

zygo[®]

**Optical Systems
Division**

**Where high precision, quality,
and volume production
come together**



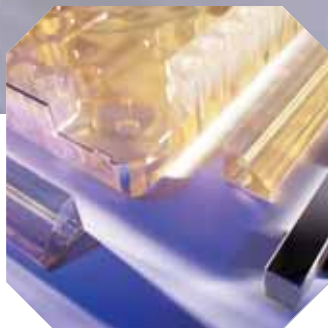
“ZYGO is the world’s only volume manufacturer of laser fusion amplifiers.”



From concept to volume production — Zygo Optical Systems Division specializes in producing high-precision optical systems and components. From concept, to prototype and to volume production, ZYGO will work with you to optimize your design for performance, cost, and delivery. ZYGO engineers and technicians can engage your project at any point in the process, with the rapid response of an agile company and the know-how expected from an industry leader.

World-class optical know-how and innovation — ZYGO’s experience and history of innovation makes it one of the most respected optical companies in the world. From developing the industry’s first precision asphere grinder for production, to becoming the world’s sole volume supplier of laser fusion amplifier slabs, to developing cutting edge medical laser delivery systems and helmet mounted displays — ZYGO is more than a collection of people and machines; it embodies a culture of industry-changing innovation.

“ZYGO tackles the most demanding product development challenges and applies world-class configurable manufacturing to deliver product.”



Industry leading metrology team — ZYGO benefits not only from world leading optical metrology but, more critically, benefits from the people who create it. A synergistic relationship with our Metrology Solutions Division integrates our scientists, engineers, and production technicians into a resource of extensive knowledge and experience found only in tier-one optical companies. The application of this knowledge ranges from proprietary metrology for real-time process control, to ISO standardized quality assurance procedures, yielding cost effective systems, and components manufactured to your exacting specifications.

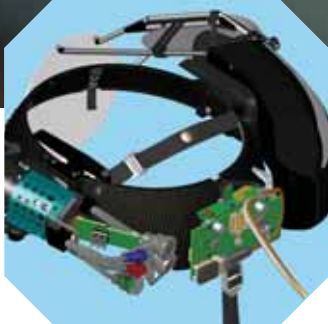
Three groups, one mission — ZYGO Optical Systems Division has the breadth of expertise to join high precision optical design with high quality volume manufacture. Three separate facilities in Arizona, California, and Connecticut work together with one mission – bringing high precision, quality, and volume production together. What can ZYGO do for you?

Integrated System Assembly

ZYGO Tucson is a tier-one optical system assembly facility for high precision, volume production. This facility brings together world-class configurable manufacturing and Design for Manufacture and Assembly. ZYGO assembles and integrates devices ranging from medical laser delivery systems to vacuum relay telescopes to opto-electronic surveillance devices. Located in the heart of optics valley, the facility boasts some of the regions most advanced clean room, metrology, and process control capabilities all backed by a highly skilled engineering, and assembly technician staff. Whether your company is a high-tech start-up or Fortune 500 enterprise, trust ZYGO for tier-one optical assembly requirements.

Integrated System Design and Prototyping

ZYGO's Costa Mesa design and prototyping center is tightly integrated with our Tucson and Middlefield facilities. The center offers a wide range of engineering services designed to take on the industry's most demanding product development challenges. These projects range from Advanced Helmet Mounted Display systems to high precision UV objectives, to integrated sensor packages and interferometric alignment systems for semiconductor applications. Core to the center's strengths is an industry leading prototype manufacturing facility featuring multi-axis alignment, optical contact assembly, custom tooling, Single Point Diamond Turning and proprietary metrology. From design concept to successful prototype delivery, ZYGO is qualified to take on your most demanding product development challenges.



