How to laser cut molybdenum

Laser cut molybdenum sheets will provide a very clean and precise part that holds a very tight tolerance. This is crucial because a refractory metal, one that has a high melting point and a closely packed crystalline structure, such as molybdenum, will often be used for industries like aerospace and automotive. With similar characteristics of tungsten and titanium, molybdenum parts are also produced for use in harsh environments and need to have resistance to corrosion and wear. Molybdenum is used for electronics and semiconductors. Pure glass is made preferably using glass melting molybdenum electrodes. In many uses' molybdenum precision parts, are subjected to wear and high heat. To perform to their optimum the method of manufacturing must be correct. Laser technology is a growing option for molybdenum sheet metal. In manufacturing, molybdenum is often produced with other alloys as it adds its characteristics to form stronger more functional metals. The following information is a general guide to the laser cutting process of these common molybdenum varieties.

1. The choice of molybdenum. Molybdenum comes in numerous grades and thicknesses, but three that are commonly used:

- TZM- A combination of titanium, zirconium, and molybdenum. This grade is called the primary alloy for molybdenum. It is chosen for its high strength and ability to withstand temperatures over 1300°C. It also exhibits the ability to be welded. You will find examples of this used for fuel cells, x-ray tube anodes, rocket nozzles, jet engines parts.
- MoW- Molybdenum and tungsten. This grade is used for its corrosion resistance and for its strength. You will see examples of this as glass stirrers, for use as sputtering targets used in coating applications and for zinc related processes.
- MoRe or Molybdenum-Rhenium, require strength but also being ductile. Thin foils can be produced that need strength, but also may need to be welded. Examples such as dental posts, cardiac stents, orthopedic and spinal issues, electron tube components and heat sinks.

2. Importing CAD or design file. Once the material is selected, the laser needs instructions to what is being cut out of molybdenum. The CAD file or computer aided design file is the path the laser will follow.

3. Material lock: Many laser systems, like all other systems, require the lasers beam to be focused so the energy is constant, and the quality of the cut remains throughout the cutting stage. Securing the molybdenum foil or plate in brackets, vacuum, or other system device is needed.

4. Input of the laser tool: The laser "tool" is a set of parameters used in programing the laser system. This is important because it allows for the fine tuning of the laser to achieve an optimal cut and cost throughput. To successfully cut molybdenum settings will be adjusted for:

- Laser travel- the rate at which the table or head is moved.
- The power of the laser- the best wattage for the specific grade of molybdenum.

- The number of laser passes-often laser work in “passes” or quantity of cycles the laser is programmed to do. Since molybdenum is a harder material, the number of passes may be more than other alloys.
- Secondary cut passes- some systems use a faster “clean up” cycle to smooth the cut edge.
- Tool Adjustment considerations: Molybdenum is reflective and thus can cause damage to the laser’s optics. When adjustments are made, the operators do their best to balance the tool for best edge and surface quality and cut time.

5. First Article Review: Standard for many service providers is a First Article or F.A. run. This is to check the current laser set-up and tool settings before production runs are started. The F.A. is checked by qualified Quality Control personnel. Resulting in:

- A QA passing – The job is approved to proceed.
- A QA rejection- Upon review the part may be out of spec, may need an adjustment to the laser tool and may need to change the material due to damage or the incorrect grade. The F.A is thus run again.

6. Production Run: Once approved the technician or laser operator will run the job to completion.

7. Quality Control: Already having processed an approved F.A., it is the responsibility of the QA inspector to review again the produced parts quality, the review of the order and inspect the level of the contracted order. Possible levels include F.A. and sampling, 100% inspection, AQL level and others.

8. Clean Up and packaging- Completed and approved parts are carefully cleaned (if required) and packaged accordingly to not result in damage during shipment back to the customer.

Molybdenum sheets are produced to meet a multitude of ASTM requirements such as: ASTM-B-387 or ASTM-B-386, Type 360, Type 361, Type 363, Type 364, or Type 365 and produced from thicknesses from 0.127mm to 1mm or thicker. Not all varieties may be produced in the grade and thickness desired, but some manufacturers do offer custom manufacturing of sheets. The best laser technology will be determined by the grade thickness and geometry of the molybdenum precision part.

Please read more at:

How to laser cut molybdenum - A-Laser Precision Laser Cutting

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