MarSurf LD 130 Aspheric / LD 260 Aspheric

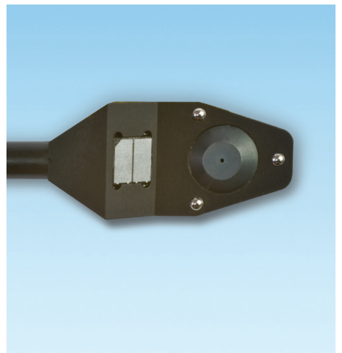
Advantages

Checking topography during the first machining operations
- Early recognition of deviations - Saves time-consuming corrections.
- Output of differential profile in a machine-readable format for control of the processing machine (closed loop)

Increased flexibility
- Rotation-symmetric objects of spheres, aspheres, conics, etc can be measured with one measuring system. No additional investments are necessary!
- High measuring range up to **260 mm**
- High measuring speed and dynamics (up to **10 mm/s** for large lenses / down to 0.02 mm/s for micro lenses)
- Tilting of the instrument possible (+ / - 45°)
- Probe tip can be positioned automatically

New probe system - probe arm LP D with bionic design
- Higher dynamics due to increased stiffness and damping and lower moment of inertia:
  New: - Optimized mechanical design
  - Innovative material selection
- Probe arm with integrated chip:
  - Detection and identification of the probe arm,
  - Verification of the correct mounting position,
  - Probe arm provides its parameters directly.

Your results are correct
- The highly precise MarSurf LD 130/260 is the basis for precision measurements of your workpieces. The vertical resolution of 0.8 nm (0.03 µin) and form deviations of less than 100 nm (4 µin) guarantee an exact reproduction of your asphere.
- Probe arm change without new calibration.
- Measurement of steep sided aspheres possible.



Technical Data MarSurf LD 130 Aspheric/ LD 260 Aspheric

Properties of the horizontal axis (X)

Traversing length	0.1 mm up to 130 mm / 260 mm
Positioning speed	0.02 mm/s up to 200 mm/s
Measuring speed	0.02 mm/s to 10 mm/s; for roughness measurement recommended: 0.1 mm/s to 0.5 mm/s
Measuring point spacing	0.05 µm up to 30 µm, adjustable
Max number of points in one scan	2.6 million points (LD 130) 5.2 million points (LD 260)
Resolution	0.8 nm (0.03 µin)
Uncertainty X-axis display	± (0,2+l/1000)µm; l in mm

Technical data probe system (Measuring direction Z+ / Z-)

Probe measuring range	13 mm (1 in) (100 mm probe arm) 26 mm (2 in) (200 mm probe arm)
Resolution	0.8 nm (0.03 µin)
Measuring force	0.5 mN up to 30 mN

Contour - display deviation

Distance measurement **EA**	$MPE_{EA} = \pm$ (1,0+l/150)µm, l in mm
Radius measurement R_K	
R smaller 10 mm:	$MPE_R = \pm$ 1,0 µm
10 mm < R > 30 mm:	$MPE_R = \pm$ (0,17+R/12) µm
R > 30 mm:	$MPE_R = \pm$ (-18+R/7) µm

Option 3D-measuring station

Measuring time	5 to 10 min, at Ø up to 100 mm
C-axis: Measuring and positioning speed	< 120° /s
C-axis: Axial- and radial run out	< 100 nm, at 50 upr

General data

Operating temperature	+ 15°C to + 35°C
Suggested working temperature	20°C ± 2K
Temperature change	< 0,5 K/h

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MarSurf

NEW: MarSurf LD 130 Aspheric / LD 260 Aspheric

High-precision 2D / 3D Measuring Station for Measurement and Evaluation of Optical Components

- **Measuring range up to 260 mm**
- **High measuring speed**
- **Chip-coded bionic probe arms**

Mahr

EXACTLY

MarSurf LD 130 Aspheric / LD 260 Aspheric

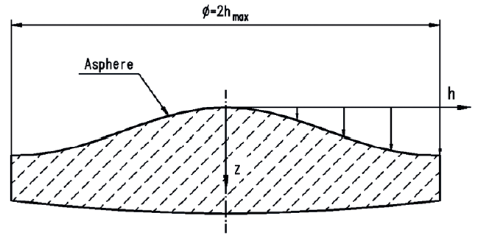
Asphere Definition

An aspherical surface is a refracting or reflecting surface which deviates from a spherical surface.

