



From UV To IR · Precision Across The Spectrum

INNOVATIVE CUSTOM OPTICS



**SYSTEMS
COMPONENTS
MICROSTRUCTURES**

OPTICAL SYSTEMS

FROM DESIGN TO SERIES PRODUCTION

We are your partner for development and production of custom optical systems from UV to IR.

Using our long standing experience in optical design and our in-house optics manufacturing we provide intelligent and innovative solutions for your best product ideas – from design and prototyping to series production.



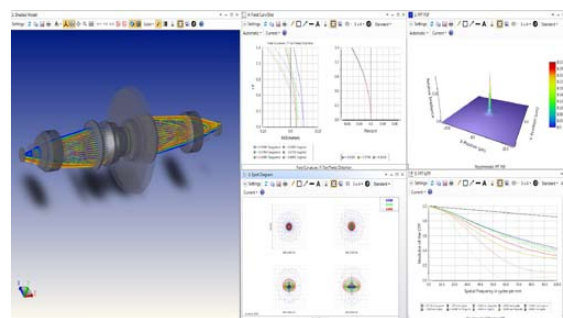
PRODUCTS

- 1 objective lens for aerial photography
- 2 special high resolution microscope system with 400 lp/mm
- 3 CAFE objective lens for Calar Alto fiber-fed echelle spektrograph
- 4 set of objective lenses NFOV, MFOV, WFOV
- 5 laser projection lens for flight simulator
- 6 3D scanning system
- 7 inspection system for bending angle in plate bending machine
- 8 wide angle collimator for inline inspection of mobile phone cameras
- 9 star sensor objective lenses for satellite navigation
- 10 solar simulation system off axis parabolic mirror array
- 11 high resolution projection lens
- 12 camera objective lens for VIRUS spectrometer
- 13 solar simulation system
- 14 lens set for super broadband system for wafer inspection
- 15 four channel beam splitter scan module

TECHNOLOGIES

OPTICAL DESIGN

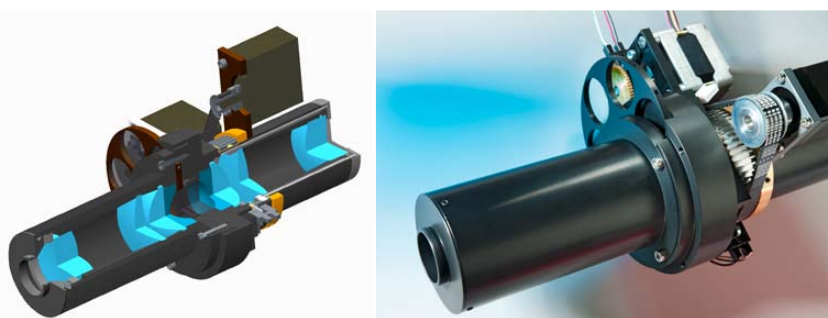
- » analytical studies for finding the best optical solution
- » design of optical systems to customer's specification
- » tolerance analysis for optical systems
- » software: ZEMAX and FRED Optical Engineering Software



figures: design process of optical system for fluorescence analysis

CONSTRUCTION

- » construction of optical, opto-mechanical and opto-electronic assemblies and systems
- » preparation of technical documentation – set of drawings, bill of materials
- » software: 3D-CAD – Creo Parametric



ASSEMBLY AND ADJUSTMENT

- » assembly of optical components using screw-in ring (filler frame) or epoxy
- » alignment turning for high end optical systems
- » assembly and adjustment of complex opto-mechanical and opto-electronical custom systems
- » prototypes and pre-production runs
- » serial production and delivery of turnkey systems
- » performed in a clean room environment of class 100–10,000



TESTING

- » focal length and image quality and MTF measurements on optical systems
- » measurement of lateral (or transverse) and longitudinal chromatic aberration
- » characterization and analysis of wavefronts using Shack Hartmann wave front sensor
- » centration measurement using OptiCentric centration test system
- » spectral measurements of transmission, reflection and absorption including scattered light of assembled systems
- » environmental tests according to DIN and MIL standards
- » comprehensive test reports for FAI (first article inspection) or serial measurements



OPTICAL COMPONENTS

PRECISION IN EVERY PART

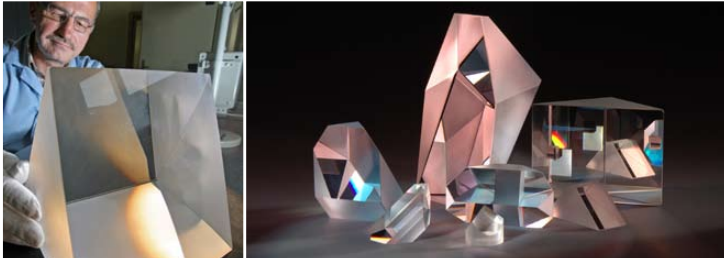
We are your partner in the production of custom optical components from UV to IR. We offer high-precision spherical, plano, and cylindrical optics made from optical glass, fused silica, crystals and special materials for challenging requirements that cannot be realized through catalog optics.

