Application Note

Fries Research & Technology
Rauheit Kontur Topographie

Measuring instrument for lens holders (components for step and scanning systems)

FRT GmbH presents a new measuring device for high-precision optical analysis of shape tolerances on rotationally symmetrical components. The system has been especially developed for the measurement of lens holders used for wafer scanners and steppers. Short measuring times, large measuring ranges and robust construction are the main characteristics of the instrument. Thanks to its easy use (Windows™), it is the ideal instrument for process control in the production department. At the same time, the comfortable and extremely powerful software provides the development department with a detailed measuring data analysis.

Measuring tasks

- Flatness measurement for any measuring position on top or rear side of components as function of the angle of rotation.
- Parallelism measurement (two flatness measurements can be referenced against each other).

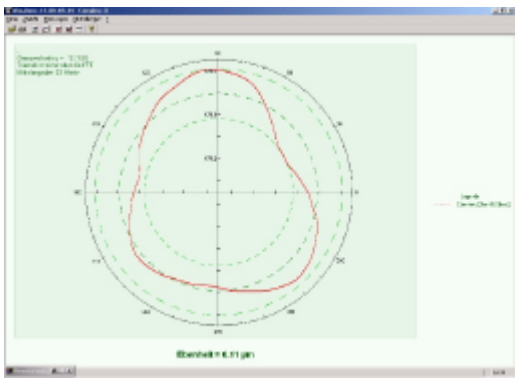

Fig. 1 Example of a flatness measurement

- Difference between maximum and minimum thickness of the component as function of the angle of rotation.
- Roundness measurement at the rim.
- Radial inclination of two neighbouring plane tracks compared to the ideal plane.
- Determination of the radial and the vertical deviation of position of the roof edges of a lens holder.

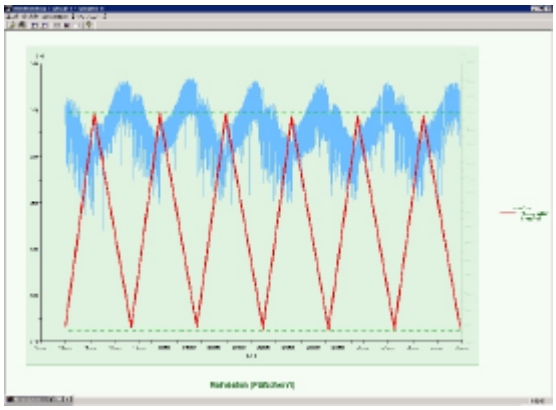

Fig. 2 Example of a roof edges measurement (rawdata)

- Concentricity of the roof edge.
- Inclination of the plane caused by the roof edges in comparison with a reference plane.

System construction and principle of measurement

On a granite base plate there are mounted an air-bearing rotation stage with a torque driving element and a four-axle portal robot. A plane plate, tiltable by means of micrometer screws, is mounted onto the rotary element. This adjustment allows the alignment of the lens holder with the measuring plane. By this tumbling of the test sample is compensated. With the help of three rollers, the lens holders are placed and centred on the plane plate. After entering the part number and selecting the measuring program in the computer, the measurement is started.

The sensor moves to the first measuring position and starts with the non-contact acquisition of measuring data. The computer controlled air-bearing rotation stage is put into action. Following the selected order all measuring positions are now approached and measured step by step. Two non-contact sensors with a measuring range of approx. 300 µm are used. The sensors are mounted onto the high-precision four-axle portal robot. A small piezo-actor on each sensor mount moves the sensor with high frequency along a 100 µm range orthogonal to the measuring direction.

Fig. 3 Gauge with user

This combination allows high-precision measurements to be performed rapidly and with a good resolution, while suppressing grooves.

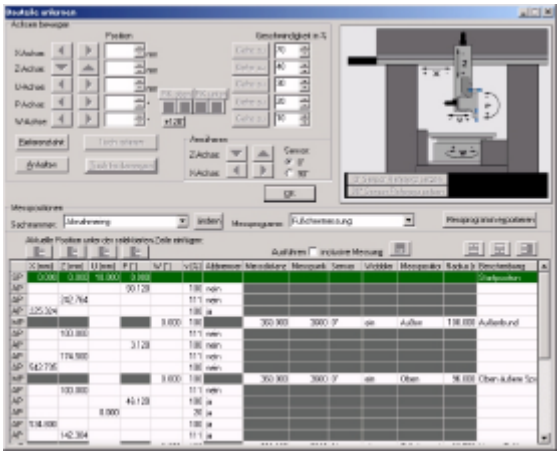

Fig. 4 Teach-in-dialogue

The measuring positions are approached by high-precision linear drives of the portal robot. An automated measuring routine can be easily programmed for each type of test samples. After starting the routine, all measuring positions are full automatically approached and measured.

Specifications

Geometry and weight of the lens holder

Outer diameter:	100 mm - 600 mm
Inner diameter:	40 mm - 370 mm
Height:	10 mm - 150 mm
Weight:	0,5 kg - 50 kg

Measuring system

Reproducibility:	down to ±0,05 µm
Accuracy:	down to ±0,08 µm

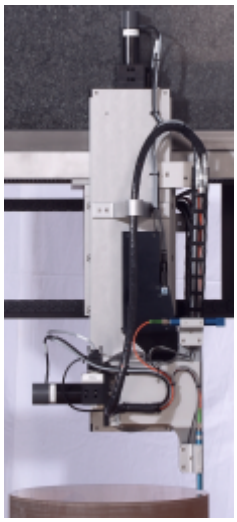

Fig. 5 Arrangement of the sensors

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