富润泽激光

FRIENDS★LASER

By Your Side

Preventive maintenance instructions for laser welding equipment

Suzhou Friends Laser Technology Co., Ltd.

Integrity, Innovation, Cooperation, and Sharing

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Revision record

Version	Revision date	Content	Revised by
V1.0	2022/1/19	Initial release	Tian Jingjing
V1.1	2024/1/31	Update the 1.2 Optical system inspection and cleaning; Update 2. preventive maintenance items by interval	Fan Jiaqing

Directory

1 Preventive maintenance

1.1 Daily preventive maintenance

Check whether each button is damaged and whether the indicator lights are normal；

Before processing, check the focusing lens for any dirt or damage；

Check the position of the lifting mechanism for any deviation before processing；

Check if there are any changes in the software parameter settings before processing；

After daily processing, check the focusing lens for any damage；

After completing the work, promptly clean up the processing waste, clean up the work site, and keep the work site neat and clean; At the same time, do a good job of cleaning to ensure that all parts are clean and pollution-free, and no debris can be placed in each part；

After completing daily work, follow the steps to shut down the laser welding machine, then turn off the entire power supply.

1.2 Optical system inspection and cleaning

a) Important Notes

1)The surface of optical lenses (reflectors, focusing lenses, etc.) should not be touched directly by hand, as this can easily cause scratches on the mirror surface. If there are oil stains or dust on the mirror surface, it will seriously affect the use of the lens, and the oil stains or dust should be cleaned in time.

2)It is strictly prohibited to use water, detergent, etc. to clean optical lenses. The surface of the lens is coated with a special film. The surface of the lens can be damage if water and detergent are used to clean it.

3) Do not place the lens in a dark and damp place, as this will cause the surface of the lens to age/wear and tear

4)The surface of the lens must be clean. The dust, dirt, or water vapor on the lens can easily absorb laser and cause damage to the lens coating. Minor contamination can affect the quality of the laser beam, while severe contamination can result in no laser beam generation.

5)When there is damage to the lens, it should be promptly sent to the supplier for repair. Try not to use damaged lenses, otherwise it will accelerate the damage to the lenses that could have been repaired.

6）When installing or replacing reflexing mirrors or focusing lenses, do not use too much pressure, as it may cause deformation of the lenses and affect the quality of the beam of light.

b) Method of installing or replacing optical lenses

1) Before installing optical lenses, it is important to wear clean clothing, clean hands with soap or detergent, and wear light, clean white gloves; It is strictly prohibited to touch the lens with any section of the hand; When taking/holding the lens, take or hold it from the side of the lens and do not directly touch the coated surface of the lens.

2) When assembling lenses, do not blow air onto the lenses with your mouth; The lenses should be placed steadily on a clean table, with a few pieces professional lens paper placed underneath. When removing lenses, caution should be exercised to prevent scratches and falls, and no force should be applied to the coated surface of the lenses.

3) Precautions when replacing optical lenses: Be very careful when removing the lenses from the packaging box to prevent damage to the lenses; Do not apply any pressure to the lens before opening the packaging paper; When taking out the reflector and focusing

lens from the packaging box, clean gloves should be worn and taken from the side of the lens; When removing the packaging paper from the lens, avoid dust and other objects falling on the lens; After removing the lenses, use a spray gun to remove dust from the mirror surface, and then place the lenses on optical lens paper; Remove dust and dirt from the lens support frame and fixing frame, and avoid other foreign objects falling on the lens during assembly; When installing the lens on the mirror base, do not apply excessive force to avoid deformation of the lens; After the lens assembly is completed, use a clean air spray gun to remove dust and foreign objects from the lens again.

c) Steps for cleaning lenses

The cleaning methods vary from different kind of lenses. When the mirror surface is flat and there is no mirror base, use lens paper for cleaning. For example: cleaning the reflex mirrors; When the mirror surface is curved or with a mirror base, a dust-free cotton swab should be used for cleaning. The specific steps for cleaning the focusing lens are as follows：

1) Steps for cleaning lenses with lens paper: Use a blowing balloon to blow off the dust on the surface of the lenses；

2) Clean the surface of the lens with alcohol or lens paper. The lens paper should be placed flat on the surface of the lens, and 2-3 drops of high-purity alcohol (99% or above) or acetone (99% or above) should be dropped onto the lens paper. Slowly pull out the lens paper horizontally in the direction of toward the operator and repeat the above operation several times until the surface of the lens is clean；

3) If the mirror is very dirty, you can fold the lens paper in half 2-3 times and repeat the above steps until the mirror is clean. Do not use dry lens paper to drag directly on the mirror surface.

d) Storage of optical lenses

1) Proper storage of optical lenses can maintain the quality and integrity of the lenses；

2) The storage environment temperature is 10-30℃. Do not put the lens in a freezer or similar environment, otherwise it will condense and frost when taken out, which may damage the lens; The temperature of the storage environment should not exceed 30℃, otherwise it will affect the coating on the surface of the lens;

3) Store the lenses in a box and place them in a non-vibrating environment, otherwise they may be deformed and affected their performance.

