MarSurf

MarSurf CWM 100

3D Measurement System
Confocal microscope combined with integrated white light interferometer

- 0 +

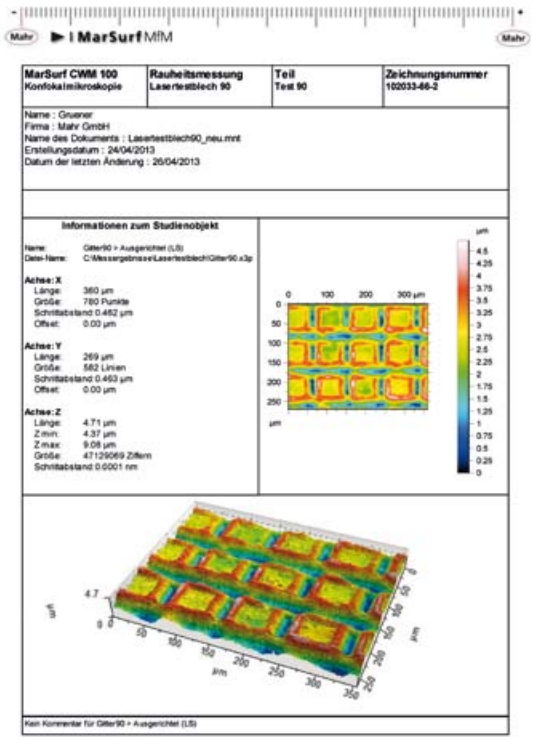
Mahr

EXACTLY

- High precision with subnanometer resolution
- Ideal for technical, optical, electronic and mirrored surfaces
- 2D surface analysis and measurement evaluation
- Topgraphic 3D surface analysis and measurement evaluation
- Short measuring time
- Microscope field of view, easily enlargeable by fully automated stitching procedure
- Fully automated multi-position and multi-tasking measurement runs

MarSurf CWM 100 for Metal Surface Analysis

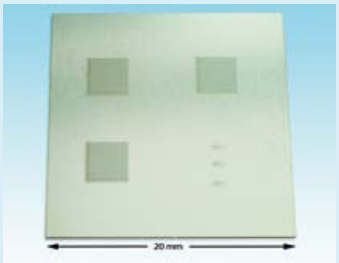
Laser structured metal surface



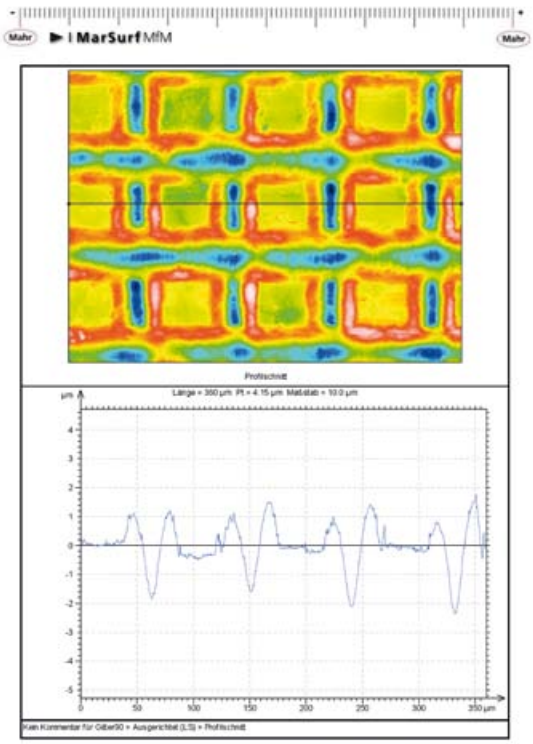
Material processing with laser is state of the art for many materials. Laser ablation is suited especially for fine structuring. Depending on the type of laser and the focus spot size, structures of a few micrometers can be created. However, a laser works differently than a mechanical tool: Edges can be sloped, treated surfaces will have a certain roughness and all kinds of heat effects can occur, especially cracks and meltings. Hence, for every material processing with laser, the laser characteristics must be adapted.

The **MarSurf CWM 100** and its topographic evaluation software enables a perfect analysis of almost all laser treated materials and structures. The true dimensions are measured and roughness figures or surface parameters can be evaluated on any line or area.

The topographical 3D analysis shows cracks and all kinds of thermal effects like meltings and gives a clear feedback for a perfect adjustment of the laser characteristics like pulse length, energy per pulse etc. This enables an optimized quality of your laser processed product.



