

Fabrication and Polishing

Laser Optics fabricates and polishes plano, spherical, elliptical, toroidal, and prismatic optics from a wide range of materials.

Component sizes range from 0.2" up to 30.0" in diameter. Our technicians routinely hold figure tolerances of 1/20th wave or better; angular tolerances of < 1 arc second and surface quality of 10/5 or better, depending on substrate properties.

Various machines are used for coring, cutting, slicing, and grinding operations. Similarly, polishing methods include pitch, powders, and chemical mechanical polishing (CMP) techniques. Often, the substrate material determines the appropriate type of processing required for each unique material.

Materials

Materials processed include optical glasses, fused silica, crystalline materials such as quartz, indium antimonide, zinc selenide, zinc sulfide, YLF, silicon and many metals.

Flats and Windows

Typical sizes for flats and windows range from 5 mm OD up to 380 mm OD or a 300 mm x 250 mm rectangular cross-section. Outline tolerances are 0.1 mm for smaller diameter parts and up to 0.5 mm for the very largest ones. Thickness tolerance can be as tight as $\pm 0.1 \mu\text{m}$. Flatness is on the order of $\lambda/20$ with transmitted and reflected wavefronts of $\lambda/10$. Edge chips are 0.10 - 0.15 mm and typically there is a 0.25 mm x 45° protective bevel.





Etalons

Laser Optics is noted for its experience in manufacturing thin glass and crystal plates to exacting tolerances. Additionally, optical contacting capability and state-of-the-art metrology enable Laser Optics to offer special expertise in the manufacture of high precision etalons.

Laser Optics supplies solid etalons for many applications. Solid etalons typically are used for laser linewidth narrowing or as a narrow linewidth filter in diagnostic equipment.

Etalon performance, or finesse, is determined mainly by the optical figure of the etalon and by the reflectivity of the coatings. In the case of solid etalons, the cavity is formed by the distance (substrate thickness) between the thin film coatings. For all etalons, precise control of thickness of the elements is essential; at Laser Optics we can meet a thickness tolerance of +/- 0.0005 mm.

Typical Specifications	
Size	1 to 25mm diameter or cross section
Thickness Tolerance	0.5 microns
Minimum Thickness	60µm
Flatness	$\lambda/20$
Parallelism	0.5 arc sec
Scratch/Dig	10/5

Please keep in mind that Laser Optics manufactures custom optics only. If you have a print you would like to send, please submit a Request for Quotation.

Wedges

Typical sizes for wedges range from 5 mm OD up to 380 mm OD or a 300 mm x 250 mm rectangular cross-section. Outline tolerances are 0.1 mm for smaller diameter parts and up to 0.5 mm for the very largest ones. Thickness tolerance can be as tight as $\pm 0.1 \mu\text{m}$. Flatness is on the order of $\lambda/20$ with transmitted and reflected wavefronts of $\lambda/10$. Edge chips are 0.10 - 0.15 mm and typically there is a 0.25 mm x 45° protective bevel. Typical angle tolerances are $<\pm 3$ arc-minutes and all faces are perpendicular to 12-15 arc-minutes.

Prisms

Typical sizes for prisms range from 5 mm x 5 mm up to 100 mm x 100 mm. Outline tolerances are 0.05 for smaller diameter parts and up to 0.1 mm for the larger ones. Surface quality is 20-10 according to MIL-PRF-13830 for harder substrates such as optical glasses and fused silica and 60-40 to 40-20 for softer substrates such as calcite, fluorides, and other crystals. Tight specifications are held for beam deviation, angle tolerances, and perpendicularity of the prism faces. Flatness is on the order of $\lambda/20$ with transmitted and reflected wavefronts of $\lambda/5$ - $\lambda/10$. Edge chips are 0.10 - 0.15 mm and typically there is a 0.25 mm x 45° protective bevel.

Lenses

We have experience with many different materials and sizes ranging from 3 mm to 220 mm in diameter. Standard centering error is less than 1 arc-minute with a surface quality of 20-10, dependent on substrate material. Radius error fit typically is between $\lambda/2$ with flatness irregularity in the range of $\lambda/4$ - $\lambda/5$. Edge chips are 0.10 mm - 0.15 mm and all edges typically have a protective bevel of 0.25 mm x 45°.



Reticules and Test Patterns

Typical sizes for reticules and test patterns range from 5 mm OD up to 380 mm OD or a 300 mm x 250 mm rectangular cross-section. Outline tolerances are 0.1 mm for smaller diameter parts and up to 0.5 mm for the very largest ones. Thickness tolerance can be as tight as $\pm 0.1 \mu\text{m}$. Flatness is on the order of $\lambda/20$ with transmitted and reflected wavefronts of $\lambda/10$. Edge chips are 0.10 - 0.15 mm and typically there is a 0.25 mm x 45° protective bevel.

Optical Assembly Capability

If you employ high precision optics in your systems, you know that meticulous attention must be paid to the mounting process, to ensure a robust, stress-free assembly.

There are three main types of assembly work carried out at Laser Optics: contacting, cementing, and mechanical mounting.

- Laser Optics uses optical contacting as an essential step in the manufacture of many types of prism assemblies and also zero-order waveplates.
- Cementing is used for a variety of glasses and crystals not suited to optical contacting. The appropriate cement must be chosen to meet your application, depending on wavelength, environmental requirements, and material properties.
- Laser Optics is a systems manufacturer as well as an OEM optics supplier. Mounting optical elements into mechanical housings is a function we perform routinely.