

THE EFFECT OF GAS IN LASER CUTTING MACHINE

Posted on 2023-08-02 by redsail

REDSAIL CM1610 AUTO FEEDING LASER CUTTER

Redsail Laser Cutter / Engraving Machine
1610 for Cutting Soft Materials

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The [laser cutting machine](#) focuses the laser light emitted from the laser device 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 at the same time, the high-pressure gas coaxial with the beam blows away the molten or vaporized metal.

Effect of different auxiliary gases on the quality of laser cutting machine

First of all, let's understand the laser cutting process: the laser light generated by the oscillator passes through the lens and is converged at one point to form a very small spot. By precisely controlling the distance between the lens and the plate, the laser spot is guaranteed to be stable in the thickness direction of the material. At a certain position, due to the converging effect of the lens, laser energy with a very high power density is gathered at the spot. The power density can usually reach 10^6 - 10^9 W/cm². The material melts instantly after absorbing the energy of the spot. The liquid is blown off the material to complete the cutting process.

During the entire cutting process, the main function of the auxiliary gas is to form a driving force to remove the molten metal liquid from the material itself. In this process, different types of gases have different effects on the material and the section:

1. When oxygen is used as auxiliary gas

While blowing away the molten metal liquid, an oxidation reaction will also occur to promote the endothermic melting of the metal, thereby realizing the melting of thicker materials. This process will significantly improve the processing capability of the laser. But at the same time, due to the existence of oxygen, the cut surface of the material will be significantly oxidized, and it will have a quenching effect on the material around the cut surface, which will increase the hardness of this part of the material and have a certain impact on subsequent processing.

2. When nitrogen is used as auxiliary gas

A protective atmosphere will be formed around the molten metal liquid to prevent the material from being oxidized, thereby ensuring the quality of the cut surface. But at the same time, because

nitrogen has no oxidizing ability and cannot enhance heat transfer, it will not help improve cutting ability like oxygen. In addition, when nitrogen is used as an auxiliary gas, the consumption of nitrogen is very large, resulting in a higher cutting cost than when using other gases.

3. Composition of air

Nitrogen accounts for about 78%, and oxygen accounts for about 21%. When air is used as an auxiliary gas for cutting, the cut section must undergo oxidation reaction due to the existence of oxygen, but at the same time, due to the existence of a large amount of nitrogen, the oxidation reaction brought by oxygen is insufficient. In order to enhance the heat transfer, the cutting ability will not be improved, so the air cutting effect can be understood as between nitrogen cutting and oxygen cutting, and the advantage is that the cost of air cutting is very low, all the cost is that the air compressor is used to provide air. The resulting power consumption, as well as the consumption of the filter element in the air pipeline.