MarSurf CWM 100 for 3D analysis of laser ablations on steel

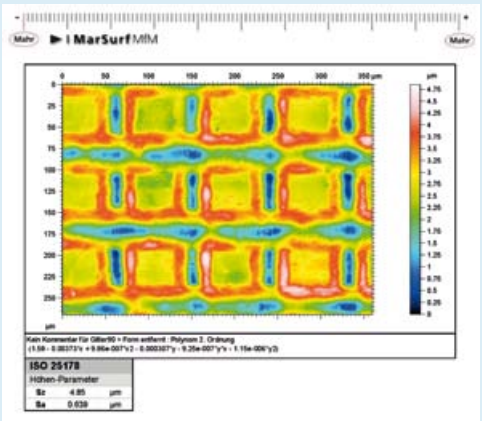


Measuring run

The measurement of the object surface can be performed by the confocal microscope or the white light interferometer sensor, providing the topography of the measured range.

The measured topography can be compared with the nominal structure and tested for cracks and meltings. As a further result, a profile along freely selectable lines is provided, giving information about the roughness and waviness of the workpiece.

These results allow a clear and unique control and optimization of the manufacturing process.



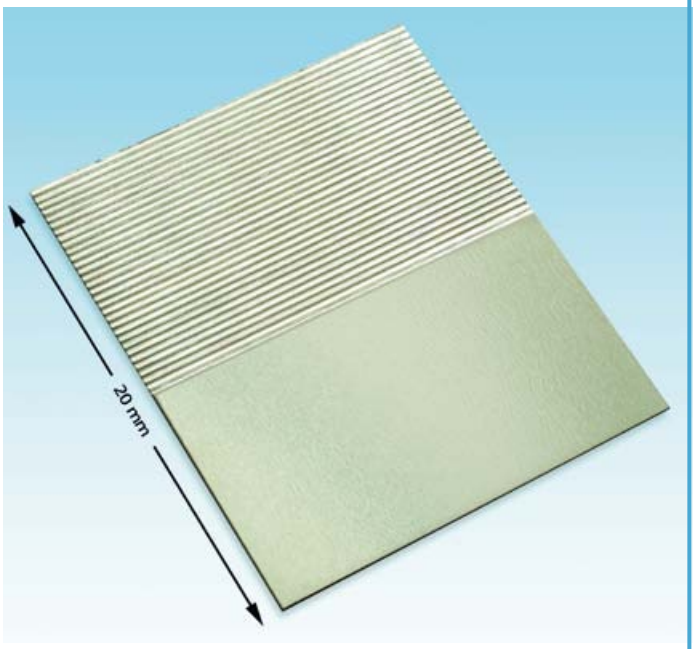
MarSurf CWM 100 for Metal Surface Analysis

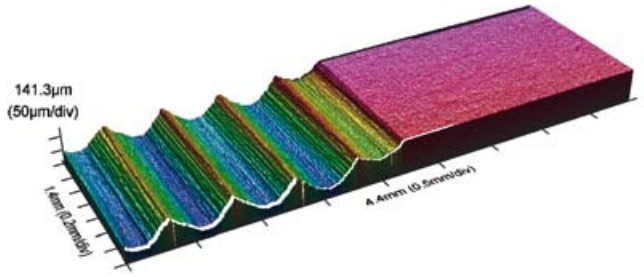
Rough ground and structured surfaces

Grinding, polishing and measurement of structured surfaces is a common process. While 2D profilometry is still the standard, topographical 3D analysis of surfaces is being used more frequently.

The surface properties are defined with 3D parameters. While fine, soft and shiny structures can be profiled to a high degree with white light interferometry; rough and coarse structures with steep profiles, however, cause a problem.

With the flexible CWM 100, even such structures can be analyzed quickly and reliably with the confocal sensor and using the automatized stitching procedure even larger areas can easily be analyzed.

