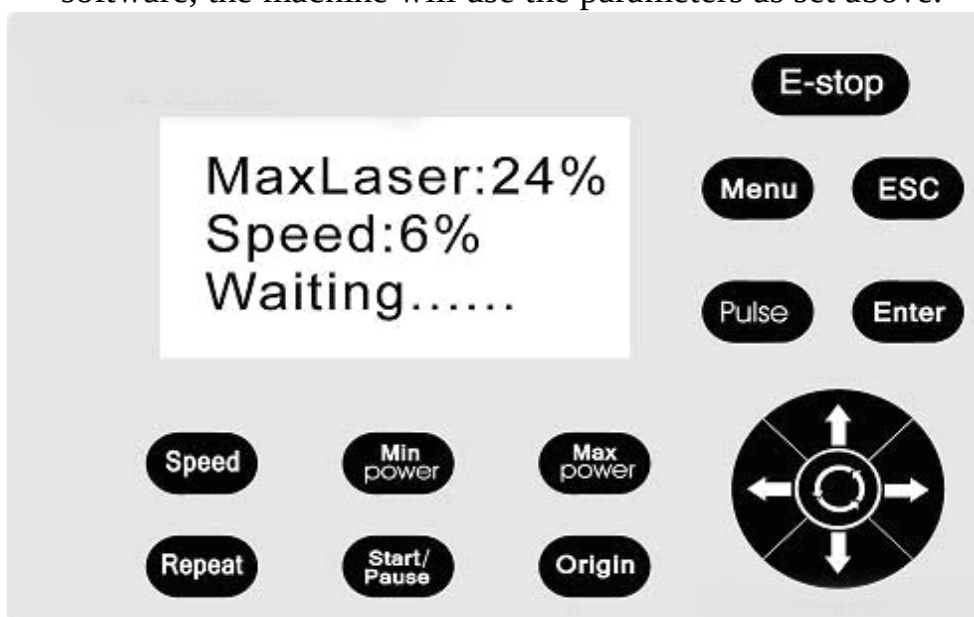


F3-6

If you want to change the engraving origin, you can change it in the waiting state of the machine. Just move the laser head to the ideal place to start your work using the arrow keys and press “Origin” (**Origin**) to redefine the engraving origin.

If there’s a program stored in the engraving machine, you can press “Repeat” (**Repeat**) to run this program again. (as in F3-7).

- ※ If you select self-definition in the engraving software, the machine will use the parameters set in the job program.
- ※ If you select “default speed” and “default power” in the engraving software, the machine will use the parameters as set above.



F3-7

C, There are several methods for the machine to change into working state from waiting state:

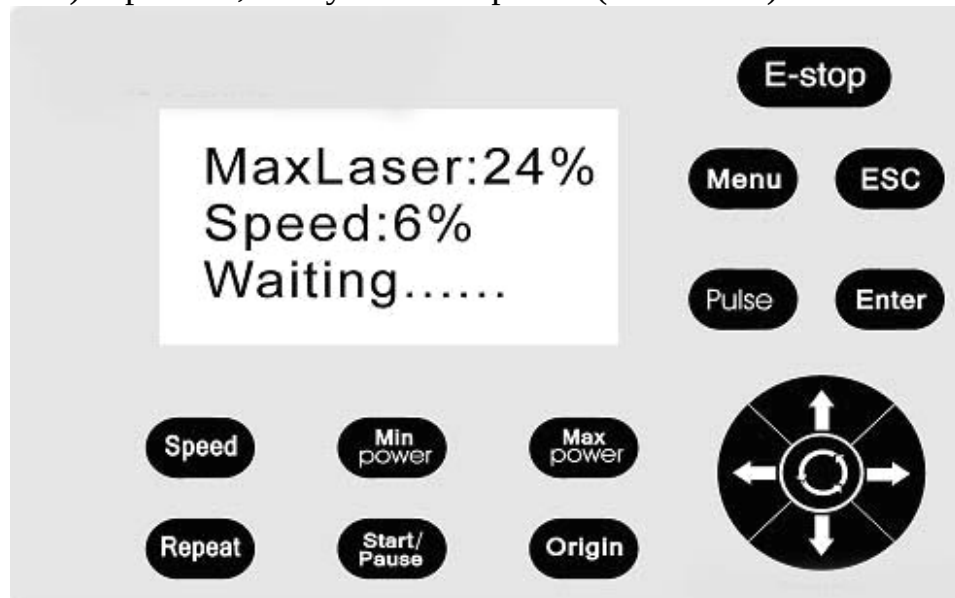
- (1), The last program run can be run again by pressing “repeat”.
- (2), Other programs stored in the machine memory can be selected and run.
- (3), New program files can be downloaded from the computer, through the YMFIL software.

(4), Output data to the engraving machine from the computer using the Eastern engraving software.

D, Only two buttons are active when the system is in the working state:

“Start/Pause” () , and “E-stop” ().

When system is running a program (as in figure F3-7) and the “Start/Pause” button () is pressed, the system will pause. (As in F3-8)



F3-8

Press the “Start/Pause” button again and the machine will resume where it left off. If you press and hold the “E-Stop” while the machine is running, it will stop its program. When the “E-Stop” is released the machine will go through a homing routine. The “E-Stop” should not be used when the machine is running normally.

E, After the system has finished its work, a buzzer will sound, and the machine will go into the “system waiting state” (as in figure F3-4). Now the user can select the next job and its proper method.

Chapter 4 Beam Path Adjustments

Following the installation of the laser tube, and periodically there after, it might be necessary to adjust the beam path. To achieve full laser power at the work piece, the laser beam must be unobstructed. This chapter describes the steps to be taken to adjust the beam.

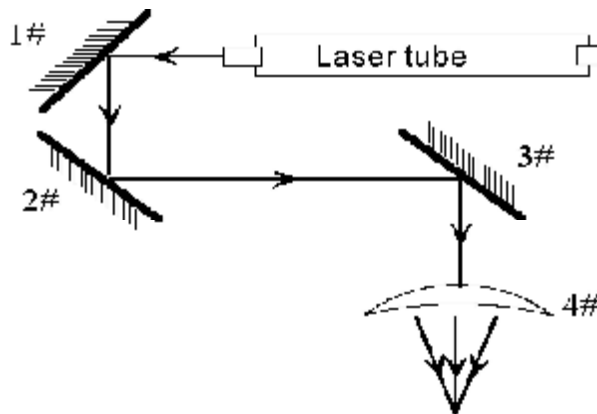
Gantry: This is the structure which moves front to back when the up and down buttons are used on the control panel.

Laser Head (Focusing Head): It combines a beam bender (mirror) with the focusing lens and can be moved left and right by using the corresponding buttons on the control panel.

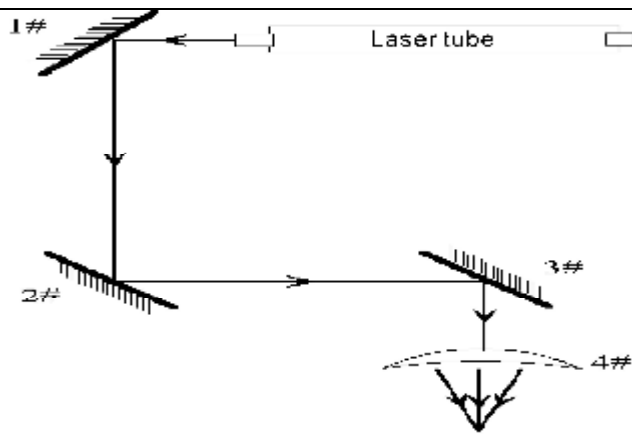
Steps for Adjustment

Step1: Ensure that the laser beam hits the center of the #1 reflecting mirror.

Step 2: To record a burn mark with the laser, paste a piece of masking tape over the entrance hole into the #2 beam bender. (Note, if you expect the beam to be off by a large amount, use first a larger piece of cardboard in front of the mirror for rough adjustments.) Move the gantry fully to the rear and press the “Pulse” key to make a mark on the tape. Make sure the guards are closed when you use the “Pulse” button.



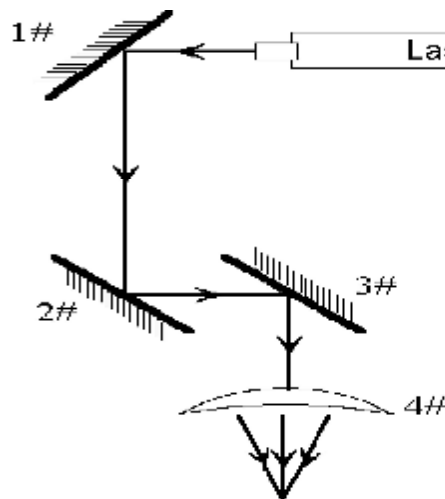
Step 3: Move the gantry to the extreme forward position and make another burn mark with the “Pulse” button.



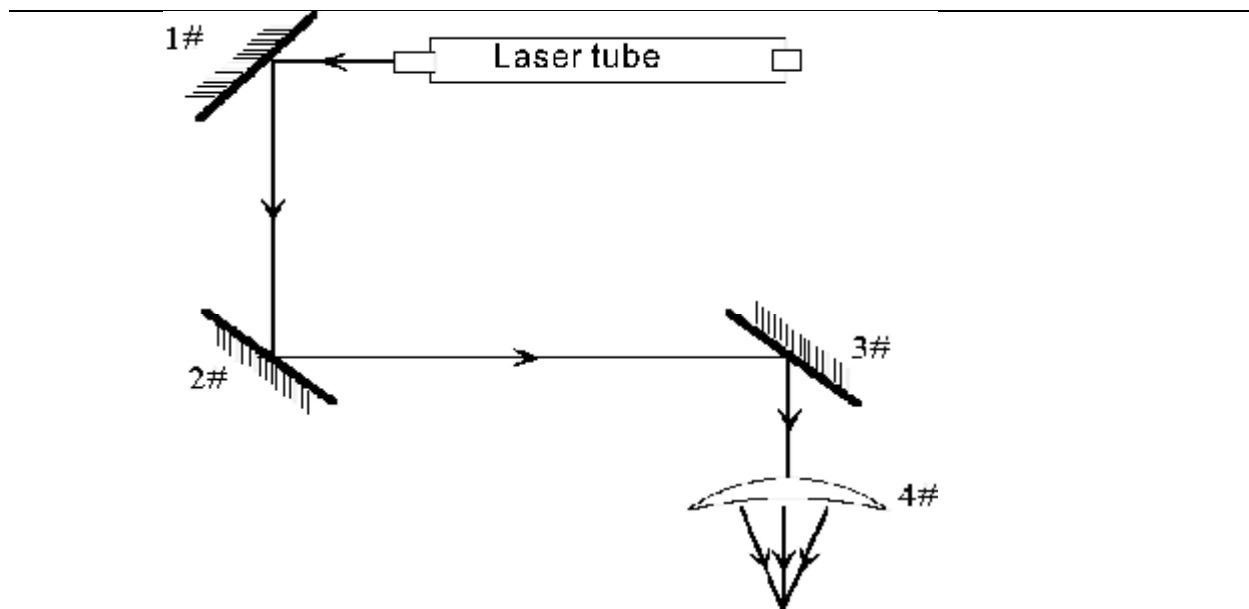
Step 4: If the two marks are not at the same point on the tape and in the center of the beam bender opening, you need to adjust the #1 mirror make the two marks coincide.

Step 5: Redo steps 2 to 4 until the two marks coincide.

Step 6: Paste a piece of masking tape over the opening to the #3 mirror. (Again, a larger piece of cardboard will help to make large adjustments first). Move the laser head to the extreme left and make a burn mark by pressing the “Pulse” button.



Step 7: Move the laser head to the extreme right and make a mark again.

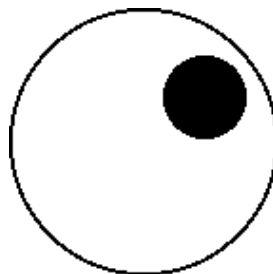


Step 8: If the two marks are not at the same point on the tape, you can adjust the #2 mirror until the marks meet.

Step 9: Redo steps 6 to 8 until the two marks coincide.

Step 10: Again, paste a piece of masking tape over the entrance hole to the #3 mirror. Press the Pulse key to make a mark on the tape. If the mark is in the center of the hole, you are finished.

Step 11: Additional adjustments are needed if the laser mark is not in the center of the hole, as figure:



In this example, the mark is up and to the right.

Up-down error: raise or lower the laser tube.

In-out (left-right) error: adjust laser tube front to back.

In this example, we must lower the laser tube, and then redo the adjustments starting from the first step.

Note: All the adjustments must be done by trained personnel as the laser beam is inherently dangerous to skin and eyes.

The focus should be adjusted as well after the optical path is adjusted before carving. The height of the laser head should be adjusted with a special focometer according to the ex-factory focus. Place the focometer on the object to be operated

on, screw off the two copper screws that peg the laser head on the dolly, adjust the distance between the object and the laser head, and make it equal to the ex-factory focus. Then screw up the screws to peg the laser head.

Other methods can be adopted to check or adjust the focus as follows:

1. Since the light spot is the smallest when it is at the focus, we can click the button “dot-shoot” and judge the focus according to the size of the light spot. When the light spot is the smallest, then we can be sure that it is the best distance for the laser head to cut.

Place an object under the laser head and adjust the height of the laser head. Click “dot-shoot” when the laser head is at different height and watch the size of the light spot. First you may adjust the distance at a large scale to find the approximate distance at which the light spot is fairly small; and then readjust the height of the laser head. When the light spot is the smallest, we can be sure that the laser head is at the right height.

2. Since the light intensity is at the maximum degree at the focus, we can find the focus according to the depth of shoot made by the laser.

Place an object under the laser head, and adjust the height of the laser head. Press the button “position” for over 3 seconds at different height. When the spoor made by the laser is the deepest, then the height may be considered as right, i.e. the right height we need.

Chapter 5 Instructions of Laser Cutting Software

This laser cutting software is a corollary software of the laser cutting machine developed independently by us. It is very convenient and can be used in many formats including BMP, PLT, EXF, OUT, DST, JPG, JPEG, and GIF etc. PLT format is a vector graph, so it is precise and rapid; while BMP's greatest advantage is that graphics can be directly scanned out if the graphics is of high quality. Besides, BMP works better than PLT. The combination of both two modes can help avoid setting the parameter time after time and it also makes it possible to realize one-step cutting. We make this instruction to help you to master this software.

Section one Basal Concept, Function and Operation of the Software

1. Installation of the Software

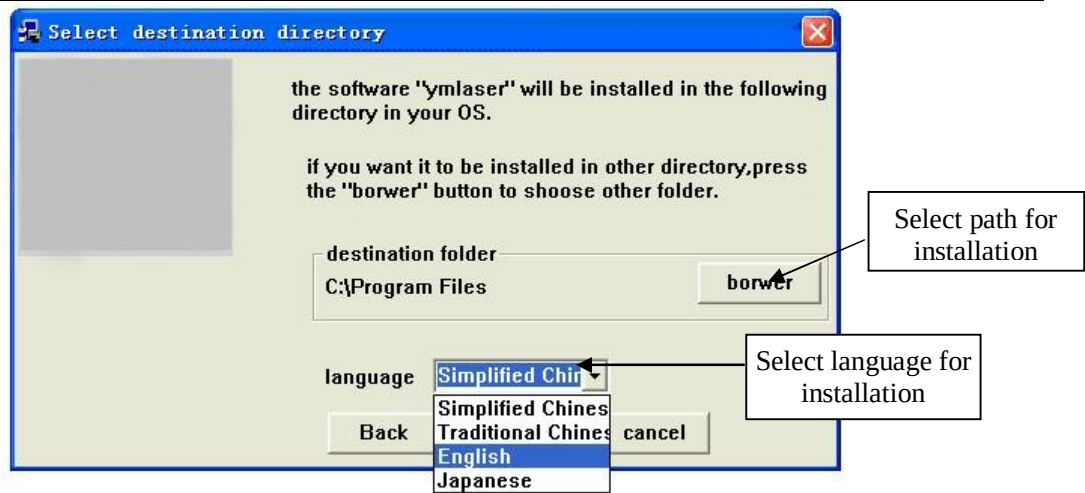
We offer a kind of software which is illuminated with multiple languages to satisfy our customers from different areas. You can select the language that you understand to conduct the installation. Detailed steps are as follows:
Put the CD into the CD ROM, find the folder SmartCarver3.012 (3.012 is the issue no. as the software is usually upgraded, the issue no. may change as well. Anyway,

only to find the SmartCarver is ok.), double-click the setup file  in this folder, and a dialog box will come out as showed in F5-1-1.



F5-1-1

Click “Next” and F5-1-2 will come out:

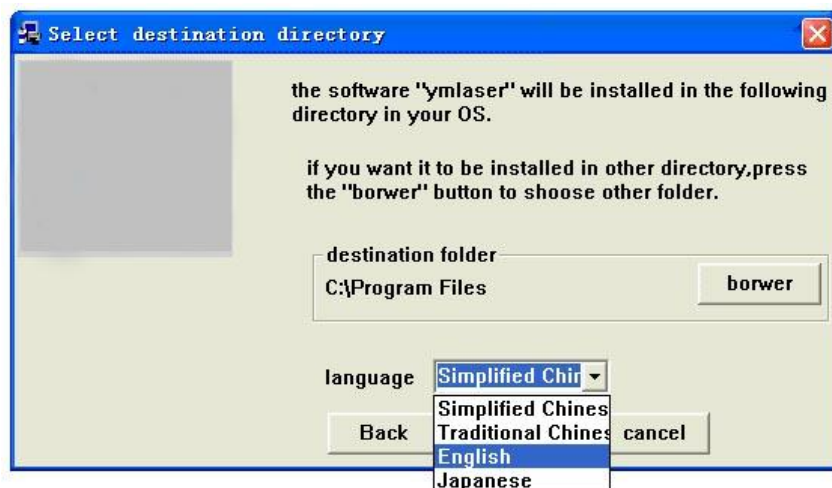


F5-1-2

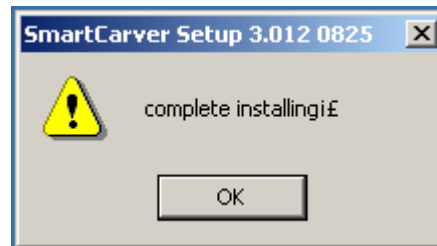
Click “Browse” as in F5-1-2 to select installation path as illuminated in F5-1-3 and to select language in the language combo box. After selecting installation route and installation language, please click “install” as in F5-1-4, and then F5-1-5 will come out.



F5-1-3



F5-1-4

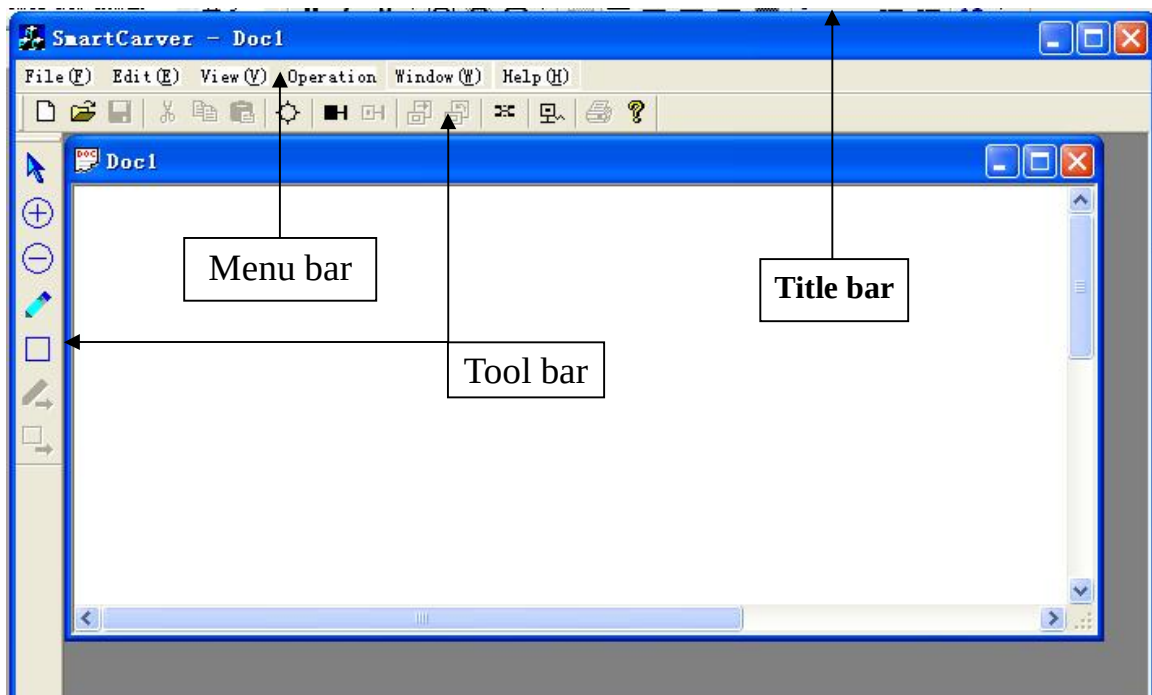


F5-1-5

2. Remarks of irons in the window and operations

(1) Manipulation window

Double-click the  icon to start the laser cutting software, and F5-1-6 will come out.



F5-1-6

A. Menu

File: click the file menu to see the function menu as F5-1-7

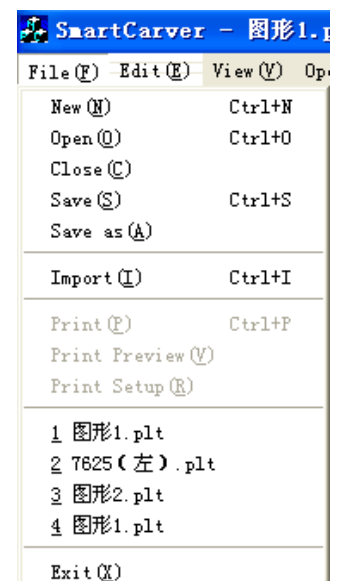
New: create a new file

Open: open a saved file

Close: close the working file

Save: save the present file. If you have defined the carving parameter, you can save it as *.Carve, which is the special data format of this laser cutting software.

Save as: save the present file. If you have defined the carving parameter, you can save it as *.Carve, which is the



F5-1-7

special data format of this laser cutting software.

Load in: load in the PLT format

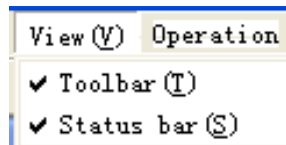
Print: print the present file

Print preview: preview the print effect.

Print setting: set the print parameter

Quit: close the software

Edition: this function can not be used for the moment.



F5-1-8

View: click the file menu to see function menu as in F5-1-8

Tool bar: can be hidden/open

Status bar: can be hidden/open

Operation	Window (W)	Help (H)
Comeback Mouse		Shift_C
Comeback Picture		Shift_A
Zoom in Tool		Shift_F
Zoom out Tool		Shift_S
Rectangle Tool		Shift_R
Adjust Rectangle		
Line Tool		Shift_V
Adjust Line		
Whole Setting		Shift_W
Group Setting		Shift_X
Import Setting		
Carve Out		Shift_E
Undo PLT		Ctrl_Z
Machine Operation		

F5-1-9

Remove Block	Shift_D
Comeback Mouse	Shift_C
Comeback Picture	Shift_A
Zoom in Tool	Shift_F
Zoom out Tool	Shift_S
Rectangle Tool	Shift_R
Adjust Rectangle	
Line Tool	Shift_V
Adjust Line	
Whole Setting	Shift_W
Group Setting	Shift_X
Add pen	
Delete PLT	Shift_Delete
undo PLT	Ctrl_Z
Machine Operation	
Carve Out	Shift_E

F5-1-10

Operation: click the operation menu to see the function menu as in F5-1-9.

Comeback Mouse: turn the mouse into a cursor in the working place

Comeback Picture: revert the graphic to original size

Zoom in Tool/Zoom out Tool: zoom in or zoom out the graphics at any degree

Rectangle Tool: define blocks with rectangles

Adjust rectangles: adjust the definition block with rectangles.

Line Tool: use the pencil to define the block.(40 definition points at the most)

Adjusting Line: adjust the line area in the defined block.

Whole Setting: set work mode, speed and light power parameters.

Group Setting: used in BMP. Different work modes can be set if different blocks.

Import setting: not applicable for the moment

Carve Out: send data set to the cutting machine for carving.

Undo PLT: repeal the foregoing operation of the PLT graphics.

Machine operation: refer to the following to see operations on the machine and coordinates.

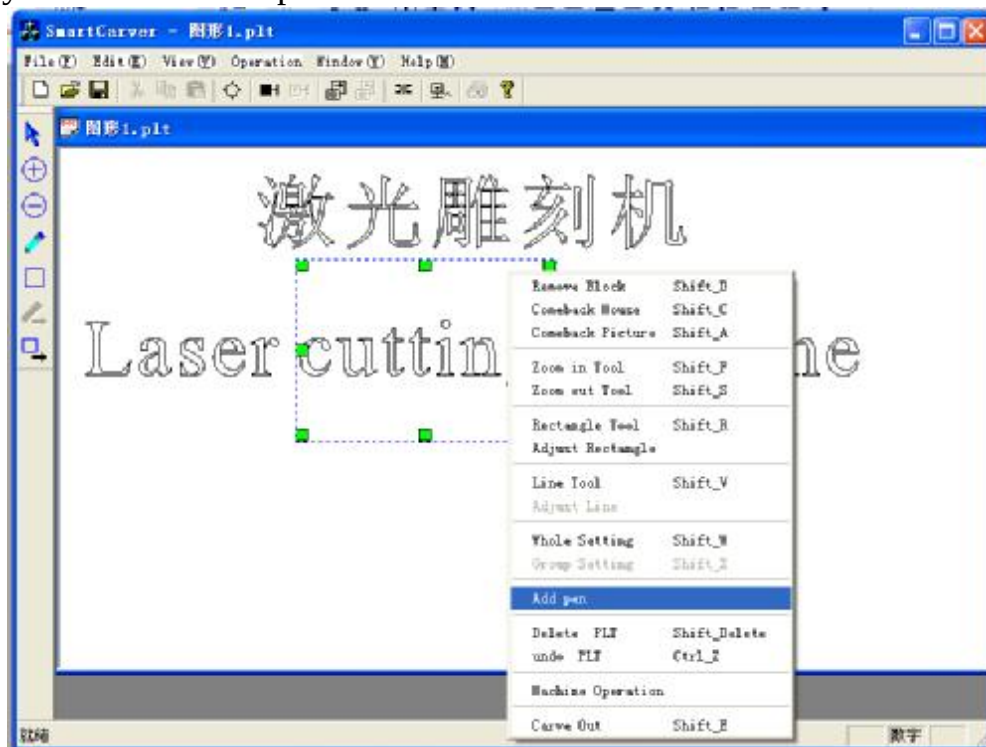
Window: shift files and set up new files.

Help: show the issue and copyright of the software

Pop-up menu: click the right key and F5-1-10 will come out. Compare F5-1-10 with F5-1-9 and you may find many similarities between the hidden menu and the pop-out menu in operation.

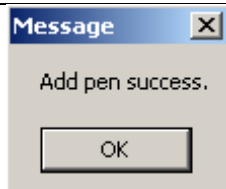
Remove block: delete block selected by rectangle tool or/ and line tool

Add Pen: after selecting an area (the area must be a whole continual line), click the right key and select “Add pen” on the menu as in F5-1-11.



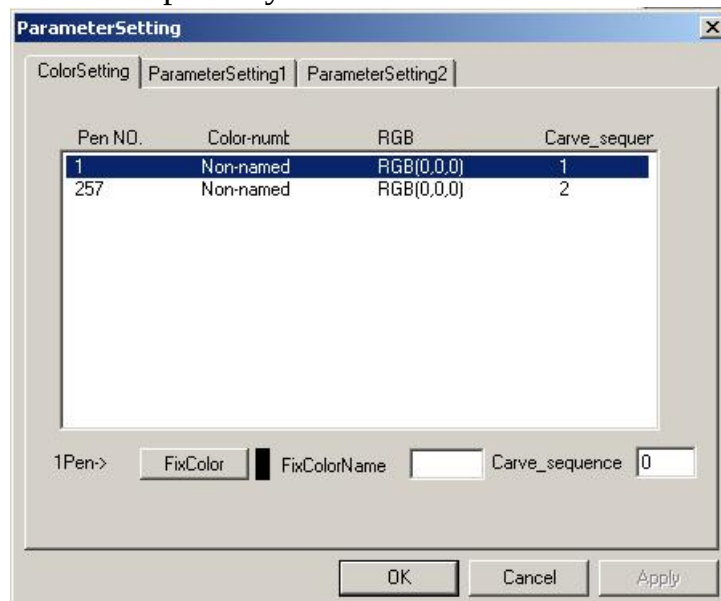
F5-1-11

If add pen successfully, F5-1-14 will appear and confirm it.



