Dapeng laser cutting machine equipment maintenance guide

Laser cutting machine daily maintenance list

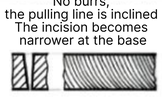
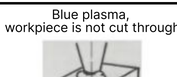
No	Maintenance content and methods (those marked ★ are key maintenance items)	Maintenance cycle	
★ 1	Use compressed air to blow the dust filter on the side of the chiller and the radiator at the top of the chiller to clean the dust and maintain good heat dissipation	daily	Daily maint-enance
2	Please check whether the circulating cooling water level in the chiller is sufficient before use. If it is insufficient, add it in time	daily	
★ 3	Check the upper and lower limit sensor switches on the side of the Z-axis and the workbench sensor switch. They must be clean and dust-free to avoid false alarms due to abnormal sensing	daily	
★ 4	After starting the machine, you should manually start the machine tool in the X and Y directions at low speed, check to confirm that there are no abnormalities, and perform all return-to-origin actions	daily	
★ 5	Check whether there is any burnt dust or oil on the protective lens. Use a dust-free cotton swab and absolute ethanol to wipe it clean according to the actual situation. Continue to use or replace the protective lens	daily	
★ 6	Before cutting, you need to calibrate the capacitance and check whether the laser beam is coaxial in the center	daily	
7	Check whether the cutting nozzle is loose or damaged, and whether the ceramic ring is cracked or damaged. Clean the nozzle every 30 minutes or so and remove the metal slag sprayed on it	daily	
★ 8	Check whether the lubricating oil in the automatic oil tank and manual oil pot is sufficient, and ensure that it is within the specified scale. If it is missing, add it immediately. Add No. 68 rail oil to the automatic oil tank, and add No. 000 butter to the manual oil pot. Shake the manual oil pot at least every day. 2nd lubrication	daily	
9	After the daily work is completed, clean up the cutting waste in time, clean the work site, and keep the work site neat and clean. At the same time, do a good job in cleaning the equipment to ensure that all parts of the equipment are clean and stain-free, and that no debris can be placed in any part of the equipment.	daily	
10	Before leaving get off work, open the drain valve under the air compressor gas tank, drain the water inside the gas tank, and then close it	daily	
11	Clean the air filter element of the air compressor once a week, and add special oil for the air compressor according to the oil meter	weekly	Weekly maint-enance
12	Every other week, you must check the X-axis guide rail and rack, Y-axis guide rail and rack, 2-axis guide rail and screw lubricant filling status, maintain the lubrication of each moving part, and extend the X, Y, and Z-axis guide rails and screw service life	two weeks	
★ 13	Clean the dust on the electrical control cabinet and exhaust fan filter every month to ensure good ventilation to facilitate heat dissipation of internal electrical components	per month	Mo-nthly maint-enance
★ 14	Check the filters in the air and water circuits every month, and remove accumulated water and debris in the filters in a timely manner to avoid clogging of debris and causing water flow alarms	per month	
15	Check the collimating focusing lens every quarter for burn spots. Use photo paper and place it about 100-200 mm directly below the cutting head. Point out the light to see if there are obvious dot-like shadows, or place white paper to observe the red light shadow. If you observe any black spots, please report to after-sales service in time	quarterly	Sea-sonal maint-enance
★ 16	Replace the cooling water inside the chiller every three months. Use pure or distilled water to reduce scale production that may cause clogging of the cutting head and weaken the cooling effect	quarterly	
★ 17	Regularly clean the dust in the guide rails and racks to avoid damage to the guide rails and racks, thereby extending the service life of the guide rails	half a year	Annual maint-enance
18	Check the wear and tear of the machine tool table support bars, and promptly clean or replace them if they are disconnected, severely piled up, or uneven	half a year	
★ 19	When the temperature is below minus degrees Celsius, the cooling water of the chiller freezes, causing damage to the chiller, laser and cutting head. Antifreeze must be added to the cooling water. The amount of antifreeze added depends on the cooling water capacity of the chiller. The amount of antifreeze The brand recommends Dowthem-SR-1 products represented by Kelaisi or Dow Chemical of the United States (for specific anti-freezing measures for lasers, please refer to the laser cutting machine maintenance guide manual provided by our company)	one year	

