



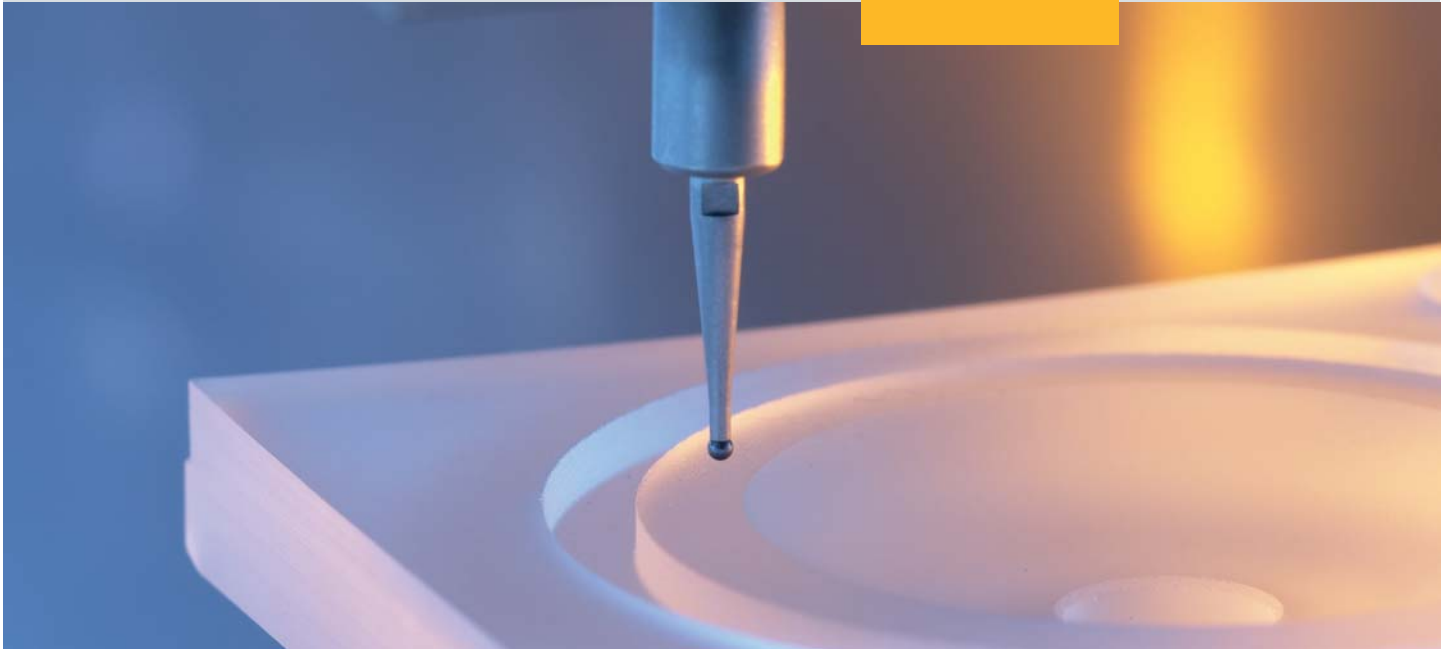
OMM

On-Machine-Metrology

OMM sets the standard for next generation high precision optical manufacturing.

satisloh[®]

OMM
long-term process stability and throughput in production are key. Each lens is measured inside the machine, saving on time and labor.



OMM enabling optimum process control

High resolution, tactile On-Machine-Metrology eliminates errors introduced by transporting the work piece between the CNC machine and separate metrology equipment. It also makes production much faster, hence greatly improving cost-effectiveness in manufacturing.

Due to the increasing accuracy demands in optics, metrology is a key factor in optical manufacturing, and often a bottle-neck in production. Especially for the production of aspheres and free-form optics, a number of iterations consisting of alternating metrology and surface grinding or polishing are required, in order to achieve the desired final shape accuracy. These iterations inevitably introduce errors caused by moving and re-positioning the work piece.

The new OMM features high resolution, tactile On-Machine-Metrology. The sensor is built into the tool head of a CNC machine, moved by the CNC-axes. Besides high resolution capability, this setup enables measurements with the work piece in the same position, where it is machined, i.e. without the necessity to move or re-position the work piece.

The sensor can be rotated by ± 90 degrees and has 100 mm of Y-axis and 600 mm X-axis travel. The very compact sensor is mounted in a small housing.

OMM is available in combination with the SPM-60 and SPM-140 CNC grinders, and offers a resolution capability of $0.1 \mu\text{m}$ on ground surfaces.