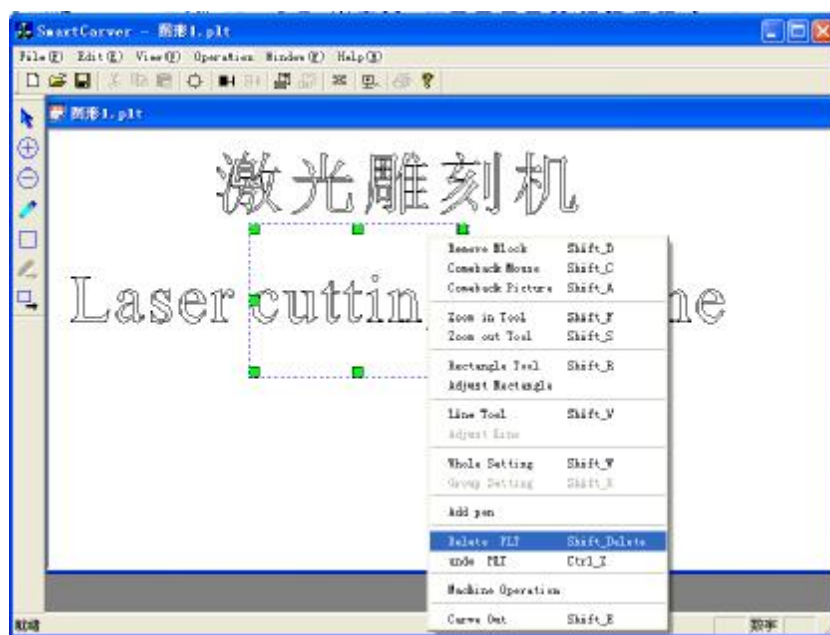
F5-1-12

Click the “Whole Setting” in the menu, and F5-1-13 dialog box will come out, in which you can find that no.257 pen is the newly added number of pen. And you can set its carving characters separately.



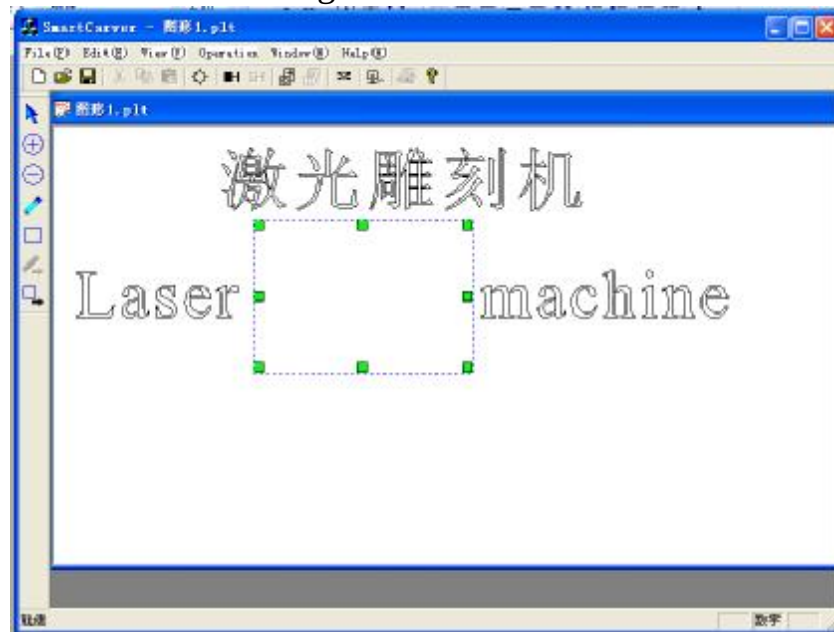
F5-1-13

You can use this function to set a whole and continual design.
Delete PLT: partial deletion. Parts selected can be deleted.
Select a whole area with the  or the , and click the right key to see the menu as in F5-1-14:



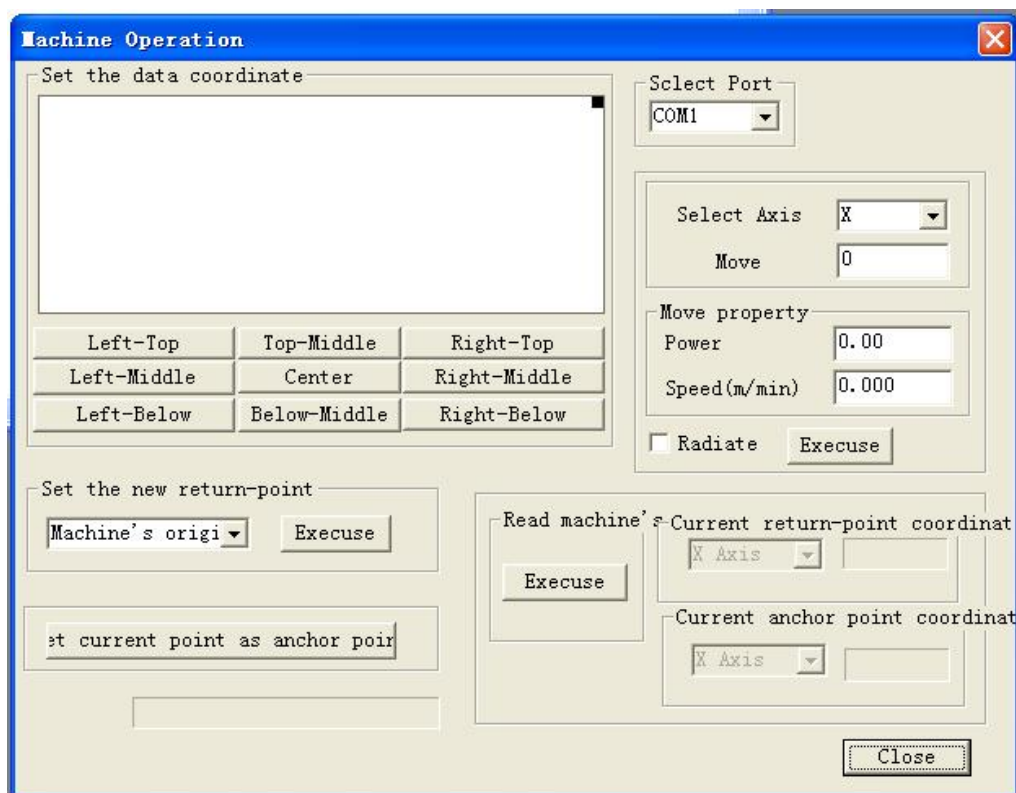
F5-1-14

Select “Delete PLT” in the function menu and the pictures or words in the selected area can be deleted. As figure F5-1-15 showed.



F5-1-15

Machine operation: click “Machine operation” or the icon , and F5-1-16 will jump out.



F5-1-16

- Set the data coordinates: Right-Top, Right-Middle, Right-Below, Top-Middle, Center, Below-Middle, Left-Top Left-Middle, and Left-Below can be selected as the coordinate point of the machine. Right-Top is default as the original coordinate point of the machine,

however, if another point is clicked, the system will immediately take it as a new original coordinate point and the machine will move towards the reverse direction of the coordinate point.

Right-Top: the same with the original point of the machine, the machine will carve and out-put the design towards the left lower of the point set.

Right-Middle: the machine will carve and out-put the design towards the left middle of the point set.

Right-Below: the machine will carve and out-put the design towards the left upper of the point set.

Top-Middle: the machine will carve and out-put the design towards the middle lower of the point set.

Center: the machine will carve and out-put the design in the midpoint of the point set.

Below-Middle: the machine will carve and out-put the design towards the middle upper of the point set.

Left-Top: the machine will carve and out-put the design towards the right lower of the point set.

Left-Middle: the machine will carve and out-put the design towards the right middle of the point set.

Left-Below: the machine will carve and out-put the design towards the right upper of the point set.

- Set the new return point: not applicable for the moment.
- Set current point as anchor point: not applicable for the moment.
- Select Port: select ports where the machine and the computer are connected.

■ Single axis moving: Select Axis: here you can set the single-axis moving. And you can also move or position the crossbeam, the dolly, and the feeding axis of the carving machine without pressing the keys on the carving machine. There are 7 options including X, Y, Z, U, V, W and the feeding axis, all of which can be selected according to practical need of the machine. After selecting the axis, you can set the moving distance, the light intensity and speed during the moving (note: if the checkbox “Radiate” is not selected, the carving machine will move with out giving off laser), and then click “Execute”. The carving machine will move according to your setting. If a positive number is filled in “moving distance”, the relevant selecting axis will move towards the positive direction; and if a negative is filled, the axis will move towards the negative direction.

B. Toolbar

 Select tool: select object

 Zoom in tool: Zoom in pictures

 Zoom out tool : Zoom out pictures

 Line tool: you can select a picture with this tool by hand. Click the pencil , and it turns into . Click the left mouse key at a proper place to define a point (the first point is the starting point of the area to be selected), and then another, and the points form a line. Continually make points and at last click the right mouse key. The starting point and the ending point will connect and form a closed area. You can make as many as 40 points.

 Rectangle tool: select the picture with . Press the left mouse key, and do not release it until the mouse is moved to where you want. And at last release the mouse. Then a rectangle area is selected.

 Moving tool: move the area selected with pencil. Applicable after the pencil is used.

 Moving tool: move the area selected with rectangle. Applicable after the rectangle is used.

Remarks: you can make some simple edition with this laser cutting software.

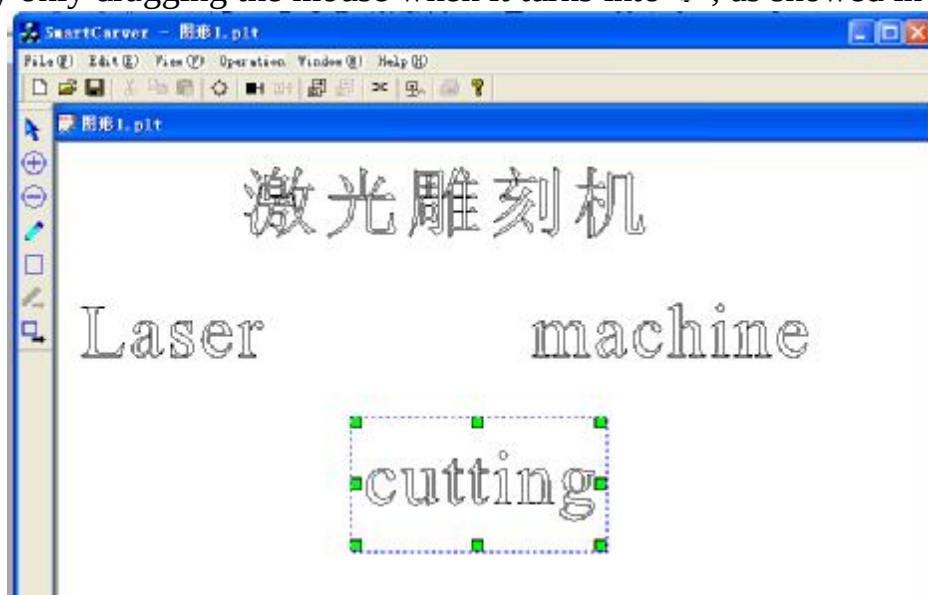
An area selected with the Rectangle tool  or the Line tool  can be moved and rotated (the rotation is applicable only to vector graphics). As showed in F5-1-17, the word “cutting” is selected with .



F5-1-17

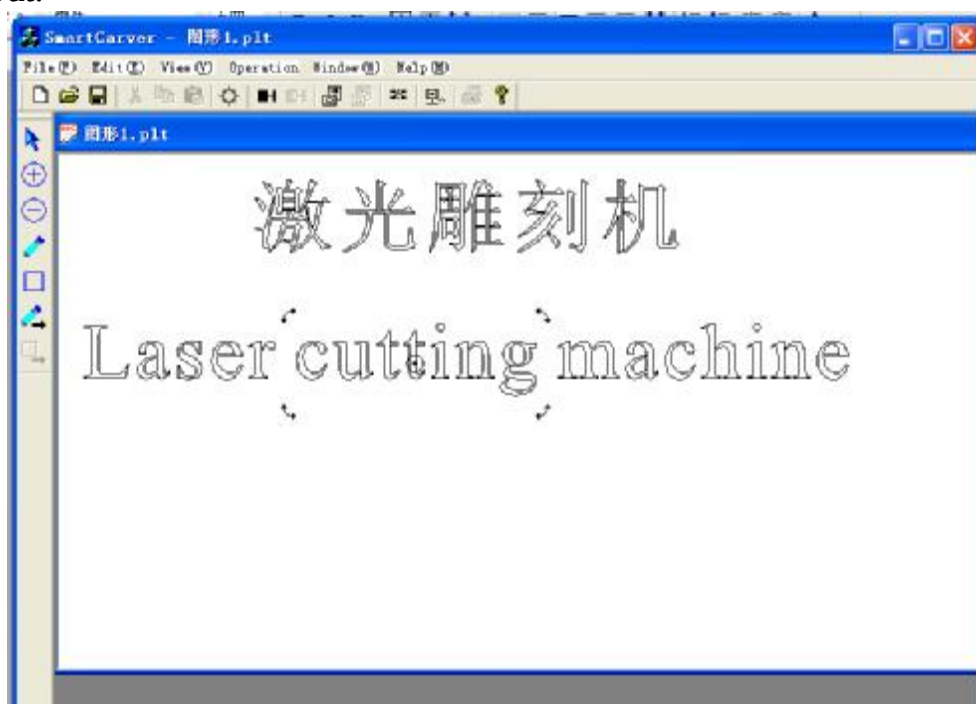
Click the  or the  on the menu on the left, and then you can move the

selected pictures. Move the mouse to the selected area, and you can move the picture by only dragging the mouse when it turns into , as showed in F5-1-18.



F5-1-18

You may also click the  (or click “Comeback mouse” on the shortcut menu) to turn the mouse normal, and then click the area to select. And this time F5-1-19 comes out.



F5-1-19

Move the mouse to one of the four corners. Move the mouse with the left key pressed when the mouse turns into , and the picture can be rotated. F5-1-20 shows the rotated picture.



F5-1-20

C. Instructions on icons of the toolbar.



-   New: create a new file.
-   Open: open a saved file.
-   Save: save the working file. It can be saved in CARVE format if you have defined the carving parameters. This format is the special data format for this laser cutting software.
-   Cut: cut the selected objects and put them on the clipboard. Not applicable for the moment.
-   Copy: copy the selected objects and put them on the clipboard. Not applicable for the moment.
-   Paste: paste the objects on the clipboard. Not applicable for the moment.
-   Comeback pictures: turn the pictures to original size.
-   Whole setting: set the parameter and method of carving.
-   Grouping setting: set the parameter and method of carving in group.
-   Load in PLT file: load in a saved PLT file.
-   Load in setting: not applicable for the moment.
-   Machine operation: operation on the machine and the coordinates.
-   Carving output: digitally handle with pictures and set different carving orders.
-   Print: print the present file. Not applicable for the moment.
-   About: display information about the program, the issue No. and the authorship.

3. Instructions on carving attribute setting.

1). Carving setting

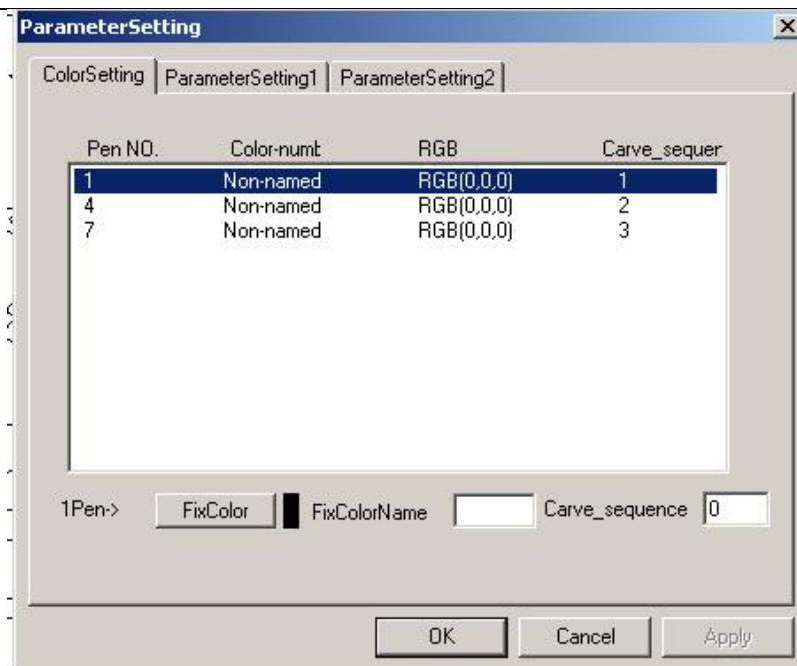
In this laser cutting software, “whole setting” and “grouping setting” are the basic manipulation for the carving. Now we are going to explain the parameter setting. Click “operation” on the tool menu (or click the right mouse key) to see the menu as in F5-1-20

Remove Block	Shift_D
Comeback Mouse	Shift_C
Comeback Picture	Shift_A
Zoom in Tool	Shift_F
Zoom out Tool	Shift_S
Rectangle Tool	Shift_R
Adjust Rectangle	
Line Tool	Shift_V
Adjust Line	
Whole Setting	Shift_W
Group Setting	Shift_X
Add pen	
Delete PLT	Shift_Delete
undo PLT	Ctrl_Z
Machine Operation	
Carve Out	Shift_E

F5-1-21

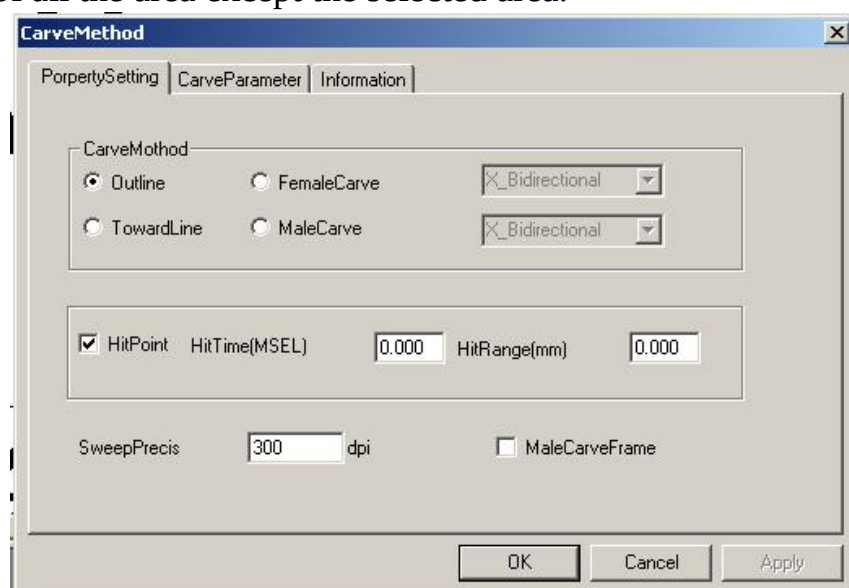
(A) Whole setting

a. Click the shortcut icon  or click the right key to choose “whole setting” when you open a PLT or DXF file. And the dialog box “ParameterSetting” will come out as in F5-1-22:



F5-1-22

b. When you open a BMP file, click the shortcut icon  or click the right key to choose “whole setting”, and then F5-1-23 will come out to show you the dialog box “CarveMethod”. In bitmaps, “whole setting” defines the carving parameters of all the area except the selected area.

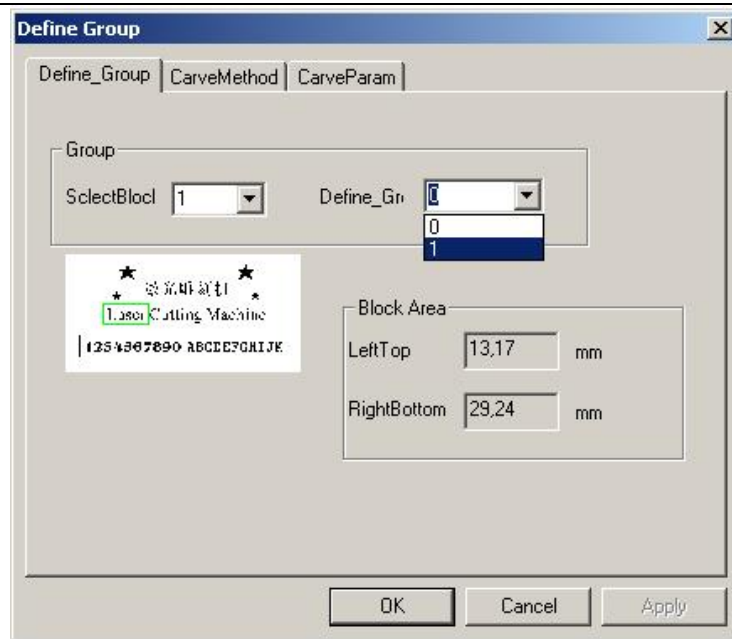


F5-1-23

(B). Grouping setting

Set carving parameters by group. It is mainly for bitmap BMP file.

Open a BPM file, click the shortcut icon  or click the right key to choose “Grouping setting”, and F5-1-24 will come out.



F5-1-24

Functions of the settings:

Block: a certain area defined (with rectangle or pencil) by the user, block is the smallest unit in carving and typeset. It is to make it possible to carve and output the different areas of a same picture with different carving methods to design the blocks.

Group: group is formed by the accumulation of blocks. When you are defining a block, you must define which group the block belongs to and how many blocks the group consists of. Carving attribute (including carving methods, depth, speed and gradient) is defined by group.

Whole: all area except area selected by the user, i.e. the unselected area.

Attribute setting (whole setting, group setting): including depth definition and speed definition.

Speed: the moving speed of the machine during carving. You can adjust the setting according to your own needs.

Default speed: the speed parameter displayed on the machine screen is adopted.

User-defined speed: the unit of the user-defined speed is “meter/minute”. If it overpasses the maximum of the user-defined parameter, it will be handled according to the maximum parameter.(See <chapter 7Parameter Setting of Machine>)

Depth: depth determines the intensity of the laser during carving. The top depth is effective only to gradient cleaning and is used to define the depth of the straight part kept by the top of slope strokes. Depth determines the maximum depth

during carving. When top depth = depth, there is no slope function.

Gradient: where to begin the slope. The applicable scope is 0~3mm. if this value is lower, the gradient will be higher. If the value is 0, it is a vertical line, no slope.

Carving method:

Outline: only carve the external frame of the picture.

TowardLine: only carve the central line of the picture or strokes. Applicable for thin lines and even lines.

Clearing: carve the selected number of pen. Carve the part filled with color and leave the unfilled part.

Ways of clearing:

X-bidirectional: the crossbeam remains still, while the laser head moves. It is carved during movement of both the directions. (usually used)

X_Unilateralism: the crossbeam remains still, while the laser head moves. It is carved during only one direction movement. Low efficiency, high quality.

Y_Bidirectional: the laser head remains still, while the crossbeam moves. It is carved during movement of both the directions. (seldom used)

Y_Unilateralism: the laser head remains still, while the crossbeam moves. It is carved during only one direction movement. Low efficiency, high quality. (Seldom used)

It is slower to use vertical clearing than to use level clearing, so it is used only for some special pictures.

FemaleCarve(Intaglio): carve the picture or strokes downwards.

MaleCarve(Relief): reserve the picture or strokes and carve the part left downwards.

Relief with frame: select this option, and the area to be carved extends around by 1mm.

Sweep precision: the higher this value is, the denser the lines are, and the better the quality is, but the slower the speed is; whereas the sparser the lines are and the rapider the speed is.

Repair: broaden or narrow the lines or strokes to be carved.

When this repair value <0, carve less, i.e. burn less. Then the stroke will turn wider in relief or narrower in intaglio.

When this repair value >0, the case is just opposite to the aforesaid.

2). Light power and speed

Adjust the height of the laser head with a special focometer according to the

focus offered by the factory after adjusting the optical path, and this should be done after the optical path is adjusted. As the light intensity mainly affects the carving depth, while the carving depth is subject to the power of the laser tube, the type of the main board, the parameter setting of the speed, the maximum depth, the minimum depth and the scan precision. Therefore, the adjusting of light intensity, i.e. the carving depth shall be done along with the adjusting of the parameter setting. The carving quality will be different at the same parameter if the types of the mainboard, the power of the laser tube are different. At the same depth parameter, the higher the speed is, the shallower the carving depth is, and vice versa. At the same speed parameter, the deeper the depth parameter is, the deeper the carving depth is, and vice versa. The higher the scan precision is, the shallower the carving depth is, and vice versa. If the carving depth is not deep enough, the speed may be lowered down or the scan precision can be improved or the maximum depth and the minimum depth may be adjusted to increase the carving depth. Fine carving quality can be gained only when the carving parameter is adjusted well. Users may adjust the parameter according to their own needs referring to the ex-factory parameter to gain the ideal effect.

3) HitPoint function

HitPointtime: When machine judges a certain place need to point, the laser head will stay at the point for a time, videlicet the time laser tube emits. After it finish point, then machine moves to another and begins to edge or continue point. Time define is very important for the depth and dimension of the point, generally, time longer, point bigger and deeper. Contrarily, the result is opposite .

HitRage: When machine meets lines shorter than the point dimension during edging, machine will point it. As in F4-11, select point when edging and define “ point time” and “point dimension”.

For example, suppose point time is 6 milliseconds and point dimension is 2.5 millimeters, videlicet, when machine meets lines shorter then 2.5 millimeters during edging, machine will point the lines. Point time is 6 milliseconds, 6 milliseconds after, machine will continue edging or pointing next work.

Point function is valid only for edge.

Section Two The Application of PLT Format File

First of all, we need to know that the application of PLT format is a feature setting conducted according to the changes of the color of the paintbrush so as to satisfy the requirements of customers for carving. Such an application enables us to use different colors to finish the output of the carving in one lot more directly.

When we open up a diagram, first we need to be certain about the requirement for our work: is it cleaning or outlining? The essence of the PLT format supported by current software to be used in outlining is to transform the external frame of the diagram directly into the access for laser carving, while cleaning is realized through filling up the empty space of the diagram with parallel lines with equal distance. In PLT format, if only an outline is required in the cleaning in Coreldraw9 software, what we need to do is to set a brush as cleaning and then the software will do color-filling automatically, as what will be shown on the windows.

How to transform the CorelDraw file into PLT format?

Our 3.013 carving software supports PLT and BMT format file made in CorelDraw11 or CorelDraw12. It is only related with the format of the file and has no connection with the version of the software used in diagram,

Outlining output: Select the diagram that is about to be output, set the “filling color” as “none”, and the “external frame” as “black”(or other basic colors), then transform it into curve and output the diagram as PLT format.

Cleaning output: Select the diagram that is about to be output, set the color for the external frame only, not for the filling space. (The color can not be set as white, because CorelDraw will automatically treat white as black in outputting PLT format file.) After setting a brush as cleaning, the software will do color-filling automatically and the result will be shown on the windows. In the output dialogue box choose “PLT” as the “File type” when” output” the selected diagram (In this dialogue box, please note whether it is required to select “selected area only”).The correct setting in the page label of “Page” of“HPGL” dialogue box is as follows: the

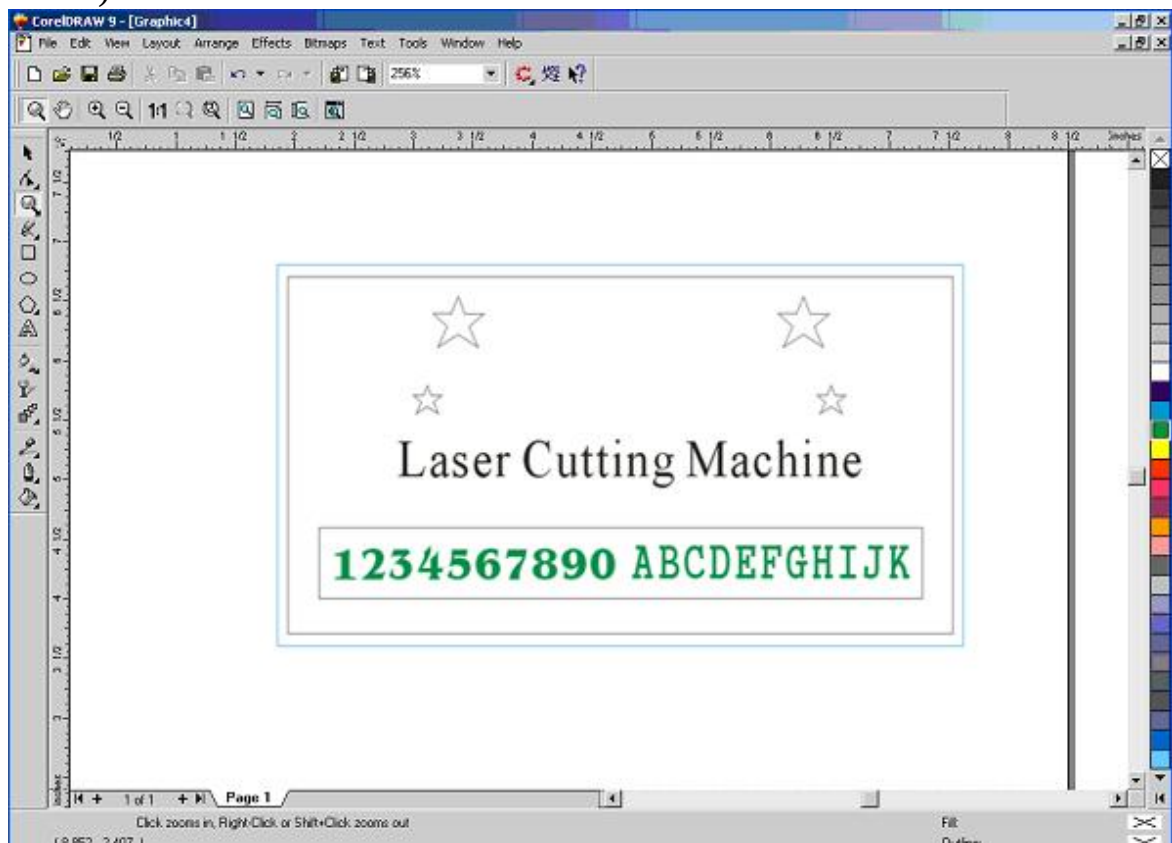
shrinking and enlargement shall be “100”; the initial point of the plotter shall be the “center of the page”; the direction shall be “vertical” and the plotting unit shall be “1000”.(For details please refer to Diagram F5-4-4). Anything wrong in the setting will lead to an incorrect result of the output.