Precautions

★ 1	Equipment operators must be trained and qualified before they can take up the job
2	When the equipment is started, the operator is not allowed to leave his post without authorization or entrust someone to take care of him. If he really needs to leave, he should stop the machine or cut off the power switch
★ 3	Before entering the equipment for maintenance, the power must be cut off and the power warning sign must be hung up
★ 4	It is forbidden to disassemble and assemble the focusing lens and collimating lens inside the cutting head without permission. When it is necessary to protect the lens of the cutting head, a special dust-free cloth and dust-free cotton swab can be used with high-purity alcohol (99.8%) to clean or directly replace it. ① Before replacing the protective lens, first use a dust-free cloth or a dust-free cotton swab dipped in alcohol to clean the perimeter of the protective lens drawer box to avoid dust when the drawer is removed and inserted. When replacing the lens, the lens must be held by the side and do not touch it with your hands. Mirror surface: ② Check the sealing ring. If the sealing ring is loose or aged, it needs to be replaced in time; ③ Avoid ventilation, turn off the fan and other ventilation equipment in the factory to prevent dust from falling on the lens; ④ When purchasing protective lenses, be sure to choose original lenses! Must Seal the cutting head against dust and use masking paper to seal the gaps to prevent dust from entering during long-term use.
5	The laser beam is harmful to the human body. It is forbidden to touch it with your hands or look directly at the laser beam with your eyes down under the cutting head.
6	Do not process a material before knowing whether it can be irradiated or heated by laser to avoid potential hazards
7	Keep the fire extinguisher within easy reach, turn off the laser or shutter when not processing, and do not place paper, cloth or other flammable materials near the laser beam.

Cutting effect adjustment diagram

Carbon Steel: Cut with Oxygen

defect	possible causes	solution
No burrs, consistent pulling lines 	Suitable power Feed rate is appropriate	/
The traction line at the bottom is significantly offset and the cutout at the bottom is wider 	Feed rate too high Laser power is too low Air pressure is too low focus too high	Reduce feed rate Increase laser power Increase atmospheric pressure lower focus
The burrs on the bottom surface resemble molten slag, Forms into drops and is easy to remove 	Feed rate too high Air pressure is too low focus too high	Reduce feed rate Increase atmospheric pressure lower focus
Connected metal burrs can be removed as a single piece 	focus too high	lower focus
Metal burrs on the bottom are difficult to remove	Feed rate too high Air pressure is too low Impure gas focus too high	Reduce feed rate Increase atmospheric pressure Use purer gas lower focus
There are burrs only on one side	Incorrect nozzle centering The nozzle mouth is defective	Centering nozzle Change nozzle
No burrs, the pulling line is inclined The incision becomes narrower at the base	Feed rate too high	Reduce feed rate
Create a crater	Air pressure is too high Feed rate too low focus too high There is rust on the surface of the plate The workpiece being processed is overheated Impure material	Reduce air pressure Increase feed rate lower focus Use better quality materials
Very rough cutting surface	focus too high Air pressure is too high Feed rate too low Material too hot	lower focus Reduce air pressure Increase knot rate
Blue plasma, workpiece is not cut through	Processing gas error(N3) Feed rate too high Power too low	If this happens, press the pause button immediately To prevent slag from splashing onto the protective lens Use oxygen as processing gas, reduce feed rate, increase power
Cutting surface is not precise	Air pressure is too high The nozzle is damaged Nozzle diameter is too large Material is not good	Reduce air pressure Replace nozzle Install the appropriate nozzle

