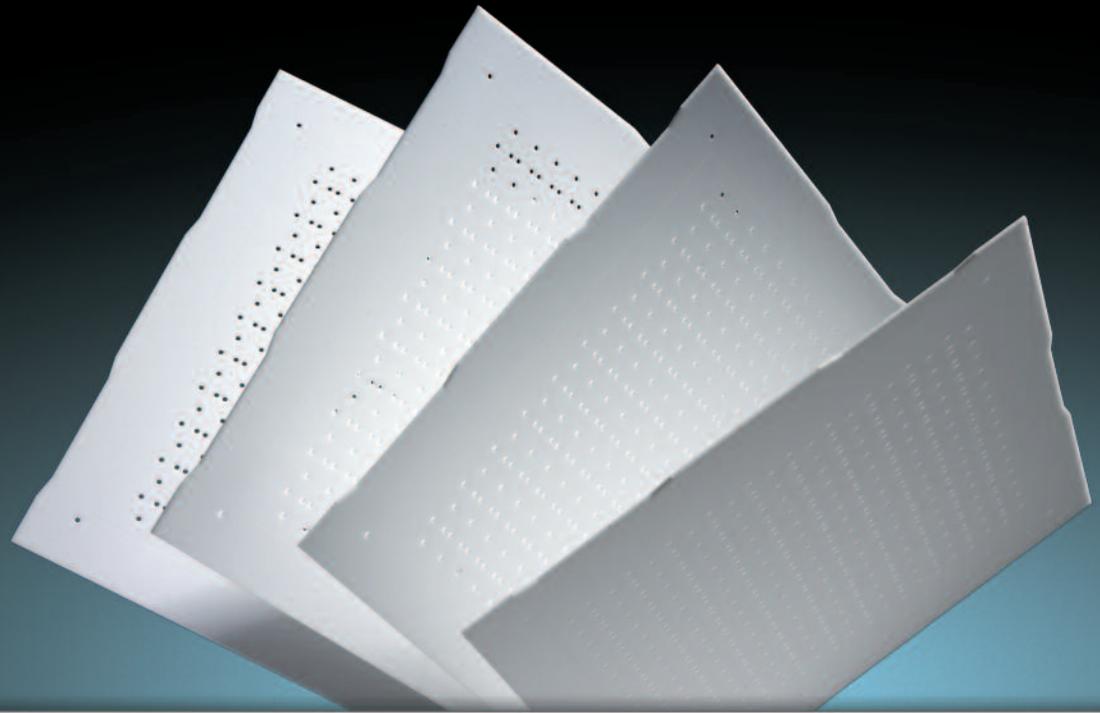




LASER  
SERVICES



*Your vision. Our precision. With Laser Services there are no limits.*

At Laser Services we offer a full-service, open-job-shop approach to meeting all your materials-processing challenges. From precision cutting, drilling, welding, marking and etching of ceramics and metals, to hands-on application engineering of custom substrates and etched glass, our fully-equipped facility and experienced team are at your disposal. With up to 2,200 watts of CO<sub>2</sub> energy, and 600 watts of YAG, you can be certain we have the power to get the job done perfectly.

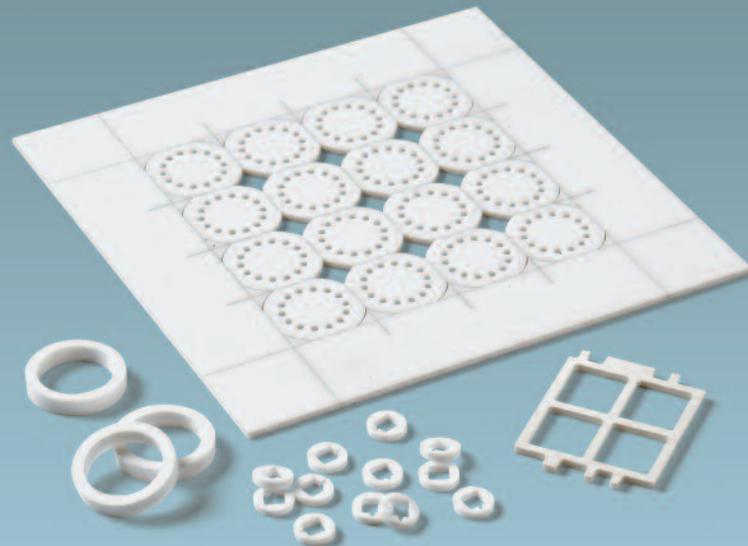
For a job that needs secondary processing, we also offer extensive finishing services including lapping, edge grinding, and surface polishing.

