

BASIC KNOWLEDGE OF LASER CUTTING THAT NOVICES MUST UNDERSTAND

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Laser cutting is the horizontal laser beam emitted by the laser changes into a vertically downward laser beam through a 45 ° total mirror, and then it is focused by the lens to form a tiny light spot at the focal point. When the light spot is irradiated on the material, the material is quickly heated to the vaporization temperature, and evaporates to form a hole. With the beam moving on the material, the auxiliary gas (including carbon dioxide gas, oxygen, nitrogen, etc.) is used to blow away the molten slag, Make the hole continuously form a narrow (such as about 0.1mm) slit to complete the material cutting.



Laser cutting machine

Principle of laser cutting machine:

The laser cutting machine uses the focused high power density laser beam to irradiate the workpiece, so that the irradiated material can melt, vaporize, ablate or reach the ignition point rapidly, and at the same time, the molten material can be blown away with the help of the high-speed air flow coaxial with the beam, so as to cut the workpiece. Laser cutting is one of the thermal cutting methods.

Classification of laser cutting:

1) Vaporization cutting

Use the laser beam with high energy density to heat the workpiece. Vaporize in a short time to form steam. Make a cut on the material. The heat of vaporization of materials is generally large, so laser vaporization cutting requires large power and power density.

Laser vaporization cutting is mostly used for cutting extremely thin metal materials and non-metallic materials (such as paper, cloth, wood, plastic and rubber).

2) Melt cutting

During laser melting and cutting, the metal material is melted by laser heating, the nozzle is sprayed with non-oxidizing gas (Ar, He, N, etc.), and the liquid metal is discharged by the strong pressure of the gas to form a cut. The required energy is only 1/10 of that of vaporization cutting.

Laser melting cutting is mainly used for cutting some non-oxidizable materials or active metals, such as stainless steel, titanium, aluminum and its alloys.

3) Oxygen cutting

It uses laser as preheating heat source and oxygen and other active gases as cutting gas. On the one hand, the injected gas reacts with the cutting metal to produce oxidation reaction and release a large amount of oxidation heat; On the other hand, the molten oxides and molten substances are blown out of the reaction zone, and the cutting speed is far greater than that of laser vaporization cutting and melting cutting.

Laser oxygen cutting is mainly used for carbon steel, titanium steel, heat treatment steel and other easily oxidized metal materials.

4) Scoring and control fracture

Laser scribing is to use a high energy density laser to scan the surface of a brittle material, make the material evaporate into a small groove, and then apply a certain pressure, the brittle material will crack along the small groove. The lasers used for laser scribing are generally Q-switched lasers and CO₂ lasers.

Controlled fracture is to use the steep temperature distribution generated by laser grooving to generate local thermal stress in brittle materials, and make the materials break along the small groove.

Application range of laser cutting:

Most laser cutting machines are controlled by CNC programs or made into cutting robots. As a precise processing method, laser cutting can cut almost all materials, including two-dimensional or three-dimensional cutting of thin metal plates.

In the field of automobile manufacturing, the cutting technology of space curves such as car roof window has been widely used. The German Volkswagen Company uses a 500W laser to cut the complicated body sheet and various curved parts. In the field of aerospace, aerospace components processed by laser cutting include engine flame tube, titanium alloy thin-walled casing, aircraft

frame, titanium alloy skin, wing truss, tail wing wall plate, helicopter main rotor, space shuttle ceramic thermal insulation tile, etc.

Laser cutting forming technology is also widely used in the field of non-metallic materials. Such as silicon nitride, ceramics, quartz, etc; Flexible materials, such as cloth, paper, plastic sheet, rubber, etc.