

Laser Cutting Tungsten

Can You Laser Cut Tungsten?

Yes! Tungsten is readily laser cut by laser technology. In the world of metal tensile strength, Tungsten is the winner. At least on earth, this is the claim to fame that tungsten can proclaim. Though not easily produced as a metal sheet by having a complex chemical structure, Tungsten or Wolfram, is a metal alloy used for manufacturing special products and precision parts. What's the challenge? Well for instance, tungsten is brittle in its raw state, so it must be manufactured in a complex chemical process. It has the highest melting point of any alloy at 3,422 °C (6,192 °F; 3,695 K). This processing results in the creation of a powder of tungsten oxide. Ingots are formed with the powder by high pressure into molds and then those undergo a process called sintering. The sintering process heats the tungsten ingots until the molecules fuse to a stable form. The sheet that will eventually be laser cut is formed by rolling under high pressure until the desired thickness is achieved. Though there are multiple laser technologies available for manufacturing, fiber laser technology has proven to be a qualified process in laser cutting tungsten. However, when laser cutting it is recommended that an assist gas of argon be used. Though this may reduce the cutting time on the laser, the result will be a much cleaner edge. Tungsten can be laser cut for applications such as the military, for electrodes used in welding, for light bulb filaments, X-ray tubes and other critical uses.

How Do You Cut Tungsten Sheets on a Laser?

Tungsten electrodes, used for welding, are manufactured in great quantities for this purpose. The electrode is a rod and comes in different diameters and cut to size by grinders or diamond tipped saw blades. For sheets of tungsten, you can cut one without much accuracy by using a diamond tipped saw or rotary saw. But for accuracy and repeatability of a design and throughput, a better choice available is laser technology. Though different manufacturers and services providers have different approaches and techniques, the following is a general guideline to the laser cutting process for tungsten,

- **Laser technology:** There are several choices of laser technology that can cut tungsten sheets such as UV-Ultraviolet, Fiber, and high-powered CO2 systems. The thickness and design will guide what system is better suited to accomplish the task. The following mentioned steps are an overview of the processes:
 - Though tungsten has the highest tensile strength of metals, a sheet can be damaged if not properly handled carefully pre and post laser cutting.
 - The sheet or foil is secured to the table or bed of the laser either by vacuum or clamping system.
 - The path that the laser will cut is determined by the CAD file. This programs the laser to cut all features. Once input, the settings are selected by the operator for the correct "laser tool". This includes settings for laser speed, laser power, laser dwell time and a host of other parameters.

- First Cut/First Article: Manufacturing high precision parts is taken seriously. A first check or First Article cut is done by Quality Control to check if the parameters are correct, and the part is meeting all requirements for the job. If a discrepancy is found, a correction is made and a new F.A is done. If given a passing approval, the job can go into the production run.
- Production: With everything in place and the systems all checking out in the green, production is run by the operator. Depending on the procedures, spots checks may be done per the demands of the customer and services provider.
- Final Quality Control review: Every project has a level of inspection that can be as simple as checking a handful of parts or higher AQL levels with CPK data. In accordance with projects details, this check confirms the parts geometry to specification. QC also confirms all other aspects to be done including any post handling including plating, passivation, plasma cleaning for example.
- Post Handling: Many laser cut parts require cleaning due to the carbon residue left on the cut edge or slag left over on the surface. The cleaning of carbon can be done with a lint free cloth or an IPA wipe or similar process. Slag is removed by several methods: hand sanding, chemical etching or using tumbling devices. Sometimes it is a combination of several processes and is determined by the thickness of the tungsten and project requirements.

Please read more at:

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