With Laser Services, the only limit is what you can dream up.

Laser machining is a process whereby material is vaporized in a well-defined and very small path or kerf (minimum width: .001 inches). The result is a minimal heat-affected zone (HAZ) and an ability to realize and consistently reproduce intricate designs.

Lasers offer many benefits over conventional machining, including reduced deformation from tool pressure, more efficient material utilization, and limited surface contamination. With minimal or no fixturing required, parts are easy to set up and last-minute modifications are quickly instituted. In addition, lasers equipped with rotary devices accommodate challenging cylindrical cuts that are often impossible with conventional methods.

## The laser advantage



## MATERIALS

### Adhesives

Adhesive Preforms

### Alloys

Kovar®  
Mild Steel  
Molybdenum  
Nitinol  
Stainless Steel  
Steel  
Superalloys  
Tantalum  
Zircaloy

### Ceramics

Alumina (90% - 99.9%)  
Aluminum Nitride (AlN)  
Black Ceramic  
Ferrite  
Green Ceramic  
LTCC / HTCC  
Piezo Ceramic  
Yttria Stabilized Zirconia

### Composites

Kevlar®  
Teflon®

### Epoxies

Conductive Epoxy  
Epoxy Preforms  
Frozen Epoxy

### Glass

Aerogel  
Fused Silica  
Glass

### Laminates

Duroid®  
Flex Circuits  
FR4  
G10, G11  
Garrolite

### Metals

Bronze  
Cobalt  
Cold Rolled Steel  
Germanium  
Hardened Steel  
Hot Rolled Steel  
Mild Steel  
Molybdenum  
Silver  
Stainless Steel  
Steel  
Tantalum  
Tungsten

### Natural Materials

Mica  
Paper/Cardboard  
Quartz  
Sapphire  
Silica  
Silicon  
Wood

### Plastics

Acrylic  
Lexan  
Lucite  
Mylar®  
Polycarbonate  
Styrene

### Polymer

Flex Circuits  
Hydrogel  
Kapton®

### Rubber

### Thin Metals/Foils

Aluminum Foil  
Brass Foil  
Copper Foil  
Gold Foil  
Molybdenum  
Nickel Foil  
Titanium Foil



## Cutting & Drilling

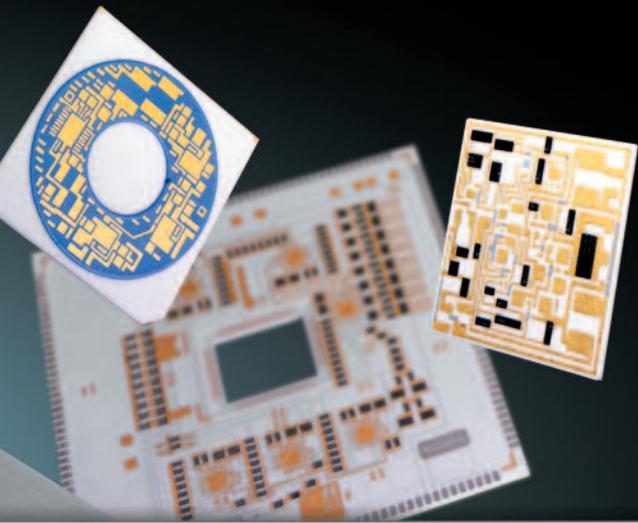
Straight cutting, drilling and scribing, plus rotary axis lasers to process tubes, pipes, spheres and cylinders. State-of-the art CAD/CAM programming, micro-positioning tables, multiple beam systems, and statistical process controls.