Costa Mesa, California & Tucson, Arizona

Markets and Products:

Medical

- Precision laser delivery systems
- Intraoral imaging devices
- Diagnostic systems

Defense

- Helmet mounted displays
- Guidance, targeting, and tracking (UV, VIS, IR)
- Multi-spectra/multi-mission sensor packages
- Telescope systems

Laser Fusion Optics

- Vacuum relay telescopes
- Transport spatial filter assemblies
- High laser damage threshold assemblies

Homeland Security

- Long range surveillance systems
- Biometric devices
- Perimeter detection

Semiconductor

- Subassembly and integration
- High precision Deep UV and VIS objectives

General Photonics

- Low stress optical mounting
- Lightweighted opto-mechanical structures
- Single point diamond turned components and systems

Large Format Optical Fabrication and Coating

ZYGO's Middlefield facility is a world leading manufacturer of large format precision optics, featuring innovative and proprietary manufacturing technologies. Our vertically-integrated approach encompasses CNC glass machining and lightweighting, rotational, double-sided and MRF polishing, and thin-film coating, with ZYGO proprietary metrology. These highly-refined capabilities give ZYGO the distinction of being the world's only volume manufacturer of laser fusion amplifiers and a world recognized producer of meter-class plano optics, including low aspect ratio and advanced materials such as sapphire. From laser fusion optics, to aircraft windows, to precision sapphire stages, ZYGO is leading the way in high precision large format optics.



Middlefield, Connecticut

Markets and Products:

Semiconductor

- Multi- and single-axis stage mirrors
- L mirrors
- Straight edges
- Wedges and prisms

Aerospace and Defense

- Aerial reconnaissance mirrors and windows
- Lightweighted structures
- Satellite optics

Laser Fusion Research

- Amplifier slabs, disks, and rods
- Windows, debris shields, and mirrors
- Polarizers and KDP crystals

General Photonics

- Lens, mirror, and custom assemblies
- Large diameter lenses
- CNC lens grinding and polishing

(Full capabilities listed on back cover.)

Capabilities:

Costa Mesa, California & Tucson, Arizona

Quality Certification and Process Control

- ISO 9001:2000 (Tucson)
- ISO 13485:2003 (Medical devices – Quality Management Systems) (Tucson)
- Demand Flow Technology system
- MIL-STD-1246 cleaning standard (NIF Certified)

Services

- Concept design and prototyping
- Pre-production manufacturing
- Design for Manufacture and Assembly
- Custom tooling design
- Prototype manufacturing facilities

Facility

- Class 10 clean room
- Configurable manufacturing
- Laminar flow work stations
- ESD production stations
- Precision cleaning

Production Equipment and Processes

- Single point diamond turning
- Multi-axis active alignment stations
- Reticle projection systems
- Fully integrated metrology

Metrology

- ZYGO advance metrology systems
- ZYGO 633 nm, 1057 nm and 1550 nm GPI™, NewView™, and ZMI™ systems
- Aspheric null and metering mirror systems
- Vertical tower system test benches
- Multi-axis MTF, large aperture, and multi-spectral
- Starrett® CMM

Middlefield, Connecticut

Quality Certification

- ISO 9001:2000

CNC Glass Machining

- Glass machining to 1 meter diameter
- Lightweighting

Rotary Polishing

- (up to 1.2 m diameter)
- Flats to 12 nm ($\lambda/50$) PV
- Low Power Spectral Density signatures
- Surface roughness to < 0.2 nm RMS
- Angular tolerances to 0.1 arc second
- 20/10 at meter class optics

Double-Sided (up to 0.5 m diameter)

- Flats to 63 nm ($\lambda/10$) PV
- Surface roughness to < 1.0 nm RMS
- Wedge tolerances to 2 arc second
- 20/10 at meter class optics

MRF Polishing (up to 1 m diameter)

- 50 mm to 500 mm wheels

Cleaning

- Class 10,000 and 100,000 cleanroom

Materials

- Precision optical glass, fused silica, sapphire, Cleartran®, ceramics, silicon, ALON™ phosphate

Coating

- Sizes from 1 mm to 760 mm
- Wavelengths from 200 nm to 2000 nm
- SPECTRA V™ high-efficiency anti-reflective coatings at 633, 1053, and 1550 nm
- Polarizing and non-polarizing beamsplitters and prisms
- Custom coating design and manufacturing
- Low-stress metal and dielectric coatings
- Aluminum, silver, and enhanced reflectors
- High laser damage threshold coatings
- Polarization Beam Combiners



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