



HOGEN INDUSTRIES, INC.

OF INDIANA

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Machining Tungsten Alloy

Machining

Our high density tungsten alloy metal machines like gray cast iron. Typical Hardness ranges from 24-32 Rc. Its low thermal expansion and other characteristics allow you to hold very close tolerances and fine finishes can be held. A coolant is optional, and carbide tools are recommended in most cases.

Turning and Boring - Carbide inserted cutters are suggested.

Roughing - Cutting depth of .030" to .125" and .008" to .015" feed, at 200 to 300 SFM.

Finishing - .010" to .015" cutting depth and .004" to .010" feed at 250 to 400 SFM.

Tapping - Use high-speed steel or carbide, two flute plug spiral point taps. A light tapping fluid is recommended.

Drilling - Carbide tooling is suggested. Increased clearance angles and automatic feeds are often used to avoid binding and seizing. Carbide drills will give a better tool life.

Grinding - Use aluminum oxide or silicon carbide wheels of medium hardness.

Milling - Carbide cutters are suggested.

Roughing - Feeds of .007" to .015" per tooth at speeds of 200 to 400 SFM.

Finishing - Feeds of .003" to .010" per tooth at speeds of 300 to 700 SFM.

Sawing or Cutting - When sawing, use a bi-metal blade; blade pitch should be relative to the thickness of the material. Coarse blades can be run at low speeds, and finer blades run at higher speeds. Coolant can be used. Material can also be cut using high-speed abrasive cutoff wheels.

Stress Relieving can be accomplished on machined parts. We suggest heating at 600°F in air for two hours and cool in air or in a protective atmosphere at 900°F for 30 minutes.

Joining

Mechanical Joining is the best option for joining Tungsten Alloy material - using standard fasteners such as bolts and pins. Tungsten Alloys can also be threaded to mate to itself and function as fastening method.

Copper Brazing is a very good method of joining high density tungsten material to itself and to other materials. Joint strength is close to that of the parent material. A disadvantage is that it should be done in a controlled atmosphere, which is not practical for most users.

Diffusion Bonding is an ideal way of joining tungsten alloy material to itself, but it has to be done by the material manufacturer. If parts are finished, there may some distortion during the process.

Silver Soldering is a practical and efficient method of joining high density tungsten material either to itself or to steel. Easy-Flo 45 (BAg-1) is commonly used. Typically .002" clearance between parts to be joined is required. As the part gets larger, more clearance is required. Parts should be as clean as possible (sandblasting is sometimes used). Both parts are fluxed and carefully heated until solder flows. A slow uniform cooling is recommended. Uneven cooling could set up stress in the joint and the material.

Shrink Fitting is another good method of joining high density tungsten material to steel. Depending on the size of the part, .005"/.007" interference per side is recommended. The tungsten alloy is chilled in dry ice or nitrogen while the steel is heated. When assembled, a slow cool is necessary while the parts are held by a locating pin or fixture.

If you need any further information, please do not hesitate to contact
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