## Welding

Precise control for perfect seams and spot welds. Capacity to work with high-conductivity metals such as copper and aluminum, plus high-melting point metals such as tungsten, molybdenum, and tantalum. Rotary chucks for 360° welding.

## Marking & Etching

Professional, permanent markings on metals, ceramics, plastics and other materials. A variety of metal coatings and finishes. Sequential serial numbers, logos, and alphanumeric bar codes on any variation of flat, curved or round surfaces.



From jet engine cores to medical devices to integrated circuits, Laser Services has the experience. For nearly 30 years, leading designers and scientists have been challenging us to deliver their parts with increasing precision. And under new leadership, we continue to push the boundaries of innovation every day.

## Ceramic Specialty

*We serve a variety of markets*

Quality ceramic substrates for today's microelectronics market. Large inventory of alumina in various dimensions, plus a variety of as-fired standard alumina sizes for immediate delivery. In-house inventory of our customers' substrates for just-in-time processing. Secondary processing including lapping, edge grinding, and surface polishing.



Aerospace & Avionics



Alternative Energies



Automotive



Electronics



Firearms



Marketing



Medical



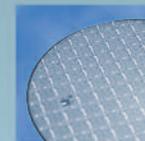
Military



RF/Microwave



Robotics

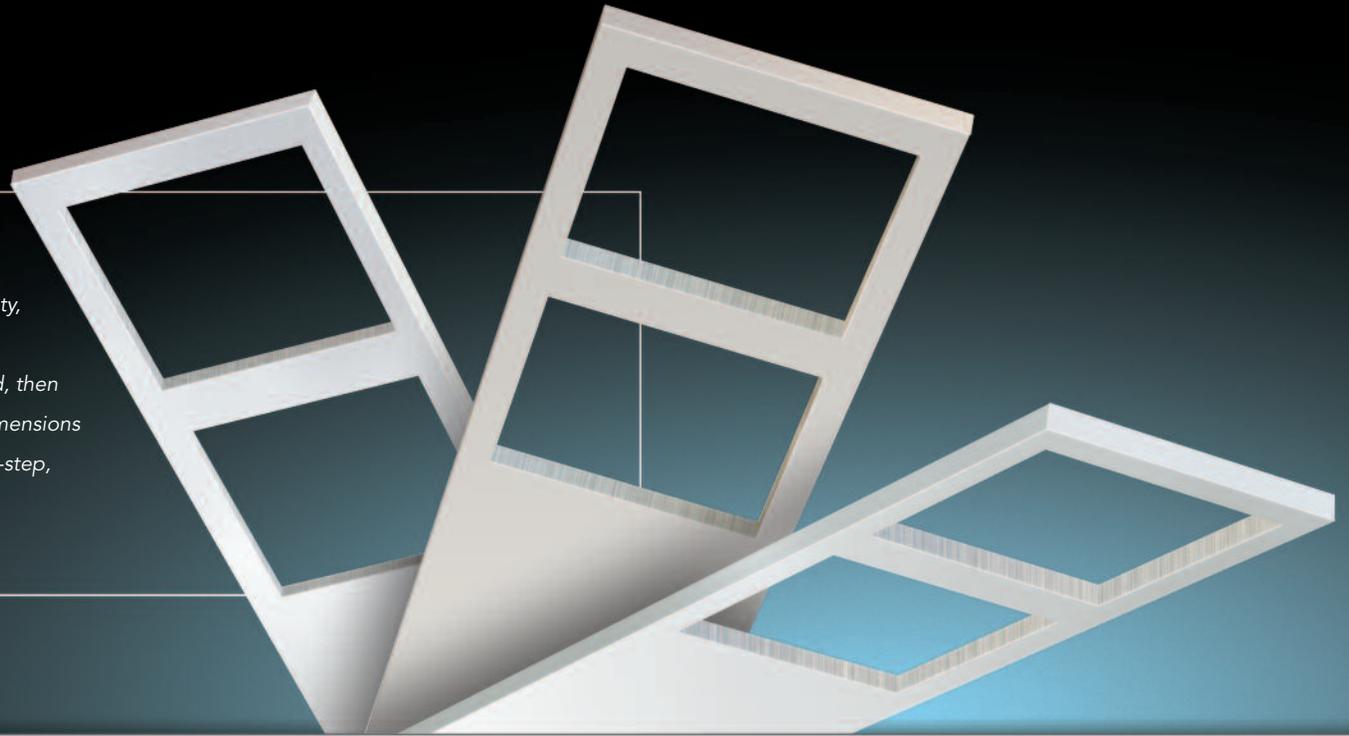


Semiconductors

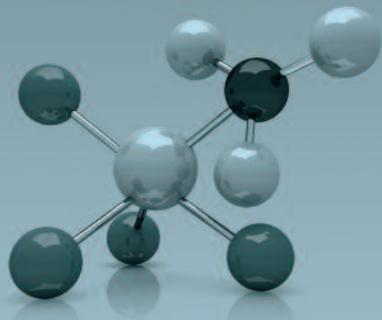


Test & Measurement

Aluminum Nitride (AlN) is an increasingly popular material due to its dielectric and thermal conductivity, plus its non-toxic qualities. These AlN frames for Stanford University School of Medicine were lapped, then precision cut by a laser, and finally diced with all dimensions measuring to within a 0.5 mil tolerance in this three-step, turnkey process.



*“The AlN frame required precision machining—something that Laser Services performs.”*