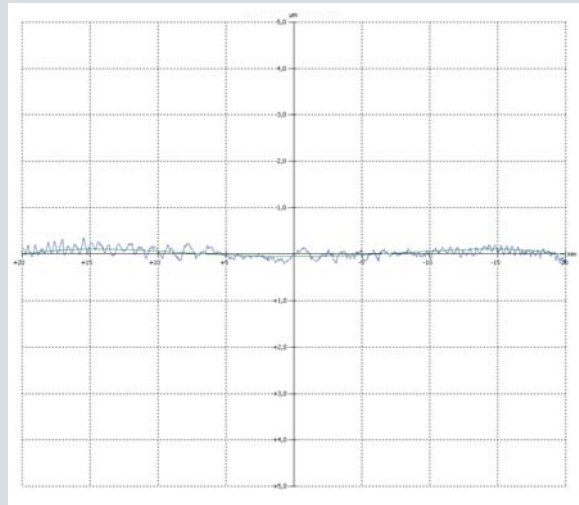
Accurate measurements require calibration with a test piece of the same dimensions as the object to be measured. The following measurements are then taken as a comparison to this reference.

Measurement routine

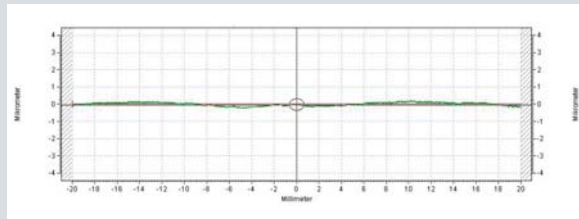
The measurements are taken in comparison to a reference. While the machine features linear and cross compensation tables for the axes errors, accurate measurements require calibration with a reference piece of the same dimension as the object to be measured. The machine is equipped with high precision optical encoders; all drives and the cooling liquid are temperature controlled.

Measurement modes:

- Meridian Scan comparison-measurement
- Run-out-measurement for calibration with test-piece
- Calibration with reference-measurement
- Center-thickness-measurement
- Position-measurement (depending on machine)



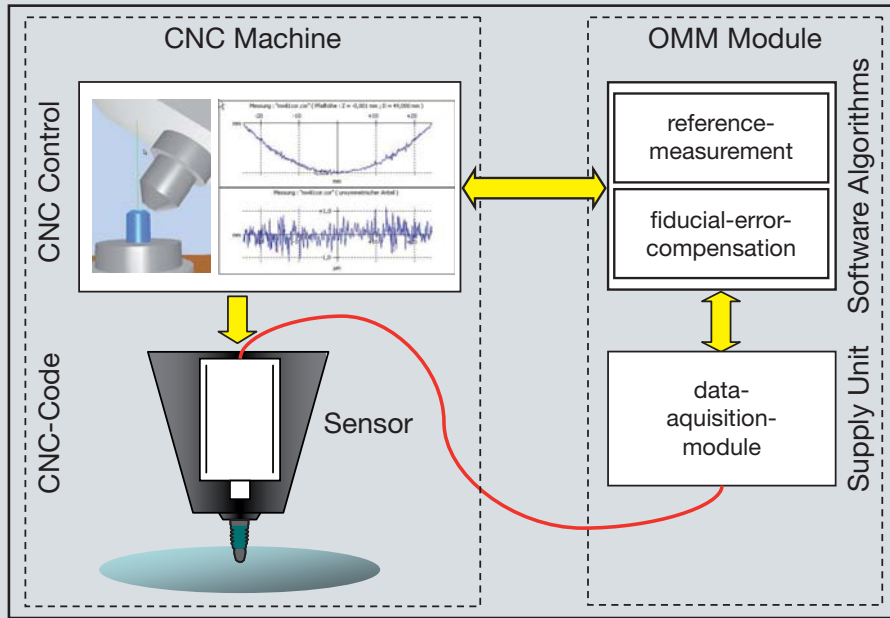
Satisloh DataCorrect Software



TalySurf PGI 1240

Meridian of a ground lens using a SPM-60 machine with OMM (top), and comparison to the measurement of the same lens using a TalySurf PGI 1240 (bottom). Both measurements show the same shape.





The Satisloh OMM sensor motion is controlled by Bosch Rexroth MTX system. The measurement results are displayed via Satisloh DataCorrect Software.

Technical Information:

Technical Data:

- Sampling-rate up to 200 Hz
- Typical measurement time < 1 min
- Probe-travel ± 2 mm
- Stylus-radius 1.5 mm

The OMM sensor system comprises:

- Data-acquisition-module
- Satisloh OMM Control software module for selection of measurement modes and parameters, calibration, etc. from the main GUI.
- DataCorrect software for OMM data display and control of corrective grinding.
- Digital I/O board (for MTX PC)
- Requirements:
Satisloh Asphere software module.
Stable environmental conditions.
A continuous shape object geometry (depending on lens geometry some restrictions may apply, e.g. for deep concave and very thin lenses).

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