

HENGXING-4060SE/6090SE/1290SE

Laser Engraving Machine

Users Operating Manual

Chapter One Performance and special feature

HX-series laser engraving machines are high technology products from HENGXING Company, which integrate computer, laser technology, automatic control and precise optical machinery. These machines are widely used on nonmetal processing fields such as printing plate making, advertising, tailoring, leather, electronics, arts and crafts.

一、 Main special features:

1. Advanced laser which is used to replace traditional mechanical gravers
Comparing with artificial or mechanical engraving machines, laser engraving machines have quite many advantages. It can be summarized as follows mainly:

- (1) No need to any gripping devices, work pieces may be placed on the table surface before working, which is convenient and swift.
- (2) There is no special demand on the hardness of material, so their application range is quite wide.
- (3) The quality of engraving is superior and the plastic effect is very good.
- (4) Working efficiency can be raised at double.
- (5) Scanning effect of net-points can be stressed.

2. Control panel with modern technology and steady performance

HengXing laser engraving machines utilize advance mainboards with more steady performance developed via professional digital control technology which is the most advanced in China. They also use stepping motors controlled by driver circuit, which run faster and more stable with higher precision.

3. Friendly machine operation interface with easy operation.

4. Wholly closed modeling, which makes the machine to be elegant in appearance and keeps working conditions safe and comfortable.

二、 Application fields

The application fields of HengXing laser engraving machines, mainly including:

1 Printing plate making

HengXing laser engraving machines are quite suitable for rubber plate making in the trade of carter printing. Traditional manual plate making has impeded the further development of printing seriously. If people want to dominate the first opportunity in keen market competition, they should employ advanced plate-making technology and printing devices.

The presentation of HengXing laser engraving machines can exactly satisfy this wish of people. They employs wholly computer control and advanced laser technology and digital control technology, which can settle down the problems of poor quality and low efficiency in printing plate-making well. Laser engraving technology is sure to bring new miniature machine and vigor into traditional backward printing trade.

2 Industrial art decoration and advertising trade

This machine can engrave all kinds of nonmetal material (density board, bamboo and wood articles; double-colored board, cloth, Acrylic, leather, glass, malachite, organic glass, crystal, marble and so on).

Chapter Two System Configuration

1. One computer (P II or above, RAM larger than 128M, 20G hard disk)
2. One set of HengXing laser engraving software
3. One HX series laser engraving machine

Chapter Three Installation

After receiving the machine, take it out of packaging box, check whether related configurations accord with packing list completely. Then you should install according to following procedures strictly.

Paragraph One Total Installation

1. Check whether laser tube is broken and every component becomes loose at first.
2. Install exhaust device. Exhaust pipe is connected on exhaust fan on one end, while the other end is placed outdoor. The maximum distance between exhaust fan and outdoors air outlet is 2 meters. If exhaust pipe extends too long because of local environment, extraction device should be equipped in addition.
3. Fix ground line firmly (See grounding position behind machine. Grounding resistance should be no larger than 4 ohm).
4. Check whether 220V power line happens to be aging, plug loose, contact loose, and whether 220V AC voltage is normal. If necessary, special-propose power line and steady voltage plug (power $\geq 3000W$).

Note: Zero line should not be connected with ground line.

5. This machine employs external submersible pump circulating water supply cooling device. User should prepare a capped cask. The height difference between engraving machine and submersible pump should be no larger than 0.5 meter. Cooling circulating water should be clean, no dust and dirt.
6. Temperature of circulating cooling water should be within 5-25°C, otherwise it will affect engraving depth. In plateau and cold region, it should be assured there is no ice blocking, otherwise laser tube will fracture. It is the best to stop working at night, discharge remnant water in circulation line and laser tube to prevent frost crack.
7. If it is found there isn't enough water in laser tube, shut down machine at once, cut the power of water pump. It must not supply water and begin to work until shutting down for at least half an hour, and laser tube has become cool naturally. If water is supplied at one, laser tube will fracture.
8. Put through submersible pump, cooling water should be circulated normally. There should be no blocking and dropping in cooling line.

Paragraph Two Connecting Method of Interface

Power cable: connect with 220 V power phase

Communication cable: connect USB cable with USB connection, and insert the dongle into printer connection.