On the cutting edge. At Laser Services, it's more than a play on words—it's where we live with our customers almost every day. Take Craig S. Levin, Ph.D., for example. As an associate professor of radiology at Stanford University School of Medicine, he's developing a positron emission tomography (PET) system to detect early-phase breast cancer.

A critical component in the PET system design is a 1.666" x 0.25" heat-conductive frame. This

frame provides a support structure while it precisely positions scintillation crystal arrays onto photodiodes. For the frames, Dr. Levin selected Aluminum Nitride—and the cuts and the finishing had to be perfect.

Laser Services knew all about AlN's inherent qualities. So we were able to consult on an ultra-efficient design and manufacturing procedure to achieve a precise, repeatable frame. Also, we were able to

*When the design team at Independent Fabrication (IF) Bikes of Somerville, Mass. developed the XS, a custom-fit, high-performance road-racing bicycle, the prototype included a titanium frame with lugs that needed to be custom-cut into a crown shape.*

*For this precise cut, IF engaged the professionals at Laser Services, who used rotary axis lasers to turn the bike-company's vision into a road-worthy reality.*



*ed with efficiency and care.”*

*Crowning achievement*

*“Our complex designs need the flexibility and accuracy of laser cutting. Now I just call up Laser Services, supply the drawings, and they take care of me.”*

**Tyler Evans**

Vice President, Independent Fabrication Bikes

educate the Stanford team on the variety of material-appropriate processes to produce optimum results.

First, the surface of the AlN material was lapped to specification. Next, the windows were precision cut by a laser. Finally the frames were trimmed out by an AlN dicing blade—with all dimensions measuring to within a 0.5 mil tolerance. These AlN frames are a showcase example of our turnkey approach and our application engineering capabilities.



For more information, including materials-processing design guidelines, visit our Web site at [laserservicesusa.com](http://laserservicesusa.com)

Laser Services is  
ISO/Aerospace  
Certified

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