Combined output of outlining and cleaning: In CorelDraw, what you need to do is to set the color of the external frame and the output the selected file in PLT format. (Please note that white color shall be excluded from your selection)In the process there is no need to set the filling color.

(1) Fabrication of PLT format file

A. Plotting

In a closed diagram made in CorelDraw, there should be carvings in both intaglio and relief, and both parts are required to be surrounded by closed external frame in which the color of the part required to be cleaned shall be the same as that of the external frame, as shown in Diagram F5-2-1. Here the blue external frame is required to be outlined, but the green numbers and the English letters inside the smallest rectangular frame is required to be carved in intaglio, while the rest words and patterns are required to be carved in relief. So the color of the words and the patterns shall be the same as that of the external frame.(In this diagram, both are black.)

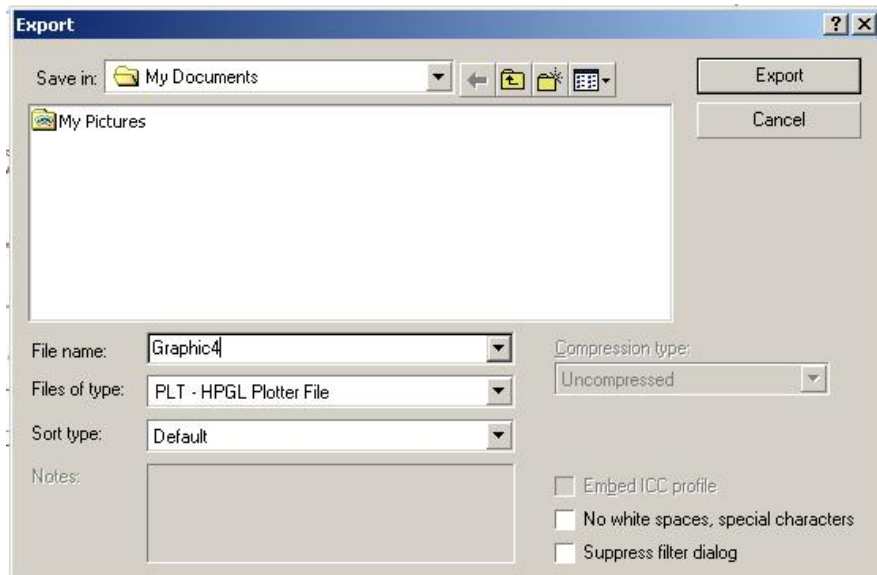


F5-2-1

B. The file shall be saved as PLT format

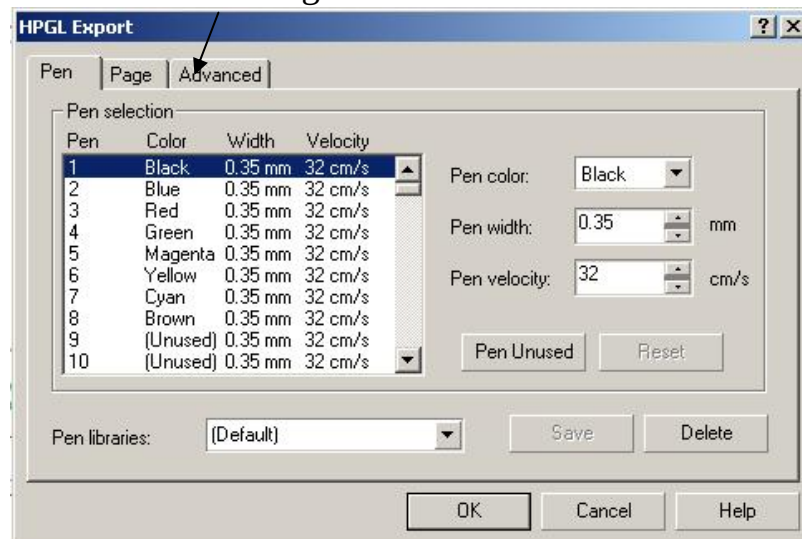
Upon completion of the diagram, click “Export” from the “File” menu shown on the window of diagram F5-2-1, or clip the icon

 (CorelDraw9), there will be a dialogue box as shown in Diagram F5-2-2:



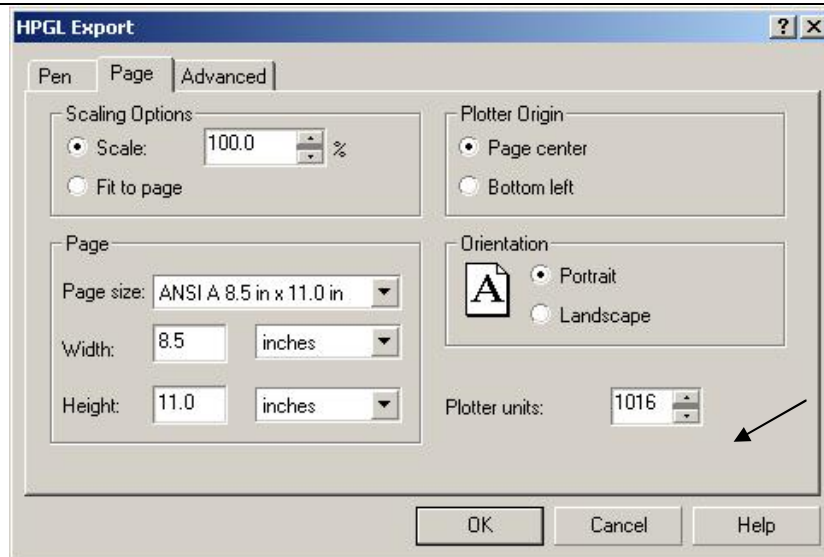
F5-2-2

Fill out the file name in the window shown in Diagram F5-2-2, select “File of type” as “* PLT” and then clip “Export” button and there will be a dialogue box as shown in Diagram F5-2-3:



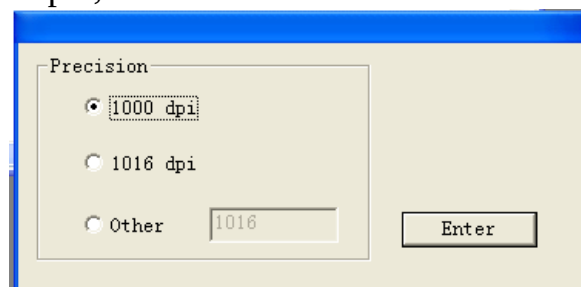
F5-2-3

In Diagram F5-2-3, clip “Page” button and there will be a window as shown in Diagram F5-2-4:



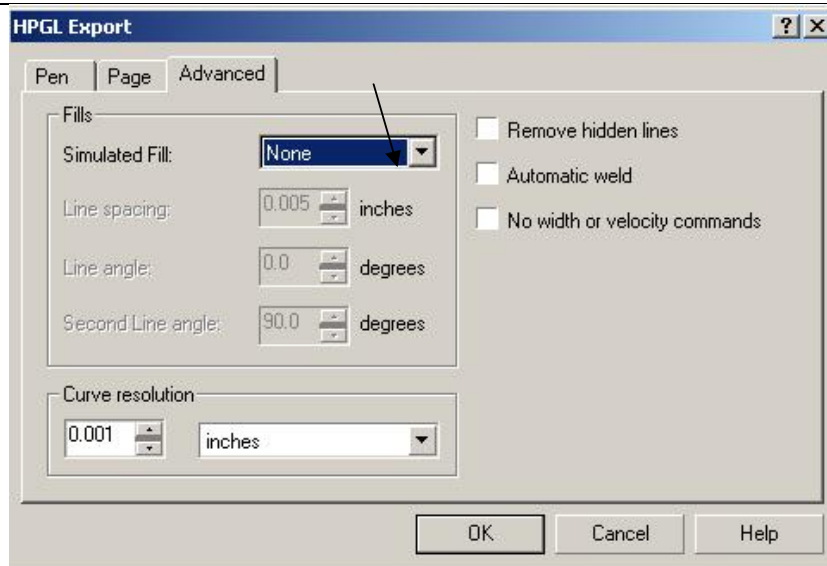
F5-2-4

There is one thing need to be pointed out in Diagram F-5-2-4: if “1000” is selected as “Plotter unit”, you have to choose “1000 dpi” as the answer for the dialogue box of the introduced resolution ratio when opening PLT file in the laser carving software. If “1016” is selected as the “Plotter unit”, then the answer for the dialogue box in Diagram F5-4-5 shall also be ‘1016dpi”, both numbers shall be the same in value.



F5-2-5

Next clip “Advance” button and there will be a dialogue box as shown in Diagram F5-4-6. Here it is necessary to be pointed out that as the system of laser carving software will do color filling for cleaning automatically, there is no need to fill out the color for the cleaning part in plotting and the “simulated File” as pointed to by the arrow in Diagram F5-4-6 shall be “none”; At the same time, the “Curve resolution” (in CoreDraw 12 it is “ resolution rato of curve”) shall be as small as possible to ensure the exactness of the curve. The best value for them is 0.001. In PLT format all curves are denoted by straight lines and the Line angle of them are 0.



F5-2-6

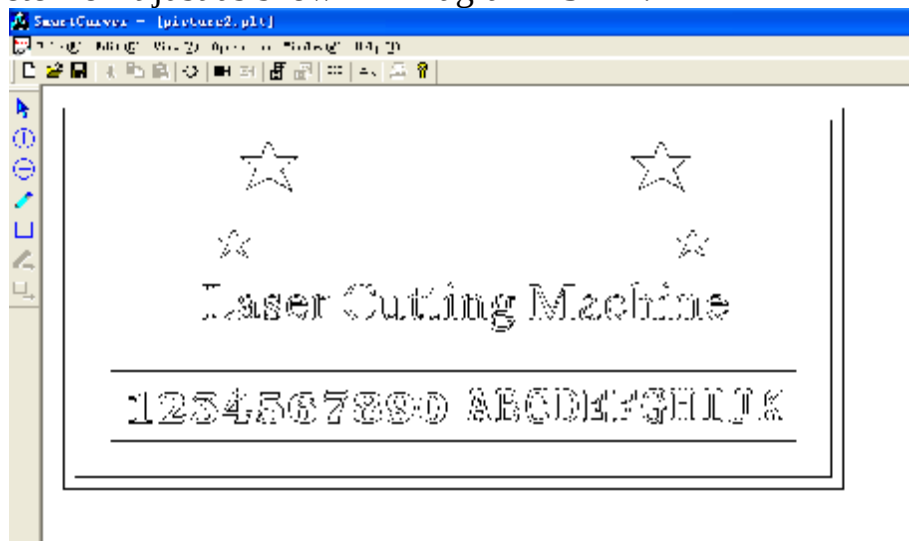
Upon completion of the setting by following the above instructions, clip the “OK” button and the PLT format file is finished.

(2) The usage of PLT file in the software

A. Defining the color



Double click the icon to start the laser carving software and there will be a window as shown in Diagram F5-1-6. Click the icon  “Open” in Diagram F5-1-6 or select “Open” in the “File” menu to open the PLT file that has been made in the CorelDraw. Then click the mouse on the right, choose “Whole setting” in the menu that has leaped out and set the parameter for it just as shown in Diagram F5-2-7.

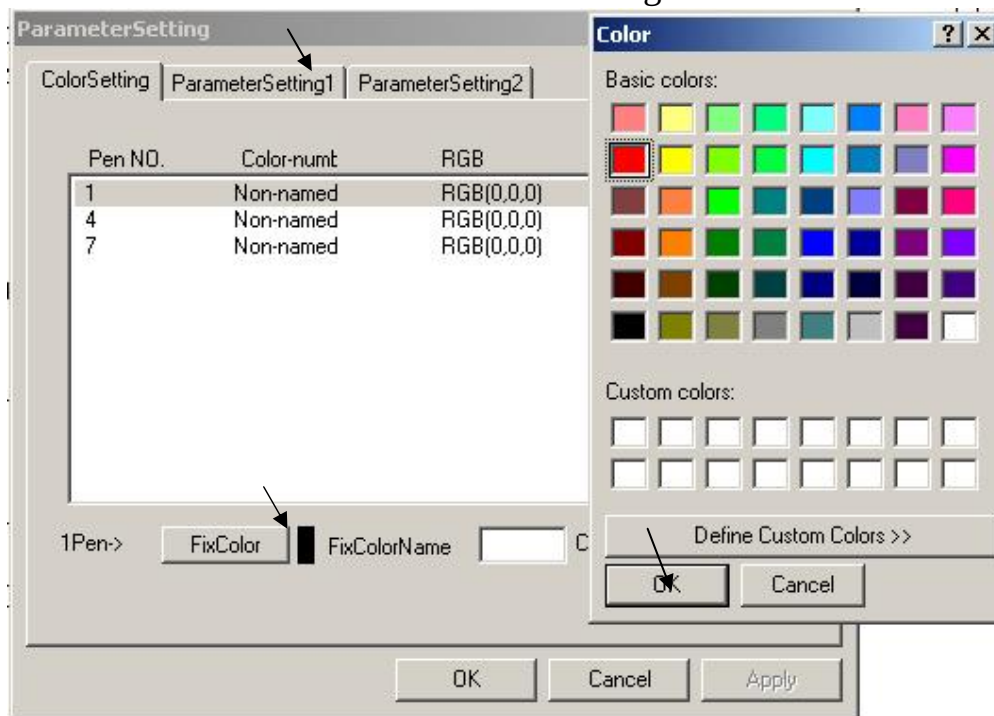


F5-2-7

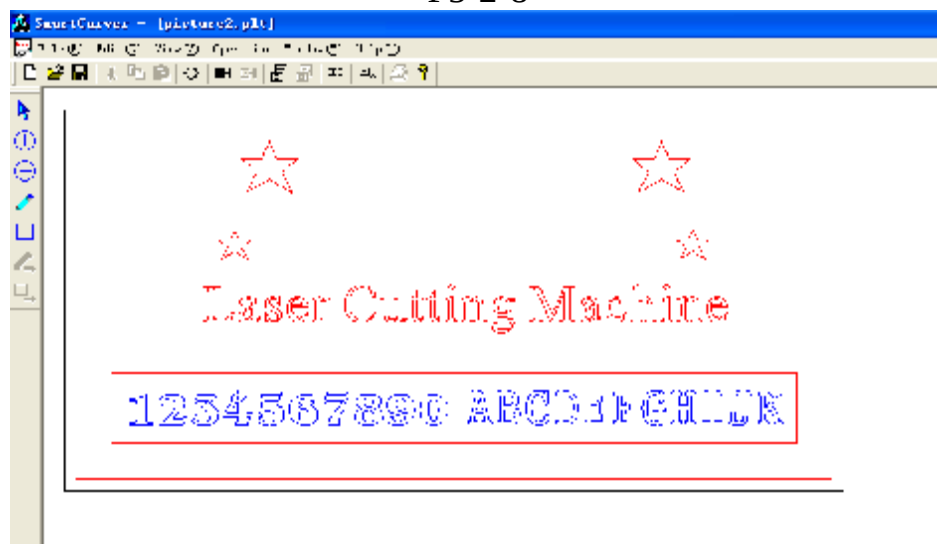
You can also click  in Diagram F5-4-7 and a dialogue box will appear as shown in Diagram F5-4-8, in which you choose the number of the brush that you are about to set the color for and then click the button for

“FixColor” to set the color for different carvings in the PLT file. Click “OK” when the setting is done.

Please note that the color of PLT diagram that has been made in CorelDraw shown in carving software could be different with its original color in CorelDraw. But no matter how many colors for plotting in CorelDraw, there will be that number of brushes in Diagram F5-2-8. This allows customers to define the colors according to their own like.



F5-2-8

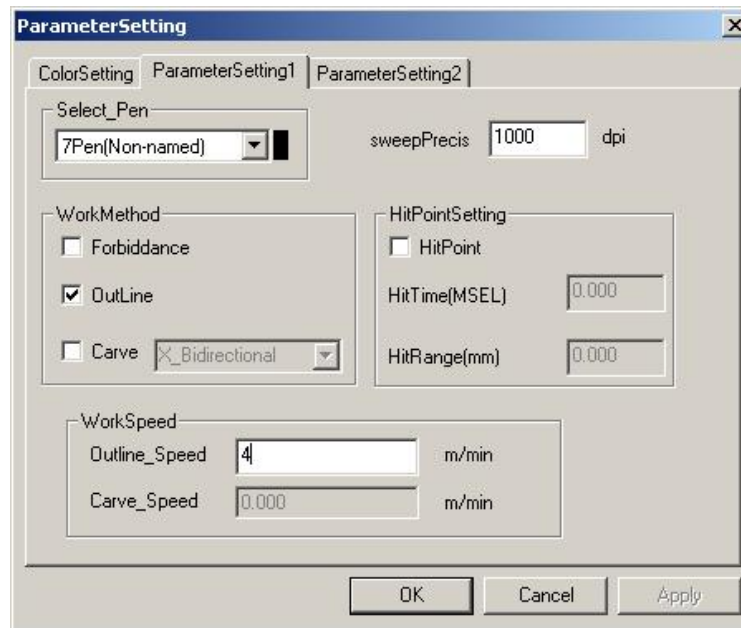


F5-2-9

B. Set up the parameter:

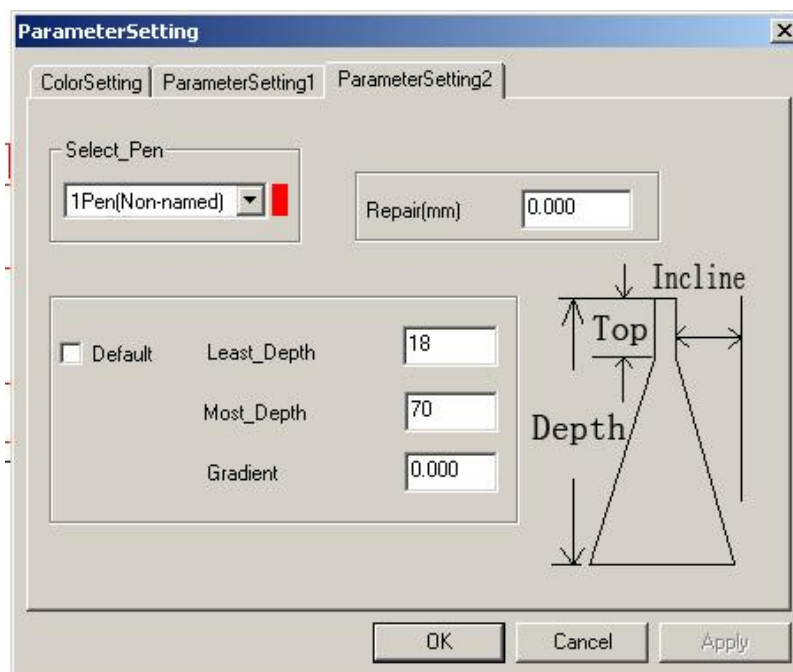
After the definition for different colors used in different carvings, we now come to parameter setting for the carving. Click the

“ParameterSetting1” in Diagram F5-2-8, you will see a window as shown in Diagram F5-2-10:



F5-2-10

In the window of Diagram F5-2-9, we can set the parameter for the way of carving, operational speed and puncturing. After the parameter of “ParameterSetting1” has been set for every color, click “ParameterSetting2” to enter into another window as shown in Diagram F5-2-11:

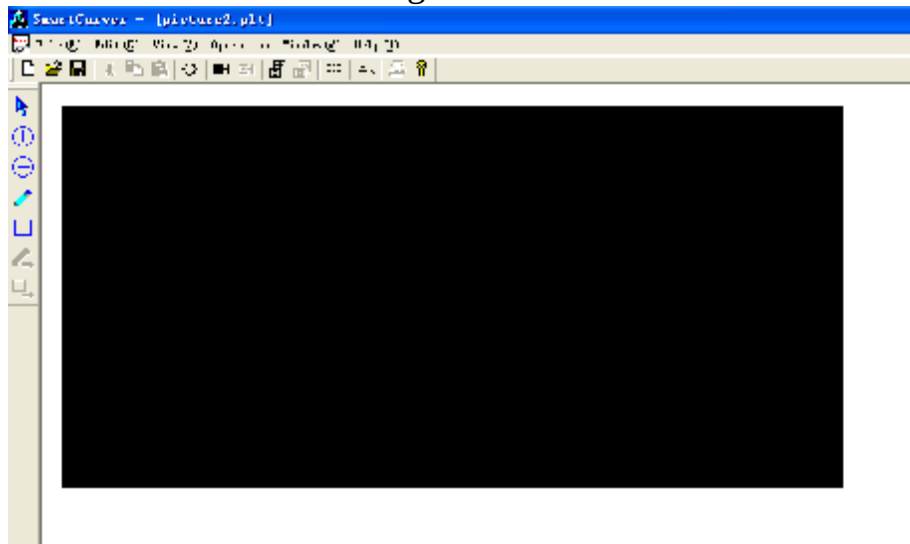


F5-2-11

In Diagram F5-2-11, you can set the depth and the gradient of the outlining and cleaning for each brush number. If “Default” is chosen, then

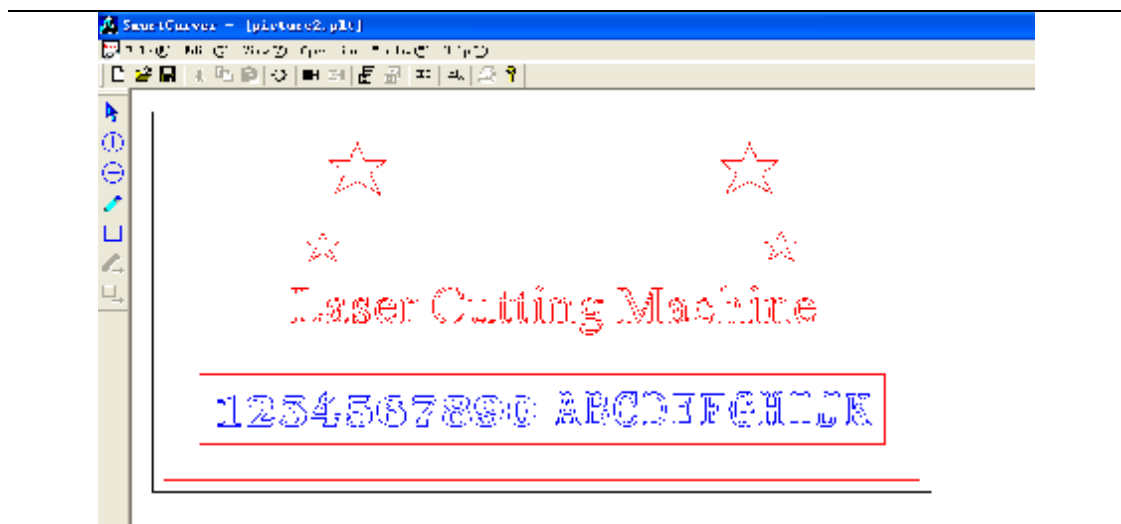
the light power is as that shown on the LCD of the machine. If you need to do some cleaning and require some gradient, you better set the parameter by yourself, because there will be no gradient if the minimum depth equals the maximum depth. Upon setting up the above parameters, click “OK”.

When opening up PLT file in the software, you may come upon the “dark screen” phenomenon as shown in Diagram F5-4-12. The reason could be that the software could remember the previous parameter set up for the carving and it can apply some parameters used before into the current documents automatically. When the color of the current file is just the same as that in the software and the way of carving for this color is just cleaning, the system will fill up the color automatically and there will be the phenomenon as shown in Diagram F5-4-12.



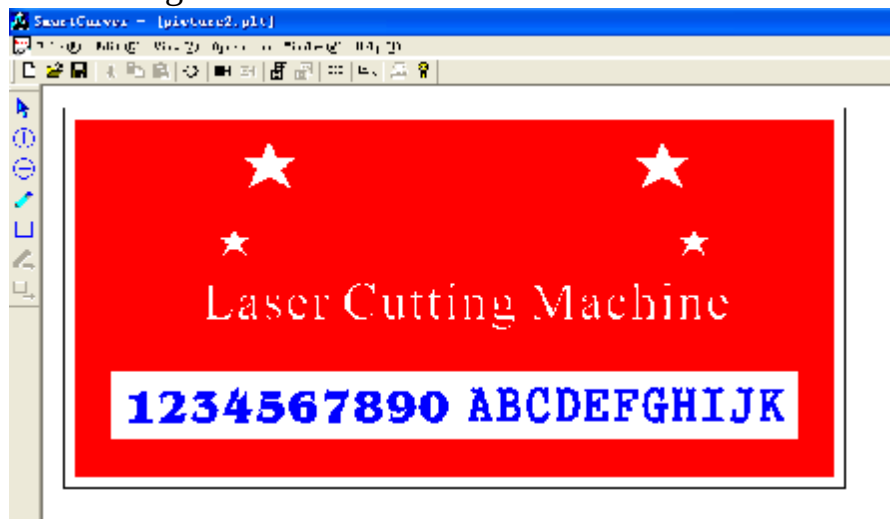
F5-2-12

Now what you need to do is to redefine the color and the carving parameter in the file. (The best way is to set all the carving ways as outlining and then redefine the parameter after the outline is shown as in Diagram F5-4-13.



F5-2-13

Take Diagram F5-2-13 as an example, the result after setting can be as that shown in Diagram F5-2-14:

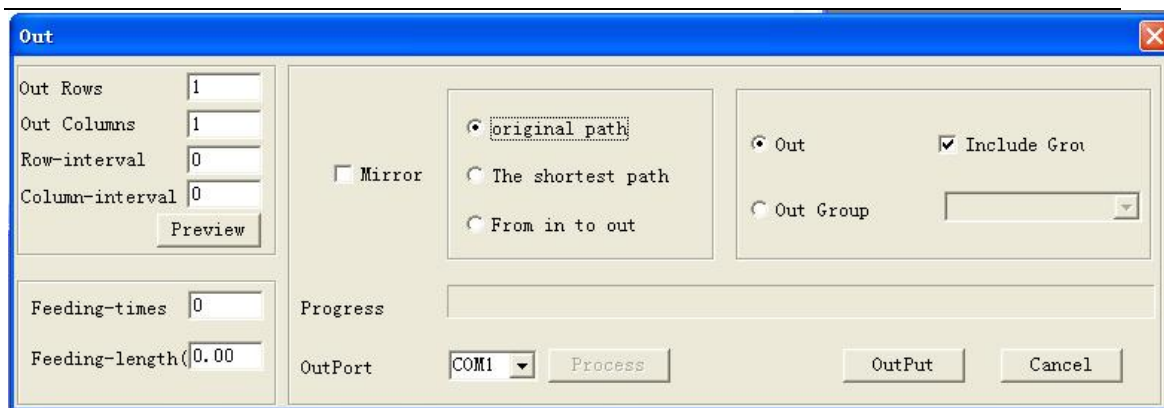


F5-2-14

In Diagram F5-2-14, the cleaning part is the part with color and the white part is the part left over after cleaning.

C. Carving output:

After all parameters are set up, click “carve out”, ”SHIFT+E” or  to output the carving. Refer to Diagram F5-2-15.

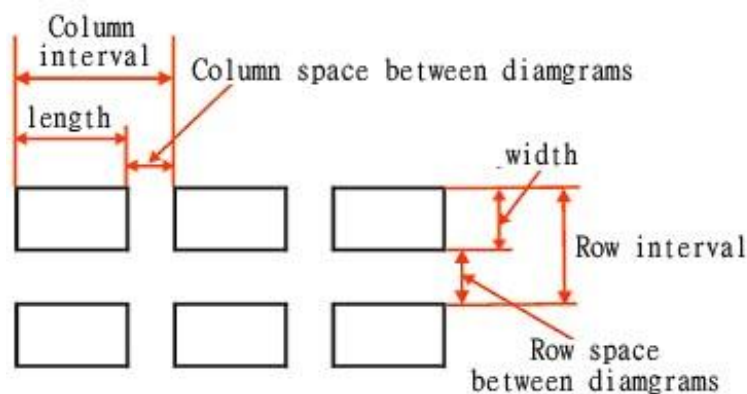


F5-2-15

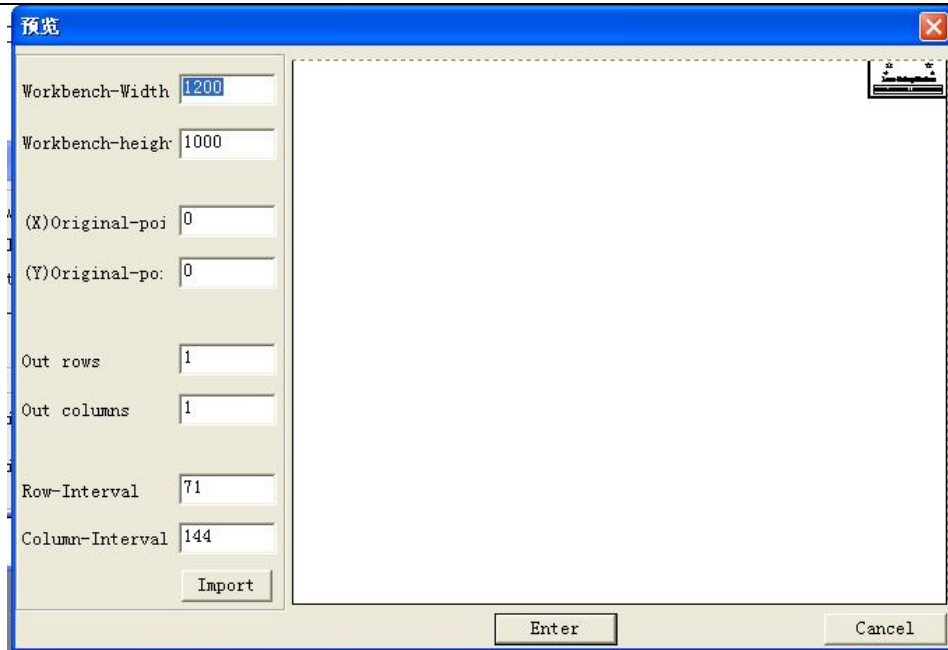
- Out Rows/Out Columns: One diagram can be output in multiple lines and rows and the original predetermined number is one line, one row.

