

# HSKD – Small diameter high-end Optics

## Enabling Technologies for the manufacture of high-end optics

### Advanced Technologies for small diameter Lenses

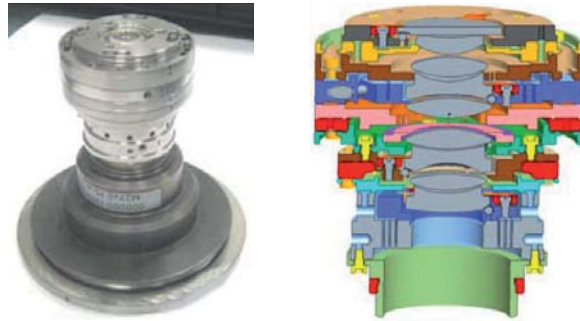
There was and is a constantly growing need for extremely high-end micro lenses, as well as the requirements grow up to levels that seemed to be not possible some years ago. Extremely high-end means here: lens systems operating at DUV 193nm with apertures up to 0.9 and wave front errors down to 1nm and below on the one side, on the other side systems with high-est NA up to 1.6 and operating over the complete VIS spectral range.

Technologies for the normal diameter range >30mm ... 200mm are available even for such high-end lenses, but they cannot simply be scaled down to such small diameters down to 3mm.

Thus, technologies have been developed to enable the manufacture of such components and systems. The main topics of this technology chain are:

- new IBF facility, allowing accurate positioning (<10µm) of a small ion beam spot (Ø 0.5mm) for local correction
- new interferometer for form measurement of small lenses and plane surfaces with <<1nm accuracy (SMT)
- mechanical parts cleaning line for highest demands
- novel framing technologies with focus on stress- and deformation free mounting
- glueless lens framing (for DUV)
- lens stacking technology for micro lens systems
- lens alignment measuring station, measures lens centring <0.5µm and lens distances to 0.5µm in mounted positions

All technologies are already developed, available and used in production processes at the Carl Zeiss Jena GmbH.



### Headlines

Complete technology chain for any high-end micro lens

### Optical Technology

Special manufacture methods for spherical optical elements Ø3...30 mm

Precise ion beam finishing with small aperture tool

Interferometric form measurement of small elements

New stress-free framing technologies for small lenses

Glueless lens mounting

Accurate mounting alignment measurement station

High-end cleaning line for mechanical parts

PSF-based wave front measurement testbench

Applications: mask and wafer inspection lenses for semiconductor industry, high-end high NA microscope lenses

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