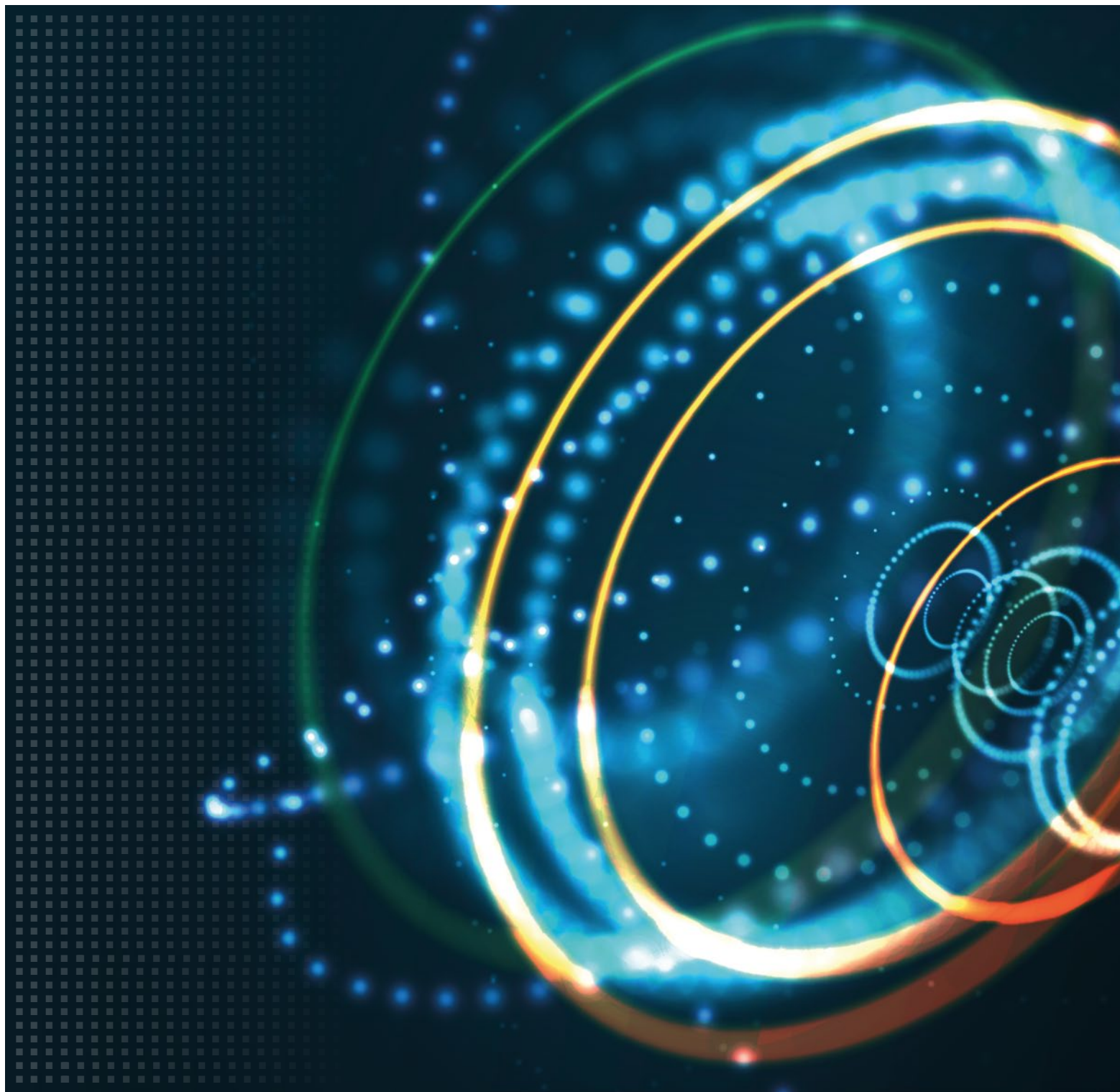


Sensors & Applications
Optics & Laser



More Precision.





MICRO-EPSILON

Micro-Epsilon is a globally active company and a pioneer in the field of industrial measurement technology. For more than 50 years, Micro-Epsilon has developed innovations and unsurpassed solutions for precise measurement and testing. The product portfolio ranges from sensors for displacement and distance measurements to infrared temperature measurement and color recognition to systems for dimensional measurements and defect inspection. Micro-Epsilon supplies the semiconductor and optics industry with sensor solutions at the highest levels of precision.

