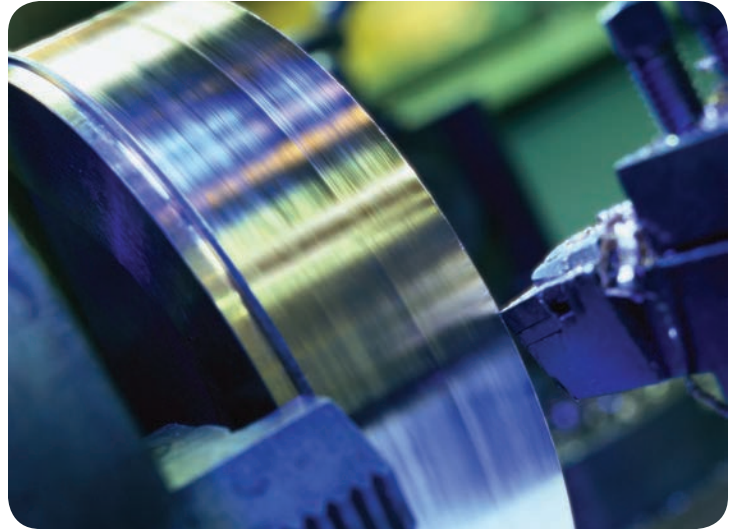


MACHINING GUIDE FOR TUNGSTEN ALLOYS

[as per ASTM B 777-07, EU RoHS Directive 2002/95/EC Compliant]

Tungsten Alloys* are alloyed with different elements such as nickel, copper, and iron to produce a large variety of grades. Many of these alloys have engineering properties similar to steel and are relatively easy to machine. These alloys can be drilled, milled, turned, and tapped using standard tools and equipment, while using speeds and feeds similar to Grey Cast Iron. Tungsten Alloys can also be plated or painted to enhance their corrosion protection.

Tungsten Alloys have found wide acceptance in applications such as radiation shielding, medical equipment, boring bars, vibration dampening, sporting goods, as well as counterweights in aircraft and racing cars.



PARAMETERS AND TOOLING TO ACCOMPLISH PROPER MACHINING:

TOOLS:

C-2 Grade carbide tooling is recommended. Use as generous a nose radius as possible.

OPERATIONS:

- Turning/Boring: Positive rake is recommended
Roughing: 0.050"/0.200"
Depth of Cut: 0.008"/.010" Feed.
- Finishing: 0.010"/0.030"
Depth of Cut: 0.003"/0.005" Feed.
- Turning Speed: 250/350 Surface feet per minute.

Note: For above operations, air is the preferred method of cooling tools; coolant can be used.

DRILLING/TAPPING:

- Drilling: Use Carbide tipped or solid carbide drills with air or coolant such as Molydisulfide cutting fluid. Drill tap holes to 50-55% of thread hole requirement.
- Tapping: Use straight flute, high alloy taps. For small threaded holes, thread forming taps can be used. Nitrided or solid carbide taps will extend life of tap on long run jobs.

GRINDING:

Use Aluminum Oxide type wheels ("J" grade typical) with coolant to remove grinding material rapidly.

MILLING:

Feeds and Speeds should follow Grey Cast Iron recommendations.

Feeds: 0.003" per tooth as a starting point.

Speed: 75 - 750 sfpm with carbide tools; adjust to depth of cut.

End Milling: Slight "climb" is best starting point.

Note: For above operations, air is the preferred method of cooling tools; coolant can be used.

EXOTIC OPERATIONS:

Wire EDM; Solid EDM; Waterjet Cutting can be performed on tungsten alloys.

For the various grades of EFI Tungsten Alloys available, visit our website. You can also download the Tungsten Alloys brochure from our Product Literature web page.

*Tungsten Alloys are also known as Mallory 1000, Densally, Fansteel 77 and Densimet.



ED FAGAN INC.
Special Purpose Alloys

www.edfagan.com

THE MATERIALS YOU NEED, WHEN YOU NEED THEM

Glass Sealing / Controlled Expansion Alloys / Electrical & Electronic Nickel

EFI provides the highest quality materials including materials from Carpenter Technology Corp.

ASTM F15 Alloy:

aka Kovar, Pernifer 2918, NILO K & Dilvar P1

Coil/Strip, Sheet, Plate, Round Bar

Invar 36:

aka Pernifer 36, NILO 36 & Invar Steel

Round Bar, Sheet, Plate

Super Invar 32-5:

Round bar, Sheet, Plate

42/*46/48/52 Alloy:

aka Pernifer 40, 46, 48 & 50;

NILO 42, 46, 48 & 50;

Glass Seal 42, 46, 48 & 50

Coil/Strip, Sheet, Plate, Round Bar

Electronic Nickel

200/201/233/270:

Coil/Strip, Round Bar, Sheet

**Products listed in Italics are special order and not standard stock items. Please call for availability.*

Soft Magnetic Alloys/ EMI Shielding & Laminations

EFI is a distributor of magnetic shielding alloys for the world's leading producer of these alloys – VDM Metals GmbH.

EFI Alloy 79:

aka Magnifer 7904, Moly-Permalloy,

HyMu 80, Hypernom & Permalloy 80

Round Bar, Sheet, Coil/Strip

EFI Alloy 50:

aka Magnifer 50, High Permeability 49 & Alloy 47-50

Round & Square Bar, Coil/Strip

Carpenter VimVar Core Iron:

Round Bar

Carpenter Hiperco 50:

Plate, Coil/Strip

Carpenter Hiperco 50A:

Round Bar

Radiometal 4550:

Round Bar, Coil/Strip

Refractory Metals/Alloys

EFI is a stocking distributor of Molybdenum & Tungsten products, as well as many other refractory metals and alloys, providing the highest quality materials available.

Molybdenum:

Round Bar, Sheet, Plate,

Threaded Rod & Nuts

**Foil/Coil/Strip, Wire*

TZM Molybdenum Alloy:

Round Bar, Sheet, Plate

Tungsten:

Round Bar, Plate, **Sheet, *Wire*

Tungsten Alloy:

Round Bar, **Sheet, *Plate,*

**Shapes, *Flat Blanks*

**Tantalum: Round Bar, Sheet*

**Niobium: Foil/Coil/Strip*

**Rhenium: Sheet*

**Products listed in Italics are special order and not standard stock items. Please call for availability.*

METALS WE DISTRIBUTE

Titanium - CP & 6Al-4V • High Temperature Alloys • Corrosion Resistant Alloys • Stainless Steel

JUST IN TIME DELIVERY: All **standard stock** items can be **shipped within 24 hours** – and are often **shipped the same day**. For **special order** materials, EFI has long relationships with the manufacturers of these materials, so please contact a sales rep to discuss price and delivery options. All materials can be certified with shipment.

SERVICES WE OFFER

Slitting, Shearing, Saw Cutting, Centerless Grinding, Water-jet Cutting, Laser Cutting, Custom Stocking Programs, Consignment Programs



Are you spending too much of your valuable time trying to locate specialty metals and materials? If you can't locate the hard-to-find materials you need, use EFI's Material Locator to source them for you.

www.material-locator.com

**THE MATERIALS YOU NEED,
WHEN YOU NEED THEM**



toll free 800.348.6268
www.edfagan.com
sales@edfagan.com
international sales
+44 (0) 1548 858 770

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