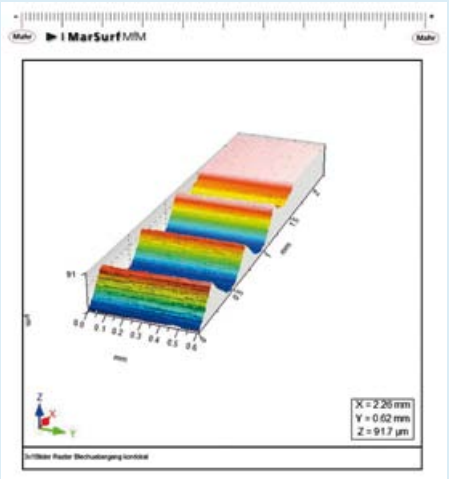


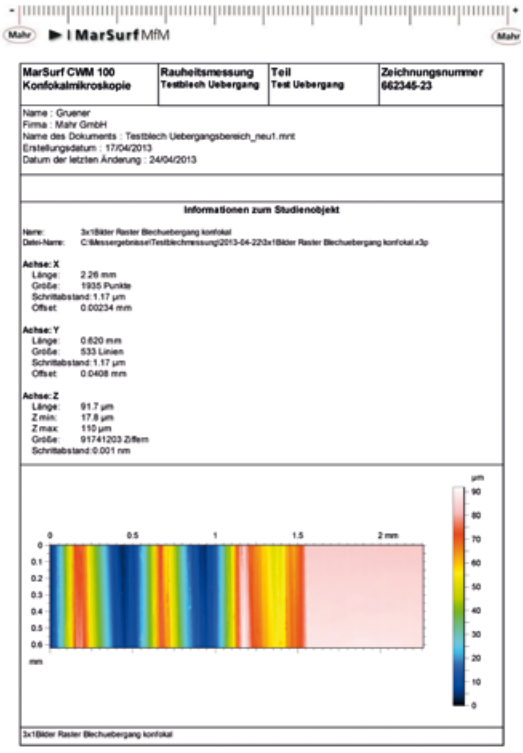


MarSurf CWM 100 for 3D analysis of a rough ground steel surface

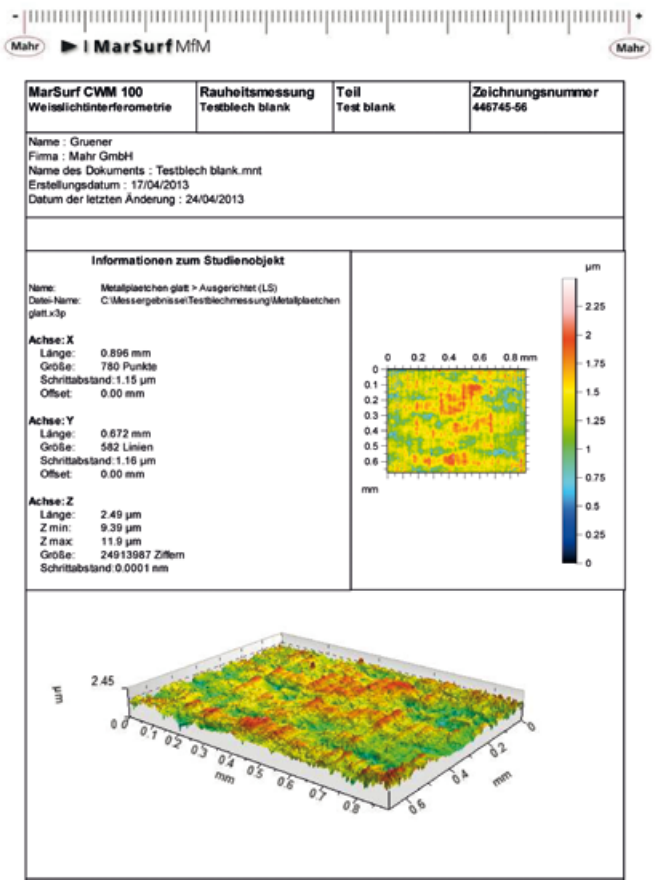
Measuring run

An automatically running measuring process incorporating the stitching of several individual fields of views perfectly shows in a 3-dimensional view the changeover from a smooth and flat area to a roughly ground area. This gives a much clearer impression of the real surface as a 2-dimensional profile and allows the manufacturer to perfectly adjust the grinding process for an optimal result.





