# HOW TO JUDGE THE QUALITY OF LASER CUTTING MACHINE PROCESSING, IS THERE ANY STANDARD?

*Posted on 2023-08-24 by redsail*


**Category:** Laser Cutter News

I believe that many friends will have a standard of judgment in their hearts no matter what they do, and they must know whether it is good or bad. We all know that in the laser cutting process of ordinary materials, due to the fast cutting speed, the thermal deformation of the parts is very small, and the dimensional accuracy of the cut parts mainly depends on the mechanical precision and control precision of the laser cutting machine's workbench. In the pulse laser cutting process, the high-precision cutting device and control technology are adopted, and the dimensional accuracy can reach the um level. So, for laser cutting, is there such an industry standard or an international standard that can be used to judge the quality of processing?

There is no uniform standard for the quality evaluation of laser cutting in the world. So far, there is no standard about the quality of laser cutting in our country. The main basis for testing the quality of laser cutting is JIS and WES (welding specification). There are standardization issues regarding laser cutting in CEN (European Organization for Standardization) and ISO (International Organization for Standardization). The relevant ISO9000 series quality assurance methods mainly provided by EU have conducted research on laser cutting standards and standard sample regulations, which include: cutting quality grades, standards for setting samples and processing samples, optical systems, price samples The model and beam characteristics, etc.

For laser cutting processing, the evaluation of its processing quality mainly includes the following principles:

1. Smooth cutting, no streaks, no brittle fracture;
2. The width of the slit is narrow, which is mainly related to the diameter of the laser beam spot;
3. The verticality of the slit is good, and the heat-affected zone is small;
4. No material is burned, no molten layer is formed, and no large slag is formed;
5. Cutting surface roughness, the size of the surface roughness is the key to measure the quality of the laser cutting surface.

In addition to the above principles, the state of the molten layer and the final shape during processing directly affect the above processing quality evaluation indicators.

Laser cutting surface roughness mainly depends on the following three aspects:

1. The inherent parameters of the cutting system, such as spot mode, focal length, etc.;

2. Adjustable process parameters during cutting, such as power, cutting speed, auxiliary gas type and pressure, etc.;

3. Physical parameters of processing materials, such as laser absorption rate, melting point, viscosity coefficient of molten metal oxide, surface tension of metal oxide, etc. In addition, the thickness of the workpiece also has a great influence on the surface quality of laser cutting. Relatively speaking, the smaller the thickness of the metal workpiece, the higher the roughness level of the cutting surface.

In order to obtain a better surface quality grade, it is necessary to optimize the process parameters such as laser power and cutting speed several times. Generally speaking, for materials with the same characteristics and thickness, there is a set of optimal cutting process parameters, which will also result in different incision surface quality. Metal materials have low melting point, high thermal conductivity, small melt viscosity coefficient, and low surface tension of metal oxides, so it is easy to obtain high surface quality during laser cutting. It is easy to measure the surface quality when laser cutting a flat plate, but it is difficult to measure it directly when performing fine processing or cutting some complex patterns, and the surface quality can only be controlled by optimizing the test parameters. Therefore, in order to facilitate automatic cutting, the corresponding relationship between external optimization parameters and surface quality grades should be established.