Row-interval /Column-interval: the distance between the diagrams output in multiple rows and columns.

The number of rows, columns, distance of columns and rows as shown in Diagram F5-2-15 are the original value of the system. Users can click the “preview” button in need of rectification and conduct the value setting in the pop-up menu as shown in Diagram F5-2-17. The row interval mentioned here equals the actual width of diagram plus the row space between diagrams; The column interval equals the actual length of the diagram plus the column space between the diagrams. Please refer to Diagram F5-2-16. If a rectangular of 15mm × 10mm is about to be output in 2 rows and 3 columns, the row-interval and column-interval between each of them is 3mm and 2 mm respectively, then the parameter shall be set up as : Out rows: 2, out columns: 3, row-interval:13mm, column-interval: 17mm.

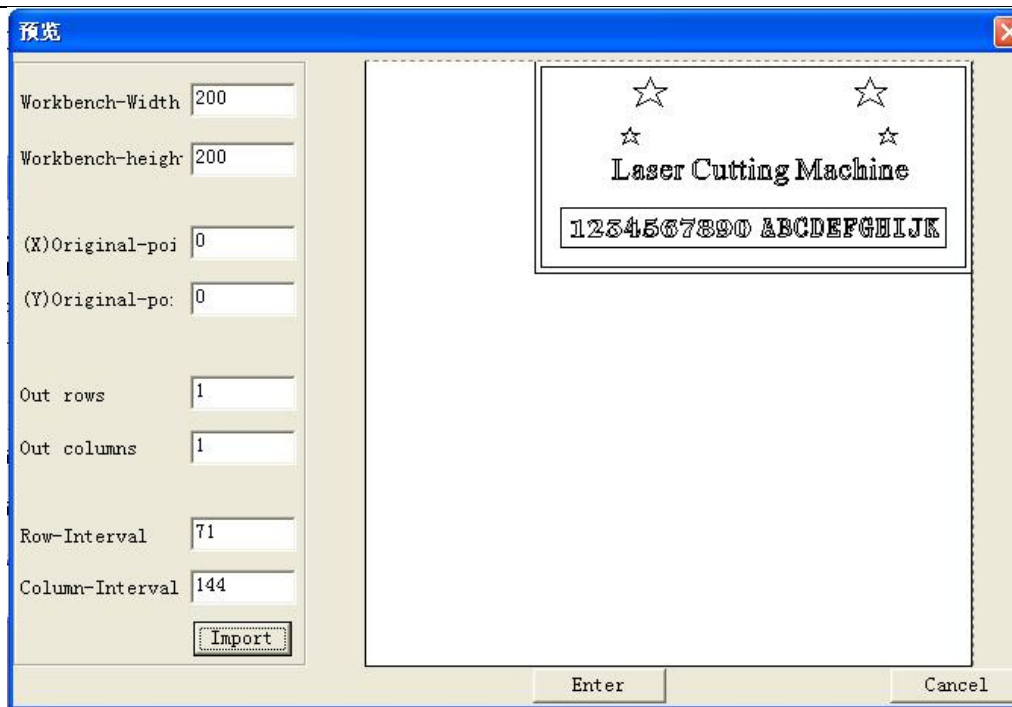


F5-2-16

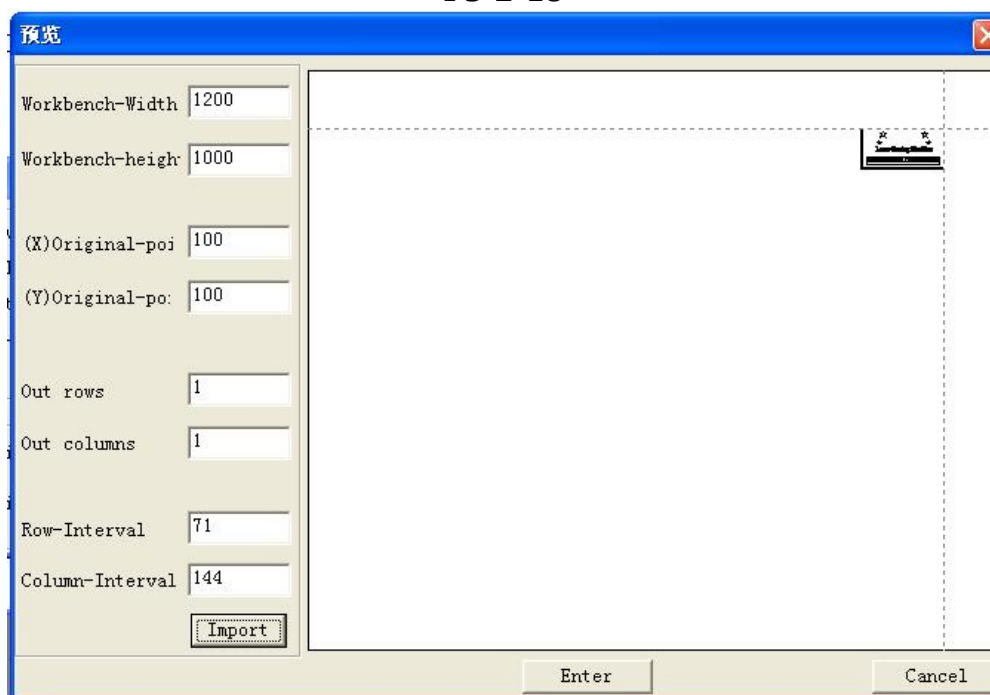


F5-2-17

- Workbench-width and Workbench-height: This is a related value, showing the related relationship between the previewed diagram and the actual diagram. It is predetermined as 1200,1000 and can be changed by users. The smaller the value is, the clearer the carbed diagram will be in preview, as you can see in Diagram F 5-2-18. Please note that the width and height of the diagram is not that of the machine and it has no concern with the machine.
- (X)Original-point, (Y)Original-point: The starting point of Axis X and Axis Y of the machine in carving. They are predetermined as 0; Diagram F5-2-19 shows that (100)Original-point, (100)Original-point and the position of the axis for this starting point.



F5-2-18

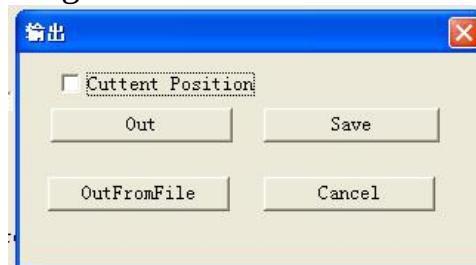


F5-2-19

- Feeding times: Mainly used for automatic material feeding equipment. The feeding time is predetermined by the system as 0. The number of the cutting done by the machine equals the feeding time plus one.
- Feeding length: it is predetermined by the system as the width of the diagram, or the predetermined system value of line space. Users can set them according to their own requirements.

-
- **Mirror:** Choose the selection box in front of the mirror image and the actual image that is about to be output will form a mirror image with that in the file.
 - **Choose the access for output:** There are three accesses: original access, the shortest path, from in to out. This selection item is mainly targeted at DXF format file: the original access refers to the order of plotting in carving; the shortest access refers to the shortest access in carving; The internal ring to external ring means to carve from the inside to the outside. For example, in carving two concentric circles, we need to carve out the one inside and then outside.
 - **Out, group out:** The output can be done in all(i.e. all numbers of the brush are output simultaneously) or in groups. If the output is carried out in different groups, a certain number of the brush(color) can be first output and then the number of the other brush (other color).
 - **Progress:** Display the rate of progress that is output the carving machine.
 - **Output port:** Choose the right number of port between the computer and the carving machine. Make sure that you have chosen the right number, otherwise the output won't be done. The port number is COM3 or COM4 generally(please check the port in the "Device Manager" in "Hardware" in System Properties).

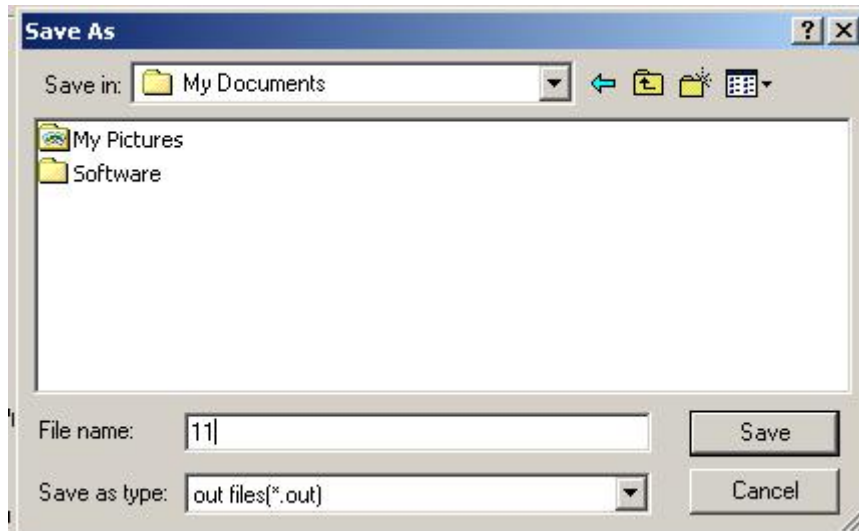
After all parameters are set up, click "Process" button, and then the "Output" button upon completion of the data treatment, a dialogue box will leap out as shown in Diagram F5-2-20:



F5-2-20

- **Current position:** This means wherever the laser head is positioned at, the machine shall start the carving from that point.

-
- **Out:** Click this button and the above file that is required to be carved and has been set with parameter will be directly output into the carving machine for carving.
 - **Save:** Click this button, there will be a dialogue box as shown in Diagram F5-2-21, choose a position for which your file is about to be saved and name it and then click “save” button to save the file. In this way, there is no need to do parameter setting again in future use.



F5-2-21

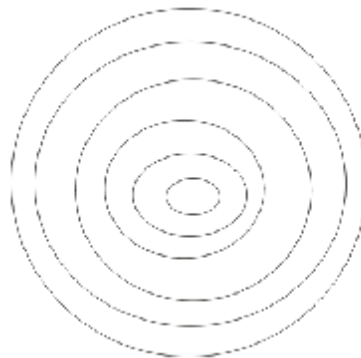
The format of the saved file is *.out, which differs from *.carve file in that the former is the final carving data that allows no further change and can only be used in carving output. For those diagrams that are under frequent cutting and carving by users, the best way is to save the parameter that has proved to be able to achieve the best result in carving so that in future use, users can directly output them by opening the file and downloading the software Down to the carving machine without conducting parameter setting again. (The file downloading software Down mainly features saving the *.out file, please save it in the chip of the carving machine to realize offline operation. For users who often need to do the same carving based on the same diagram, the Down software can greatly help them to improve their work efficiency. Details on the operation of the Down software will be given in Chapter V.)

- **OutFromFile:** Click this button so that the *.out file that has been saved up previously will be directly sent to the carving machine to be output.
- **Cancel:** Click this button to close the output window.

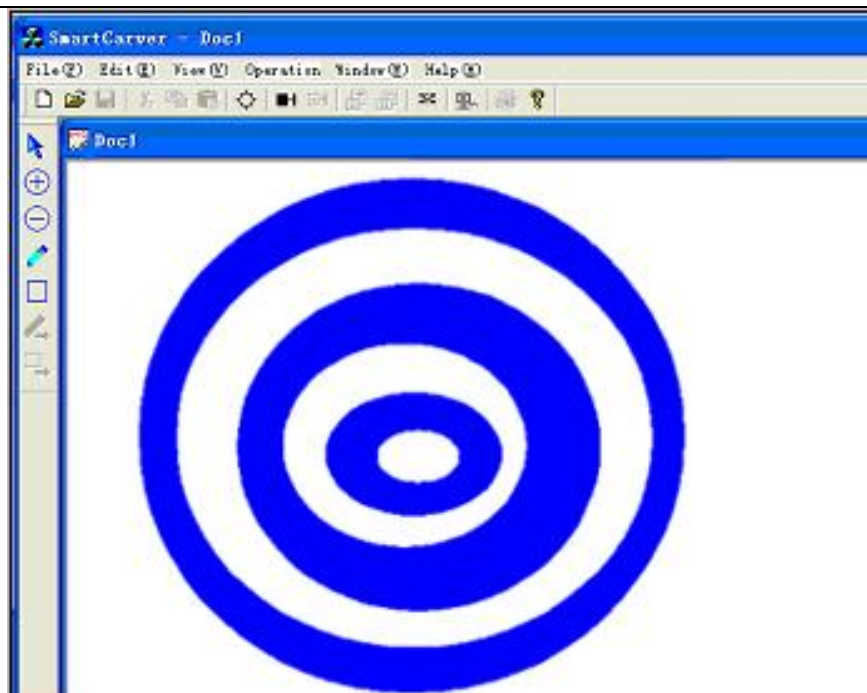
Note: When plotting in CorelDraw, the diagram required to be cleaned shall not be filled up with color, because the software will do color-filling automatically. Although it can clear off the color you have filled up, there could be some other problems occurred in the operation. Therefore we recommend not to fill up the color.

Statement: If the diagram required to be carved by customers does not need to be carved in both intaglio and relief as stated above, in real plotting the carving can be differentiated by different color in CorelDraw and be conducted in different ways according to the change of color in the software.

Other statement: In the software, diagrams surrounded by layer after layer with the same color assume the following feature: colors are filled up every two layers. This can be seen from Diagram F5-2-23, which shows the result of the diagram made in Diagram F5-2-22 after it is cleaned in the software. Therefore users are advised to be careful about the choice of the colors in plotting.



F5-2-22



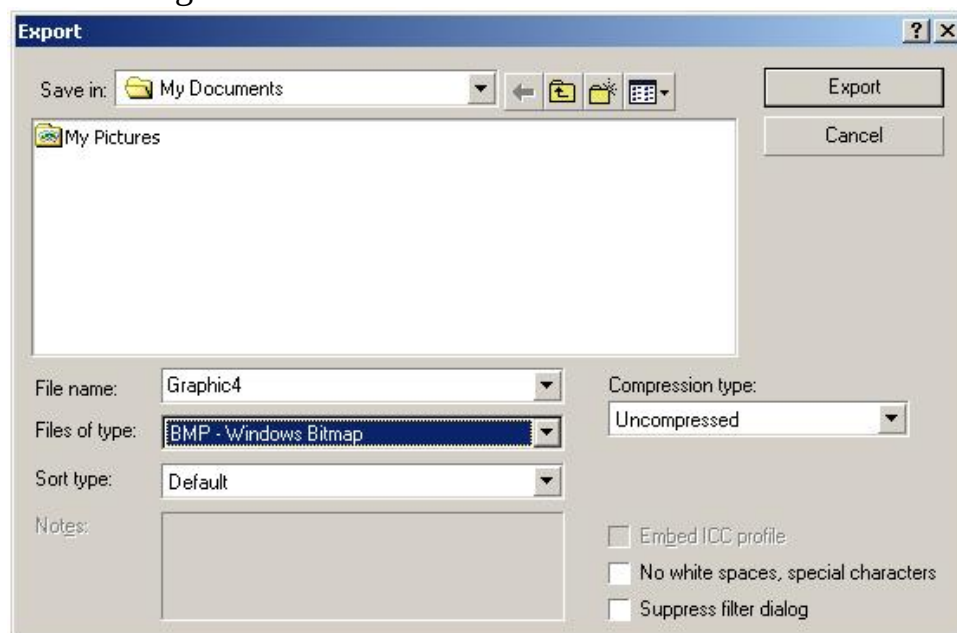
F5-2-23

Section three Application of BMP format File

The application of this format is to save the final image as BMP format and in black-and-white, or one figure image and then start the carving and output. In this way we can avoid the distortion of image in transformation and reduce the error so as to improve the exactness.

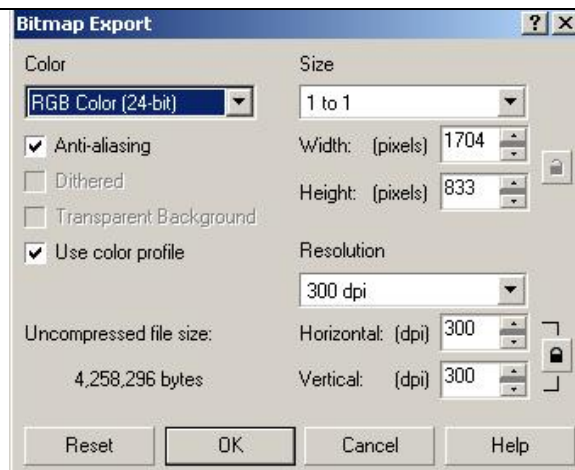
1. How to transform CorelDraw file into BMP format

After you are done with the final image in CORELDRAW9, please choose the diagram that is about to be output and then execute the “output” order as shown in Diagram F5-3-1.



F5-3-1

After the output access and file name are designated(in this case the file name is Graphic 4.BMP), click Export, the following dialogue box will be pop out(Diagram F5-3-2, here the color shall be black and white and do not choose the selection box in front of “Dithered”. There should be a direct proportion between the size of the width and the height and the resolution degree and the height and width shall not exceed 10000 pixel. If it is exceeded, you shall lower the resolution degree. The ratio between the horizontal and the vertical resolution degree shall be kept at a fixed point, otherwise deformation of the diagram could occur). After setting up the correct parameter, click “OK” to output the file.



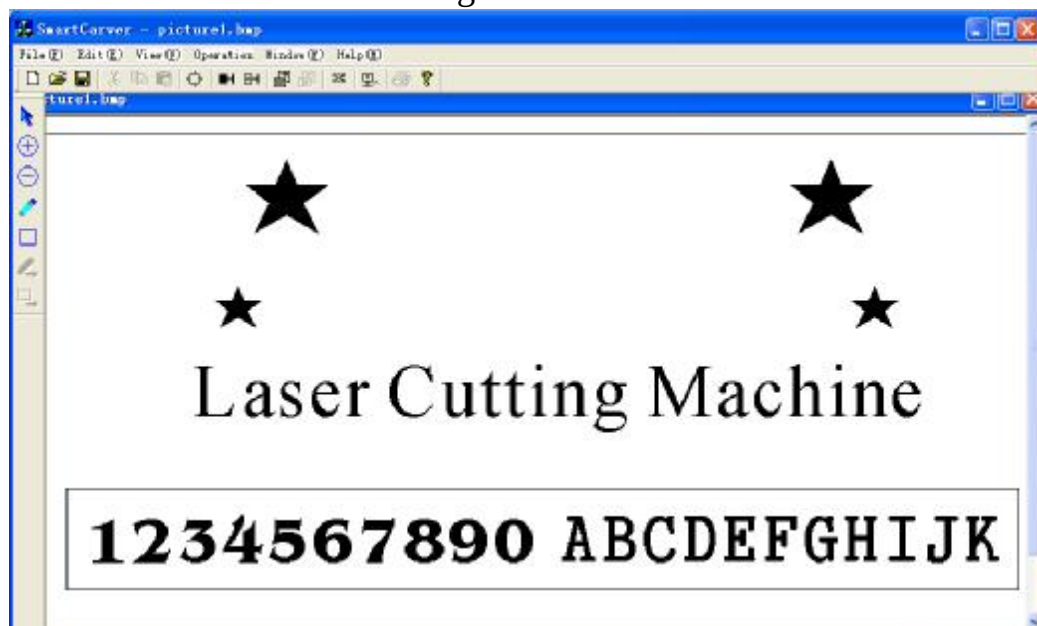
F5-3-2

2. How to apply BMP format:

The setting of parameter for carving embodies the intention of the users and has direct influence on the effect of the carving.

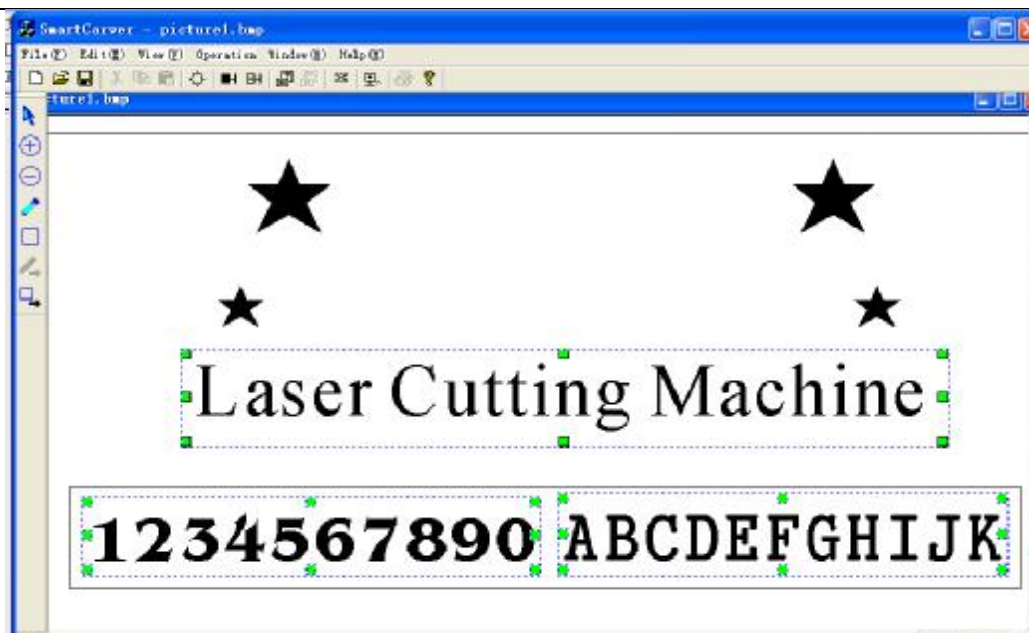
Following is an example on how to apply BMP format in practical use.

First of all, open such a file from the diagram 4.BMP in CORELDRAW as shown in Diagram F5-3-3.



F5-3-3

If you are about to conduct carving in relief to “Laser Cutting Machine” and “123456789”, and in intaglio to “ABCDEFGHIJK” and outlining to the rest, you can operate it under the following instructions: first select the part that is about to be carved in intaglio or relief by “selecting tool”(rectangle tool or line tool) as shown in Diagram F5-3-4:



F5-3-4

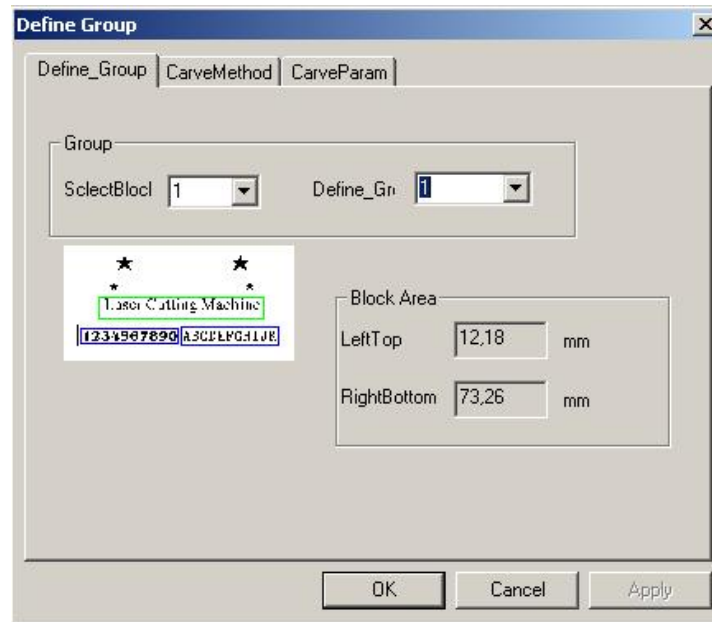
Now you can start the feature setting for different groups. You can click the icon  for “group setting” in the tool bar in Diagram F-5-3-4 or click the mouse on the right to pop up the window as shown in Diagram F5-3-5:

Remove Block	Shift_D
Comeback Mouse	Shift_C
Comeback Picture	Shift_A
Zoom in Tool	Shift_F
Zoom out Tool	Shift_S
Rectangle Tool	Shift_R
Adjust Rectangle	
Line Tool	Shift_V
Adjust Line	
Whole Setting	Shift_W
Group Setting	Shift_X
Add pen	
Delete PLT	Shift_Delete
undo PLT	Ctrl_Z
Machine Operation	
Carve Out	Shift_E

F5-3-5

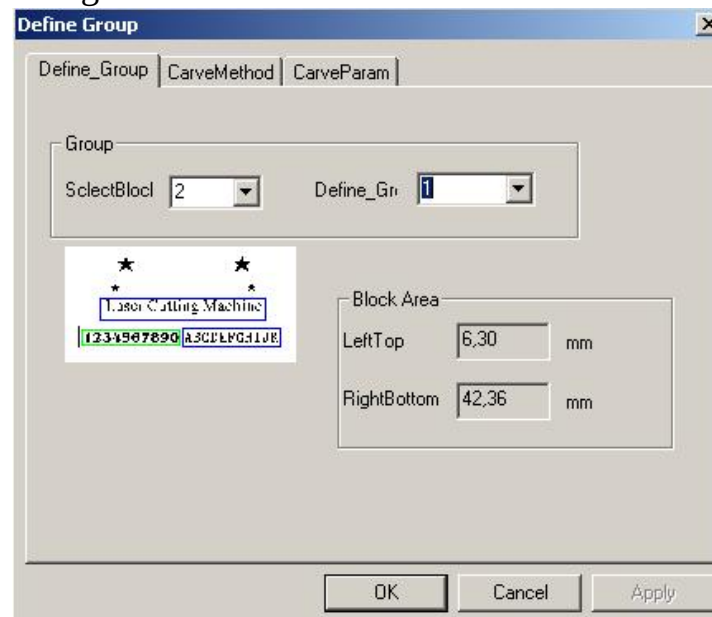
Choose “group setting” on the window of Diagram F5-3-5. Group setting includes group division, the setting of the way and the parameter for carving. Here we can conclude carvings of the same way into one group. (Of course, it is depended on your own requirements). You can carve the “Laser Cutting Machine “ and “123456789” in relief. First choose the first frame “Laser Cutting Machine” (at this moment the selection frame of the laser carving machine is green) and define it as the first Group. Please refer

to Diagram F5-3-6.



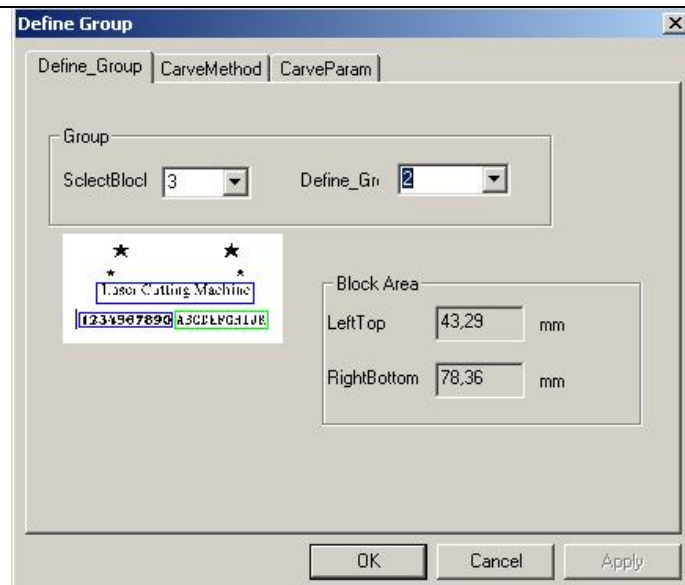
F5-3-6

Then choose the second frame “123456789” (at this moment the selection frame of “123456789” is green) and define it as the first group as well. Refer to Diagram F5-3-7.



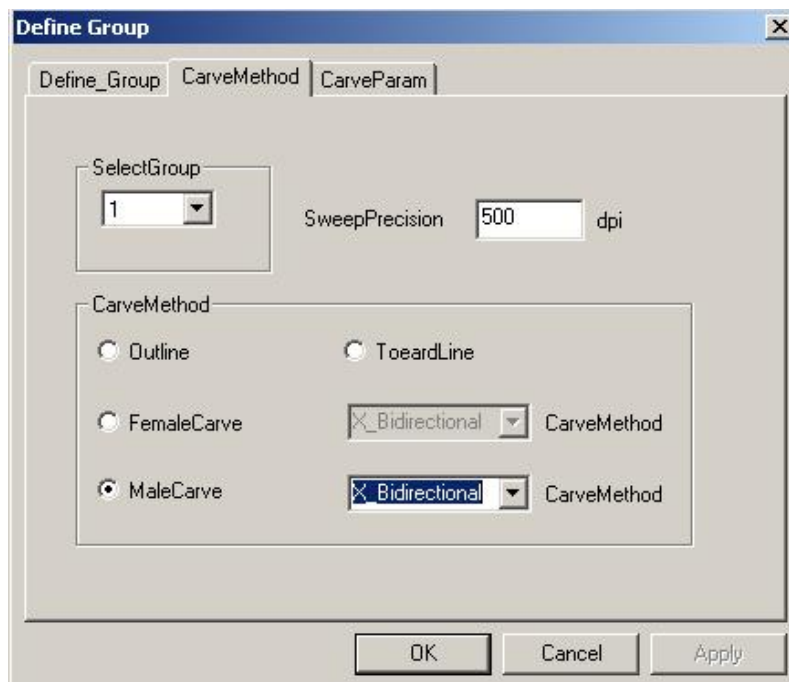
F5-3-7

If “ABCDEFGHIIJK” is about to be carved in intaglio, choose the third frame “ABCDEFGHIIJK” (at this moment the selection frame of “ABCDEFGHIIJK” is green) and define it as the second group. Refer to Diagram F5-3-8.