www.micro-epsilon.com

OPTOCRAFT
OPTICAL METROLOGY

Optocraft develops and manufactures Shack-Hartmann wavefront sensors and system solutions for testing optics and lasers. Both in production facilities and R&D, Optocraft's measurement technology contributes worldwide to the targeted and efficient development and manufacturing of optical systems. The product portfolio ranges from the Shack-Hartmann SHSLab wavefront sensor to measurement modules for integration into production lines and turnkey optical test systems. Optocraft has been a member of the Micro-Epsilon Group since 2018.

www.optocraft.de/en

Sensors and systems for precise optics testing

OPTOCRAFT
OPTICAL METROLOGY



SHSLab wavefront sensors

- Fast single-shot measurement at up to 30 Hz
- Excellent basic accuracy of 2 nm RMS
- Extreme dynamics: 10° tilt and 10 mm local WF curvature
- High spectral bandwidth:
355 nm - 1064 nm (VIS/NIR), 980 nm - 1700 nm (SWIR), 193 nm - 400 nm (UV/DUV)
- High intrinsic stability and reliability
- High-performance, configurable software
- Compact sensors, designs with 90° beam path
- Vacuum suitability



SHSInspect RL modules

- Measurement module for integration into production lines
- Double-pass or reflected light inspection with accuracies of <math>< 10\text{ nm RMS}</math>
- Simple switching of the test wavelength
- Measurement of aspherical wavefronts with several λ PV
- SHSLab wavefront sensor can be used separately

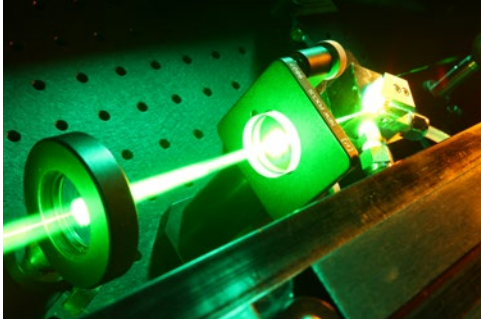


SHSInspect 2Xpass

- Turnkey inspection system for lenses
- Wavefront measurement on-axis and at field points
- Measurement of chromatic effects
- Basic accuracy $\lambda / 20$ peak-to-valley
- Semi-automatic measurement processes
- Measurement of polarization effects

Multifunctional optics testing

OPTOCRAFT
OPTICAL METROLOGY



Wavefront-based alignment of laser systems

The extreme measuring range of the SHSLab wavefront sensors allows wavefront measurement even when the initial state is severely misaligned, which indicates to the operator the direction for further adjustment steps. The suitability for a wide wavelength range (193 nm - 1700 nm) and the high intrinsic stability make SHSLab a universal tool for the characterization of optical systems.

Microscope lens testing

Turnkey SHSInspect systems are used in the qualification of lenses in R&D and production, providing detailed Zernike analysis on-axis and at field points as well as at different wavelengths. The measurement of the transmitted wavefront enables precise determination of the imaging quality as well as active adjustment of the optical system, thus offering crucial advantages over traditional MTF methods.

Inline measurement of focus-variable lenses

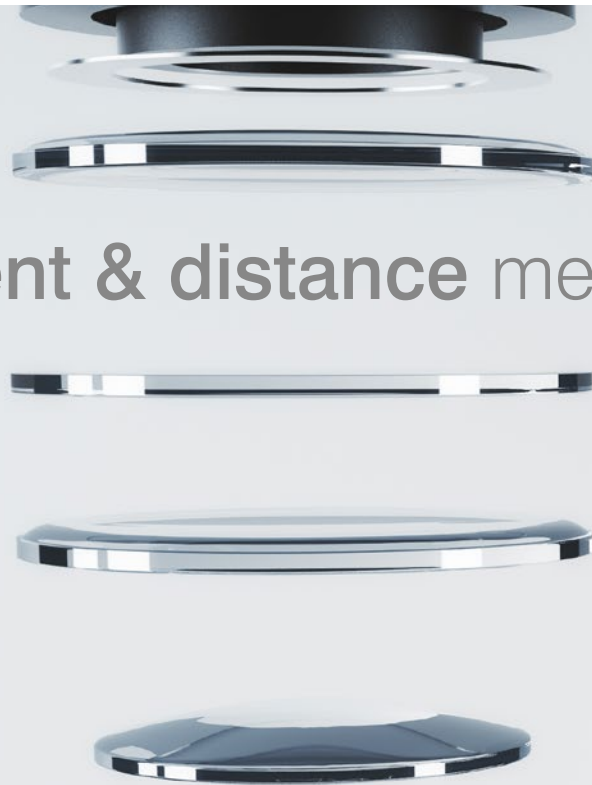
Wavefront measurement is based on a single camera image and is therefore fast and intrinsically stable. Optocraft's wavefront measurement modules thus enable automated inline measurement of imaging quality and refractive power. The flexible data interfaces of the Shack-Hartmann software allow easy and fast integration into production lines, both mechanically and in relation to software.