Using the most innovative coating technologies, we provide standard AR and mirror coatings as well as special custom coatings designed according to your requirements.

PRODUCTS

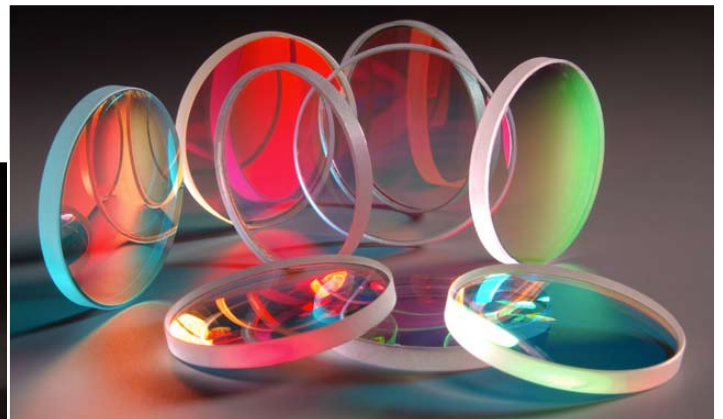
PLANO OPTICS

- » prisms, windows, filters, wedges, beamsplitter cubes, mirror substrates, colored glass filters, optical wedges, reflecting prisms, pentagonal, rhombus, dove, right-angle and triple prisms
- » parameters: largest dimension up to 300 mm; angles accuracy of prism and wedges up to ± 1 arcsec



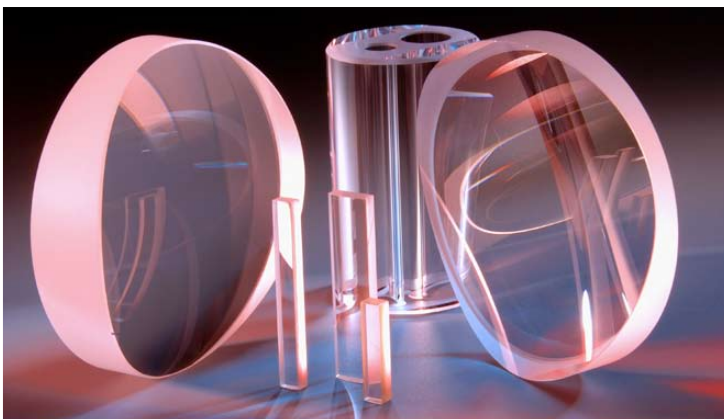
SPHERICAL OPTICS

- » lenses, concave mirrors
- » parameters: diameter 3 ... 300 mm



SPECIAL GEOMETRY OPTICS

- » cylindrical lenses, mirrors, reflectors, domes, laser reflectors



OPTICAL ASSEMBLIES

- » doublets, triplets, prism assemblies, beamsplitter cubes, lens doublets



TECHNOLOGIES

MATERIALS

- » optical glass, fused silica and ceramics
- » IR and UV materials (e.g. silicon, germanium, zinc selenide, zinc sulfide, chalcogenide glasses, barium fluoride, calcium fluoride, magnesium fluoride)



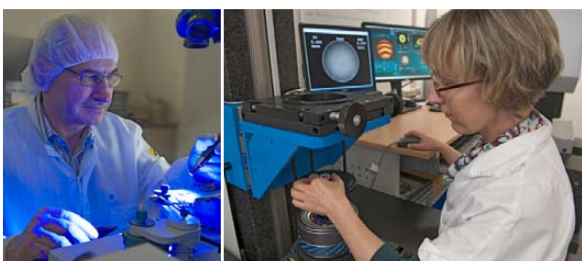
OPTICAL COATINGS

- » anti-reflective and high reflective coatings for different spectral ranges from NUV up to NIR
- » beam splitting coatings
- » custom coating design according to your specifications
- » technologies: IAD (ion assisted deposition) and sputtering
- » our coating catalog is available on our website



CEMENTING

- » cements: UV curable and two component adhesive
- » optical contacting
- » edge blackening of optical components
- » centering better than 4/0.5'
- » angle tolerance: ≤ 10 arcsec



MACHINING

- » Plano Optics:
 - › 5-axis CNC milling machine
 - › CNC grinding capabilities
 - › conventional and NC polishing technology
- » Spherical Optics:
 - › CNC grinding and polishing technology
 - › conventional pitch polishing
 - › CNC centering machines
- » Optical assemblies:
 - › OptiCentric centration test system



METROLOGY

- » surface figure measurement
 - › interferometry
- » surface roughness measurement
 - › atomic force microscopy (AFM)
- » measurement of angular and geometrical tolerances
 - › precision goniometer ($\pm 1''$)
 - › multi-sensor coordinate measuring machine with micron accuracy
- » centration measurement
- » thickness measurement
 - › non-contact ($\pm 1 \mu\text{m}$)
- » surface defect inspection
 - › 100% testing · DIN ISO 10110 and MIL standards

OPTICAL MICROSTRUCTURES

DEFINED AND STRUCTURED

We are your partner for sophisticated, customized optical microstructures.

