

# ADVANTAGES OF LASER CUTTING TECHNOLOGY IN INDUSTRIAL APPLICATIONS

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Laser cutting technology is a comprehensive high-tech technology. It spans disciplines such as optics, materials science and engineering, mechanical manufacturing, numerical control technology and electronics. It belongs to the hot spots in the scientific and technological circles and industrial circles at home and abroad. Over the past 50 years, laser processing technology and applications have developed rapidly. It combines with many disciplines to form several technical application fields. The main laser processing technologies include: laser cutting, laser welding, laser marking, laser drilling, laser heat treatment, laser rapid prototyping, laser coating, etc.

Laser cutting technology is the main application of laser technology in the industry. It accelerates the transformation of traditional processing industry and provides new means for modern industrial processing. It has become the most widely used laser processing method in industrial processing. At present, laser cutting technology has been widely used in machinery manufacturing, bridge construction, sheet metal processing, shipbuilding and automobile manufacturing, electronics, aerospace and other pillar industries of the national economy. With the continuous progress and application of science and technology, laser cutting technology will further develop into other fields.

In the past few years, laser processing technology has developed very rapidly and its applications have become increasingly widespread. Therefore, the laser is called "universal processing tool" and "universal processing method for future manufacturing systems". Due to the widespread use of laser processing technology, companies in developed industrial countries are undergoing qualitative changes. Laser cutting technology is the main application of laser technology in the industry. It accelerates the transformation of traditional processing industry and provides new means for modern industrial processing. It has become the most widely used laser processing method in the field of industrial processing and can solve the problems of the entire laser processing industry. More than 70%.

Laser cutting effectively uses a focused, high-power-density laser beam to illuminate a workpiece. Under the premise of the laser power density exceeding the laser threshold, the energy of the laser beam and the chemical reaction heat energy added by the active gas-assisted cutting process are all absorbed by the material, resulting in a sharp rise in temperature to the effect of the laser. After reaching the boiling point, the material begins to evaporate and a pore forms. As the beam moves relative to the workpiece, the material is eventually cut and the deposits at the slit are blown away by some kind of assist gas.

Laser cutting has the characteristics of wide cutting range, fast cutting speed, narrow incision, good cutting quality, small heat-affected zone, and great flexibility. It has been widely used in modern

industry. Laser cutting technology has also become laser processing technology. One of the most mature technologies. Compared with other light, laser has the following characteristics: high brightness, high directivity, high monochromaticity and high coherence. It is precisely because of the four major characteristics of laser that it is widely used, so that laser processing has the following valuable features that are not found in traditional processing:

- (1) Since there is no contact processing, and both energy and moving speed of the laser beam are adjustable, various processing can be realized.
- (2) It can be used to process various metals and non-metals, especially materials with high hardness, high brittleness and high melting point.
- (3) There is no "tool" wear during laser processing, and no "cutting force" acts on the workpiece.
- (4) The heat-affected zone of the laser processed workpiece is small, the thermal deformation of the workpiece is small, and the subsequent processing is less.
- (5) The laser can perform various treatments on the workpiece in the airtight container through the transparent medium.
- (6) The laser is easy to guide. Through focusing, it can realize the transformation in all directions, and it is easy to cooperate with the numerical control system to handle complex workpieces. Therefore, laser cutting is a very flexible cutting method.
- (7) Laser processing has high production efficiency, stable and reliable processing quality, and remarkable economic and social benefits.