Paragraph Three Machine Debugging

一、 Install laser tube

- (1) Take out laser tube shield at the back of the machine, open the door of the left shield.
- (2) Take out cooling water machine(or water pump) and air pump, then take out the spare parts as electrowelding wire and high-voltage adhesive tap.
- (3) Take out tube lightly from packing box(special care should be taken for it is a kind of glasswork), it has two ends: the front end(with a light hole) and the tail end(without light hole but with spire glass). Put the tube on two semicircle rings. The distance between the front end of the tube and the first reflector should be within 5-20cm, and the tail end should not go beyond the laser machine. Now attention that the water outlet at the front of the tube should be adjusted upwards(be sure the tube is full of water without any bubbles). Put the four arc cushions on the back of the two semicircle rings and screw studs below separately, hang the elastic belt used to fix the tube, so through adjusting the four screw studs of the semicircle rings, you can adjust the light way with the up and down, front and back motion of the tube. Then connect the inlet pipe of the tail end of the tube with the outlet pipe of the front end of the tube.
- (4) Weld firmly the high tension line by the tail end and the grounding wire by the front end to the laser tube separately with electric iron(the welding time should not last too long). Then twine with high voltage adhesive tap to avoid damage from striking fire.
- (5) Fill the cooling water machine (or water pump) full of water, the outlet pipe of cooling water machine is connected to the inlet pipe of laser machine, while the inlet pipe of cooling water machine to the outlet pipe of laser machine (or the outlet pipe of water pump is connected to the inlet pipe of laser machine, then put the water pump in the bucket with water, the water in the bucket must above the pump for 10CM, about 20KG, the outlet pipe of laser machine is put in the bucket directly), connect the air pump. Electrify cooling water machine (or water pump), then check whether the circulation water in the laser tube flows normally (the water flows in from the back of tube and out to the front), whether there is bubble in the tube, if with, please rotate the tube.

二、 Adjust light way

- (1) Turn on the air pump, there is air out under the dolly, then pull off wires of the driver on X,Y axis by the right side of controlling box.

(2) Turn on the switch of laser machine, LCD displays “system waiting.....”, now the machine is resetting, after about half a minute, LCD displays: File AAA; Speed 100%; Power 100/100%; Pieces 1; Delete. Now the machine is online.

(3) Stick chipboards a little larger than the reflector to the first and second reflectors.

(4) Put a hardboard before the light hole of the tube, press pulse key, there is light out from the tube, through adjusting the laser tube up and down, left and right, make laser hit the centre of the first reflector.

(5) By adjusting the three screw axis at the back of first reflector, make laser hit the center of second reflector, when adjusting the second reflector, move the crossbeam of X-axis to the front and the back, then hit light separately, the two spots should coincide completely.

(6) By adjusting the three screw axis at the back of second reflector, make laser hit the hole by the left side of laser head, when laser head moves to the four corners of worktable, hit light separately, and the four spots should coincide and all into the hole.

(7) Focus adjustment. Focus is the distance between the conule under laser head and the surface of processed material (4-4.2 mm).

(8) By adjusting the elasticity of three screws of reflectors above laser head, make laser in upright angle, and make sure the cutting surface is upright while cutting.

三、 Connect USB line (forbid to insert or pull off wires when the machine is with electricity), fix the door of tube shield, right shield and left shield at the back of machine separately, then insert wires of the driver on X,Y axis by the right side of controlling box.

四、 Insert dongle to the parallel port of the computer, set engraving software and dongle driver (refer to manual for software setting), then turn on the machine to start work.

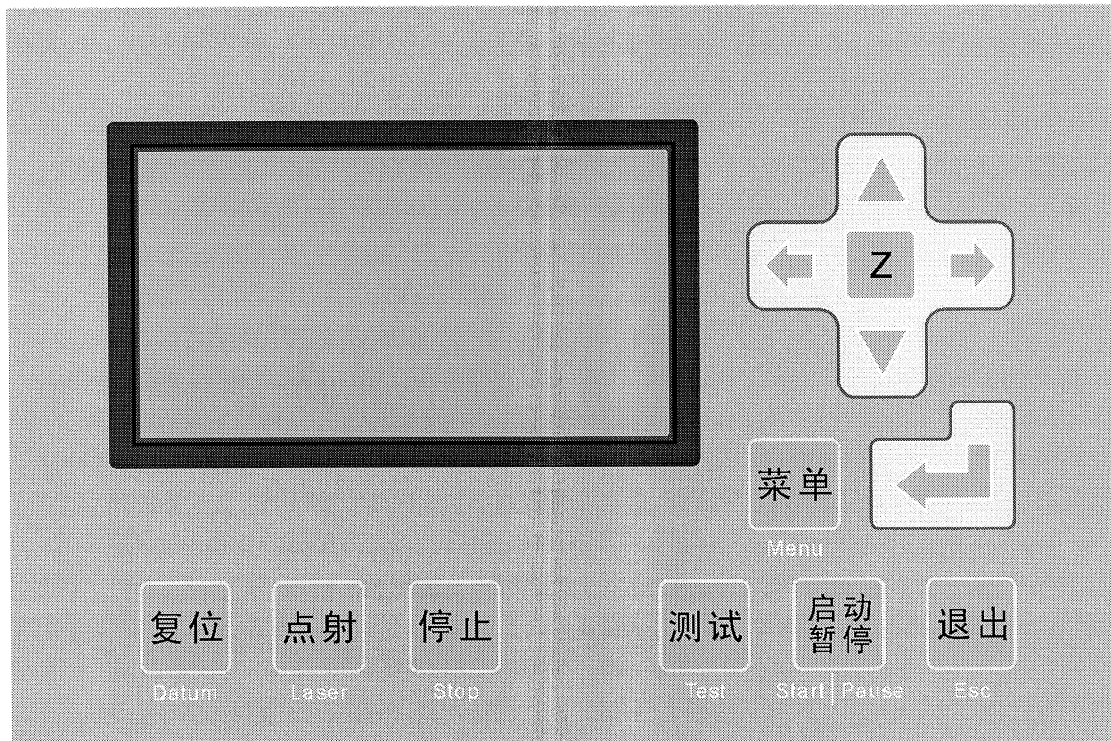
Please note:

- (1) Laser used in this laser engraving machine is invisible infrared light. When adjusting light way, please be sure that person body do not enter light way so as not to burn you.
- (2) When the machine is working, it is prohibited to touch the high-tension power part to avoid danger.
- (3) Be sure to wear protective spectacles during light adjustment, and the eyes are not allowed to enter reflecting light way.
- (4) Choose suitable laser strength to avoid burning during processing.
- (5) Adjusting light way requires to be careful, and has some technical difficulty. If user isn't familiar with optic knowledge, please not operate blindly, and be sure to keep it in mind that light way should end in the machine case and mustn't be adjusted outside the machine case!
- (6) Chassis cover should be put on the position when engraving, otherwise the extraction effect will be poor. When unused, chassis cover should also be put on to avoid dust entering so as to affect the working effect and shorten normal

service life of machine.

Chapter Four Elementary Operation

- 一、 Open air blower, water cooling machine or water pump. After water flows from outlet, open power switch, then X,Y axis will reset to the upper-right corner of worktable, now the engraving machine is online.
- 二、 Turn on the computer, run laser engraving system software.
- 三、 Choose suitable engraving speed, engraving form, laser power with laser engraving software.
- 四、 Try engraving on different materials and observe whether it can satisfy requirements.
- 五、 Explanation on control panel operation



Datum: Laser head will move to the original point of the machine slowly.

Laser: Laser on/off.




Stop: Cease the processing operation.

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

Start/Pause: Start/pause the processing operation.

Esc: Escape the current status window.

Menu: Enter accessory interface.

: Click this button, then  and  can move the Z axis. This function needs hardware (machine) support.

: Enter.

5.1.1 Startup interface

When power on, PAD will show" System starting, please wait".

5.1.2 Main interface

The main interface shows as following.

FILE	AAA
SPEED	100%
POWER	100 / 100%
PIECES	1 DEL

File: File names which are saved in MPC6515 controller.

Speed: Percentage of speed. When it is 100, the actual speed is the number which is set in processing data.



Power: Percentage of power. When it is 100, the actual power is the number which is set in processing data. There are two options: the former is for "Corner -Power" and the latter for "Power".



Pieces: Repeat times of a file.


Del: Delete the current file.

At first, file name is brightened (word is white and background is black).





Now,

Press  and , and you can select the option you want to modify.

Press  and , and you can change the number in the selected option.

Press  and all the number will be saved.

Press "Esc" and all the options will not be modified (none of the options is brightened).

Now, press     and you can move the laser head.

Press  again and you can modify the options (file name is brightened).

5.2 Processing interface of PAD03

Press "Start" and the interface will show as following.

FILE	AAA
SPEED	100%
POWER	100 / 100%
TIME	0 : 0 : 15



File: File name which is being processed.



Speed: Percentage of speed.

Power: Percentage of power.

Time: Time for processing this file.

When processing,

Press  and , and you can change the percentage of power (only for Power, not for Corner -Power).

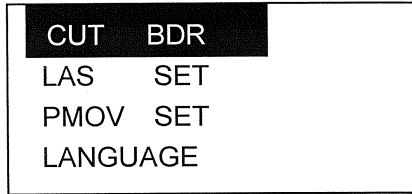
Press  and , and you can change the percentage of speed.

Press "Start/Pause" and you can control the processing procedure.