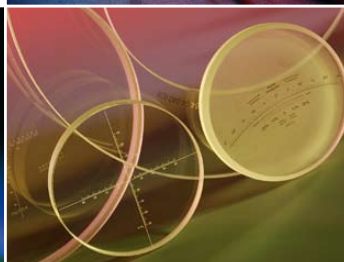
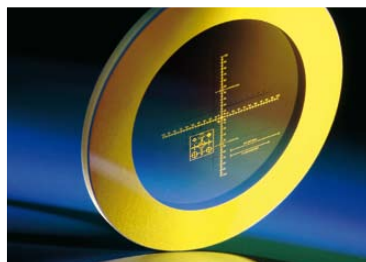
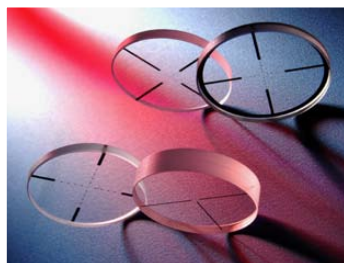
We have the expertise and the technical facilities to carry out the entire development and production process in house. This ensures a consistently high quality in the production of single pieces and small batches as well as in high-volume serial quantities. Depending on your specific application, you have the flexibility to select amongst a variety of substrate options and surface finish quality.

Continuous advancement in our technology, investments in modern equipment in all areas of production, our highly skilled team with extensive experience and the superior quality of our products have made us one of the leading suppliers of optical microstructures worldwide.

PRODUCTS

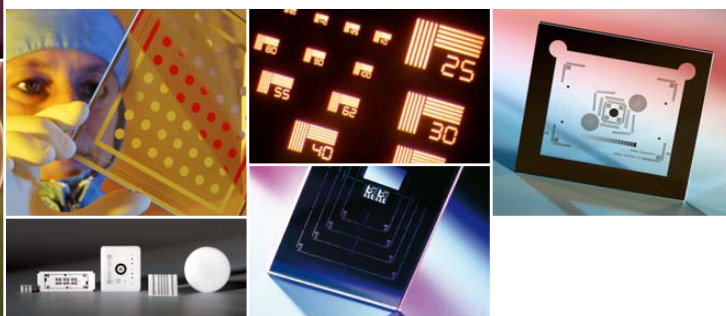
RETICLES AND SCALES

- » stage micrometers and eyepiece micrometer scales
- » graticules, reticles, crosshairs
- » pinholes, apertures
- » gratings
- » geometrical beam splitters



CALIBRATION AND RESOLUTION TARGETS

- » calibration plates, resolution targets
- » USAF resolution targets — siemens stars
- » available for applications in reflected light or transmitted light

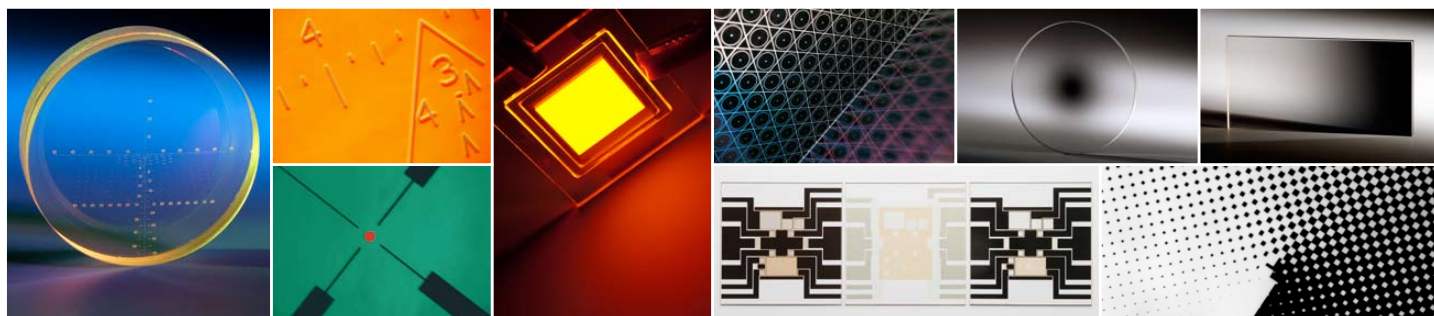


ILLUMINATED STRUCTURES

- » etch and fill reticles
- » chrome covered etch and fill reticles
- » OLED microstructures

