

WHAT ARE THE EFFECTS OF THE CHARACTERISTICS OF THE WORKPIECE ON LASER CUTTING?

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After having a certain understanding of the knowledge of [laser cutting technology](#), we should know that the factors that affect the effect of laser cutting are not only cutting speed, laser output frequency, adjustment of focus position, etc., but also the material characteristics of the material to be cut will also affect the cutting effect. The overall effect of laser cutting. The following factors have the greatest impact on the quality of laser cutting and even whether it can be cut:

Material surface reflectance

The influence of other factors on the cutting quality of the surface state of the material: the influence of the cutting torch and the nozzle. The design and manufacturing process of the cutting torch have an important impact on obtaining good cutting quality, especially the nozzle. If the nozzle is improperly selected or maintained, it will easily cause pollution or damage, or if the roundness of the nozzle opening is not good or local blockage is caused by hot metal splashing, a vortex will be formed in the nozzle, resulting in a significant deterioration of the cutting performance.

For nozzles, pay special attention to two issues:

(1) Influence of nozzle diameter. The size of the nozzle opening has a certain influence on the cutting speed, and the size of the nozzle opening also affects the pressure distribution at the outlet. The diameter of the nozzle is increased, and the heat-affected zone is narrowed due to the strong cooling effect of the jet flow on the base material in the cutting area, but it will also cause the slit to be too wide, and the size of the nozzle will cause alignment difficulties, and the nozzle opening may be cut off by the beam. , Moreover, if the slit is too narrow, it will hinder the smooth discharge of slag at high cutting speeds.

(2) The influence of the distance between the nozzle and the surface of the workpiece. The distance between the nozzle and the workpiece directly affects the coupling of the nozzle airflow and the kerf of the workpiece. If the nozzle mouth is too close to the surface of the workpiece, it will generate a strong return pressure on the lens, which will weaken the ability to disperse the splashed cutting product particles, which will have an adverse effect on the cutting quality, but if the distance is too far, it will cause unnecessary kinetic energy loss. Effective cutting is also bad. Generally, it is advisable to control the distance between the nozzle and the workpiece at 1-2mm. The cutting torches of modern laser cutting systems are equipped with inductive or capacitive sensor feedback devices to automatically adjust the distance between the two within the preset height range. The influence of the external optical system: the original beam emitted by the laser is transmitted through the external optical system (including reflection and transmission), and accurately irradiates

the surface of the workpiece with extremely high power density. The optical components of the external optical path system should be regularly checked and adjusted in time to ensure that when the laser cutting torch is running above the workpiece, the light beam is correctly transmitted to the center of the lens and focused into a small light spot to perform high-quality cutting on the workpiece. Once the position of any one of the optical components is changed or polluted, it will affect the cutting quality, and even cause the cutting to fail. The outer optical path lens is polluted by impurities in the airflow and the splash particles in the cutting area are bonded, or the cooling of the lens is insufficient, which will cause the lens to overheat and affect the beam energy transmission. It will cause the collimation drift of the optical path and lead to serious consequences. The overheating of the lens will also cause focus distortion and even endanger the lens itself.