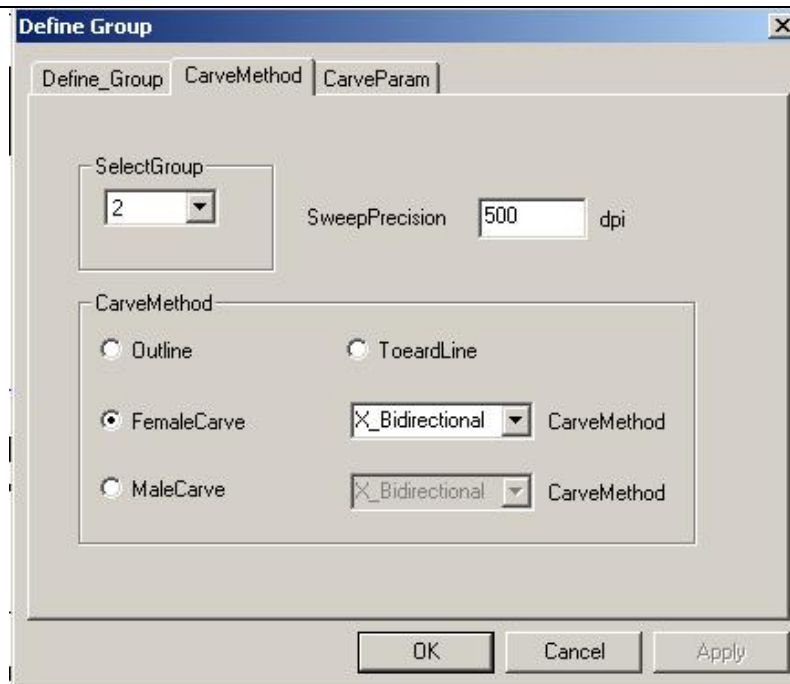


F5-3-8

After division of the group, next set the parameter for the way of carving and the exactness of scanning by clicking “CarveMethod” on the window.

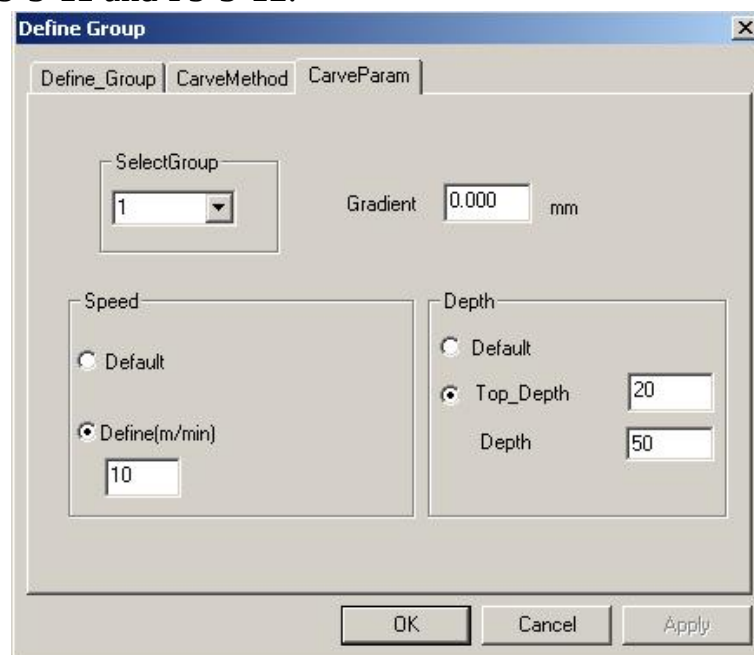


F5-3-9

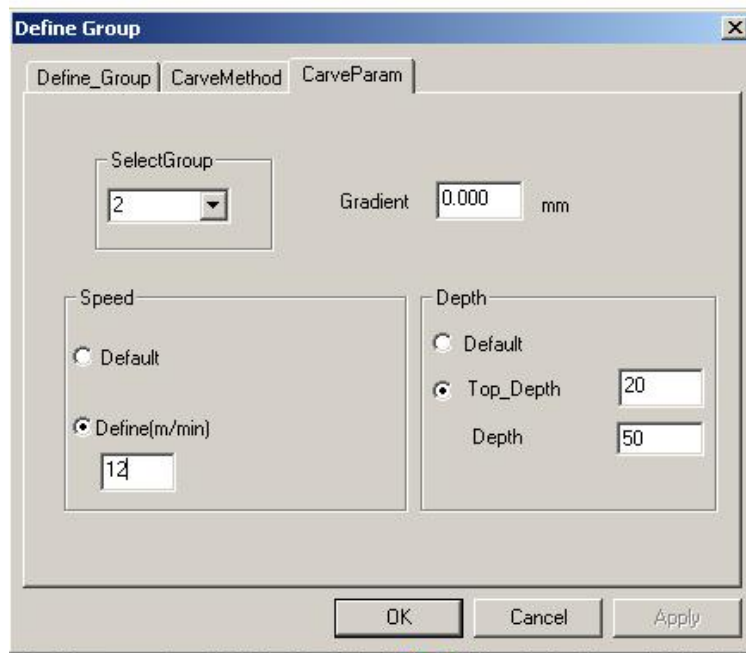


F5-3-10

Upon setting up the parameter for the “CarveMethod”, click the “CarveParameter” to set the speed, depth and gradient as shown in Diagram F5-3-11 and F5-3-12.

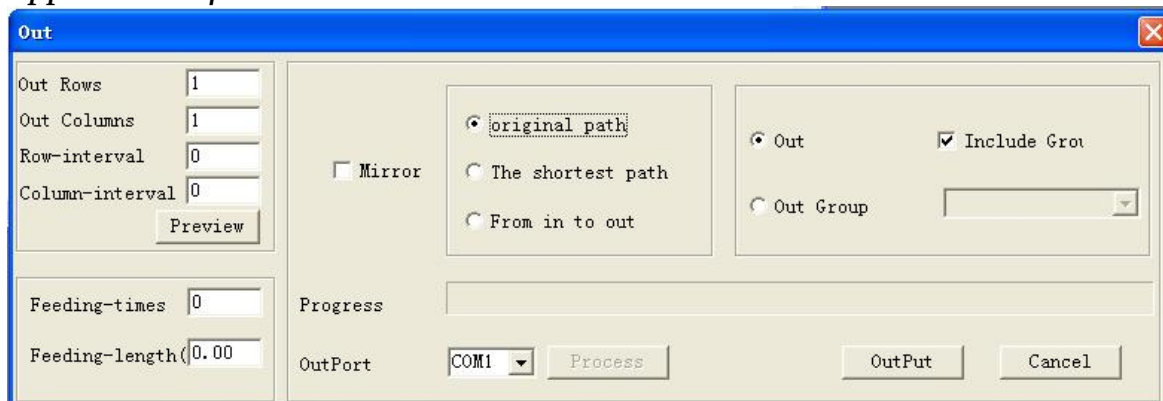


F5-3-11



F5-3-12

Upon completion of setting the way and parameter of carving, the carving can be output as shown in Diagram F5-3-13. Detailed statement of the output of the carving can refer to “C. carve out” in Chapter Two *The Application of PLT Format* .



F5-3-13

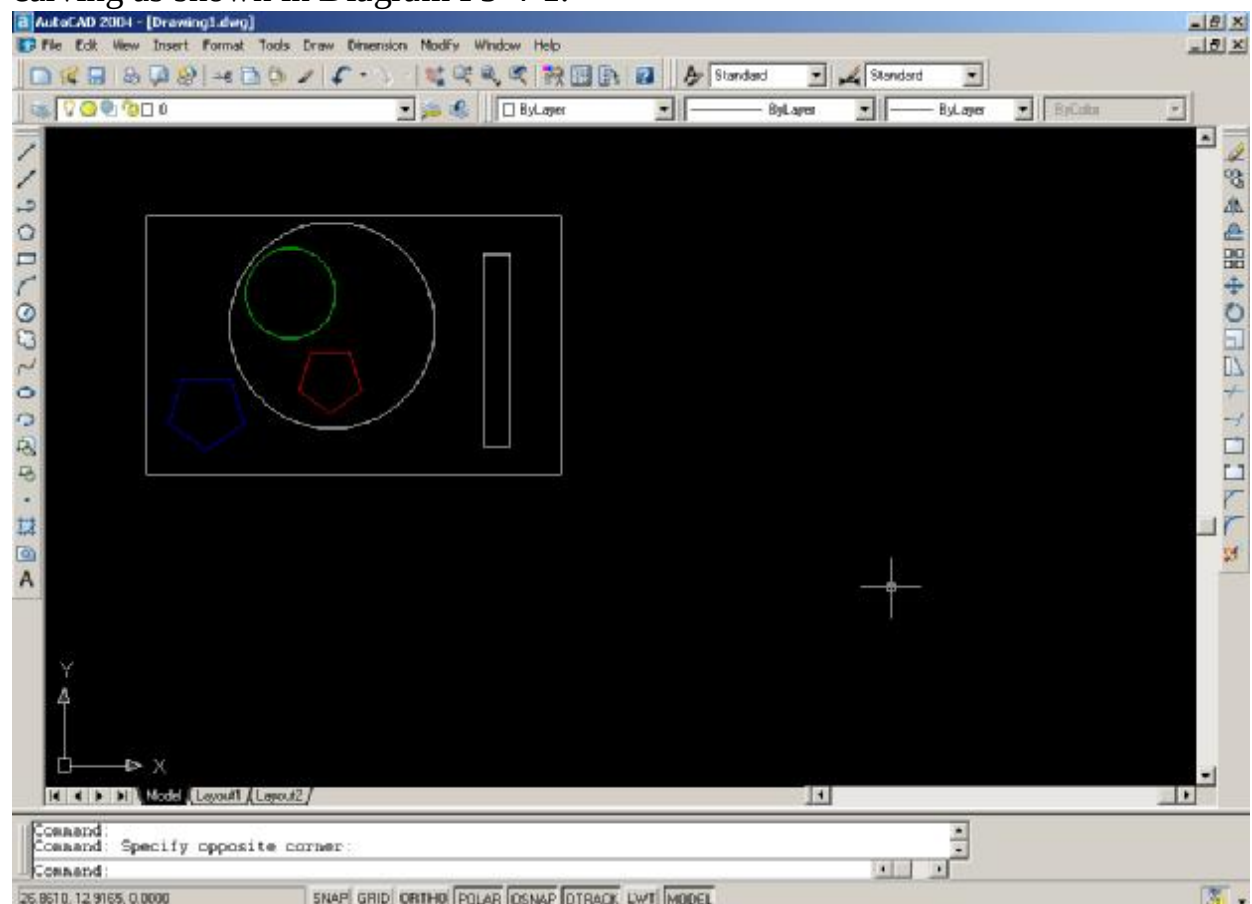
Section four The Application of DXF Format File

In order to satisfy the requirements of the customers, new functions have been added into the carving software supporting DXF format file. The operational method of DXF format in the laser carving software is about the same as that in PLT format. Following is a statement about how to use DXF format file in the laser carving software.

At present the DXF format supported by this software is DXF2000, DXF2004 and R14.

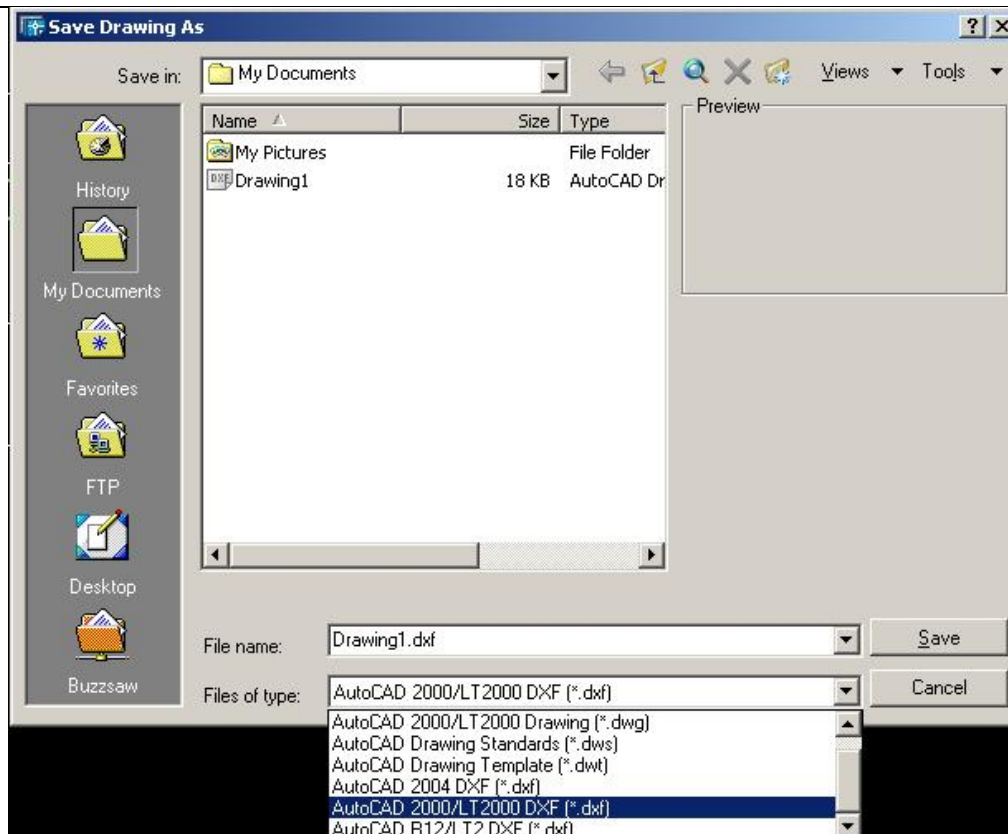
A. Fabrication of DXF file

Open AutoCAD, the customers can do plotting according to their own requirements and different colored line shall be applied in different way of carving as shown in Diagram F5-4-1.



F5-4-1

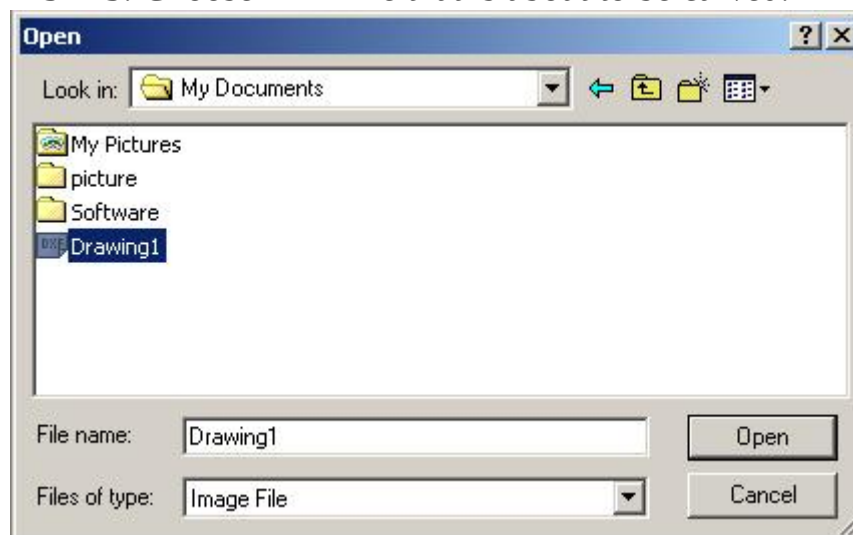
Upon completion of the plotting, save the file as DXF2000 format or DXF2004 format as that in Diagram F5-5-2.(Note: the fabrication of DXF format file is not necessarily conducted in the AutoCAD. All plotting software can be made into DXF file if only they can be saved as DXF2000, DXF2004 or R14 format file and can be opened in carving software):



F5-4-2

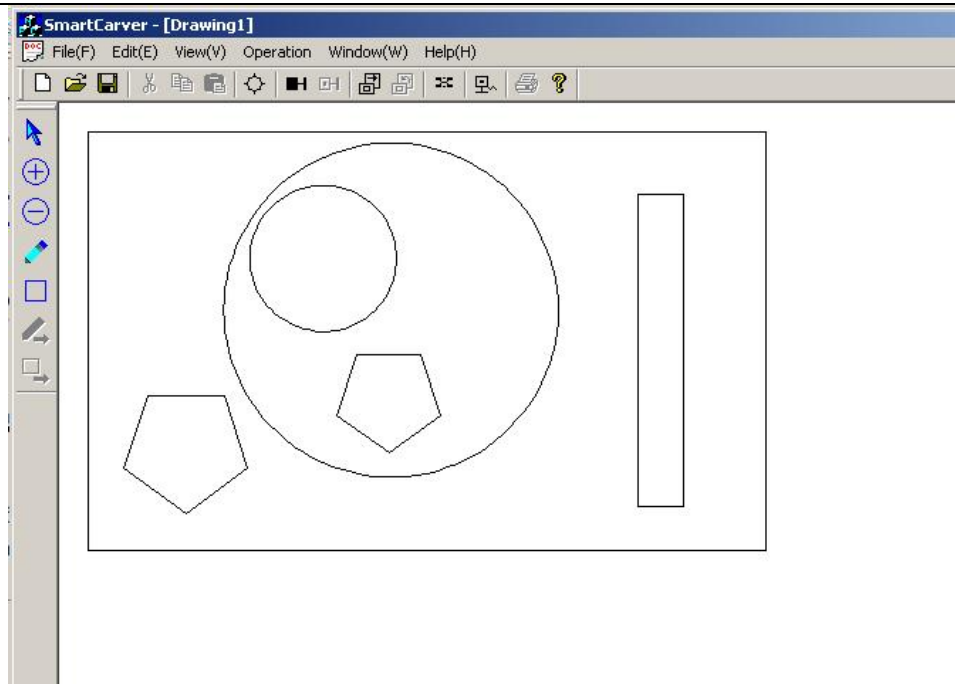
B. Operational method of DXF file in software

Upon completion of DXF file, open the software and click “open” to open the file menu or icon and there will be a dialogue box as that shown in Diagram F5-4-3. Choose DXF file that is about to be carved.



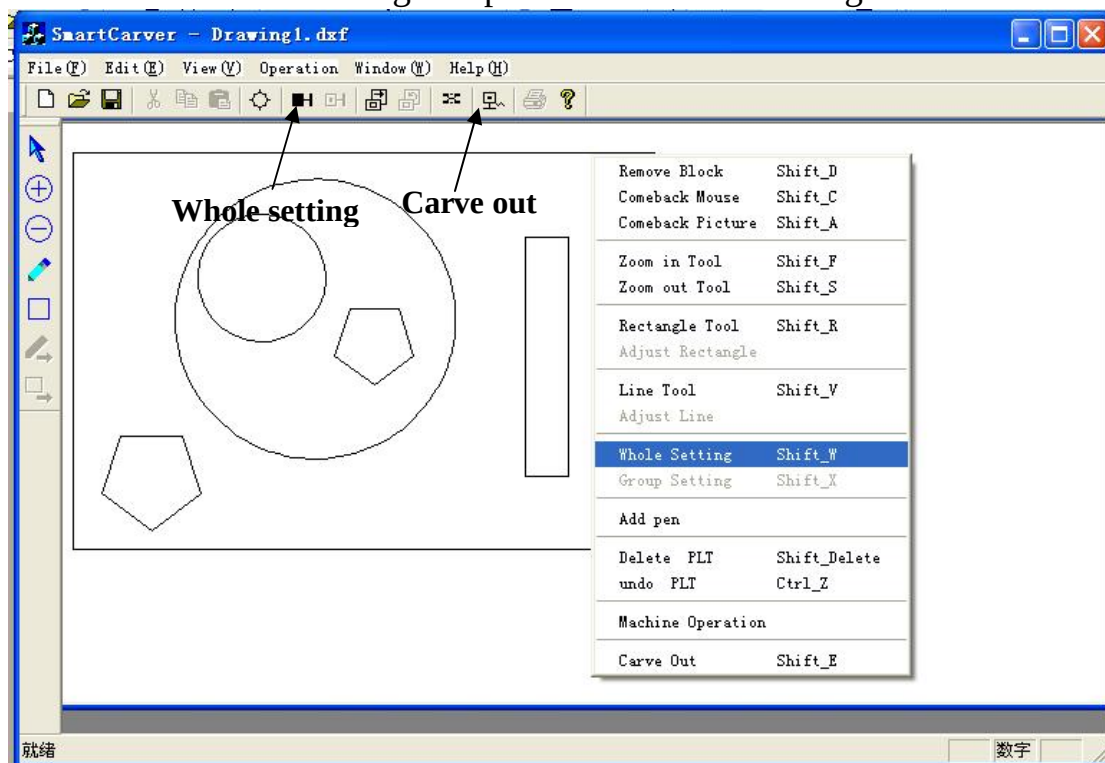
F5-4-3

Open DXF file to enter into the window as shown in Diagram F5-4-4.



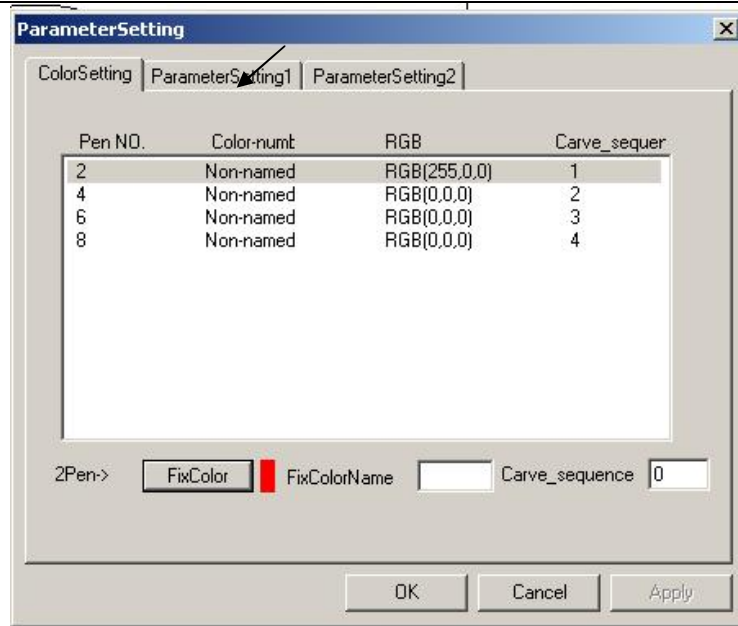
F5-4-4

Next is to start setting the parameter for the carving:



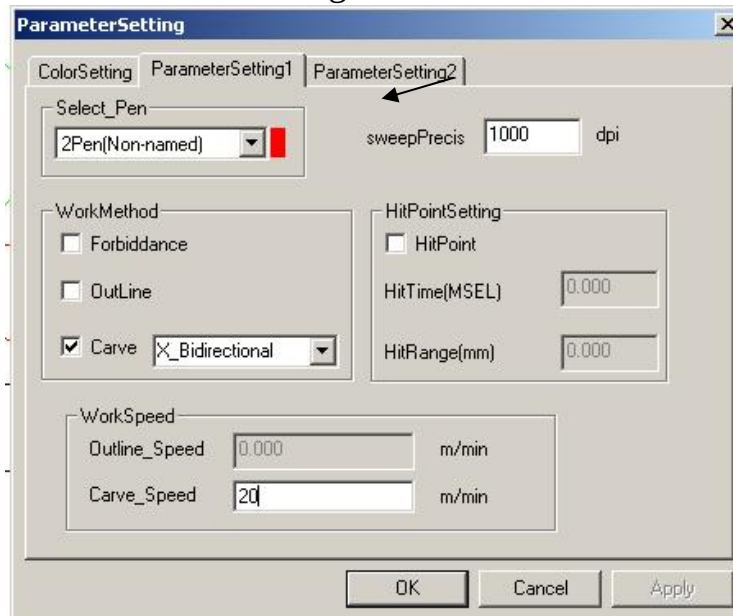
F5-4-5

Click the icon for “Whole setting” as pointed to by an arrow in Diagram F5-4-5 or click the right button of the mouse and a dialogue box as shown in Diagram F5-4-6 will occur:



F5-4-6

When plotting in CAD, no matter how many colors you have used, there will be that much brush number in engraving software when saved in DXF format file. For instance, in Diagram F5-4-1 there are four colors, so in Diagram F5-4-6 there are four numbers of brush. The brush number first opened in the engraving software are all black and users can set up different colors for different number of brush. After the color is set, the next step is to set the feature by clicking “ParameterSsetting1” and there will be a window as shown in Diagram F5-5-7:



F5-4-7

In the window of Diagram F5-5-8, we can set the way of operation, operational speed, puncturing and other functions. After that, click

“ParameterSetting 2” and there will be a window as shown in Diagram F5-4-9:

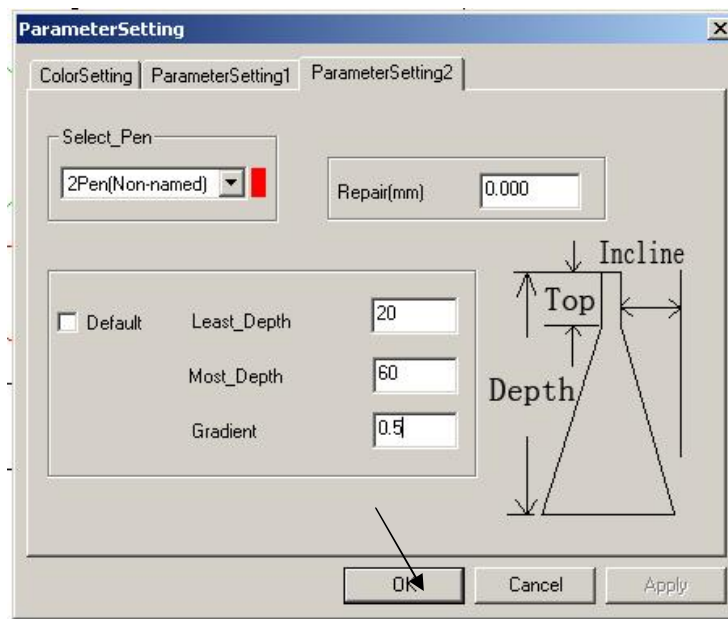
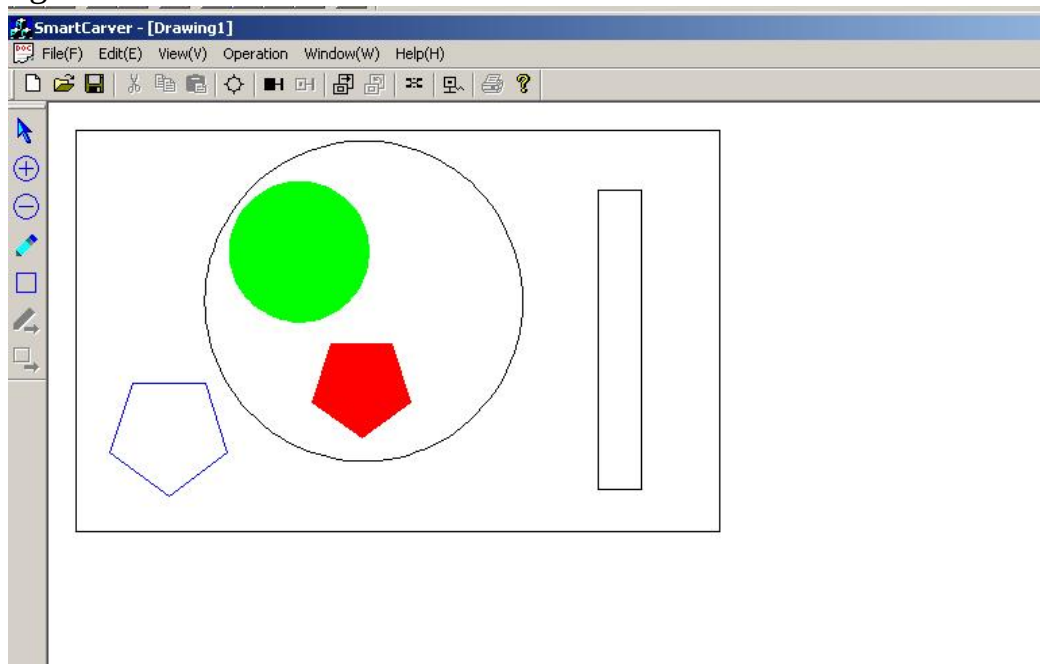


图 F5-4-9

Here the setting is mainly targeted at the light intensity of carving. If the speed is the same, the stronger the light intensity is, the deeper the carving will be, so the “Least depth” and the “Most depth” in the diagram refer to the maximum light power and the minimum light power. After setting up the parameters, click “OK” to enter into the window as shown in Diagram F5-4-10:



F5-4-10

Diagram F5-4-10 shows the effect after the setting. In this diagram

graphics that are filled up with colors are required to be cleaned and those without color are to be outlined. In software, those have been set up as cleaning in setting will be filled up with color by the software automatically and those to be outlined will only have frame lines.

After the way, speed and depth of carving have been set up, next the carving can be output. Just click the icon  for carving output or click the mouse on the right button and there will be a window as shown in Diagram F5-4-11. Detailed statement of the carving output can refer to “C. Carve out” in Section Two *The Application of PLT Format*.