Stainless steel: cutting with high-pressure nitrogen

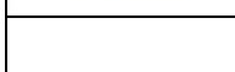
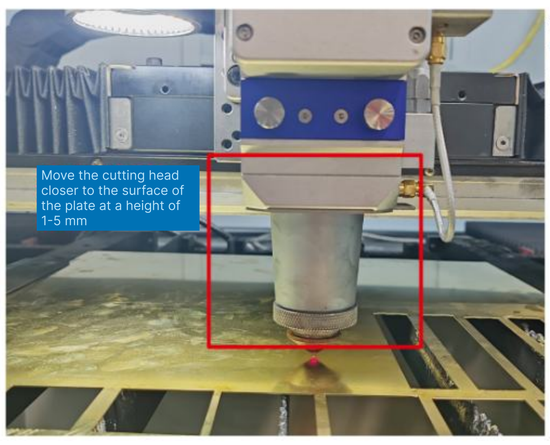
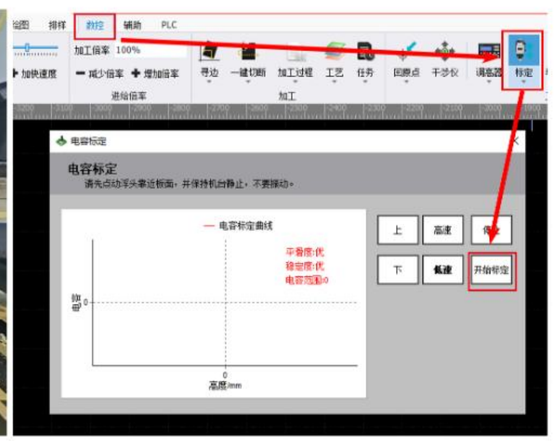
defect	possible causes	solution
produces tiny, regular burrs in the form of droplets 	focus too low feed rate too high	raise focus reduce feed rate
long irregular filamentous burrs are produced on both sides, surface discoloration of large plates	feed rate too low focus too high air pressure is too low material too hot	increase feed rate lower focus increase atmospheric pressure cooling material
long irregular burrs are produced only on one side of the cutting edge	nozzle misaligned focus too high air pressure is too low speed too low	centering nozzle lower focus increase atmospheric pressure accelerate
plasma generation in straight section	feed rate too high power too low focus too low	when this happens, press the pause button immediately to prevent slag from splashing on the focusing lens. decrease feed rate, increase power, raise focus
material is discharged from above	power too low feed rate too high air pressure is too high	when this happens, press the pause button immediately to prevent slag from splashing on the focusing lens. increase the power and reduce the feed rate.
plasma generated around corners	angle tolerance too high modulation too high acceleration too high	reduce angle tolerance reduce modulation or acceleration
the beam diverges at the beginning	acceleration too high focus too low molten material failed to drain	reduce acceleration raise focus
rough cut	the nozzle is damaged the lens is dirty	replace the nozzle cleaning lens, replace if necessary

