



- 1 *Diamond turned ellipsoid.*
- 2 *Diamond milled microlens array.*
- 3 *Freeform mirror module with light weight structure, produced in combined manufacturing of diamond turning and magneto rheological finishing.*

ULTRA-PRECISION MACHINING OF OPTICS

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Motivation

Ultra-precision cutting with diamond tools enables flexible manufacturing of various surface shapes in optical quality.

The Fraunhofer IOF develops and qualifies advanced manufacturing technologies for generating complex optical shapes. Even sophisticated requirements given by the optical design are realized with modern machine equipment.

After systematic analysis, the adequate machining technique (diamond turning, fly-cutting, shaping, micromilling) are selected and further developed to fit the particular application.

Local correction and smoothing methods such as magneto rheological finishing (MRF) and computer controlled polishing (CCP) are used for demanding applications in the EUV to VIS spectral range.

Optical components, mirrors

- Rotationally symmetric surfaces
- Complex optical shapes such as parabolic, ellipsoidal, conic surfaces, off-axis aspheres
- Freeform surfaces
- Segmented surfaces

Microstructures

- Microlens arrays
- Reflection gratings, transmission gratings
- Fresnel structures
- Grooves

Moulds

- Replication tools for plastics (hot embossing, injection moulding, UV reaction moulding)
- Tools for glass hot moulding