“As a global leader in production of high precision optics and systems for demanding customers, e.g. in the semiconductor or medical field, every day we are working at the limit of what is feasible. Oftentimes, metrology for online quality control of our products during manufacturing, assembly or during the final testing is not commercially available. Therefore, we depend on partners who develop and deliver customized innovative metrology solutions. This requires a high degree of creativity, know-how in physics and a maximum amount of flexibility. Also when facing demanding tasks, Optocraft fulfills these requirements with strong personal commitment and in a professional way.”

Thomas Thöniß
Qioptiq

Displacement & distance measurements



Confocal chromatic sensors for distance and thickness measurements

- Distance and thickness measurements with high resolution
- Ideal for automation & production monitoring
- Surface-independent, ideal for mirrors and glass
- Extremely small, constant measuring spot captures the smallest details and structures
- High-performance portfolio for industrial series applications: from compact sensors to high-performance controllers



High precision white light interferometers for distance & thickness measurements

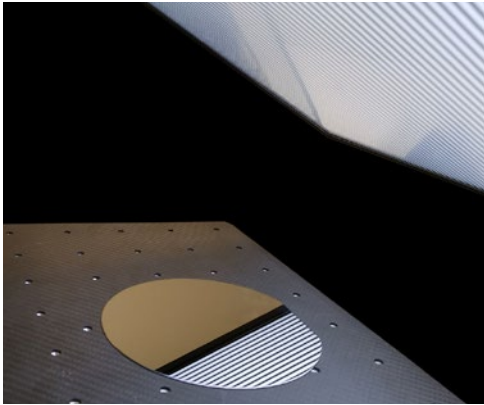
- Absolute distance measurements with nanometer accuracy
- Distance-independent thickness measurements and multi-layer thickness measurement
- Miniature light spot of $10\ \mu\text{m}$ for the detection of smallest details
- Easy configuration via web interface
- Active temperature control in the controller
- High-performance portfolio for industrial measurement tasks and semiconductor machine building



3D sensor for measurement and inspection of shiny surfaces

- 3D measurement and inspection of strongly reflecting and glossy surfaces
- Reliable detection of the smallest defects $< 1\ \mu\text{m}$
- Inspection rate < 2 seconds per measuring position
- High-precision measurements, flatness deviation in the submicron range
- Inline use or robot-based testing
- Large measuring field
- Powerful 3DInspect software

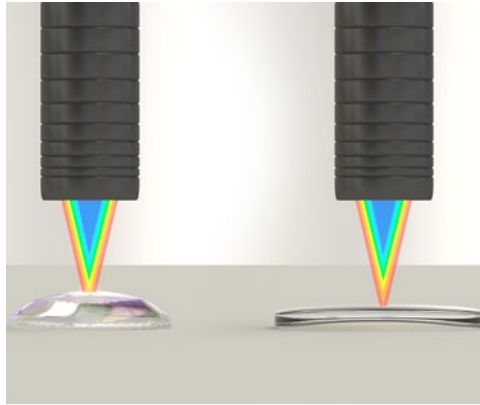
Measurement of dimensional variables



Surface inspection of mirrors

For optical components such as mirrors, a high surface homogeneity is required. reflectCONTROL sensors are used to inspect the reflective surfaces. They detect and classify surface deviations on the mirror surface.

Sensor: reflectCONTROL Sensor



Curvature measurement of optical glass

In order to meet production tolerances, the contour of optical lenses such as eyeglass lenses or objectives is measured using confocal chromatic sensors. Based on the distance values, statements about the surface properties can also be made. Furthermore, the center thickness of the lens is determined. Due to the large tilt angle the sensors can also detect highly curved surfaces.

Sensor: confocalDT



Camera autofocus measurement

Confocal sensors measure the distances between the autofocus lenses to provide the camera with the highest possible image quality.

Sensor: confocalDT



Why Micro-Epsilon?

- High-tech measurement technology - made in Germany
- Consultation, development, production and implementation from a single source
- Worldwide industry and application support
- Solution competence from catalog to OEM series
- Technological expertise from more than 50 years of sensor development with over 400 active patents and patent applications
- Real added value and competitive advantages for your application

Precise testing of function and geometry - Sensors and Systems from Micro-Epsilon and Optocraft

OPTOCRAFT
OPTICAL METROLOGY

ME
MICRO-EPSILON



With concentrated expertise and a powerful product portfolio,
we are here to solve your measurement tasks — get in touch!

MICRO-EPSILON MESSTECHNIK GmbH & Co. KG · +49 85 42 168-0 · info@micro-epsilon.com

OPTOCRAFT GmbH · +49 9131 691 500 · sales@optocraft.de