

Precision Parts Built to Succeed

If you're not sure it can work, bring it to Elcon. We're ready to find out.











Private Ownership (USA)



Elcon Precision Markets and Customers





Biomedical

• Oncology, orthopedic surgery, surgical devices



Defense & Aerospace

• Radar, IR detection, X-Ray, microwave, border protection





Electronics and Commercial

• Semiconductor, lidar, communication, analytical instruments



Renewable Energy

• Energy storage, fuel cells, electrolyzers



Business Units





What is Photochemical Etching?

Photochemical Etching of Precision Components



Technology

- Photochemical Etching is a burr-free, stress-free process, where metal material is precisely removed to create a 2D or 3D component via photolithographically imaged patterns
- Other names: Chemical milling, Photoetching, Photochemical machining



Range of materials we etch

- Refractory metals Molybdenum, Tungsten, Titanium, Hafnium
- Pure metals Copper, Nickel, Palladium
- Alloys Stainless Steels, Kovar, Phosphor bronze, Brass, Alloy 42
- Specialty Metals CuW, BeCu, CuMo
- Selective plating can be combined with photolithographic processes to add gold, copper, nickel or silver to components



Metal Products Division

Capabilities

- Step etching
- Selective plating
- 3D photoetching: hemispherical domes, springs, RF shields, heaters, multilayer structures
- Conical and other hole shapes

Benefits

- Burr-free for durability, bonding, stacking and ease of handling
- Stress free for dimensional stability
- Metallurgical properties preserved
- Design flexibility and complexity with no incremental cost
- Dimensional repeatability
- Flat, uniform surface







Simplified Photochemical Etching Process





Photochemical Etching vs Other Metal Fabrication Processes

	Photochemical Etching	Laser	Stamping/ Hydroforming	CNC Machining
Volume	High	Low	High	Low
Tolerances	High	High	Low - Medium	High
Tooling cost	Low	Low	High	Low
Stress	No stress	Thermal stress	Stress at edges	No stress
Burrs	No burrs	Micro burrs	Partial burrs	No burrs
Drawbacks	Limited to 1mm thickness unless combined with CNC machining	Can only deal with one part/feature at a time, slag on edges	Long lead times & high costs for producing the stamping tool.	Inefficient with very thin materials



Photochemical Etching Examples



Photochemical Etching Examples



Ceramic Metallization & Brazed Assemblies

Ceramic Products Division



- Capabilities

- Metallization of ceramics & sapphire
- Advanced brazing techniques for metal to ceramic assemblies
- In-house metallizing, plating, & glazing

Benefits

- Uniform coating, thickness, & density
- Strong, robust bond
- High hermiticity
- Minimal oxidation





Ceramic metallization



Precision brazed assemblies



Ceramic Products Division

Process

- Thick film refractory metal paints provide a reliable means to braze metals to ceramics
- The metallized ceramic forms a base for the attachment of metal via brazing with an alloy filler
- This creates an electrically insulated and hermetic seal for feedthroughs and other features

Materials we process

- Ceramics: alumina, sapphire, beryllium oxide, AlN, zirconia, ZTA
- Metals: Kovar, copper, molybdenum, alloy steels, stainless steel, titanium, others
- Alloy fillers: Cu, Ag, Cusil, Au, AuGe, active metal braze alloy (ABA)

Products

• Our paints and braze alloys enable metal to ceramic assemblies to withstand high temperatures and voltages in many varying applications



Brazed Hermetic Assemblies







Quality Control



Quality Inspection Tools

- ✓ Advanced Mitutoyo QV404-Apex and QV302-Apex optical CMMs
- ✓ Fischer XAN and Oxford XRF spectroscopic inspection tools
- ✓ Varian and Agilent leak detection tools (10⁻¹⁰ sccm/sec)
- ✓ Keyence IM vision inspection scope (2D rapid inspection)
- ✓ Two OGP CMMs
- ✓ 160KV 3-Dimensional Digital/Quantitative X-ray inspection tool
- ✓ Minitab 18 SPC software for six-sigma capability assessment
- ✓ RF and high voltage (30KV) testing capabilities
- ✓ Leica Digital Inspection Microscope

Management

- ✓ QCBD Quality Management Software for NCMR, RMA, dynamic MRB, CAR and reports
- ✓ Large team of full-time inspectors and metrology experts
- ✓ Manual inspection equipment





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