

# SIX COMMON PROBLEMS AND SOLUTIONS OF LASER CUTTING MACHINES

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Do you know about [laser cutting machine](#), do you know its common problems and how to deal with them? As an emerging industry, laser cutting equipment has broad prospects for development. Laser cutting machine has the advantages of good controllability of energy density, narrow slit, small deformation of workpiece, good quality of cut surface, unlimited cutting shape, and non-contact processing. Let's take a look at its common problems and how to deal with them.

## Cutting and perforating technology

Any kind of thermal cutting technology, except for a few cases where it can start from the edge of the board, generally must punch a small hole in the board. In the past, on the laser stamping compound machine, a punch was used to punch out a hole, and then the laser was used to cut from the small hole. There are two basic methods of piercing for a laser cutter without a punching device:

(1) Blasting perforation - after the material is irradiated by a continuous laser, a pit is formed in the center, and then the molten material is quickly removed by the oxygen flow coaxial with the laser beam to form a hole. Generally, the size of the hole is related to the thickness of the plate. The average diameter of the blasting perforation is half of the thickness of the plate. Therefore, the diameter of the blasting perforation on a thicker plate is larger and not round. It is not suitable for use on parts that require high processing accuracy. on waste. In addition, because the oxygen pressure used for perforation is the same as that for cutting, the splash is larger.

(2) Pulse perforation - use high peak power pulse laser to melt or vaporize a small amount of material, and air or nitrogen is often used as auxiliary gas to reduce hole expansion due to exothermic oxidation, and the gas pressure is lower than the oxygen pressure during cutting. Each pulse laser only produces small jets of particles, which go deeper gradually, so it takes a few seconds to perforate a thick plate. Once the perforation is complete, immediately switch the assist gas to oxygen for cutting. In this way, the diameter of the perforation is smaller, and the perforation quality is better than that of blasting perforation. The laser used for this purpose should not only have a higher output power; more importantly, the time and space characteristics of the beam, so the general cross-flow CO<sub>2</sub> laser can not meet the requirements of laser cutting. In addition, pulse perforation also needs a more reliable gas circuit control system to realize the switching of gas types and gas pressure and the control of perforation time.

In the case of pulse piercing, in order to obtain high-quality cuts, the transition technology from pulse piercing when the workpiece is stationary to constant-velocity continuous cutting of the

workpiece should be paid attention to. Theoretically speaking, the cutting conditions of the acceleration section can usually be changed, such as focal length, nozzle position, gas pressure, etc., but in practice, it is unlikely to change the above conditions because the time is too short. In industrial production, it is more realistic to mainly adopt the method of changing the average power of the laser. The specific method is to change the pulse width; change the pulse frequency; change the pulse width and frequency at the same time.

## **Analysis of the deformation of the cutting hole**

This is because the machine tool does not adopt the method of blasting perforation when processing small holes, but uses the method of pulse perforation, which makes the laser energy too concentrated in a small area, and burns the non-processing area, resulting in deformation of the hole. affect the processing quality. At this time, we should change the pulse perforation method to the blasting perforation method in the processing program to solve it. For the laser cutting machine with lower power, it is just the opposite. When processing small holes, pulse perforation should be used to obtain better surface finish.

## **When laser cutting low carbon steel, the solution to the burr on the workpiece**

According to the work and design principle of CO<sub>2</sub> laser cutting, the following reasons are analyzed and concluded to be the main reasons for the burrs on the workpiece: the upper and lower positions of the laser focus are not correct, the focus position test needs to be done, and adjustments are made according to the offset of the focus; The output power of the laser is not enough, you need to check whether the laser generator is working normally, if it is normal, check whether the output value of the laser control button is correct, and adjust it; the cutting line speed is too slow, you need to increase the line speed during operation and control; The purity of the cutting gas is not enough, it is necessary to provide high-quality cutting working gas; the focus position of the laser is shifted, the focus position test is required, and adjustments are made according to the shift of the focus; the instability of the machine tool due to long running time needs to be shut down at this time Restart.

# **Analysis of the burrs on the workpiece when laser cutting stainless steel and aluminum-zinc plate**

When the above situation occurs, first consider the burrs when cutting low-carbon steel, but the cutting speed cannot be simply increased, because sometimes the plate will not be cut through when the speed is increased. This situation is especially prominent when processing aluminum-zinc coated plates. . At this time, other factors of the machine tool should be considered comprehensively, such as whether the nozzle needs to be replaced, the guide rail movement is unstable, etc.

## **Analysis of incomplete cutting through state of laser**

After the analysis, it can be found that the following situations are the main causes of unstable processing: the selection of the laser head nozzle does not match the thickness of the processed plate; the laser cutting line speed is too fast, and the operation control is required to reduce the line speed; If the error of the laser focus position is too large, it is necessary to re-check the sensor data of the nozzle, especially when cutting aluminum.

## **The solution to abnormal sparks when cutting low carbon steel**

This situation will affect the quality of the cut section finish of the part. At this time, when other parameters are normal, the following situations should be considered: the loss of the nozzle NOZZEL of the laser head, and the nozzle should be replaced in time. If there is no new nozzle to replace, the pressure of the cutting working gas should be increased; the thread at the connection between the nozzle and the laser head is loose. At this time, the cutting should be suspended immediately, check the connection status of the laser head, and re-install the thread.

The above is a brief introduction to the common problems and solutions of laser cutting machines. Laser processing technology has gradually entered various manufacturing industries, which has improved the technical content of products, accelerated the speed of replacement, realized agile manufacturing, and met the market's demand for "personalized" products.