

# PRECISION AEROSPACE METAL PRODUCTS

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HIGH PRECISION METAL PRODUCTS FOR  
CRITICAL AIRFRAME AND ENGINE APPLICATIONS.





## HIGH PRESSURE, HIGH STRENGTH PRECISION TUBES

NADCAP approved seamless titanium tubes engineered for aircraft hydraulic and pneumatic control systems up to 5,000 psi with excellent strength to weight ratios. Deliver substantial weight savings for reduced fuel consumption and operating costs.

Heat resistant stainless steel and nickel alloy tubes for extreme temperature and high strength engine applications.

### PRODUCTS

- Titanium: Ti CP (Grade 1 and 2), Ti 6Al-4V (Grade 5), Ti 3Al-2.5V (Grade 9), Ti 6Al-4V ELI (Grade 23), Ti A-40, Ti 4Al-2.5V
- Stainless steel: 304, 316, 321, 347, 15-5PH<sup>®</sup>, 17-4PH<sup>®</sup>, 17-7PH<sup>®</sup>, 21-6-9, FV607
- Nickel alloy: Nimonic Alloy<sup>®</sup> 75, C263, 200, 201, 211, 600, 625, 718, X-750, Invar<sup>®</sup> 36, Waspaloy<sup>™</sup>
- Sizes: From 0.010 in (0.25 mm) to 1.5 in (38.10 mm) OD

- Seamless, welded and welded & redrawn (titanium seamless only)

### APPLICATIONS

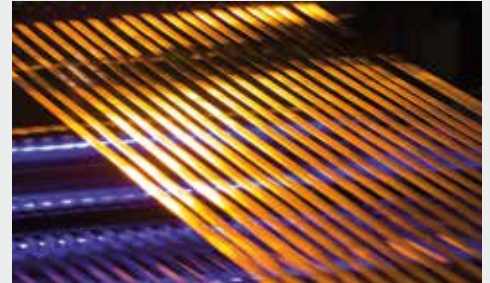
- Hydraulic and pneumatic control systems
- Actuation
- Instrumentation
- Landing gear
- Pitot tubes
- Convoluting / seals
- Engine fuel lines
- Fire suppression, drain lines and bleed air systems
- Satellite propulsion systems
- Heat exchangers
- Fuel and hydraulic tube for space rocket engines



Fine Tubes  
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Superior Tube  
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## ULTRA THIN, HEAT RESISTANT FOIL AND PRECISION STRIP

Ultra thin metal strip and foil in nearly any alloy rolled to the tightest tolerances and thinnest gauges in the industry - from 1.5mm (0.060") down to 1.5 microns (0.000060") in thickness.

We are experts in controlling consistency, precise thicknesses, specific mechanical, physical, electrical and magnetic properties and surface finish.

### PRODUCTS

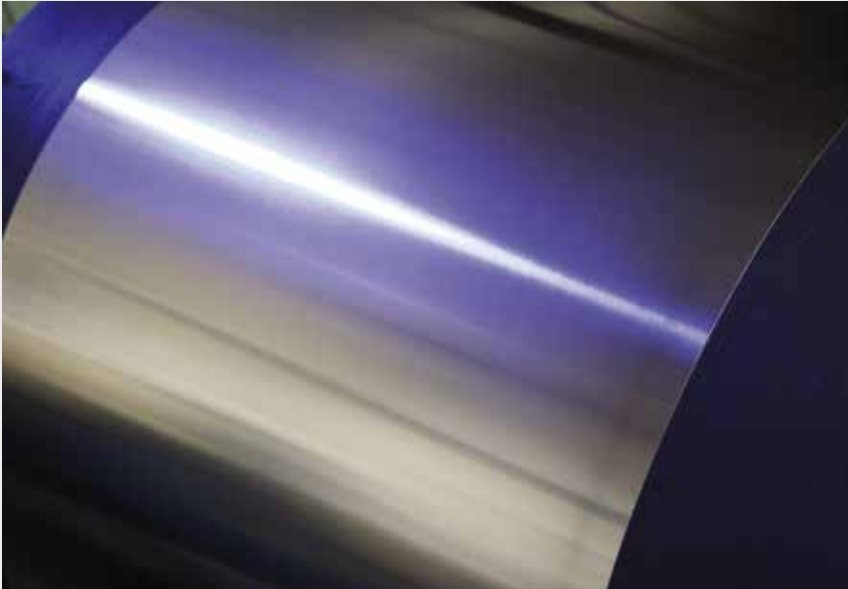
- Precision heat resistant brazing foil rolled from 0.0001" to 0.0004" (0.0025mm to 0.01 mm) thick
- Metal strip for specialized sensor diaphragms
- Alloys: Stainless and heat resisting steels, nickel and high nickel alloys, nickel base superalloys, cobalt base superalloys, custom alloys, copper and copper alloys, titanium, controlled expansion alloys

### APPLICATIONS

- Brazing foils used in jet engine fan blades, vanes and housings. Placed between the inner and outer skins on both sides of a metal honeycomb, the brazing foil joins critical parts of the engine
- Diaphragms for specialized aerospace sensor applications



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## HIGHLY CONDUCTIVE NICKEL STRIP

Our high purity nickel strip battery connectors deliver 15-20% higher conductivity than traditional cast nickel strip connectors.

