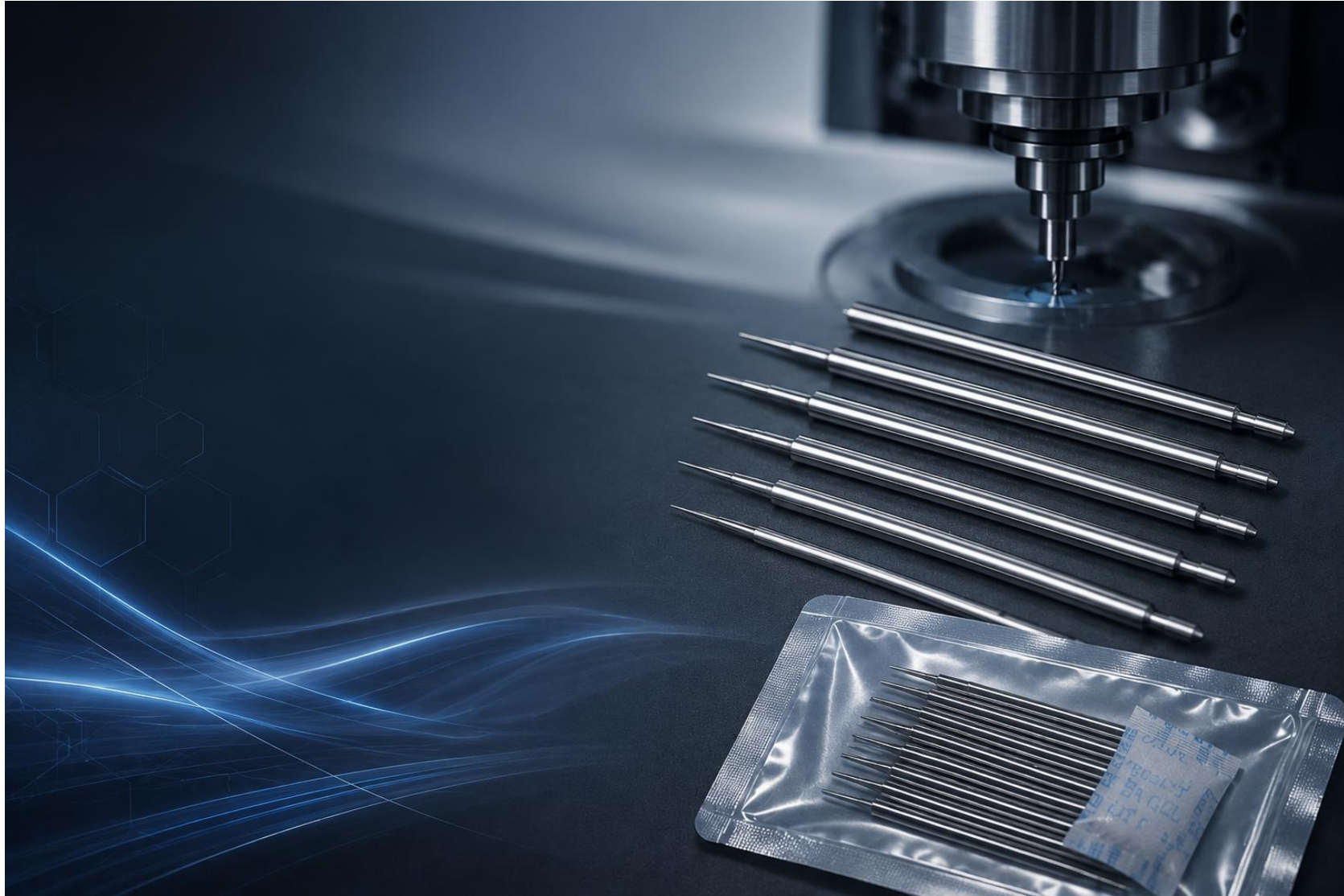




Hero image caption — what is shown, material, and process.