Section five Complementary instruction of DXF file

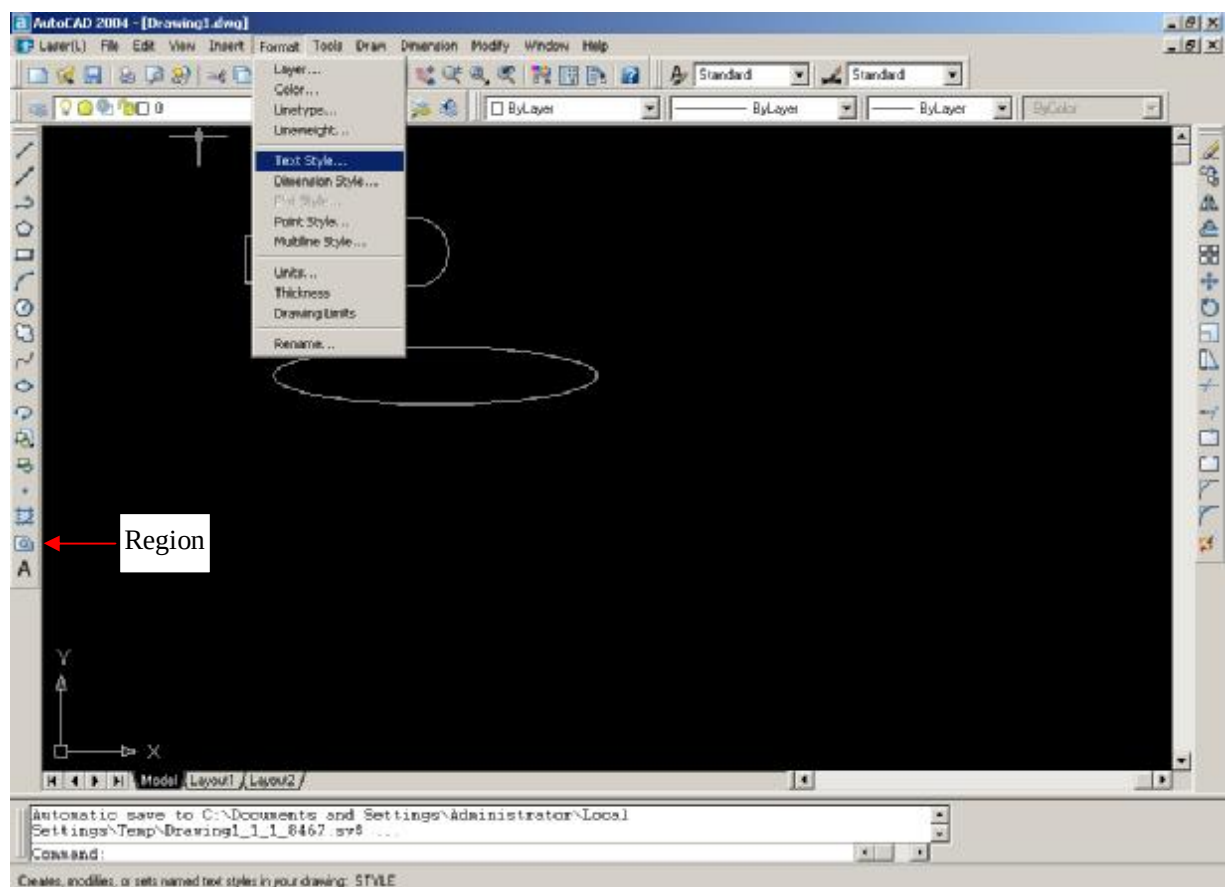
Eastern engraving software support dxf file of version R14, dxf2000, dxf2004, but there are some things need to explain.

1, The software doesn't support Region (as picture 1 showed), it is said that a close figure have been Surfaced will be ignored.

2, There is a sheet tool in AutoCAD2005, it can build sheet, and the letter can be written in it, but our software doesn't support sheet.

3, Our software can support the figure that have been broken up.

4, Font, our software can support font, but it is limited, it should meet some specific condition. First, we need to select "Text style" in "Format" menu in AutoCAD, as the picture 1 showed.

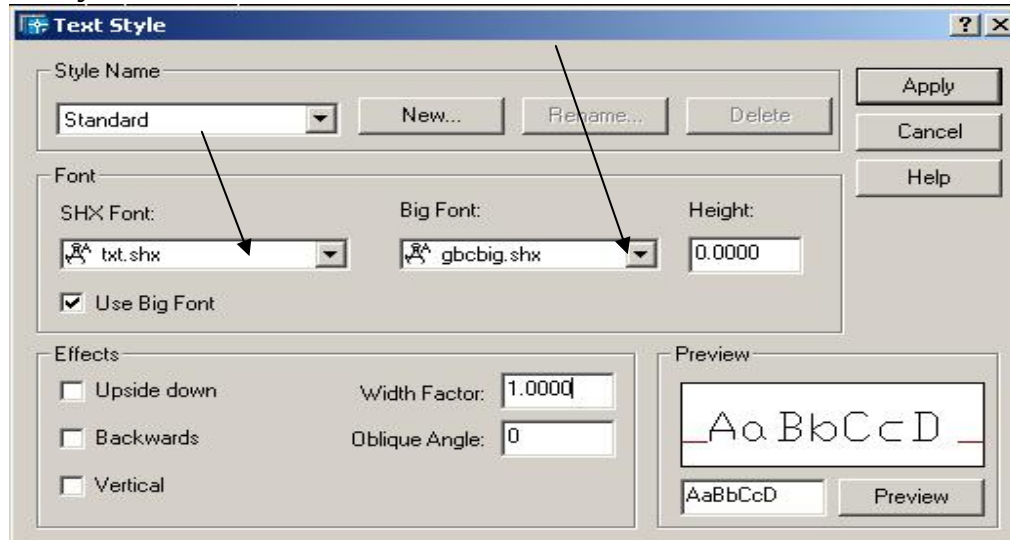


F5-5-1

Then it will appear Picture2, here, we click check box of "use big font", then select the font our software supports in "Big font". The font our

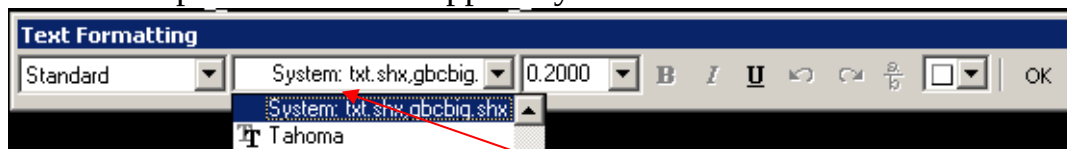
software support are

“Fs.shx”, ”gbcbig.shx”, ”HT.SHX”,”Htxt.shx”, ”Khz.shx”. If you can’t find these font in AutoCAD, you can find the Font folder in our software’s installation directory, copy the Font folder into AutoCAD installation directory.



F5-5-2

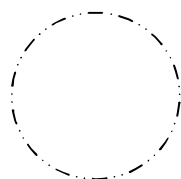
After selecting the font, do the following step: As picture3, select System:txt.shx,gbcbig.shx System:txt.shx,xxx.shx(we support).The font after above operation can be support by our software.



PICTURE 3

5,Our software also support label. But the letter and arrowhead of the label line can’t be showed, the latter can be output by breaking up ,but the arrowhead cann’t.

6,Line shape support, our software support simple line shape, for example, point-line (as picture4), note: as picture5 draw by line can be support, but if the figure is build by line shape tool can’t be supported.



F5-5-4



F5-5-5

7, Doesn't support fill figure, if the figure is filled, the filled part will not output, because the clear of our software doesn't need to fill.

8, We can select whether to output the label and the letter.

9, Through breaking up, the label and letter broken up can be output, even though you don't select output label and letter, because they are broken into lines. But the precondition is that the label, letter or figure really can be broken up, some broken up operation is ineffectual.

10, Note: don't break up the figure when you draw as possible, because the figure have been broken up is bad order, the data is very big.

11, The content of the text also can be applied to AutoCAD output.

Chapter 6 Instruction of YMFILE Download Software

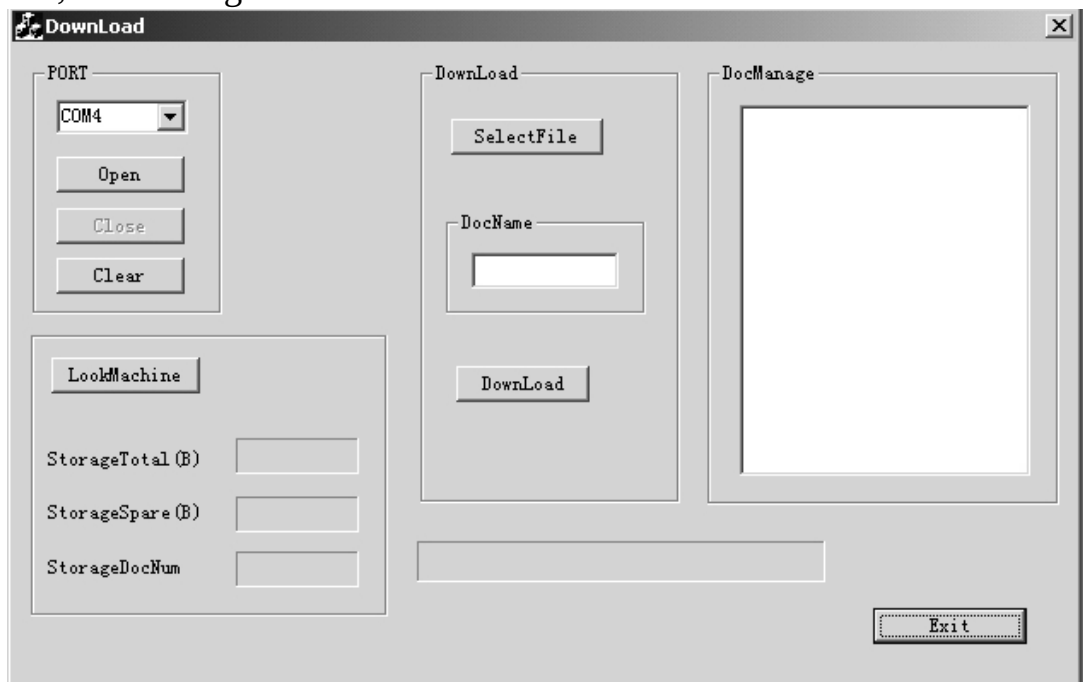
Please copy the YMFILE download software from the SC folder on the CD onto your hard disk. It will run directly without any special installing.

1. Function of the software: Using the *.OUT format, files created in the engraving software, can be downloaded to the engraving machine, allowing the machine to run without the computer.

2. Interface introduction:

Click the YMFILE icon to open the interface shown in F6-1.

The interface is made up of 6 parts: Port, LookMachine, Download, Status bar, DocManage and Exit.



F6-1

Port: The communication port, which connects the machine with the computer (see the parameter setting introduction).

LookMachine: Checks for stored information in the machine memory: total memory, available memory, files stored already.

Download: Downloads *.OUT files from the computer to the machine.

Status bar: Shows the operational state.

DocManage: Manages the files stored in machine already.

Exit: Closes the download window and exits the program.

3. Operations Introduction:

A. Select the correct port and click the “open port” button. If the port opens successfully, the status bar will show “open serial port success”, or a dialogue box like F6-2 will appear. Close this dialogue box and the status bar will show “open serial port failure”. Only an open serial port will allow the downloading of files to the machine.

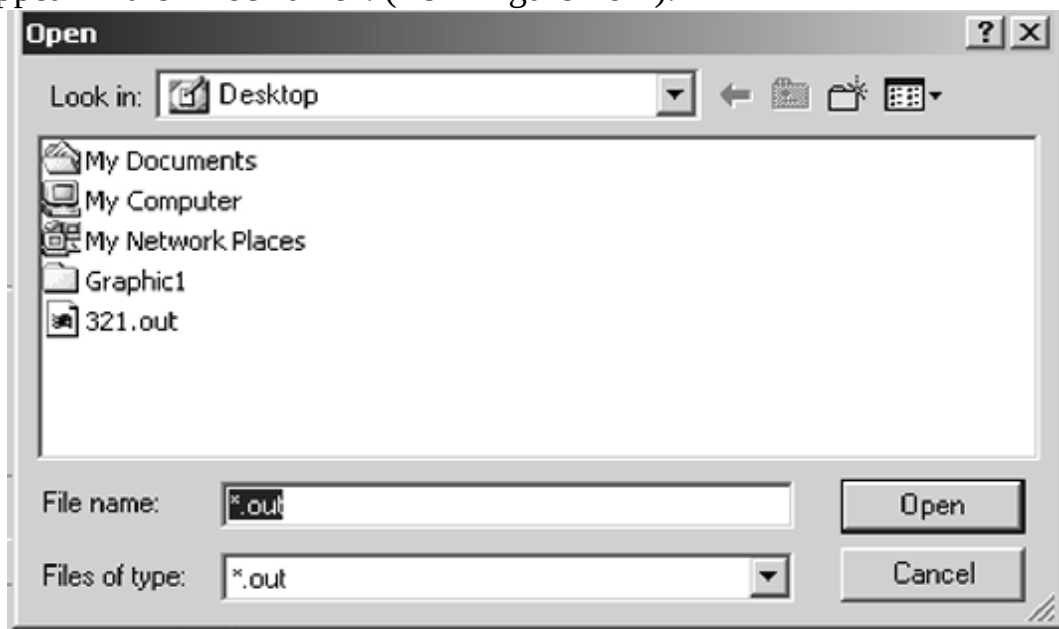


F6-2

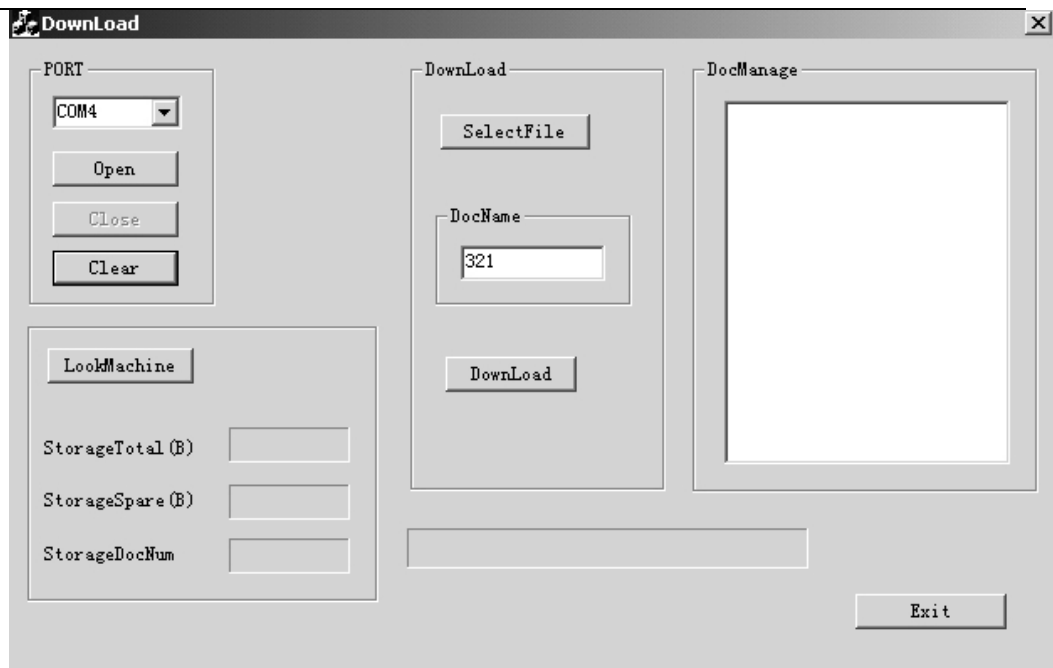
B. Click the “LookMachine” button, and you can see the “Storage Total”, ”StorageSpace”, and “StorageDocNum”.

C. Click “SelectFile”, then select a file (as in F6-3). The user can now locate the path of the files and find the required files to write into the machine memory.

Click the “open” button or double click a file. The name of the file will appear in the “DocName”. (As in figure F6-4).



F6-3



F6-4

D. Click “Download”.

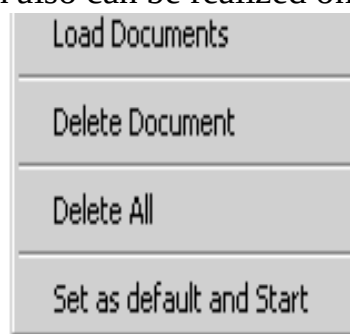
E. In the “DocManage” window, right click and the following dialogue box as in figure F6-5 will appear:

Load Documents: You can see all file names in the “DocManage” window. Users can check the number of files and file names with this function.

Delete Documents: Deletes selected files.

Delete all: deletes all the files.

Set as default and start: make the selected files default files and start work directly. This operation also can be realized on control panel directly.



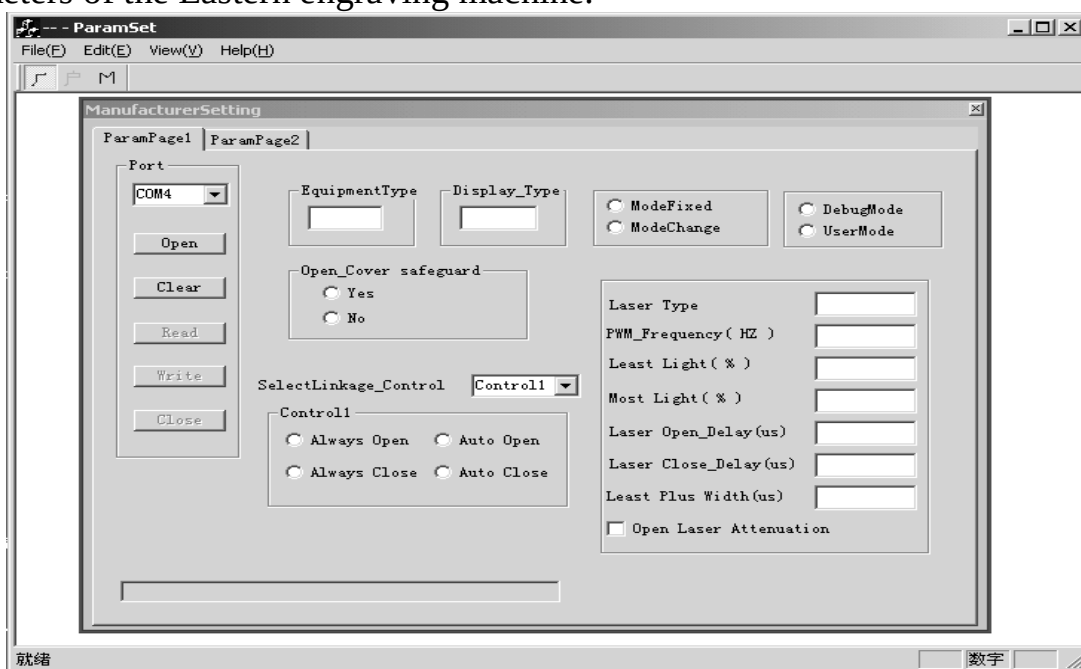
F6-5

Chapter 7 Parameter Setting of the Machine

In this chapter, we will introduce how to set engraving parameters and how to use the parameter setting software. This is of great importance as the parameter settings decide the working status of the machine. Please read this chapter carefully and don't change any parameters before you have understood the meaning of each parameter.

Parameter setting is the core setting of the engraving machine. We recommend that you back up your parameter settings before attempting any changes. This way you can write the back up back into the machine memory if your changes do not work out.

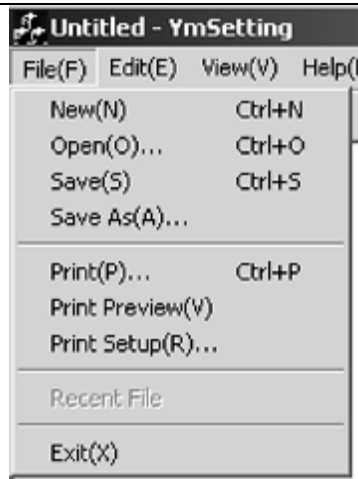
Copy the Ym setting software in SC catalog of the CD to your hard disk. It will run directly and without installing. Open the parameter setting interface (as in figure F7-1). The function of this software is to set the parameters of the Eastern engraving machine.



F7-1

Introduction of the functions on the main menu:

Introduction of the files menu:



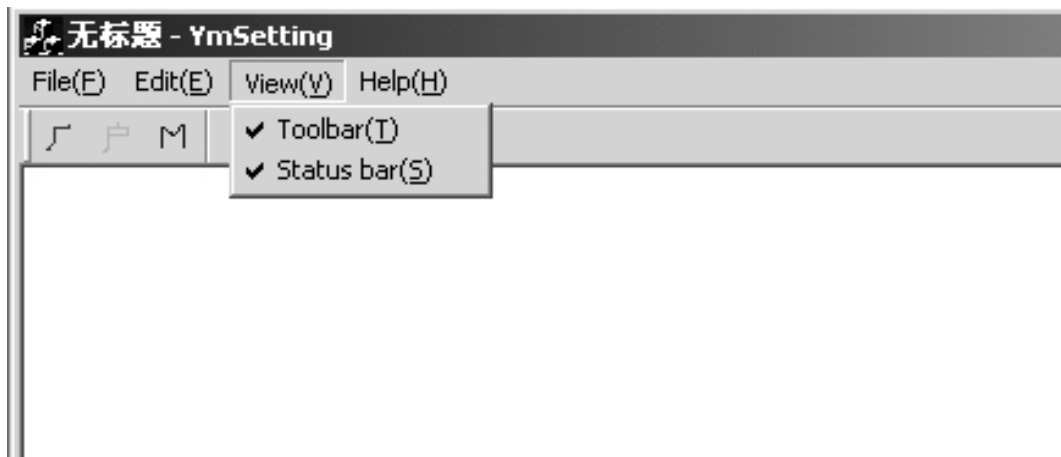
F7-1-1

The Files menu includes standard content of Windows: New, Open, Save, Save As, Print, Print Preview, Recent File and Exit.

“Open”: Open an existing file

“Save As”: The User can save the parameter files to a folder and name the file after the parameter.

Menu introduction:



F7-1-2

Includes Windows’ standard menu content: Toolbar and Status bar

Toolbar: There are 3 buttons on the Toolbar, they are : Manufacturer Settings, User Settings and Message Notify.

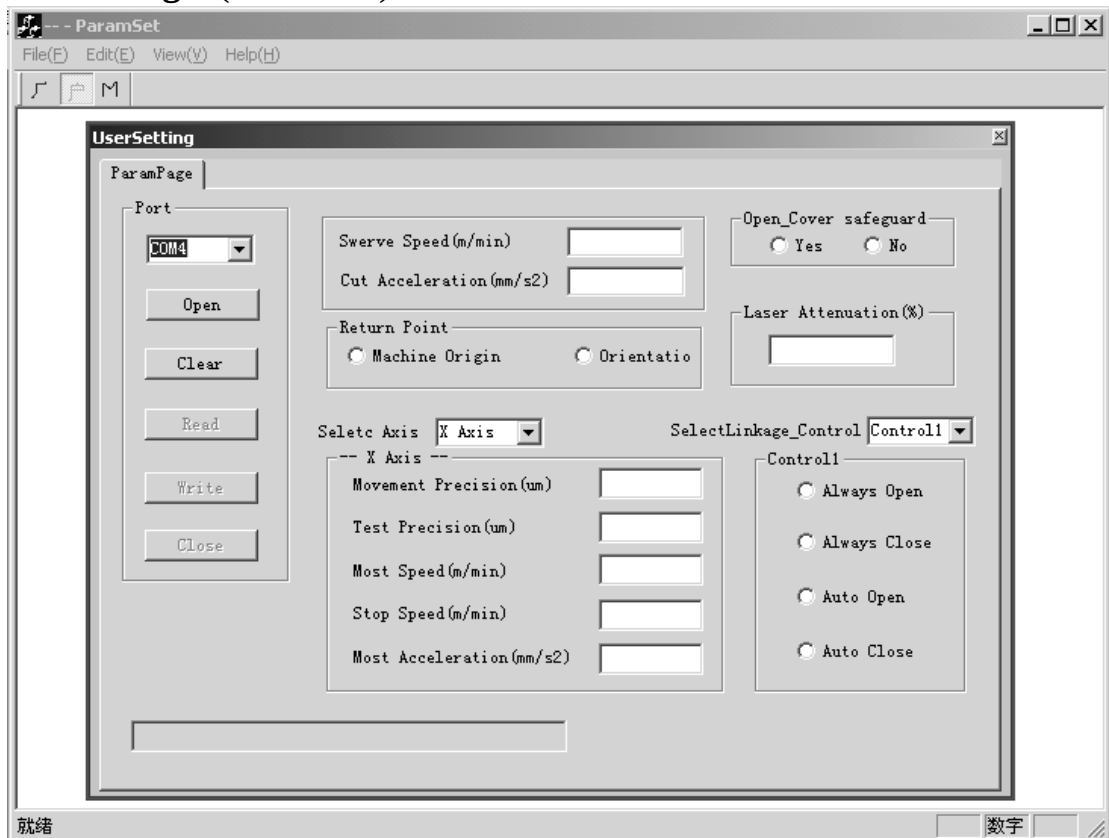
Manufacturer Settings: These are not accessible to the user and set the outer limits for axes travel and similar limitations.

User Settings: The user can set or adjust various parameters to adjust to different conditions like material, cutting method, machining properties, precision requirements and efficiency requirements. Users can also produce samples before starting production, and then select the best

parameters for the job at hand. Many groups of parameters may be stored to suit different engraving needs.

Message Notify: This reflects the working status of the machine. Parameter values shown do not effect work in progress. Parameters cannot be changed here except for the coordinates of the origin.

User Settings: (as in F7-2)



F7-2

Port: The communications port of the computer used to connect to the machine. Laser engraving machines use USB ports to connect to computers.

Open: Opens the selected port. If the computer can't find the communications port, data can't be transmitted from the computer to the machine. In this case the "Port connect error" dialogue box will appear on the monitor and "open serial port failure" will appear on the status bar. If the connection is successful we will see "Open Serial Port success" on the status bar. Values in the machine can now be read and new values written to the machine.

Clear: Resets all values, except pull-down options.

Read: Reads the value of parameters stored in the machine. To change a parameter, you need to first open the job file. (Again, this will

only work if the serial port is open).

Write: Write the new parameter values into the machine memory. The machine will now work with the new parameters. If the transfer is not successful or the parameters are not complete “Some data is invalid” will appear on the status bar.

After the new set of parameters have been written to the machine, they are valid at once. However, some special parameters will only take effect after you restart the machine.

Close: Closes all ports, and breaks the connection between the computer and the machine. “Close serial port” will appear on status bar.

In the Eastern engraving software, the download software and the parameter setting software, an open communication port is needed. All three use the same port to transmit data and work only one at a time.

Swerve speed (m/min):

The speed around a corner (such as right angle), this speed can affect the engraving quality of the machine.

The bigger swerve speed is, the higher the efficiency. However the engraving quality and the machine life are inversely affected.

The smaller the swerve speed is, the better will be the engraving results, but efficiency diminishes.

Cutting Acceleration: (m/ s²):

This is the acceleration (deceleration) the machine uses for cutting and engraving. The value of the acceleration will affect especially the cutting quality. This will show up most on sharp corners and corners with tight radii. Reduce the acceleration if the quality of a corner needs to be improved.

Return point

The point where laser head stays after work finishes or after an E-stop.

There are two options: machine origin and job origin.

If the user selects the machine origin, the laser head will return to the rear right corner of the work area after a job is finished or after an E-stop.

If the user selects the job origin, laser head will finish at that point, which is freely selectable over the work area.

Select axes:

Your CMA machine uses the X axis (left to right) and a Y axis (front to back). Therefore only parameters for these axes need to be set when programming a job.

Precision of Movement:

The accuracy of the travel of the two axes can be corrected by setting a software parameter. This will correct inherent tolerance add up in the machine as well as wear.

If the accuracy of your machine needs to be corrected, the new value of the correction factor can be calculated as follows:

New Correction Factor = Present Correction Factor $\times$ Real Dimension / Theoretical dimension.

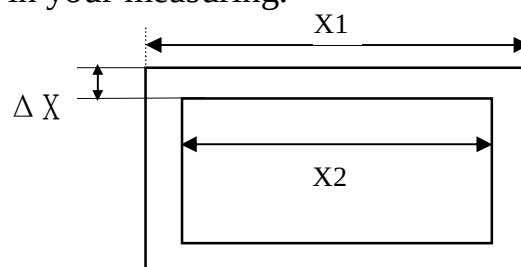
The Present Correction Factor is the factor stored in memory now. We can get this value by reading the parameter off the main board.

The Theoretical Dimension is the dimension you are trying to achieve.

The Real Dimension is what the machine is giving you.

About the measurement of dimensions:

If you are trying to figure the correction factor, we suggest you cut a rectangle whose sides are parallel to the axes of the machine. The rectangle should be of good size to give your measurements accuracy. By measuring the sides of the rectangle you get a direct indication of the accuracy of the associated axes and by measuring the two diagonals you can judge the squareness of the axes to each other. Don't forget to consider the kerf width (width of the cut) in your measuring.



Test Precision (mm):

If device configure closed loop check system, this parameter is valid and this parameter decide the error between engraving dimension and designed dimension. Under this condition, we mainly adjust this parameter, and moving precision do not affect engraving dimension.

Max. Speed (m/min):

This is the maximum cutting and engraving speed allowed when the machine is working in one axis.