We employ an advanced wrought powder metallurgy process for roll compacted strip which achieves the highest purity commercially available. This means reduced impedance and increased conductivity in battery tab connectors delivering higher transmission of power.

The higher conductivity of our battery tab material allows for manufacturers and designers to continue miniaturizing the sizes and weights of the battery connections without sacrificing power handling capabilities.

### PRODUCTS

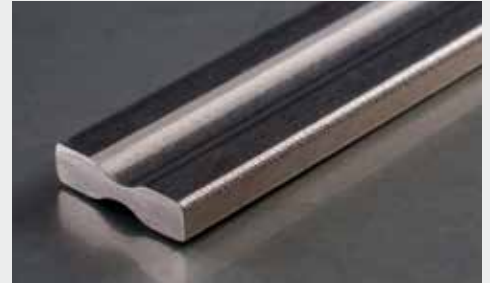
- Highest purity (99.98%) for greater conductivity
- Low impedance
- Available nickel grades: Nickel 270 (899A), Nickel 201/200 (899L), Nickel 201/200 (899M)
- Thickness range: Down to 50 microns
- Standard and custom sizes & tempers
- Customizable materials
- Small minimum order sizes
- Short lead times

### APPLICATIONS

- Aerospace batteries
- Heat exchangers
- Bellows



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## HIGH TOLERANCE CUSTOM SHAPED WIRE

Specialty shaped wire and flat wire products in an extensive range of standard and custom shapes and alloys.

Our wrought powder metallurgy process delivers proven advantages—purity, consistency, and close compositional control. These advantages give our customers improved die wear, formability, and platability.

Used primarily in aircraft push-pull mechanisms to deliver remote activation of aerospace controls. Our shaped wire is used by manufacturers of these devices to build a bearing controlled linkage for applications requiring high tension and compression forces and tight radii for the cable assembly.

### PRODUCTS

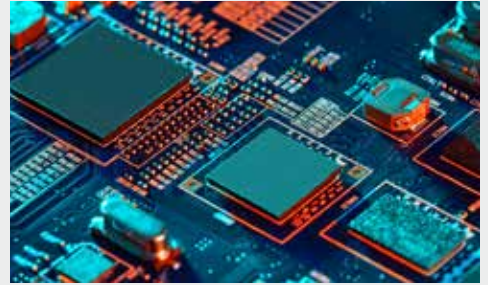
- Alloys: Aluminum, copper, copper alloys, nickel, nickel alloys, stainless steel, custom
- Shapes: Round, square, rectangular, half-round, hex, flat-wire, bunched, custom
- Sizes: Square 0.010" to 0.200", round 0.004" to 0.250", flat 0.008" x 0.018"
- Edge capabilities: Square edges, rounded corners, natural rolled or round edges, full rounded or blended edges

### APPLICATIONS

- Push-pull mechanisms required for remote activation of aircraft controls, fuel shutoffs, fasteners, landing gear and emergency controls
- Lock collar tape for aerospace rivets



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## THERMAL MANAGEMENT MATERIALS

We specialize in engineering high quality Molybdenum Copper composites for the management of heat in electronics packages that operate in spacecraft and satellites.

Our Molybdenum-Copper (AMC) composites are engineered through wrought powder technology to deliver improved thermal conductivity and highly controlled thermal expansion.

These materials are trusted in sensitive space applications such as electronic and integrated circuit (IC) packaging that necessitate tight thermal expansion control.

### PRODUCTS

- Alloys: Molybdenum-Copper (AMC), consisting of various compositions
- Compositions: 60% Molybdenum - 40% Copper, 65% Molybdenum - 35% Copper, 75% Molybdenum - 25% Copper, 80% Molybdenum - 20% Copper, 85% Molybdenum - 15% Copper
- Sizes: Width: 4 inches (102 mm), Thickness: 3 inches (76 mm), Length: 24 inches (610 mm)

### APPLICATIONS

- Electronic and integrated circuit (IC) packaging
- Heat sinks
- Circuit board cores
- Pedestals
- Optoelectronics
- Microwave packages



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## EXTREME BONDABILITY AND RELIABILITY

### COINING's Molybdenum Double Clad Nickel Bond Pads

These bond pads offer high conductivity and durability. Ideal for aerospace and other demanding environments, they support secure wire attachment through soldering, ensuring long-term performance.

### COINING's Copper Bond Pads with Nickel and Gold Plating

Designed to create electrical connections between circuit boards and electronic devices. Their multi-layer plating enhances corrosion resistance and conductivity, making them suitable for high-performance systems.

### Copper-Core Connect™ Bond Pads

Enables high-power wire and ribbon connections in areas traditionally inaccessible on 2D PCBs, heat sinks, or ceramic substrates.