Illustration of key maintenance items

Capacitance calibration method



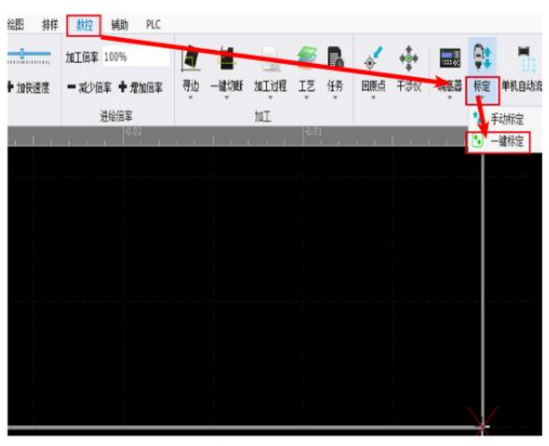


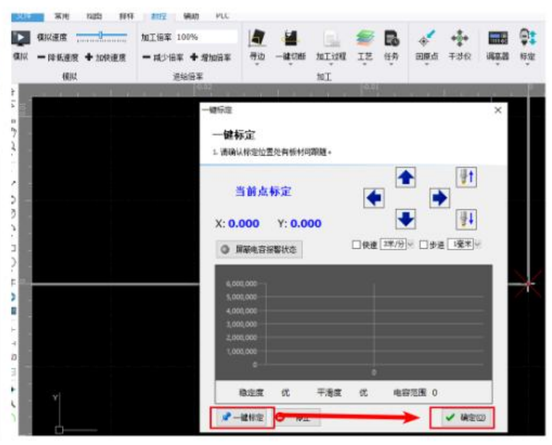
CNC→Calibration→Start calibration

Manual calibration process

Open the cutting software (CypCutE), move the Z-axis downward to bring the cutting head nozzle close to the board (about 1~5mm from the board), keep the board still and do not vibrate, and click CNC at the top of the page. Calibration - manual calibration, enter the calibration interface, press the start calibration button, the calibration process is completed automatically, and it takes about ten seconds. During the calibration pr-ocess, the user can press the "stop" button to force the end of the calibration (the purpose of the calibration is to measure the floating head Corresponding relationship with the capacitance and position between the plates), when the calibration is completed, there will be two indicators of smoothness and stability displayed, each indicator has four levels of "excellent", "good", "medium" and "poor" .

The floating head calibration process is briefly divided into the following steps:
(1). The floating head moves slowly downward to detect the collision plate
(2). After touching the board, move up a certain distance to check the stability of the sensor.
(3). The second slow downward movement of the floating head detects the collision plate
(4). After touching the plate, move upward by the set calibration distance to detect the smoothness and ch-aracteristic curve of the sensor. If the above steps are not completed, or the calibration process terminates abnormally, there may be a problem with the hardware or connection cable. A simple way to check whether the hardware or connection is normal is to slowly approach the nozzle with a metal object to see if the capa-
citance changes. If the capacitance gradually increases until the metal contacts the nozzle and becomes 0, it means that the hardware and connections are normal and can be calibrated. conditions of.





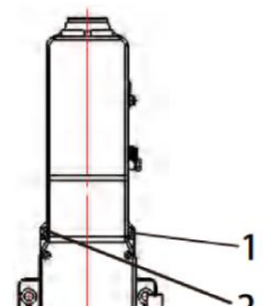
CNC → Calibration → One-click calibration

One-click calibration → OK

Automatic calibration process

Open the cutting software (CypCutE), click on the small triangular arrow below CNC-Calibration at the top of the page, and select one-click calibration (Note: Make sure there is a plate directly under the cutting head to perform the one-click calibration operation). The calibration process is completed automatically. , it takes about ten seconds. During the calibration process, the user can press the "Stop" button to forcefully end the calibration. There will be two indicators of smoothness and stability displayed. Each indicator has four levels: "Excellent", "Good", "Medium" and "Poor". After the calibration is completed, click OK.

Check whether the laser beam coaxiality is in the center

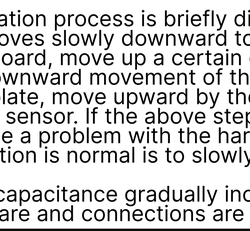


1Y direction horizontal adjustment screw
2.X direction horizontal adjustment screw

1. Use an Allen wrench to adjust the X/level adjustment screws of 1 and 2 so that the beam passes through the center of the nozzle
2. When the beam passes through the center of the nozzle, the cutting effect is the best
3. If the beam does not pass through the center of the nozzle, it may lead to no light output and poor cutting effect.

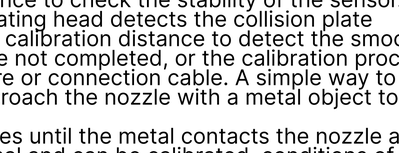
Method to detect whether the beam passes through the center of the nozzle

1. Use transparent tape to stick to the nozzle opening (it is best to use new or non-deformed nozzles)
2. Adjust the laser power to about 50W: (taking 500W as an example, adjust the burst power to 10%)
3. Light up for 1~2 seconds, then remove the transparent tape
4. Face the transparent tape to the lighting source and observe whether the circular mark printed by the nozzle on the tape and the burning point of the laser penetrating the tape are concentric
5. If they are concentric, the debugging result is qualified; if they are not concentric, continue debugging. until qualified



The beam passes through the center of the nozzle (correct)

