

# WHAT ARE THE MAIN SYSTEM PARTS OF THE LASER CUTTING MACHINE?

Posted on 2023-08-01 by redsail



Category: [Laser Cutter News](#)



A laser cutting machine system generally consists of a laser generator, (outer) beam transmission components, a workbench (machine tool), a microcomputer numerical control cabinet, a cooler, and a computer (hardware and software).

1. Main part of the machine tool: the machine tool part of the laser cutting machine, the mechanical part that realizes the movement of the X, Y, and Z axes, including the cutting work platform. It is used to place the workpiece to be cut and move it correctly and precisely according to the control program, usually driven by a servo motor.
2. Laser generator: a device that generates a laser light source. For the purpose of laser cutting, except for a few occasions where YAG solid-state lasers are used, most of them use CO<sub>2</sub> gas lasers with high electro-optical conversion efficiency and high output power. Because laser cutting requires high beam quality, not all lasers can be used for cutting. Gaussian mode is suitable for less than 1500W, low-order mode carbon dioxide laser 100W-3000W, and multi-mode 3000W or more.
3. External optical path: Refractive mirror, used to direct the laser to the desired direction. In order to prevent the beam path from malfunctioning, all reflectors must be protected by protective covers, and a clean positive pressure protective gas should be introduced to protect the lenses from contamination. A set of good lenses will focus a light beam with no divergence angle into an infinitely small spot. A lens with a focal length of 5.0 inches is generally used. The 7.5" lens is only used for >12mm thick material.
4. Numerical control system: Control the machine tool to realize the movement of X, Y, and Z axes, and also control the output power of the laser.
5. Stabilized power supply: connected between the laser, CNC machine tool and power supply system. It mainly plays the role of preventing external power grid interference.
6. Cutting head: It mainly includes cavity, focusing lens seat, focusing mirror, capacitive sensor and auxiliary gas nozzle and other parts. The cutting head driving device is used to drive the cutting head to move along the Z-axis according to the program, and is composed of a servo motor, a screw or a gear and other transmission parts.
7. Operating table: used to control the working process of the entire cutting device.
8. Chiller: used to cool the laser generator. A laser is a device that converts electrical energy into

light energy. For example, the conversion rate of a CO<sub>2</sub> gas laser is generally 20%, and the remaining energy is converted into heat. The cooling water takes away the excess heat to keep the laser generator working normally. The chiller also cools the reflector and focusing mirror of the external light path of the machine tool to ensure stable beam transmission quality and effectively prevent deformation or bursting of the lens due to excessive temperature.

9. Gas cylinders: including laser cutting machine working medium gas cylinders and auxiliary gas cylinders, used to supplement industrial gas for laser oscillation and supply auxiliary gas for cutting heads.
10. Air compressor, air storage tank: provide and store compressed air.
11. Air cooling dryer and filter: used to supply clean dry air to the laser generator and beam path to keep the path and reflector working normally.
12. Ventilation and dust removal machine: extract the smoke and dust generated during processing, and filter them to make the exhaust gas discharge meet the environmental protection standards.
13. Slagging machine: remove the leftovers and wastes generated during processing.