### PRODUCTS

- Molybdenum: ASTM B361
  - Nickel: ASTM B162
  - Gold: ASTM B562

- Solder: J-STD-006
  - Copper: CDA 101/102
  - Nickel: QQ-N-290
  - Gold: Mil-G-45204, Type III, Grade A

### Solder Alloys:

- Sn60Pb40 (melting range 183 - 188°C)
- Sn96.5Ag3Cu.5 (melting range 217 - 218°C)
- Au80Sn20 (melting point: 280°C)
- Pb95Sn5 (melting range: 305 - 314°C)
- Other solders available upon request

### Wire and Ribbon Bonding Applications:

- Solders Alloys:
  - Pb91Sn10 (melting range 275 - 302°C)
  - Other solders available upon request
- **Dimensions:** 0.025 inches by 0.025 inches minimum up to 1 inch square
- **Thickness:** 0.005 inches up to 0.020 inches overall

### APPLICATIONS

- Aircraft engine management systems
- Fighter aircraft applications



## GOLD BONDING WIRE & SOLDER PREFORMS FOR HIGH-RELIABILITY PERFORMANCE

### COINING's Gold Bonding Wire

Designed for demanding aerospace environments, COINING's gold bonding wire delivers exceptional conductivity, corrosion resistance, and long-term durability. Offered in a variety of diameters, including ultra-fine wire for high-density interconnects.

### COINING's Solder Preforms

COINING's solder preforms are engineered for precision and reliability in aerospace applications, offering consistent solder volume and shape for high-quality, repeatable joints. Available in a wide range of alloys, sizes, and geometries—including custom designs tailored to specific mission requirements.

### PRODUCTS

- COINING works efficiently with alloys of silver, gold, tin, lead, antimony, zinc, indium, copper, molybdenum, iron, nickel, Kovar and tungsten. Special alloys can also be used such as palladium, germanium, and platinum.
- COINING's gold bonding wire is composed of the following:
  - Au: 99.99% min; Be: 3 - 10ppm
  - Impurities: Cu, Ag < 30ppm; Fe, Mg < 20ppm
  - Total impurities all elements: < 100 ppm max

### APPLICATIONS

- Attaching components to PCBs
- Die attach in hybrid microcircuits
- Sealing hermetic packages
- Wire bonding in ICs and hybrid circuits
- Interconnects in sensors, avionics, and satellite systems



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## SPECIALTY METAL ATOMIZED POWDER

We supply several products through qualified AS9100 powder producers. Many of our products are key constituents of blends or some of the original materials used in aerospace thermal spray metallic coatings.

Our metal additive powders are engineered for space application components made by Laser Powder Bed, Binder Jet, and Cold Spray processes.

### PRODUCTS

- 80/20 nickel chrome
- PF 60
- Inconel 600
- 316L (including A240 grade), 304L, 17-4PH<sup>®</sup>



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**Defense applications include**



- Afterburners
- Combat aircraft hydraulics
- High performance actuation
- Pitot tubes
- Flex-heaters
- Radar / sound detection
- High power batteries

**Space applications include**



- Satellite propulsion systems
- Flex-heaters in satellites
- Space rocket engines
- Spacecraft launch and detonation systems
- High power batteries
- Electronic packages

From commercial aircraft to fighter jets and satellites, our metals enhance the performance of the aerospace sector.

**Customer approvals include:** Airbus, Boeing, Bombardier, Embraer, GE Aviation, Liebherr, Lockheed Martin, Raytheon, Rolls-Royce, SNECMA-SAFRAN, UTC and more.

**STRIP**

**TUBE**

**POWDER**



## **Six Leading Specialty Metal Manufacturers**

AMETEK Specialty Metal Products consists of six leading specialty metal manufacturers of advanced metal products based in the USA and UK: Fine Tubes, Superior Tube, AMETEK Eighty Four, AMETEK COINING, Hamilton Precision Metals, and AMETEK Wallingford.

Our extensive product range includes thermal management materials, metal tubes, strip, shaped wire, clad plate, powder, bonding wire and ribbon, solder preforms, and bond pads.

From powering aircrafts and space rockets, to advancing medical care, and accelerating the

transition to renewable energy – our precision materials enable technological innovations.

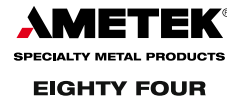
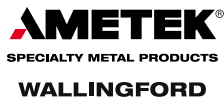
AMETEK Specialty Metal Products is a business of AMETEK Inc., a leading global provider of industrial technology solutions serving a diverse set of attractive niche markets.



### ABOUT AMETEK SPECIALTY METAL PRODUCTS

For over 90 years, AMETEK Specialty Metal Products has been at the forefront of manufacturing precision-engineered metal products that meet the most demanding performance standards for critical applications.

With production facilities in the UK and USA, and sales offices strategically located worldwide, we serve a diverse range of industries with leading expertise in metallurgy.



[www.ametekmetals.com](http://www.ametekmetals.com)

Email: [smp.connect@ametek.com](mailto:smp.connect@ametek.com) | Tel: +1 610 489 5260

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