

## Core Competencies

### Single Point Diamond Turning (SPDT)

G&H | GS Optics has a state-of-the-art diamond turning facility that is capable of creating optics (spherical, aspheric, or freeform) directly into a polymer substrate for part diameter dimensions of 3mm-430mm. Our Precitech Nanoform® X turning machines can produce low volume production and prototype components. We have slow tool capability as well as fresnel, raster, and lens array cutting expertise.

### Injection Molding

G&H | GS Optics specializes in specifying the molds and tooling that will be used to make the optic component. We work closely with our clients to understand their application, reduce risk, evaluate tolerances, establish quality metrics, and build a mold that will consistently deliver uniform optical components.

Our molding presses have capacity of 20-200 tons with part sizes ranging from 2.5mm-150mm. We have complete production capability and routinely handle programs from thousands to millions of parts per year. The automation on our presses can be customized to maximize efficiency and minimize handling costs. We have extensive experience in molding materials such as: Acrylic, NAS, Polystyrene, Polycarbonate, COP: Zeonex, Zeonor.

### Design For Manufacturability (DFM)

G&H | GS Optics specializes in scientific injection molding which is a systematic, data-driven methodology to produce world-class polymer optics. There are many factors that will determine success or failure of molding an optic including temperature, pressure, cooling, and ejection rate. Our engineers will work with you to discuss your design for optimal manufacturability.

### Assembly and Packaging

G&H | GS Optics provides complete opto-mechanical assembly and packaging services. Our engineers specialize in bringing custom solutions and unique tooling concepts to solve complex optical challenges. The company has realized a growing need for the production of multi-element optical assemblies that require rigorous contamination control. In response, we installed a 2,000 sq. ft. ISO 7/Class 10,000 clean room enabling G&H | GS Optics to meet client demands.

### Thin-Film Optical Coating

We have a state-of-the-art coating facility onsite. The coater is a fully automated Citation I™ precision optical box coater that includes E-Beam and resistive evaporation with Plasma Ion Assist to form low stress, dense, and durable coatings that will satisfy the most demanding requirements. In addition, our coating chamber configuration includes a unique flexible rotation system to accommodate complex shapes that are prevalent in polymer optics.

Our reflective (HR) coatings include protected and enhanced Gold, Silver, and Aluminum. We also offer single and multilayer anti-reflection (AR) coatings suitable for v-coats and broadband AR performance. Our specialty is coating plastic substrates. G&H | GS Optics has complete in-house thin film design capabilities to tailor thin-film performance to meet your requirements.

### Quality and Metrology

All manufacturing is supported by our modern onsite metrology lab. G&H | GS Optics places heavy emphasis on quality and has developed a highly trained quality team that provides feedback to our production engineers. All programs are subject to rigorous quality standards to ensure consistent, reliable performance. Upon request, we offer acceptance, qualification, and inspection certifications and we have the capability to perform IQ/OQ/PQ.

### Control Procedures:

- UL-recognized molder in QMMYS fabricated parts program: Recognition is based on material traceability, UL assigned designation B-1842
- ISO 9001:2015 certified
- ITAR registered and compliant: adheres to all US export regulations

G&H | GS Optics can provide complete material and manufacturing certifications to satisfy program quality metrics.

## G&H | GS Optics

G&H | GS Optics manufactures custom precision polymer optical components, including integrated features, for photonics applications.

Our customers use our products in illumination, imaging, scanning, and detection applications. The various markets we support include medical device, AR/VR/HUD, defense, and machine vision.

Our Application Engineers work closely with our customers to optimize the component design for cost-effective low risk manufacturing.

G&H | GS Optics has in-house capability to provide scientific injection molding, optical coating, prototyping, SPFT, metrology, and assembly, which allows us to deliver quality goods and services on time.

## Manufacturing Standards

Parameter	Standard	Precision
Focal length (%)	±5	±2
Radius of curvature (%)	±3-5	±2-3
Power (fringes)	10	5
Irregularity (fringes / 10 mm)	4	2
Scratch / dig	80/50	60/40
Center thickness (mm)	±0.1	±0.05
Flange diameter (mm)	±0.1	±0.05
Concentricity (mm)	0.1	0.05
Center to edge thickness ratio	1:1	3:1
Surface roughness (Å RMS)	>75	>60