Press "Stop" and you can cancel the processing procedure. The interface shows "Stopped". Press "Esc" and you can see the main interface.

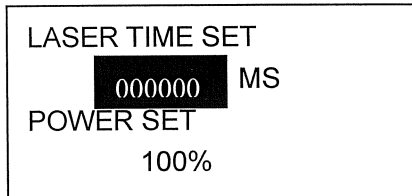
5.3 Accessory interface of PAD03



Press "Menu" and you can see the accessory interface.






CUT BDR: Laser head will move a rectangle with laser on according to the size of the graphics.

LAS SET: Select this option and press . The LAS SET interface is as following.




Press  or  can move the cursor.

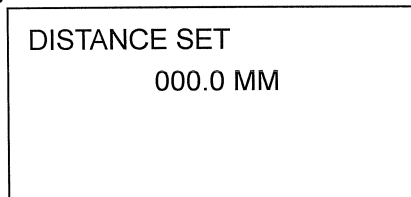
Press  or  can change the number.



Press  and all the number will be saved.


If this number is 0, press "Laser" key and laser on; release "Laser" key and laser off.

If this number is not 0, press "Laser" key, and laser will shoot a certain time as you set.

PMOV SET: Select this option and press . The PMOV SET interface is as following.



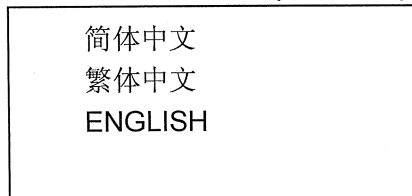
Press  or  can change the number.

Press  and all the number will be saved.

If this number is 0, press the direction keys, and the laser head will move; release the direction keys, and the laser head will stop.

If this number is not 0, press the direction keys, and the laser head will move a distance as you set.

LANGUAGE: Select this option and press . The language interface is as following.



Select the language as you prefer.

Chapter Five Maintenance and Repair

Paragraph One Maintenance

- 一、 Laser engraving mechanism and workbench should be clean, no dust. Clean every time when opening and closing.
- 二、 X, Y axis guide rail should be cleaned gently with long fiber cotton ball dipping a little lubricating oil regularly. (Be careful not to leave cotton ball inside the machine and on belt when adding oil regularly.)
- 三、 Clean focusing lens with cotton ball dipping absolute ethyl alcohol (chemically pure) once a day. Floating dust on reflector lens can be blown down with scavenger, or be wiped gently off with lens paper. If it is found plating film is damaged, which will affect the depth of engraving and cutting, it should be replaced in time.
- 四、 It should be kept dry inside the machine, especially reflector lens, laser power and switch power. If it is found there is dewdrop, user should cut off power supply, then make it dry with hairdryer.
- 五、 If it is found the light way shifts when engraving, it should be adjusted as soon as possible.
- 六、 When eliminating troubles, 220V power supply should be cut off at first. It is inhibited to plug and pull all kinds of cable and connecting wire inside machine with electricity.
- 七、 Before use, it should be checked whether cooling water and all kinds external connecting wire are normal. It is inhibited to operate without cooling water circulation, which can prevent laser tube from overheat crack.

Paragraph two Remove trouble

1. Laser tube doesn't give out light during testing.
Inspection position: Has water pump been opened? There shall be water flowing out of outlet. Whether laser power supply and laser tube are damaged?
2. Laser scanning mechanism doesn't act when power switch has been opened.
Inspection position: Whether the control panel supply power? Whether the USB connection of laser machine and computer has trouble, or whether the composition of laser engraving software has faults.
3. There is misplacing and scratching during working.
Trouble reasons: there is external interference. If grounding isn't firm, the static electricity of computer is too intense, or computer has trouble by itself, USB cable has trouble; engraving path has faults. Please redesign or contact with our technology department.
4. The depth of engraving on any material is too shallow.
Trouble reasons: light way deviates (details are offered in Chapter Three Paragraph Three Machine Debugging).
Light way components are polluted or damaged, for example, the plating film of

reflector lens falls off, focusing lens is polluted, the power of laser tube decreases.

Paragraph Three Introduction of main vulnerable parts

一、 Laser tube

This machine uses home-made sealed off type carbon dioxide laser tube. Air volume in pipe is fixed, whose service life is about 1000h. Its service can be roughly divided into four phases (average 8 hours every day):

Phase one: excellent phase, when laser tube is in steady status. All performances are in the best status. This phase can last about 2~3 weeks.

Phase two: steady phase, when laser tube is in steady status. Under the same current, light intensity is a little weaker than that in phase one, but is enough to satisfy working demand. This phase can last about 1~2 months.