Stop Speed (m/min):

The speed allowed for a sudden stop when the machine is working in one axis. This is also the startup speed.

The larger the speed is, the higher the efficiency. However the engraving quality and the machine life are inversely affected.

The smaller the speed is, the better will be the engraving results, but efficiency diminishes.

Max. Acceleration (m/s²):

The rate with which the speed changes when the machine is moving on one axis.

The larger this acceleration rate is, the shorter are the changes from one speed to another. Again, the larger the acceleration, the higher the efficiency. However the engraving quality is inversely affected.

The smaller the acceleration rate is, the better will be the engraving results, but efficiency diminishes.

A max. value for the acceleration is set in the manufacturers parameters to protect the machine.

The maximum speed and maximum acceleration must be compatible with each other so as to make machine work well. Generally speaking, the user can vary engraving speed and engraving accuracy according to his own needs.

Guard Protection:

The guards to the work area are protected by redundant safety switches. These are installed to protect the user as well as bystanders from the effect of laser emissions. Laser action will stop whenever a guard is opened while the machine is cutting or engraving. Never attempt to defeat the safety switches.

Laser Attenuation (%):

The power of the laser tube will decrease over time, affecting the engraving depth and cutting ability. Adjusting this parameter will allow you to compensate for this degradation in power, without changing your work files. It will instead automatically reduce all speed settings.

Linkage control:

This option is not the same for different control configurations.

There are 8 options (control 1 to control 8). They can control 8 peripheral pieces of equipment. Each option has 4 control modes: always open, always closed, auto open, auto close.

Always open: Regardless of whether the machine is working or not, this device is always on.

Always closed: opposite to always open.

Auto open: The peripheral pieces of equipment are on when machine is working and off when machine is not working.

Auto close: opposite to auto open.

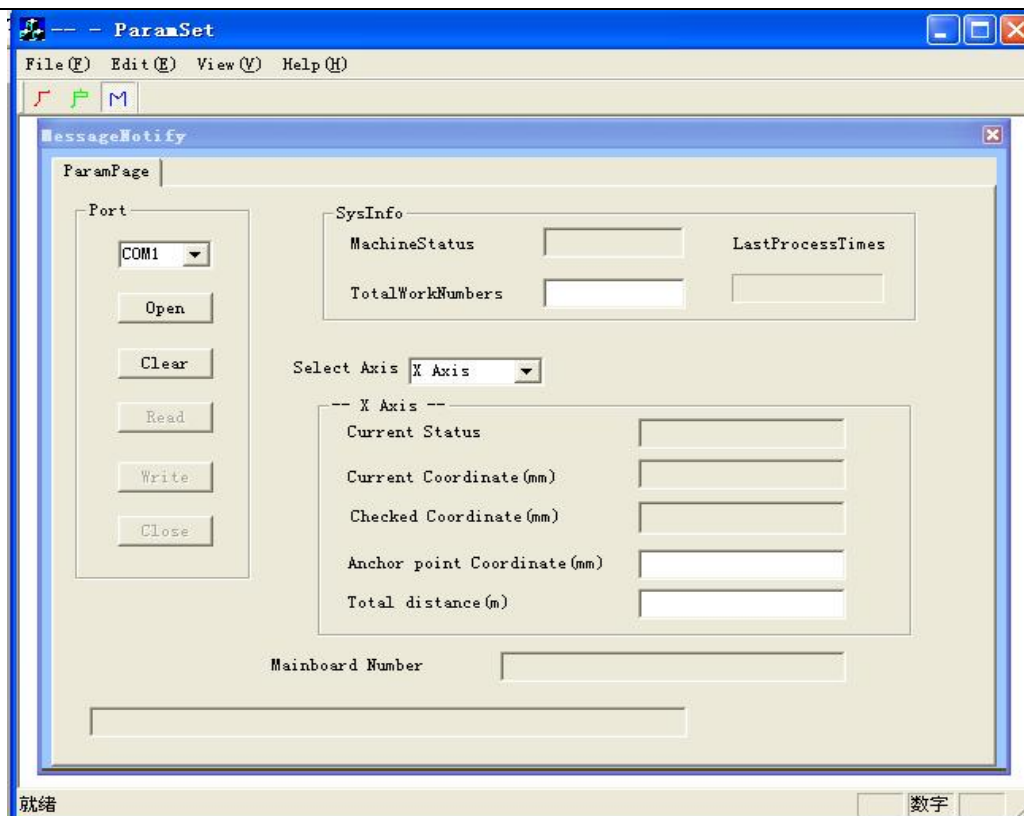
The user can select different control modes according to his requirements.

Manufacturer Settings are only used as a reference for User Settings. Users cannot change Manufacturer Settings.

Only trained personnel should make changes to any of the parameter settings. The user can reference the Manufacturer Settings to set a proper parameter.

Message Notify interface (as in figure F7-3)

The parameter in Message Notify is created by the system automatically, and the parameter doesn't affect the machine's performance. It is only a description and statistic of the machine status.



F7-3 Message Notify interface

1. Sys Info (System information)

Machine Status: working or idle. (The user cannot change this parameter)

Total Work Numbers: The total number of jobs which have been produced on the machine. This information cannot be changed by the user.

2. Select axis:

Current status: the status of the machine at present: working status, idle status.

Current Position (Millimeter): The position of the laser head on the selected axis. This position is relative to the machine origin.

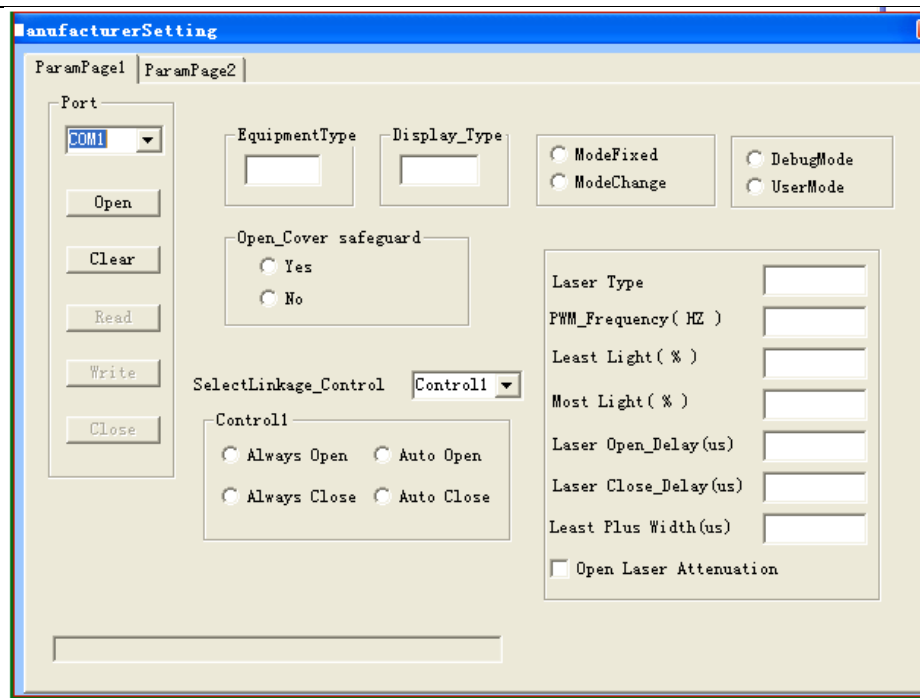
Anchor Point or Job Origin (Millimeter): the user selected coordinates of the job origin.

Total Travel (meters): The total distance, which the select axis has traveled.

3. Main Board Number:

The model number of the main board.

Manufacturer Settings as in figure F7-4



F7-4

Equipment Type:The machine model.

Display-Type:

Sets the display according to Mode Fixed and Mode Change

If you select Mode Fixed, you have to use Manufacturer Setting mode and cannot make changes in the working mode.

If you select Mode Change, you can change the working mode and parameters in several working modes.

Debug Mode, User Mode and Adjust Mode:

The mode, which the factory uses to set the machine before shipping, cannot be changed by the user. When this mode is selected, the system will copy the Manufacturer Settings to the User Settings automatically. This will allow the user to start the machine with well adjusted settings.

User Mode: These are user selected values. The user can reference the Manufacturer Settings and set the parameters according to his own requirements. After you have made changes to the settings, User Settings will have precedence over the Manufacturer Settings. The Machine will then use the User Settings to run. However, user set parameters cannot exceed Manufacturer Settings or machine will default to the Manufacturer Settings.

Laser type:

You can select laser type shipped with your machine.

PWM (Pulse Width Modulation frequency)

The pulsing frequency varies with the laser, please refer to section on laser tubes.

Minimum Laser Power (Least Light):

This is the minimum laser output feasible with your machine.

Maximum Laser Power (Most Light):

This is the maximum laser output achievable on your machine.

Laser open-delay/close-delay: The delay parameter is set to avoid irregular engraving when laser switches on and off.

Laser open-delay:

This is the compensation for the minute delay from the signal for power to actual power output.

Laser close-delay:

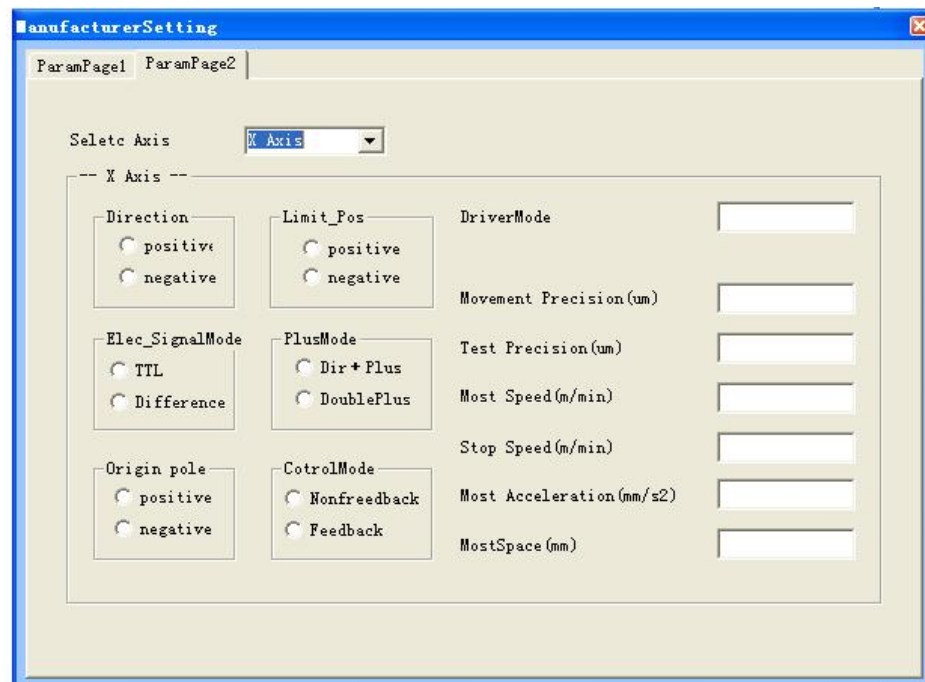
Likewise, this is the compensation for the minute delay between signal to power down and actual power down.

Minimum pulse width:

The minimum pulse width, which can be achieved.

Open laser attenuation:

We advise users to select this option to compensate for laser attenuation.



F7-5

Direction:

Changes the direction of an axis.

Limit -pos:

We have positive and negative poles, when a motor cannot reset or resets abnormally, we can change polarity to correct it.

Elec-signal Mode:

We use TTL and Difference modes. They can be selected according to the motor driver used.

Pulse Mode:

Stepper motors are used on the CMA. There are two kinds of pulses for the driver: direction + pulse, and double pulse; they can be selected according to the motor driver type.

Origin pole:

The single pole of the machine when laser head resets to origin, if you select positive pole and machine reset to origin, then the origin pole is positive; Contrarily, the result is opposite.

Control Mode:

There are two kinds of control modes: open loop (nonfreeback) and closed loop (feedback). This is set by the factory to reflect the equipment installed.

Drive mode:

Drive mode is the configure method of rail and motor. Please refer to the manual book select the correct mode.

Maximum Travel (Most Space):

Maximum travel for the X and Y axes needs to be entered to avoid the crashing of these axes at their limits.

Chapter 8 Operational Method for Direct Output of

AutoCAD

For the convenience of users, Eastern Company has elaborated a carving software based on the direct output of AutoCAD which is characterized by simple operation, flexibility and strong practical applicability. Following is an illustration about the installation and usage of the software.

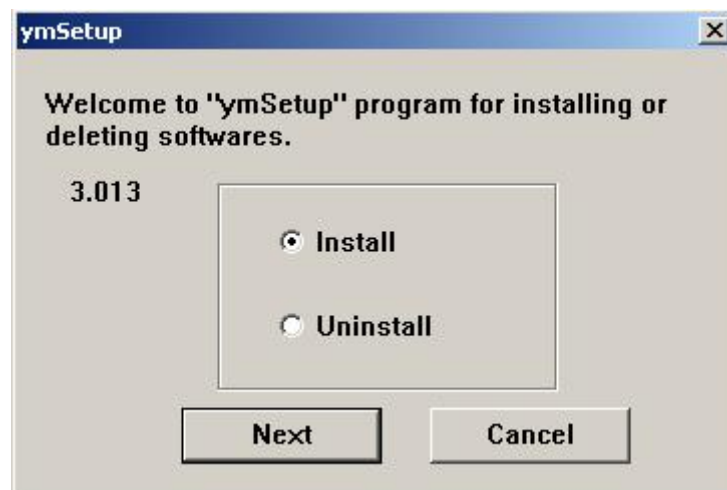
Operational platform: Windows98、 Windows ME 、 Windows NT4、 Windows 2000、 Windows XP, at least IE6.0 and windows 2000 SP4 or above。

1. Installation of the direct output system of AUTOCAD

Make sure that AutoCAD shall be installed before the installation of this system. It needs to be emphasized that the VBA support function shall be fixed up before the installation of AutoCAD, otherwise the system won't work.

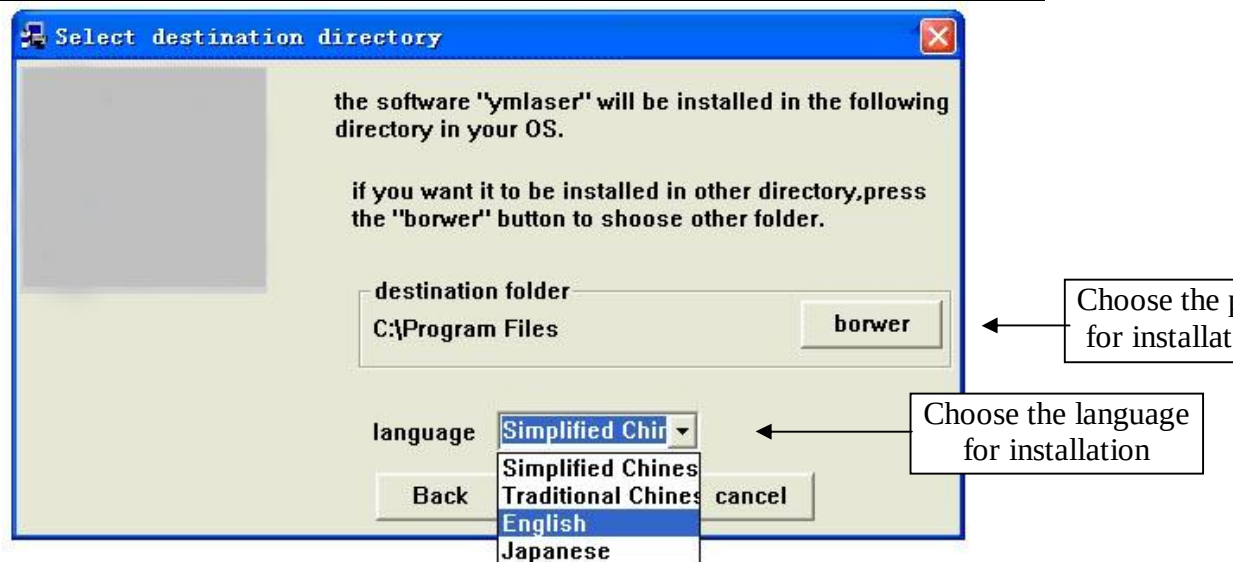
Put the CD into the CD driver to have the content of the CD copied to the disk of the computer (such as Disk C or Disk D). Then find out the file For CAD3.013 (3.013 is the number of version), double click the software

CAD Setup 3.013  to start the installation as shown in Diagram F8-2:



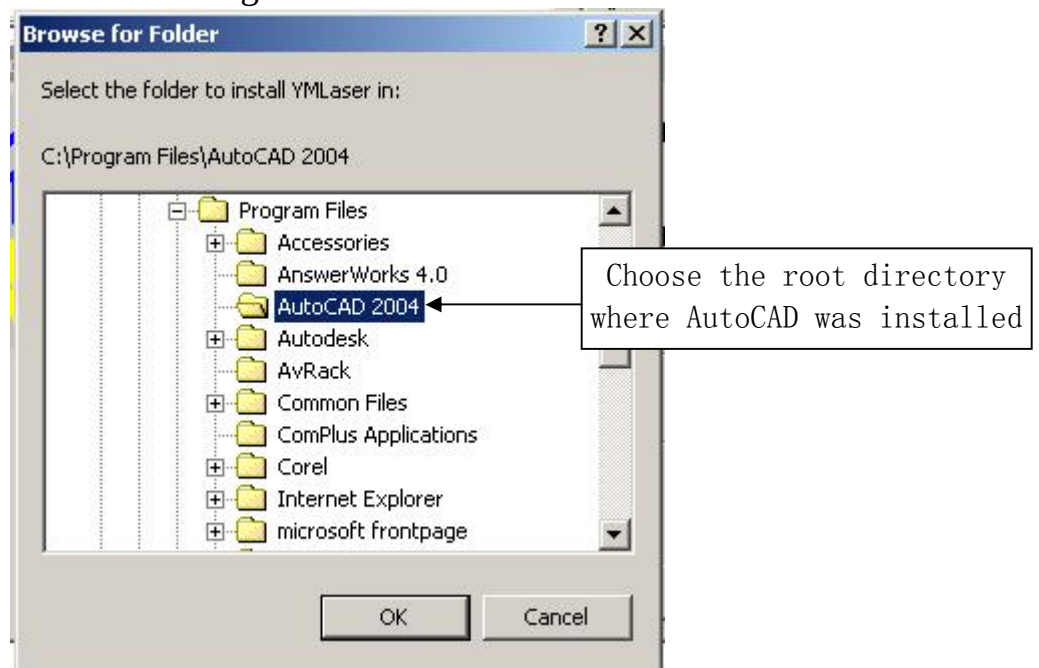
F8-1

Choose “Install”, click “Next” in Diagram F8-1 and there will be window as shown in Diagram F8-2:



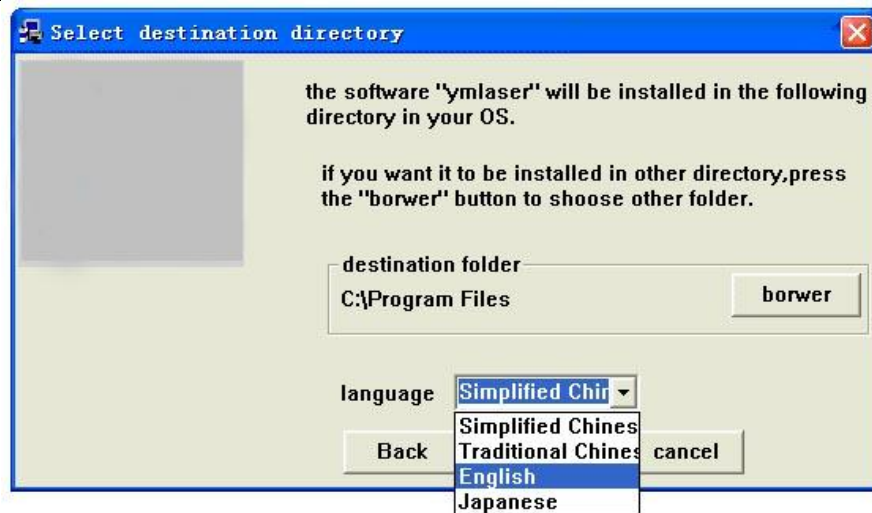
F8-2

Pull down the Language box as shown in Diagram F8-2, choose the type of the installation language and click “Browse” button to select an access for installation, which shall be at the root directory where AutoCAD is. Then click “OK” as that in Diagram F8-3:

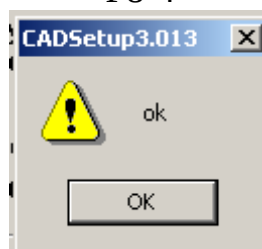


F8-3

After selecting the installation language and the access for installation, there will be a window as shown in Diagram F-4. Click “Install” button to start the installation. When it is done, a dialogue box will occur as shown in Diagram F8-5:

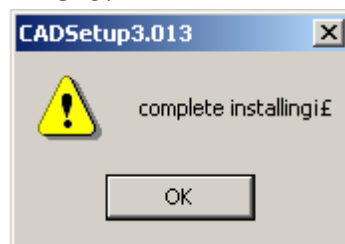


F8-4



F8-5

Click “OK” on the window of the Diagram F8-5 and there will be a window as shown in Diagram F8-6:

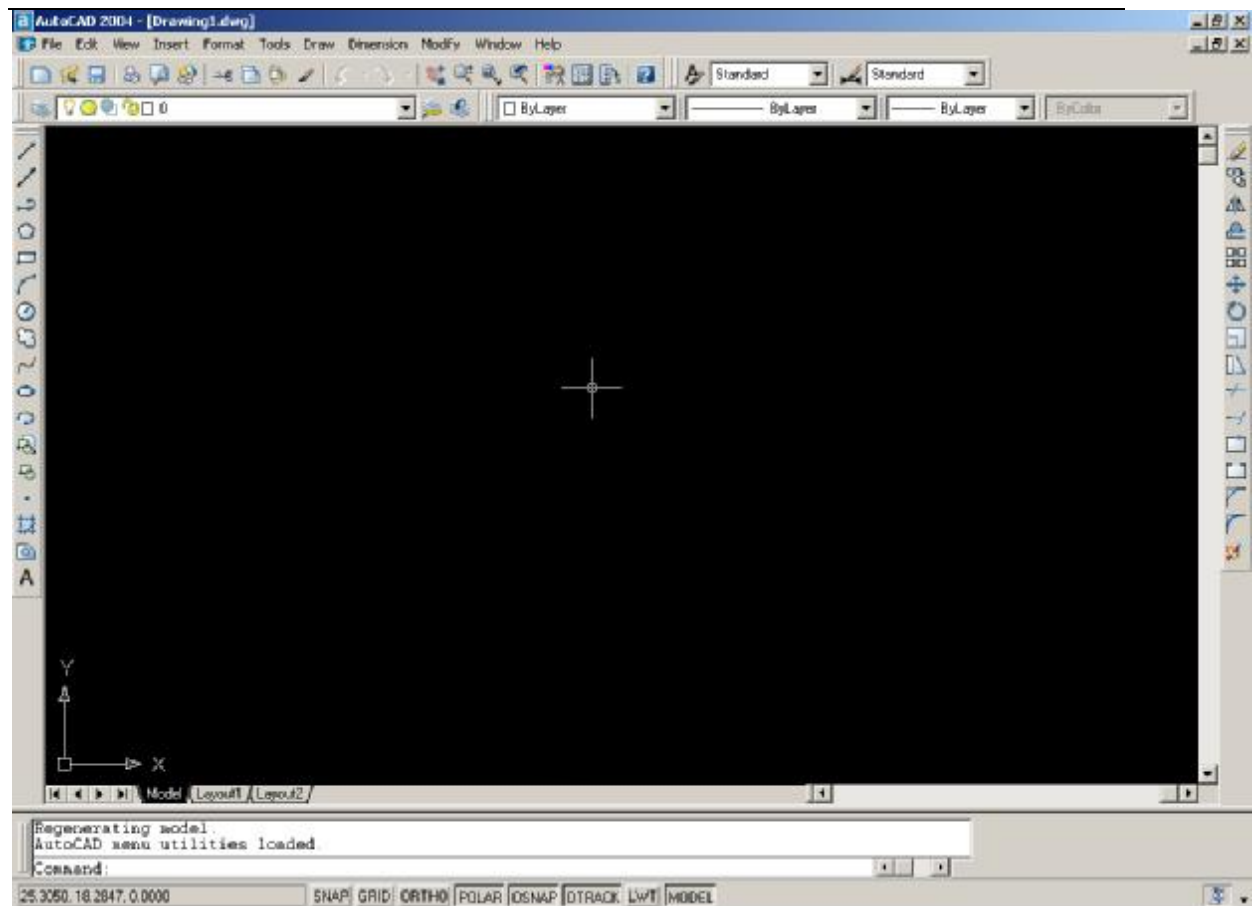


F8-6

Click “OK” on the window of Diagram F8-6 to get the installation done.

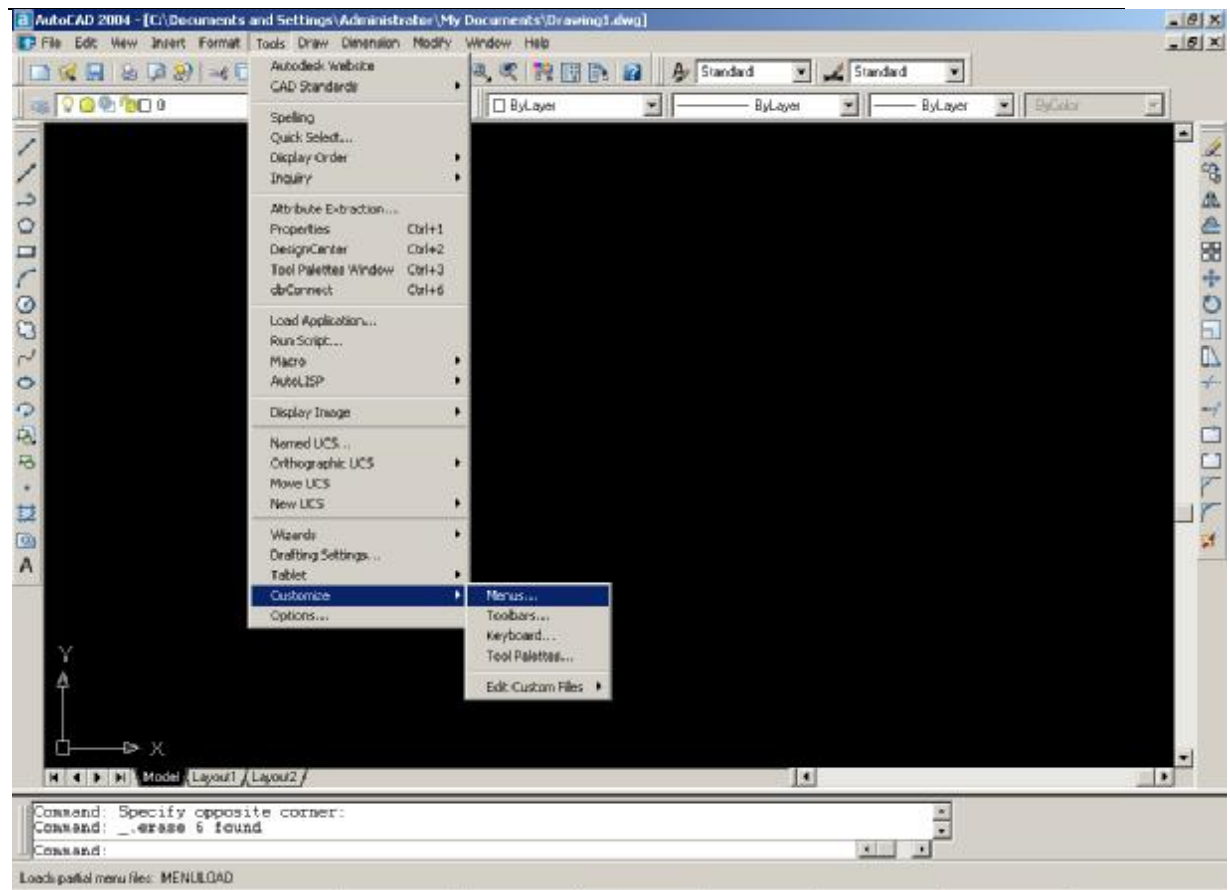
1. Locating a CAD direct carving software in the CAD menu

Open up an AutoCAD software and there will be an operational window as shown in Diagram F8-7:



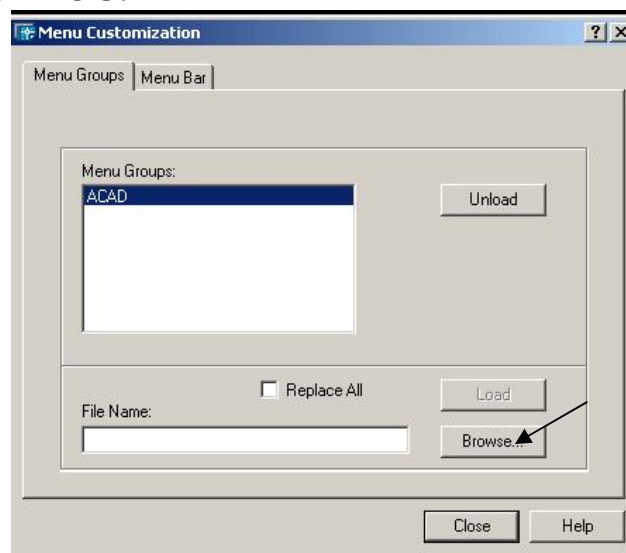
F8-7

Choose "Tools" from the menu bar of the window of Diagram F8-8, click it and choose "Menus" from "Customize" and there will be a window as shown in Diagram F8-8:



