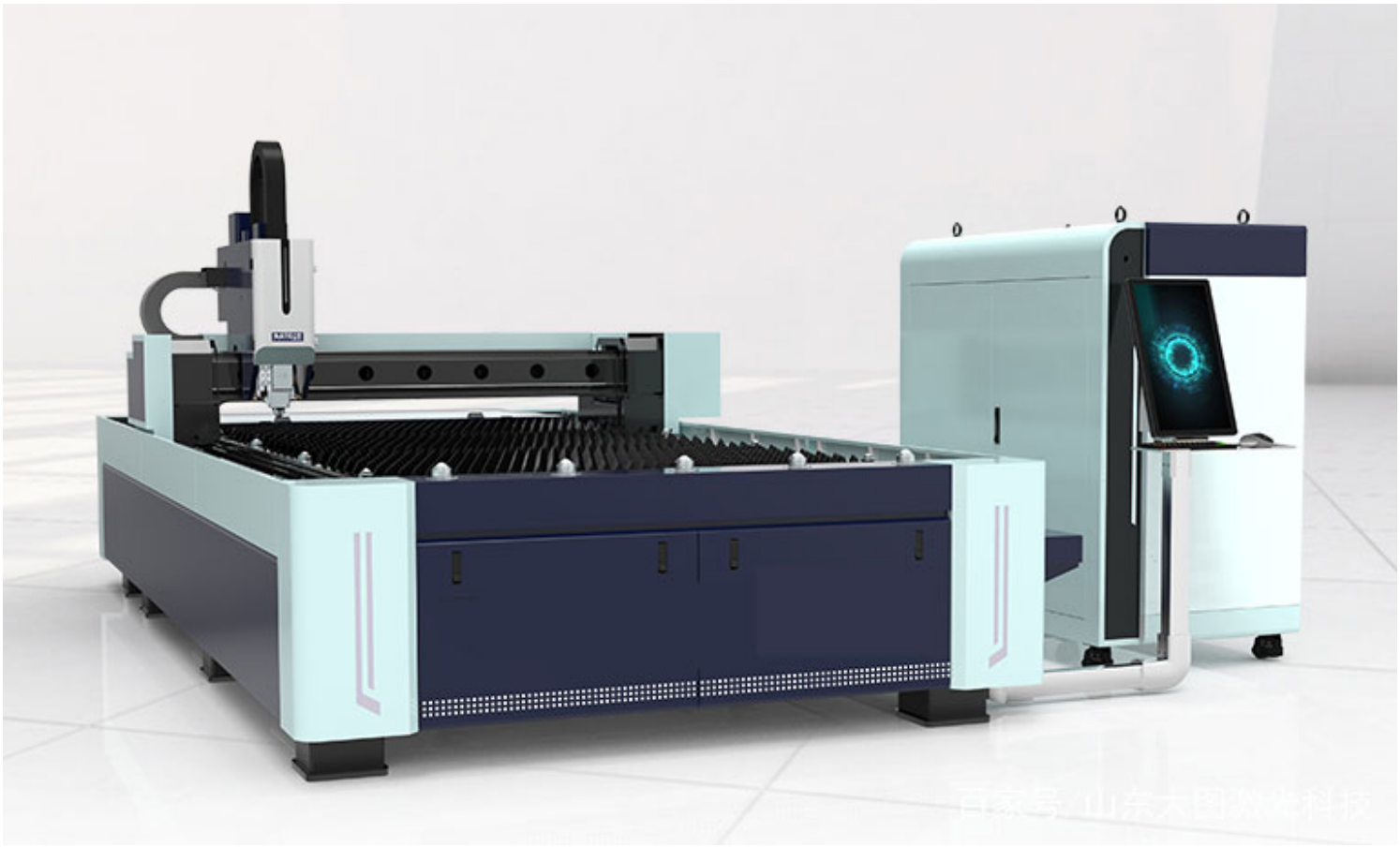
# WHAT ARE THE COMPONENTS OF A LASER CUTTING MACHINE?

*Posted on 2023-06-09 by redsail*



**Category:** Laser Cutter News

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



Laser cutting machine

1. Main part of the machine tool: The mechanical part of the X, Y, Z axis movement of the laser cutting machine part includes the cutting platform. Usually driven by a servo motor, it is used to place the cutting workpiece and move correctly and accurately according to the control program.

2. Laser generator: a device that generates a laser light source. For laser cutting purposes, except for a few occasions where YAG is used in addition to solid-state lasers, most of them have high electro-optical conversion efficiency and can output high-power CO2 gas lasers. Not all lasers are used for cutting, because laser cutting requires high beam quality.

3. External optical path: The refracting mirror is used to guide the laser to the desired direction. To

prevent beam channel failure, all mirrors should be shrouded and passed through a clean positive pressure shielding gas to protect the mirrors from contamination. A set of lenses with good performance can focus the light beam with no divergence angle into an infinitely small light spot.

4. Numerical control system: Controlling the movement of the X, Y, and Z axes of the machine tool also controls the output power of the laser.

5. Stabilized power supply: connect the laser, CNC machine tool and power supply system. Mainly prevent external power grid interference.

6. Cutting head: It mainly includes cavity, focusing lens seat, focusing mirror, capacitive sensor and auxiliary gas nozzle. The cutting head driving device is composed of servo motor, screw or gear and other driving components, which drive the cutting head to move along the Z axis according to the program.

7. Control the working process of the whole cutting device.

8. Chiller: used to cool the laser generator. The cooling water removes excess heat to keep the laser generator running normally. The chiller also cools the optical path reflector and focusing mirror outside the machine tool to ensure stable beam transmission quality and effectively prevent the lens from being deformed or burst due to excessive temperature.

9. Gas cylinders: including laser cutting machine working medium gas cylinders and auxiliary gas cylinders, used to supplement laser shock industrial gas and auxiliary gas.

10. Air compressor, air storage tank: provide and store compressed air.

11. Air cooling dryer and filter: used to provide clean dry air to the laser generator and beam channel to keep the channel and reflector in normal operation.

12. Suction dust collector: extract the smoke and dust generated during the processing, and filter it to make the exhaust gas discharge meet the environmental protection standards.

13. Slagging machine: to remove waste and scrap generated during processing.

The laser cutting machine focuses the laser light emitted from the laser into a high power density laser beam through the optical path system. The laser beam irradiates the surface of the workpiece to make the workpiece reach the melting point or boiling point, and the high-pressure gas coaxial with the beam blows away the molten or vaporized metal. As the beam moves relative to the workpiece, the material eventually forms a seam, thereby achieving the purpose of cutting.

Laser cutting process uses an invisible beam to replace the traditional mechanical knife. It has high precision and fast cutting. It is not limited to cutting patterns. Automatic typesetting saves materials, smooth incision, and low processing cost. It will gradually improve or replace traditional metal cutting process equipment.

The mechanical part of the laser cutter head has no contact with the workpiece, and it will not scratch the surface of the workpiece during work; the laser cutting speed is fast, the incision is smooth and flat, and there is generally no subsequent processing; the cutting heat-affected zone is small, the plate deformation is small, and the cutting seam is narrow; the incision has no mechanical Stress, no shearing burrs; high machining accuracy, good repeatability, no damage to the material surface; CNC programming, can process any plan.