The beam does not pass through the center of the nozzle (error)



Coaxial dotting renderings

Coaxial adjustment diagram explanation

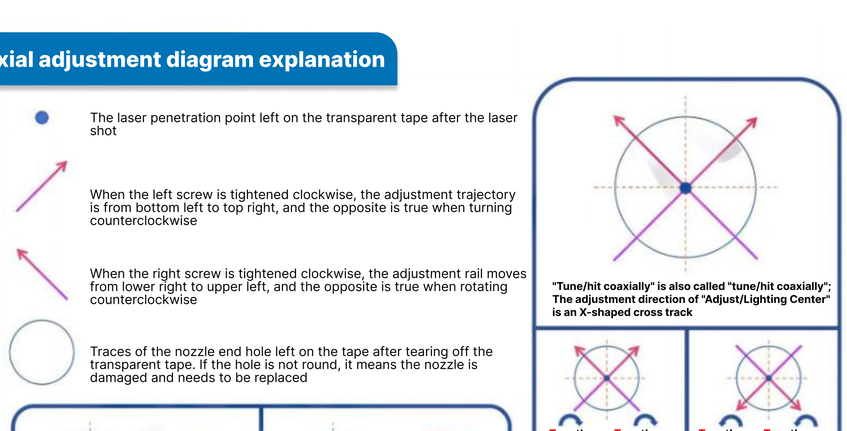
The laser penetration point left on the transparent tape after the laser shot

When the left screw is tightened clockwise, the adjustment trajectory is from bottom left to top right, and the opposite is true when turning counterclockwise

When the right screw is tightened clockwise, the adjustment rail moves from lower right to upper left, and the opposite is true when rotating counterclockwise

Traces of the nozzle end hole left on the tape after tearing off the transparent tape. If the hole is not round, it means the nozzle is damaged and needs to be replaced

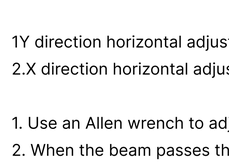
Coaxial adjustment diagram explanation



Chiller dust filter cleaning

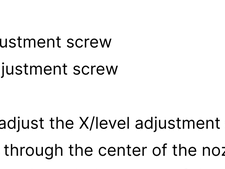
Use compressed air to blow the dust filter on the side of the chiller and the radiator at the top of the chiller to clean the dust and maintain good heat dissipation

Replace chiller cooling water



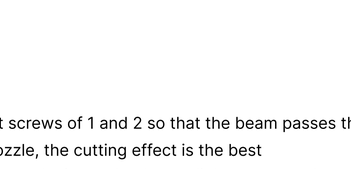
Replace the cooling water inside the chiller every three months. Use pure or distilled water to reduce scale production that may cause clogging of the cutting head and weaken the cooling effect

Chiller filter cleaning



Check the filters in the air and water circuits every month, and remove accumulated water and debris in the filters in a timely manner to avoid clogging of debris and causing water flow alarms

Cleaning of switchboard sensor switch



Check the workbench sensor switch to make sure it is clean and free of dust to avoid sensor failure

Z-axis sensor switch cleaning

Check the upper and lower limit sensor switches on the side of the Z-axis. They must be clean and dust-free to avoid false alarms due to abnormal sensing

Electric cabinet dust cleaning

Clean the dust on the electrical control cabinet and exhaust fan filter every month to ensure good ventilation to facilitate heat dissipation of internal electrical components

Automatic/manual fuel tank

Check the appropriate amount of lubricating oil in the automatic oil tank and manual oil pot every day to ensure that the lubricating oil remains within the specified scale. If it is less, add it immediately. Automatic oil tank No. 68 rail oil, manual oil pot No. 000 butter, manual oil pot Take at least 2 shots a day

Rack guide rail cleaning and lubrication

Every other week, you must check the X-axis guide rail and rack, Y-axis guide rail and rack, Z-axis guide rail and screw lubricant filling status, maintain the lubrication of each moving part, and extend the service life of X, Y, Z-axis guide rails and screw screws. Service life