SPECIAL MICROSTRUCTURES

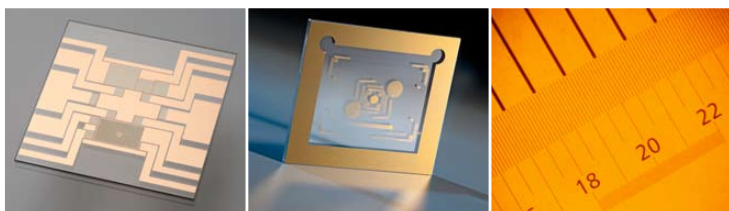
- » micro lens arrays
- » micro aperture pinhole plates
- » broad band low reflective chrome for different wavelengths
- » conductive patterns
- » variable ND-Filters, grey scales



TECHNOLOGIES

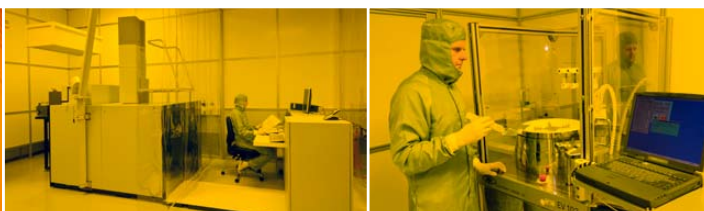
LAYOUT DESIGN

- » consultation and layout design according to customer specification



ELECTRON BEAM LITHOGRAPHY

- » exposure of mask blanks or glass wafers by e-beam structure dimensions down to 0.6 μm



PHOTOLITHOGRAPHY

- » overlapping of several structure layers, structure dimensions down to 1.0 μm using stepper and mask aligner technology



SPUTTERING

- » broadband low absorption AR coatings
- » HRC, LRC (high & low reflective chrome) copper, aluminum, et al.
- » broadband LRC with high optical density



ETCHING AND FILLING

- » wet etching and plasma etching of chrome layers
- » filling of the structures
- » production of illuminated scales and reticles
- » etching of glass by plasma and HF



MECHANICAL MACHINING

- » dicing
- » centering
- » chamfering



CEMENTING AND ASSEMBLY

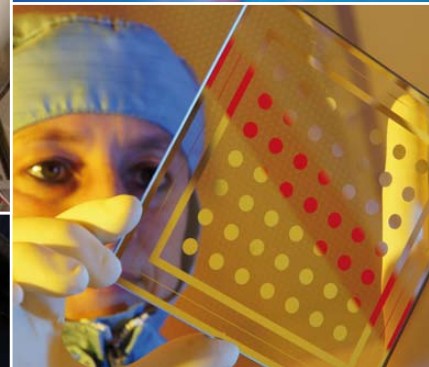
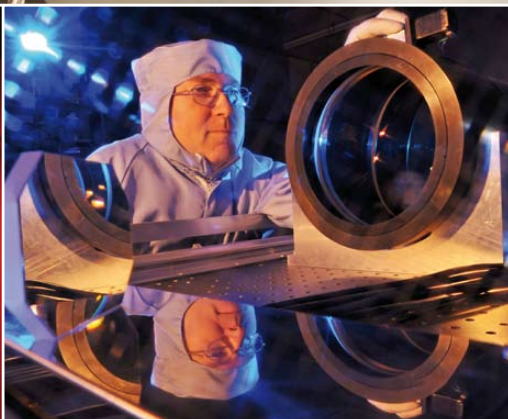
- » cementing of cover glasses or other components
- » assembly in mounts and integration into complete systems



SUBSTRATE OPTIONS

- » microstructures can be created on a variety of substrate materials (fused silica, ceramics, glass ceramics, white flash opal glass and IR materials).
- » our standard materials: B270 superwhite (thickness in mm: 1.0/1.5/2.0/3.0 \pm 0,1) and D263T thin glass (thickness in mm: 0.145/0.17/0.21/0.30/0.4 \pm 0,02/0.55 \pm 0,05)





COMPANY

POG Precision Optics Gera develops, produces and distributes client-specific, precision optical components and systems for applications covering the entire spectral range.

POG's product portfolio varies from conventional precision optical components and microstructures to complex optical and optoelectronic systems that are utilized in machine vision & lighting, metrology, industrial image processing, medical, sports optics and military applications. Owing to the high quality standard and com-

petitiveness of our products and services, POG has won a worldwide reputation as a technology company leveraging valuable partnerships with research institutions in Germany and abroad.

POG is DIN EN ISO 9001 certified.

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