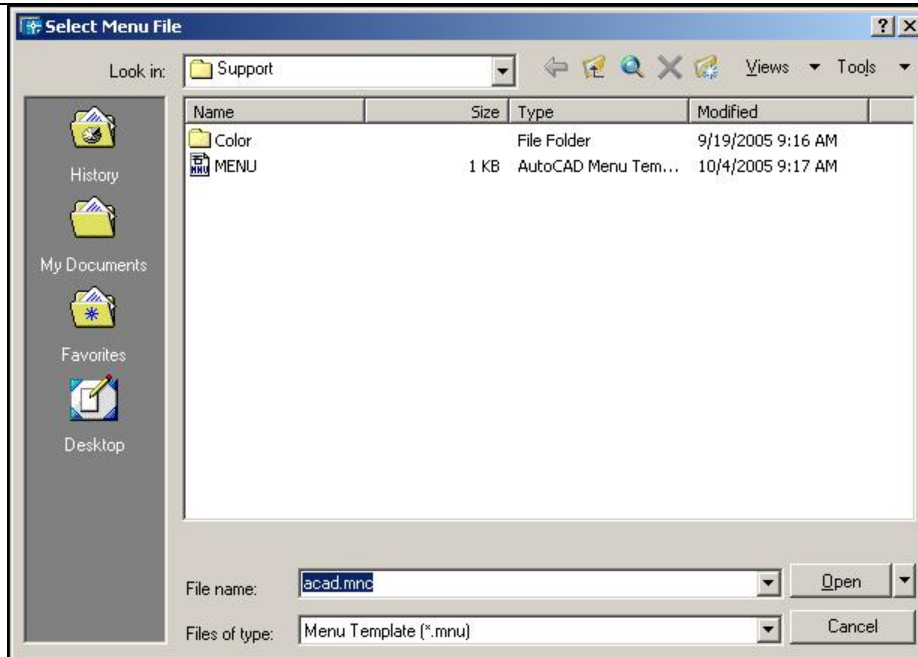
F8-8

Choose “Menus” in Diagram F8-8 and click it to enter into a window as shown in Diagram F8-9:

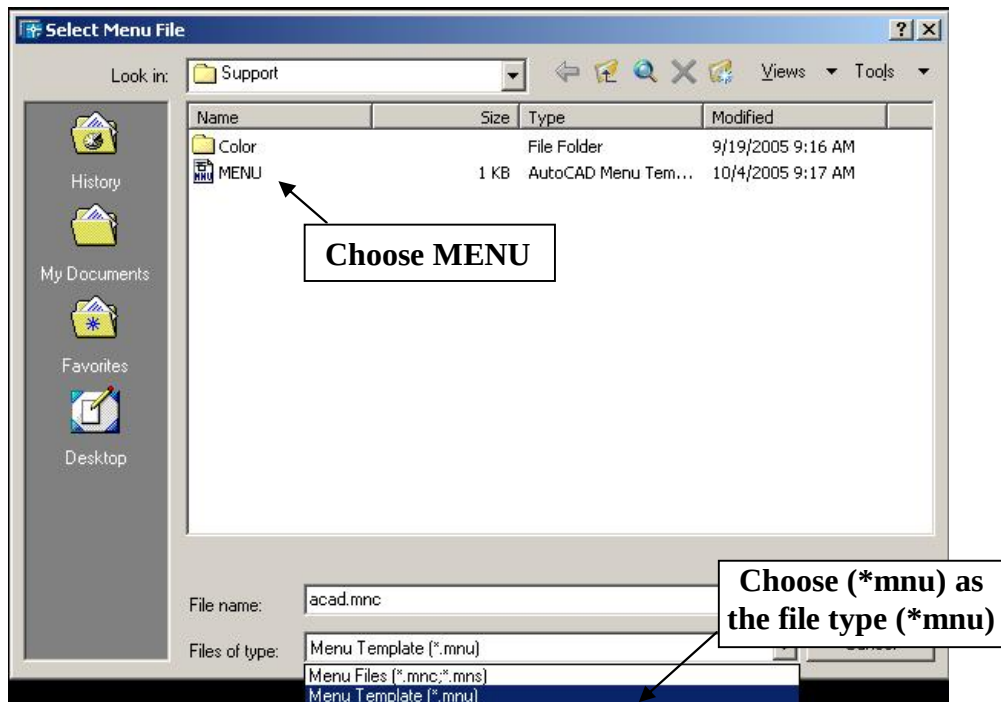


F8-9

Click “Browse” in Diagram F8-9 to search required documents for Support in the directory of AutoCAD. Please refer to Diagram F8-10.

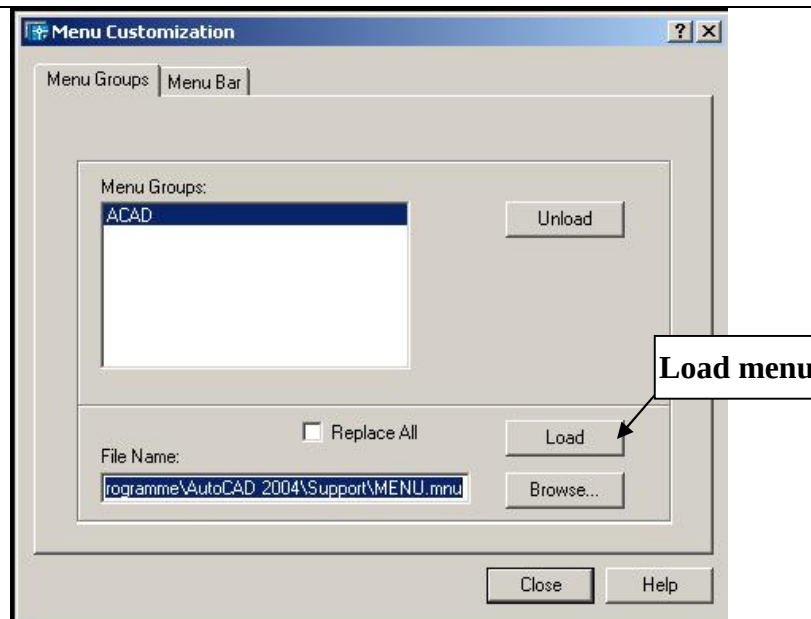


F8-10



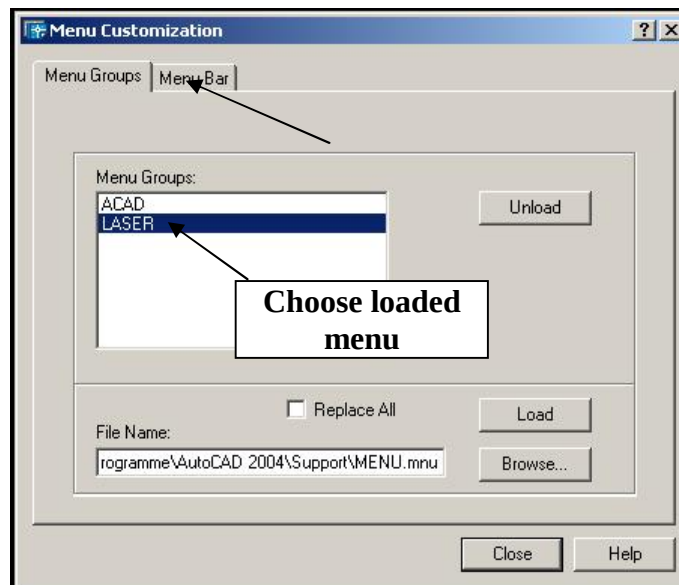
F8-11

Choose “MENU” from Diagram F8-11 to set the file as *.mnu format as shown in Diagram F8-11. Click “Open” in the window of Diagram F8-11 and there will be a window as shown in Diagram F8-12:



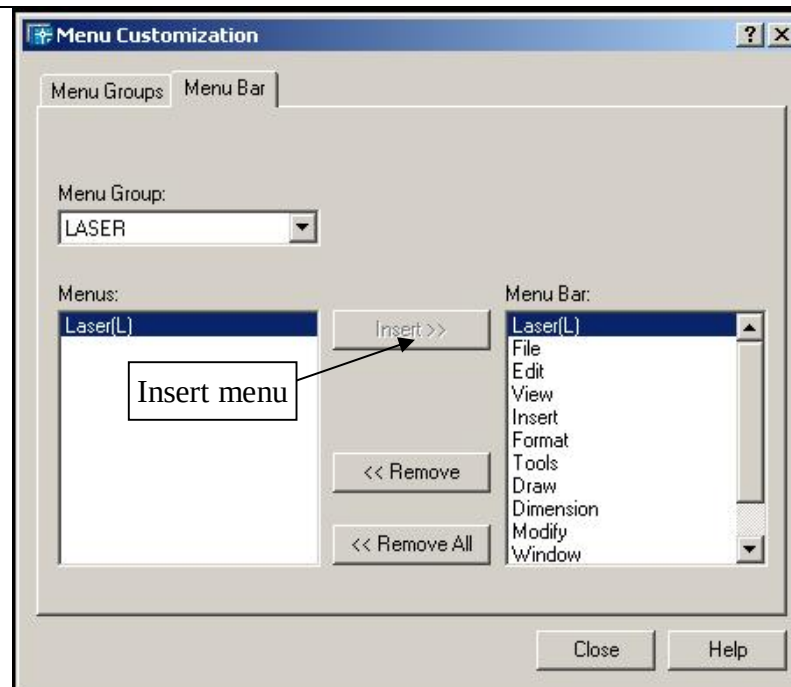
F8-12

Click “Load” in the window of Diagram F8-12 to start the window as shown in Diagram F8-13. Note: Please delete the menu group if there is already the existence of it, otherwise it is impossible to load on new menu groups. Meanwhile do not choose full replacement or all menu of the system will be deleted.



F8-13

Click the menu “Laser” that has been loaded in the menu group of the window of the Diagram F8-13 and then click **Menu Bar** to conduct the next operation;

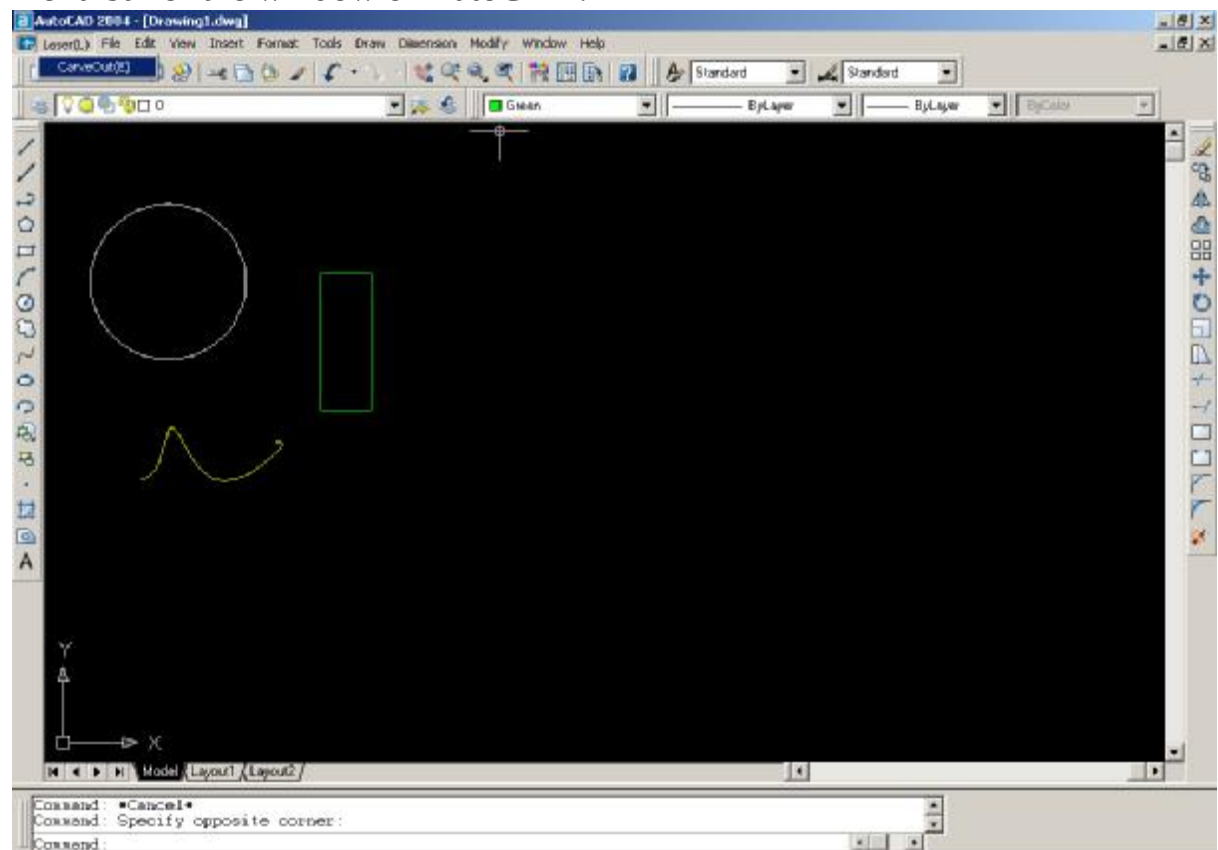


F8-14

Choose “Laser(L)” on the window of Diagram F8-14 and click “Insert”.

3. Setting window for the operation of the software

As you can see in Diagram F8-16, the **Laser(L)** can be found in the menu bar of the window of AutoCAD:



F8-15

check box is not chosen.

Statement for the parameters:

Output: when it is selected, the diagram with the existing color will be carved and output.

Light power: the minimum light power: refers to the light power used in curving during the outlining or at the top depth during cleaning.

Maximum light power: refers to the light power used in straight line during the outlining or at the extremity of the depth. If the turn-over is too deep, it indicates a stronger minimum light power or a lower speed.

Puncturing function: (See Section One of Chapter Five)

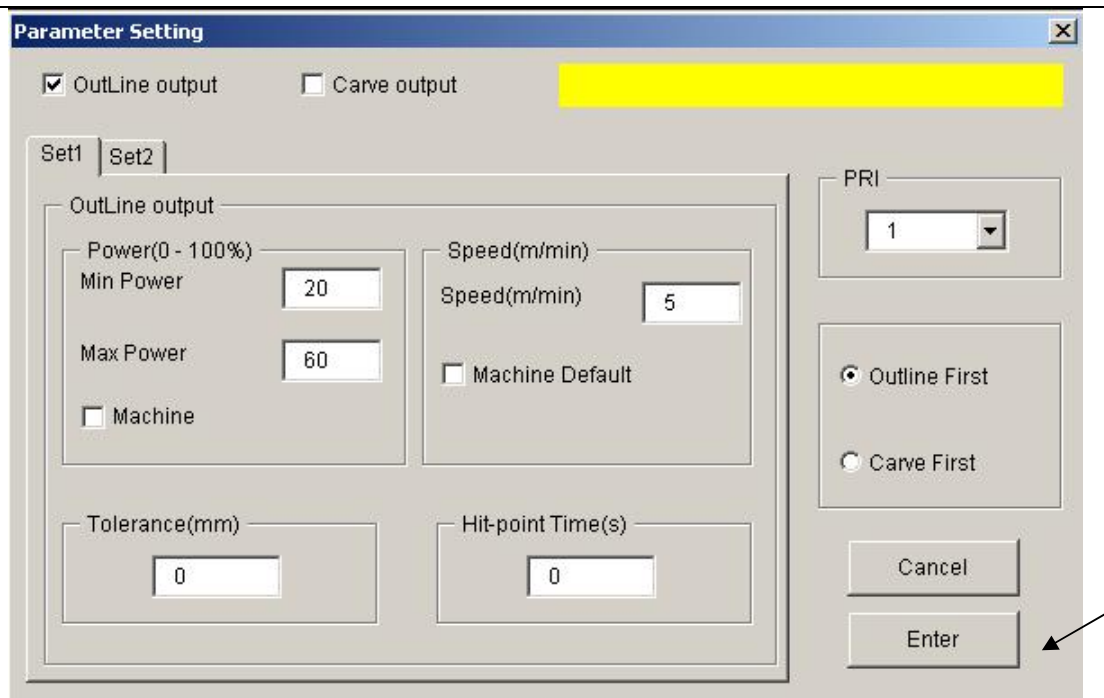
Predetermined by the machine: if predetermined value is selected, then the parameter for light power and speed are based on what shows on the machine.

Speed: the unit for the moving speed of the laser head is mm/s.

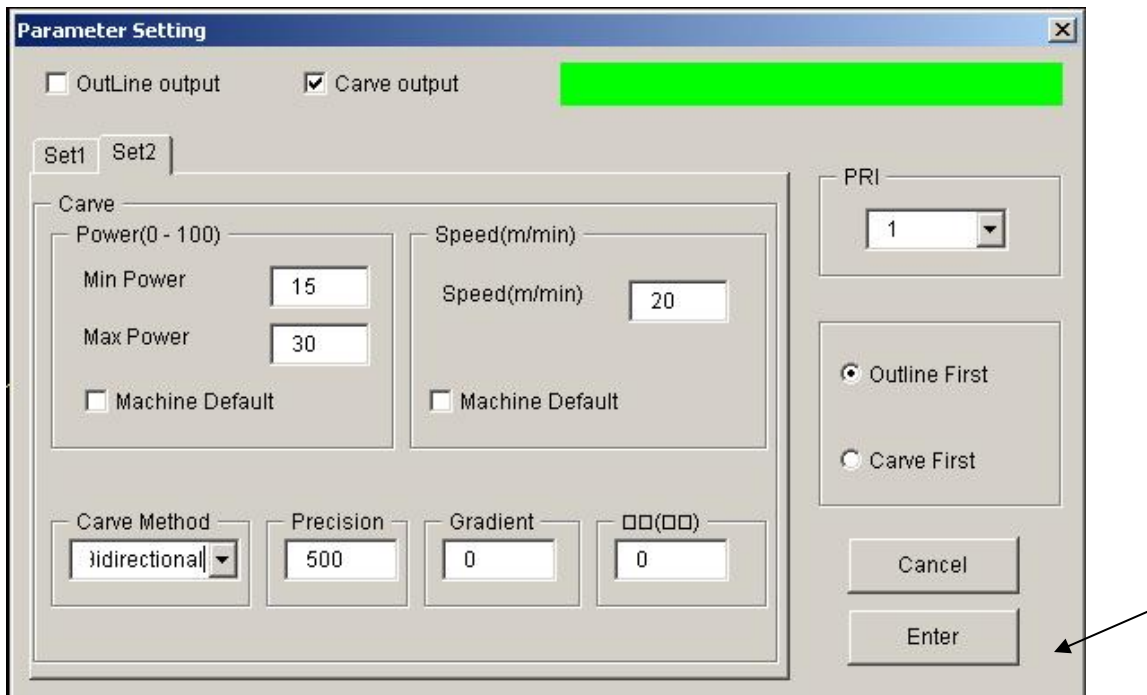
Difference making-up: Error made in carving (-0.5mm---0.5m) caused by the size of the diameter of the laser facula on the operation of a closed diagram can be adjusted by difference difference-making-up. For instance, in carving a circle with 5mm as diameter, the actual circle output is 4.99mm in diameter if you don't make up the difference. So you can input 0.01 to correct the error caused by the diameter of the laser facula.

Priority grade: it is used for setting the order of carving for different colors. The smaller the priority grade is, the earlier the output is, and vice versa.

Carving output can be conducted after setting up the parameter. The system will remember the parameter set in the last collocation. In your daily plotting a habitual setting style can be adopted to avoid repeated parameter setting. For example, if you set the output light power for red light as (50%, speed 20%, no difference making-up, priority grade of carving 1), the same effect would be adopted for all red light in your following plotting.



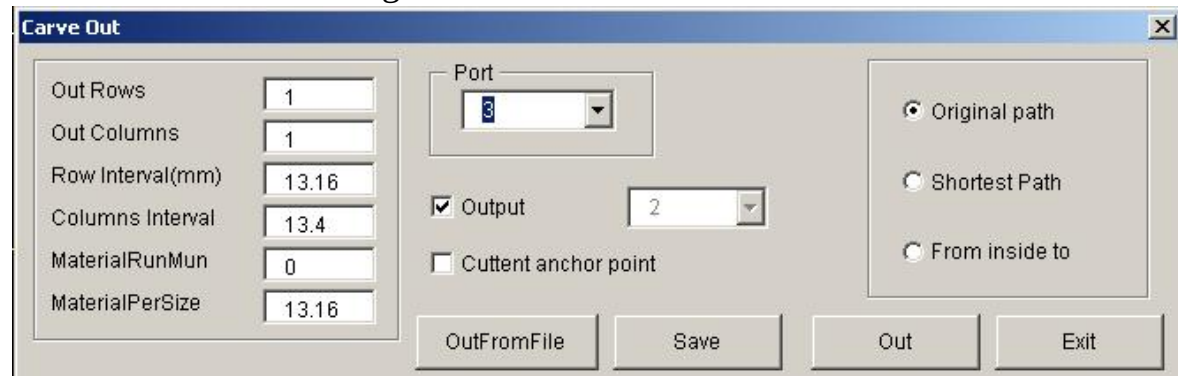
F8-18



F8-19

Click “confirmation” upon completion of setting up all parameters for diagrams with different colors and a window as shown in Diagram F8-20 will occur:

Upon completion of the setting, choose “Out” on the window of the Diagram F8-22 to conduct the output of carving, meanwhile there will be a window as shown in Diagram F8-23:



F8-23

Statement for the parameters

Current anchor point: This decides the output position of the current diagram on the carving machine. There are two kinds of ways: to be output from the current position and to be output from the original position. Current position refers to the position where the laser head is, while original point corresponds with the positioning point set on the controlling board of the carving machine.

Port: When the data is sent from the computer to the carving machine, the communication port adopted can be chosen from the pop-up menu of the port(shall be corresponded with the virtual port series created in the controller of the computer equipment)

Save: this refers to output a carving data to a certain file. It corresponds to “output from the file”. This operation mode can be adopted if it is not the current diagram but a file containing a certain carving data that is to be output.

Out: this is to directly output the carving of the diagram file opened in the current CAD.

Statement: The diagram output by the carving machine is only related with the size of the diagrams in CAD and has no relationship with where it is placed in the plotting area of CAD.

For detailed statement of the carving output, you can refer to the previous content of this manual

Chapter 9 Daily Maintenance and Basic Fault Analysis

Correct operation and daily maintenance play a significant role in machine's long term performance. The following is a listing of items requiring periodic maintenance and a table for fault analysis.

1. Daily Maintenance:

A. Water changing and water tank cleaning (we advise you change the water and clean water tank every week).

Caution: make sure that laser tube is filled with water before restarting the machine.

Water quality and the temperature of the cooling water affect the life of the laser tube. You need to use pure (distilled) water and control the temperature below 35 centigrade (95 degree F). All machines sold in the US and Canada are equipped with a refrigerated water chiller, which will automatically maintain the proper temperature. On machines with a coolant tank, you may need to change the water or add some ice into the water when temperature rises above 35 centigrade. (We advise the user to use the water chiller or double water tanks)

Water tank cleaning: turn off the power and pull out the water inlet pipe to let the water drain from the laser tube by gravity, then open the water tank and remove the water pump, cleaning the dirt on the pump. Clean the water tank and change cooling water, reinstall the pump and reconnect the water supply pipe, turn on the pump for 2-3 minutes in order to fill the laser tube with water.

B. Blower cleaning

A blower, used for a long time, will accumulate solid dust, causing it to run noisily and at reduced efficiency. When this happens, disconnect the power to the blower and then the hoses. Clean the blower (and all the vanes) and reconnect.

C. Cleaning of Mirrors. For the machine to run at maximum capacity, we advise to clean the mirrors before work everyday. Caution: make sure the power is off.

The diagrams in chapter 8 show that the machine has 3 mirrors and a focusing lens. The #1 mirror is the first one from the laser, or in the rear left corner of the machine. #2 mirror is mounted to the left end of the gantry and the #3 mirror is at the top of the focusing head. The focusing lens is mounted to the bottom of the adjustment tube below the focusing head.

The mirrors will easily get dirty, which will cause the laser power to diminish. Laser energy absorbed into a dirty mirror will also heat and destroy the mirror. The cleaning of the first two mirrors is easy as they do not have to be removed from the machine. Just wipe them carefully with lens cleaning paper, dipped in cleaning solution. The mirror in the focusing head and the lens need to be removed, carefully cleaned and reinstalled.

Caution:

A, Mirrors must be wiped carefully in order to avoid destroying their surface plating.

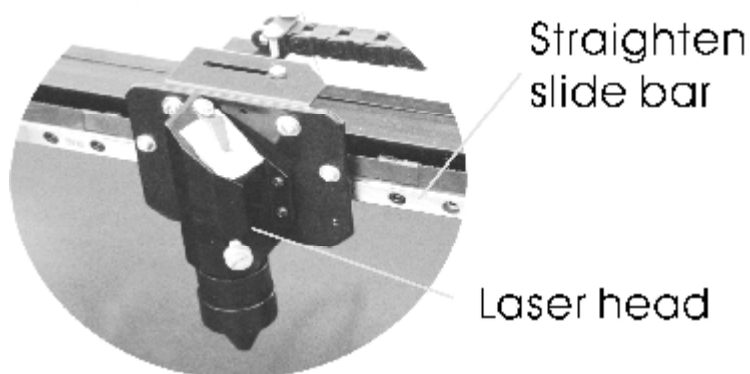
B, Do not touch cleaned mirror and lens surfaces as this will deposit a new layer of oil on them.

C, The concave side of the lens must be on the bottom when installed.

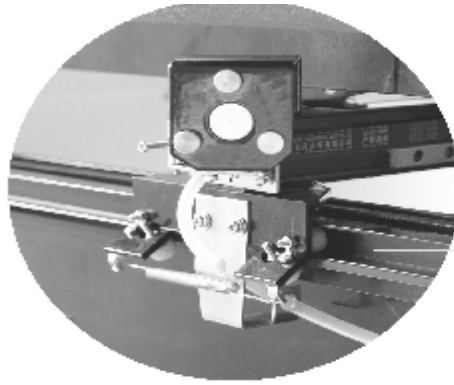
D. Cleaning of the rail (we advise you to clean the rail twice a month, when machine is power off)

Caution: cleaning preparation –dry cotton, lubrication.

The slides of the engraving machine consist of linear rails and rail trolleys. In the YM machine series, we are using linear bearings in the X direction and trolley rails in the Y direction.



Cleaning of the linear rail: first move the laser head to the right (or left) side, find the linear rail as shown in above figure, use dry cotton to wipe it clean and add some lubrication on it, move the laser head from right to left slowly several times to allow the lubrication to distribute equally.



Trolley
slide bar

To clean the trolley rail, move the gantry to the rear and open the covers on both sides of the machine. Find the rails as shown in the above picture and clean using a clean cotton rag. Move the gantry forward and clean the rear area.

E. Checking the Beam Path

The beam path includes 3 mirrors and a focusing lens. To avoid the possibility of stray beam reflections, the beam path should be checked for obstructions before starting the machine.

Basic Fault Analysis

Num ber	Problem		Solutions
1	Machine doesn't engrave	1.check whether the power is on.	Connect all lines firmly.
		2.check the parameters of main board.	Correct the parameters according to manual.
2	Continuous laser power	1.check the parameters of mainboard.	Refer to the software instruction and correct the parameter of laser.
3	Abnormal reset	1.check the parameter of mainboard.	Correct the parameters for the gantry according to the manual

4	Engraving depth varies	1.check whether water flows smoothly.	Clean the water tank and pump, drain the water pipe
		2.Check whether power supply is steady	Use manostat to input power supply
5	Dimension does not fit	1.Whether the proportion is 1 to 1 when you output with BMP format in Coreldraw9.	Change it into 1 to 1.,
		2.whether the total figure points has accessed 10000.	Reduce the figure points of the figure.。
		3 、 when customer uses Coreldraw9 to output with PLT format, check whether the zoom in the HGPL dialogue box is 100% or not.	Change it to 100%
		4.check the parameters in mainboard	Referring to using explanation, and change parameter.
6	Cannot download from the Computer to the machine	1.USB driver is installed?	Select correct port.。
		2.whether the power is on.。	Turn on the power.。
		3.Any problem with the USB.。	Reinstall the drive.。
		4.check whether grounded correctly.。	Install ground.。
7	Engrave without imprint	1.Beam path strays?	Adjust the beam path according to chapter 8.
		2.Damages to the water system?	Make water flow freely.
8	Can't find laser device	1.trouble with computer or USB.	1. Change computer or change USB cable

Chapter10 Warranty

1. Warranty Time

The machine has a warranty for parts of 1 year from the date you bought our machine except following consumable material:

- a. The laser tube has a guarantee time of 3 months.
- b. Optical mirrors, the lens and other consumable material is not included in our warranty.

2. Items for warranty:

a. Repairable objects include products sold by Laser Tech. Co. Ltd of Dongguan City.

b. You will enjoy free repair service within the warranty period if your machine encounters problems not due to abnormal usage. You will need to show us the guarantee card or invoice when our technician comes to repair your machine.

3. The following conditions do not enjoy free service, and you should pay some money for different condition.

- a. Repair service caused by non-quality reasons of device.
- b. Warranty time has finished.
- c. Can't show guarantee card or alter guarantee card.
- d. Do not carry out promised responsibility.
- e. Reinstall, rebuild, repair the machine without our company's permit.
- f. Problems caused by man-made or force majeure reasons.

4. Our company only bears the legal obligations for the machine and will not be responsible for any consequential damages.

5. We only bear the law responsibility of selling our products, we are free of other responsibility caused by using our company products