CASE STUDY

Precision Machining Case Study: High-Purity Molybdenum Pins

When Extreme Heat Meets Extreme Precision: Inside Korea Tungsten's Molybdenum Pin Machining

Molybdenum withstands temperatures above 2,600°C. Machining it into a pin the width of a wire is another challenge entirely.

At Korea Tungsten, we specialize in high-density refractory metal machining — and few projects illustrate our capabilities better than the precision molybdenum pins we manufacture for some of the most demanding environments in modern industry.

These components serve as electrodes and fastening elements inside semiconductor equipment, display manufacturing systems, dispenser nozzles, and high-temperature industrial machinery. They are small, unassuming, and absolutely critical.

Why Molybdenum?

Molybdenum occupies a rare position among engineering materials. Its thermal stability is exceptional — it maintains structural integrity at temperatures that would reduce most metals to liquid. Combined with an unusually low coefficient of thermal expansion, it remains dimensionally stable under conditions where thermal cycling would destroy ordinary components.

For applications where failure is not an option and heat is constant, molybdenum is the answer. Getting it into the precise form those applications demand, however, is the hard part.

The Machining Process: Four Stages of Precision

1. Precision Micro Turning

Starting from high-purity molybdenum wire or bar stock, we perform precision turning to achieve the required outer diameter within extremely tight tolerances. Slender components flex under cutting forces — controlling that deflection during high-speed rotation is one of the most technically demanding aspects of this work.

2. Precision Forming & EDM

Depending on product specifications, we apply precision forming and Electrical Discharge Machining to create intricate geometries, uniform curvature, and stepped end features. Each component in a production batch is held to identical dimensions and consistent tolerances — no outliers, no compromise.

3. Surface Finishing & Ultrasonic Cleaning

Every pin undergoes precision polishing to minimize installation friction and remove microscopic burrs left by machining. Components are then ultrasonically cleaned to eliminate residual cutting oil and any surface contaminants, leaving a surface that is clean at a level invisible to the naked eye.

4. Vacuum Packaging with Silica Gel

Molybdenum oxidizes when exposed to moisture and oxygen. Immediately after cleaning, each component is vacuum-sealed with silica gel — ready for installation the moment it arrives, with material quality fully preserved.



(주)코리아텅스텐

Vacuum-sealed molybdenum pins with silica gel packets — Korea Tungsten

Vacuum-sealed molybdenum pins with silica gel packets — Korea Tungsten

The Hard Part Nobody Talks About

Molybdenum's properties that make it valuable also make it difficult to work with. Three challenges define precision molybdenum pin machining:



Bending & Fracture

Thin molybdenum pins have limited ductility. Excessive cutting forces bend or fracture them. Korea Tungsten uses ultra-precision chucking technology and custom fixtures to minimize vibration and machining pressure throughout every operation.



Work Hardening

Each tool pass makes the material harder and more resistant to cutting. We use specialized carbide tooling with optimized cutting speeds and depths — threading the needle between a smooth surface finish and the cracks and defects that result from pushing the material too hard.



Moisture Sensitivity

Freshly machined molybdenum is particularly reactive. Every component is cleaned, dried, and sealed in oxidation-resistant vacuum packaging immediately after machining. The packaging process is not an afterthought — it is part of the quality system.

Precision Beyond the Machine

The smaller the component, the larger the margin for error, and the more expertise it takes to eliminate it. A molybdenum pin that fails inside a semiconductor tool doesn't just replace itself — it halts production, triggers an audit, and raises questions that nobody wants to answer.

Korea Tungsten's commitment is to precision at every stage: machining, inspection, and packaging. Because the value of a precision component is only realized if it arrives in perfect condition and performs without compromise.

Get in Touch

If your application requires precision machining of high-purity molybdenum pins, electrodes, sintering boats, vacuum furnace components, or other difficult-to-machine refractory metal parts, Korea Tungsten is ready to help.

We deliver quality and precision that exceed expectations — because in refractory metal machining, that is the only standard worth having.

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