Phase threes: decline phase. After being used for a quite long time, every index of laser tube begins to decrease. The light intensity becomes weaker. Now, you can increase current and slow down speed to satisfy your requirement for engraving depth. This phase can last about half to one month.

Phase four: depletion phase. The service time of laser tube ends.

It can be found from the process of laser service life. The length of steady phase is the key of laser tube usage. The quality of maintenance affects directly the length of steady phase. The essentials for maintenance are as follows:

- (1) Machine working environment must be fine. Power voltage must be steady. If voltage fluctuates too great, steady power supply should be equipped. The machine must be placed steadily without great vibration, and can't work in damp environment.
- (2) Laser current can't be too great and must be lower than 20mA. In addition, light intensity should be adjusted to be small as far as possible under the condition of satisfying engraving depth and speed. 13~17mA is relatively suitable current range.
- (3) Laser tube is heating element, so the quality and quantity of circulating water should be assured. Quality—be sure there is no dirt. Replace circulating water regularly (every two days). Replacing water is carried out when machine shuts down. Quantity—be sure there is enough circulating water (more than 20kg). Be sure the temperature of circulating water is between 5~25°C.
- (4) Under the condition of satisfying working requirement, optimum working method should be used to extend service life of laser tube as far as possible. For example, cutting form can be used as far as possible.

二、 reflector lens and focusing lens

The surfaces of reflector lens and focusing lens has been polished precisely and plated a layer of thin film. Their surface cleanliness affects directly the reflector rate and focusing effect of laser, so they should be cleaned and maintained regularly. Clean should be followed strictly maintenance procedures, which can extend their service life.

三、 water pump and air blower

Their maintenance is relatively simple. When machine stops working, they should

be turned off in time. They must be removed dust and cleaned regularly so as not to affect the working effect and service life. Air blower has special protect measures. It can't work in the rain and in intense sunshine.

Chapter Six Quality Assurance Regulation

一、 Quality assurance period

The assurance period of HengXing HX laser engraving machine is 12 months, from the date when user fills warranty card. This date should be indicated on the warranty card, and be handed to user with the machine.

二、 Quality assurance conditions

1. For any assurance during quality assurance period, user is required to show warranty card stamped our company's official seal.
2. Before user proposes quality assurance, he should keep initial status of damage.
3. During quality assurance period, the assurance period of whole machine quality or component replaced can't be extended by the replacement and repair of components.

三、 Belong to quality assurance range

1. Features caused by faults of product manufacture, assembly and raw material, which cause machine unable to work.
2. Machine damage caused by quality faults.

四、 Not belong to quality assurance range (paid by user)

1. User can't show warranty card, which is considered user automatically given up right to claim quality trouble.
2. Any problems happen after user repairs by himself or send to other factory, not our company, to repair.
3. Quality problem caused by user's improper use or maintenance.
4. Machine damage caused by external reasons, especially the collision during delivery and transport, as well as spoiled by chemical gas and chemicals.
5. Problem caused by natural disaster, being stole and people's intentional destroy.
6. Cost not especially stipulated in quality assurance, for example, user's transportation and hotel expenses for quality assurance.
7. Economy loss or additional expenses happening during quality assurance.
8. Damage caused for not operating according to fixed method in manual.
9. Normal loss of vulnerable parts (including laser tube, reflector lens, focusing lens and consumable parts named in manual) and repair expenses for loss.

Chapter Seven Technical parameter

Model	4060SE	6090SE	1290SE
General size	1130*930*1360mm	1405*1015*1090mm	1705*1365*1090mm
Laser power	40W	60W	80W/100W/120W
Process breadth	400*600mm	600*900 mm	900*1200 mm
Engraving depth	Acrylic 8mm	Acrylic 15mm	Acrylic 20mm/25mm
Engraving speed	0-1000mm/s		
Cutting speed	0-200mm/s		
Minimum shaped word	Chinese word 2.5*2.5mm, English word 1.5*1.5mm		
Orientation precise	<0.01mm		
Power	AC220V ± 10%		
Working temperature	0-45°C		
Circulating water temperature	5-25°C		
Data form	CDR、AI、BMP、PLT、DXF、DST、DWG、DSB		

Chapter Eight Declaration

- 一、 Manufacturer keeps the right to modify manual content and product without notice beforehand.
- 二、 Laser engraving machine is a kind of precise digital control device. The voltage inside machine is greater than ten thousand volts, and laser tube shoots invisible ultra red laser, so that it must be operated by professional staff. Our company won't burden any responsibilities for body damage caused by improper operation of user.