The mathematical description of the sagitta Z (dependance of the vertical height to the horizontal coordinates) of aspherical surfaces based on a conical section is given in the following equation:

$$z(h) = \frac{\frac{h^2}{R_0}}{1+\sqrt{1-(1+k)\left(\frac{h}{R_0}\right)^2}} + \sum_{n=2}^{5} A_{2n} \cdot h^{2n}$$

R_O = Radius of curvature
h = Radius of the area of application of the asphere
k = Conical constant
A_i = Aspheric coefficients

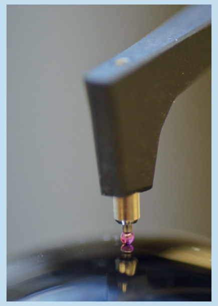


Description

An increasingly more compact and favorable system design is demanded on optical systems such as zoom lenses, optics for DVD drives and lenses in the cameras of mobile phones, for example. For this purpose, in addition to classic spherical lense shapes (sphere-shaped), the optics industry is increasingly producing aspherical (not sphere-shaped) lenses.

The evaluation program serves to analyze measurements on spherical surfaces with Mahr contour measuring units. Measured profiles are imported, the nominal form of the aspheres are defined and the residual error is determined compared to the nominal form. The data of the determined differential profile is made available in a machine-readable format for readjustment of the processing machine (closed loop).

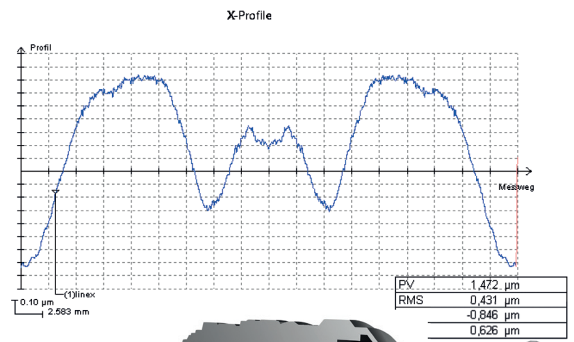
In comparison to the laser interferometer, the tactile measuring technology also allows 2D and 3D measurement of optically rough surfaces, so that testing and correction is possible already early on in the production process (grinding).



MarSurf LD 130 / 260 Aspheric - 2D-Measuring

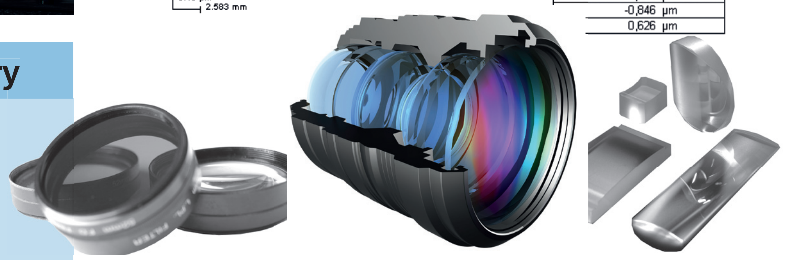
Measuring Run

- For the 2D-measurement a linear scan over the zenith of the asphere is performed.
- Data collection of the aspherical contour
- Comparison of the nominal contour with the measured data
- Result parameter PV, RMS, slope error
- Export of the differential profile for the manufacturing machines (Closed Loop)



Additional applications in optical industry

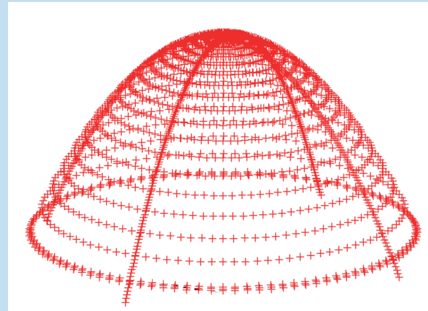
Contour and roughness measurement of:
- spherical and aspherical lenses
- cylinder lenses
- lens mounts
- housing and other mechanical components



MarSurf LD 130 Aspheric / LD 260 Aspheric - 3D-Measuring

Measuring Principle

For a 3D measurement first two parallel linear profiles offset by 90° are measured across the zenith of the asphere. Second several concentric circular profiles are gathered by turning the C-axis. These measured points are used to create the topography.



As the probe arms can be positioned automatically, i.e. lifted-off and contact, even discontinuous surfaces, e.g. with a hole in the center, can be measured.

The use of the machine in a vibration-damped cabinet keeps ambient influences such as vibrations and impurities away from the measuring object.

Measuring Run

Before starting the measurement, you select the nominal form type and set the parameters of the expected nominal asphere. In the next step, the measuring data is recorded and compared to the defined nominal asphere.

As results, the RMS value, PV value and slope error are shown.

In the software, the individual parameters such as the radius of curvature R0, conical constant k and the aspheric coefficients Ai can be adjusted to the measuring values when fitting the nominal asphere into the fit asphere.

In addition to spheres and aspheres also other rotational symmetric objects can be measured and analysed. For the nominal shape the sagitta table or a 3D-point cloud can be used. The 2D-Scans and the topography can be exported for corrections in production machines.

The differential profile between the determined measuring values and the nominal asphere is output as a color-coded height picture.