1.3 Electrical inspection

Mainly to check the stability of daily power supply voltage, keep the electrical cabinet clean, well ventilated, and check the integrity of various parts of the circuit.

1.4 Preventive maintenance during operation

Before operation, please check the equipment according to the daily maintenance checklist. If there is any abnormal sound during operation, please stop the machine immediately for inspection. After the welding operation/task is finished, please stop the machine according to the shutdown procedure and clean the equipment workbench and the surrounding area of the machine. No unrelated items should be placed on the equipment workbench or operating table.

a) Check if there is any damage to the compressed air pipes every day. If there is any damage, repair it in a timely manner；

b) Clean the air passage and filter of fan daily and remove debris and dust;

c) Check the surface contamination of the focusing lens daily, clean the focusing lens in a timely manner to ensure its service life;

d) Check whether the external light path section has loose or others abnormal once a month, as it directly affects the processing performance and effect (operated by professionals/trained and certified personnel). The external light path is defined from the output of laser source to the focusing lens.

e) Monthly check whether external electrical cables are scratched or damaged, and check if the circuit interfaces inside the electrical distribution cabinet are loose;

f) After the equipment is installed and used for 3 months, the levelness of the equipment should be readjusted to ensure the welding accuracy of the equipment.

1.5 Preventive maintenance after long-term halting

When the equipment is halted for a long time and not in use, please apply grease to all moving parts of the equipment, wrap them with anti-rust paper, and regularly check for rust on other parts. Rust removal and rust prevention treatment should be carried out on the rusted parts (if conditions permit, a dust cover can be added), and the equipment should be regularly cleaned and inspected.

2 Preventive maintenance items by interval

2.1 Daily preventive maintenance

Serial Number	Related units	work
1	Galvanometer	·Clean F- θ Protective glass for lenses
2	Fan	·Clean the air passage
3	Industrial PC	·Check the operation status of the fa indicator
4	Environment	·No strong mechanical vibration
5	Focus lens	·Check the lens dirty, damage or nor
6	Electrical button, switch	·Check the button and switch damage or nor
7	The lifting/descending mechanism	·Check the position of the lifting /descending mechanism change or not
8	Compressed air pipe	·Check air pipe damage or not

2.2 Weekly preventive maintenance

Serial Number	Corresponding unit	work
1	Industrial PC	·Cleaning the monitor, mouse and keyboard
2	galvanometer	·Check the protective lenses to see if they are intact
3	radiating	·Clean the fan duct
4	Dust pipes	·Check dust pipe damage or not

2.3 Monthly preventive maintenance

Serial Number	Corresponding unit	work
1	laser	·Clean the dust of the laser source fan and air passage
2	Whole machine	·Clean it with a vacuum cleaner
3	Industrial PC	·Check and tighten fixing screws, plugs, etc
4	The external light path section	·Check whether the external light path section has loose or others abnormal
5	external electrical cables and the circuit interfaces inside the electrical distribution cabinet	·Check whether external electrical cables are scratched or damaged, and check if the circuit interfaces inside the electrical distribution cabinet are loose;
6	Fan	·Clean the filters of fan

2.4 Quarterly preventive maintenance

Serial Number	Corresponding unit	work
1	controller	·Check and tighten fixing screws, plugs, etc
2	Electrical system	·Check and tighten the fixing screws, and ensure that the plugs and connecting wires have no signs of aging
3	Placement environment	·Confirm that the long-term parking environment is dry and clean
4	staging	·Check the flatness of the machining table surface
5	Levelness	·Check the levelness of the equipment, adjust if machine levelness is out of specification
6	Movement axis	·Remove the old grease and replace it with new grease

2.5 Annually preventive maintenance

Serial Number	Corresponding unit	work
1	Laser source power	·Check laser source power by laser power meter
2	Whole machine	·Clean every area of machine, especially inside of machine; Check and preventive maintain all of movement axis' motor and screws