MarSurf CWM 100 for Metal Surface Analysis

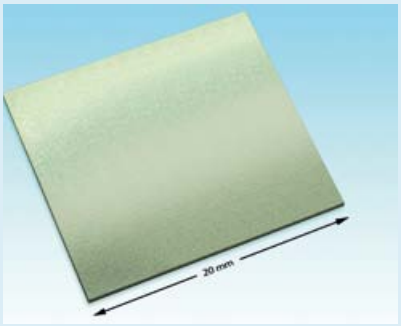


Finely ground and structured steel surfaces

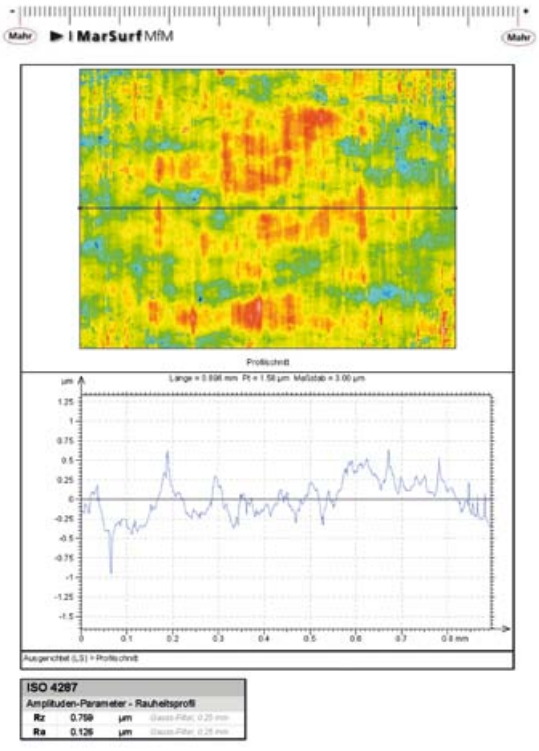
Fine grinding, polishing and measurement of structured surfaces is a common process. While 2D profilometry is still the standard, topographical 3D-analysis of surfaces is being used more frequently. The surface properties are defined with 3D parameters.

Fine polished and shiny structures can be measured well with white light interferometry. The flexible CWM 100 with its variety of lenses with different magnifications and fields of view can also analyze such structures precisely, quickly and reliablly.

Even larger areas can easily be analyzed thanks to its automatized stitching procedure.



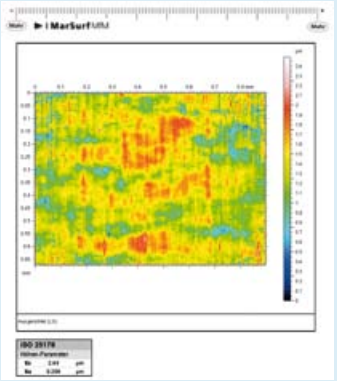
MarSurf CWM 100 for 3D analysis of fine grinding on steel



An automatically running measuring process with stitching of several individual fields of view shows perfectly the true surface in a 3-dimensional view.

This gives a much clearer impression of the real surface as an only 2-dimensional profile and allows the manufacturer to perfectly adjust the grinding and polishing process for a perfect result.

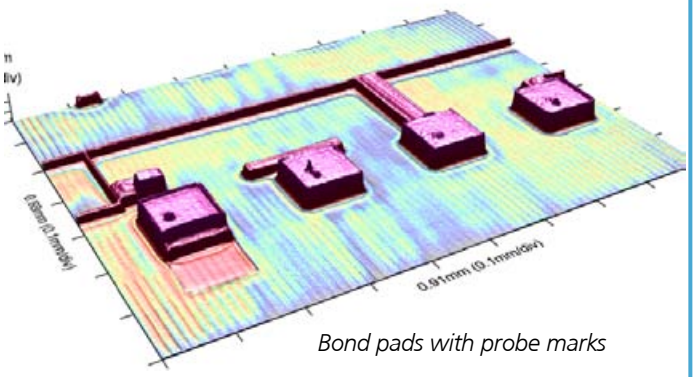
The standardized 3D and 2D surface parameters are easily evaluated with the MarSurf MfM software along freely selectable lines or in freely selectable areas.



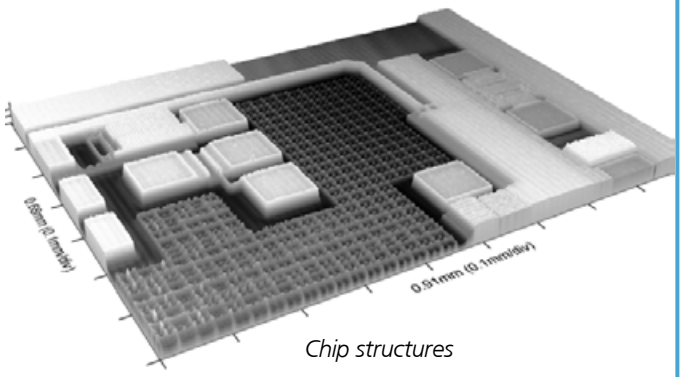
MarSurf CWM 100. Application with Confocal and/or Interferometric Sensor System

Wafer analysis and measurement

In the semiconductor industry, precise, fast and reliable quality assurance is a must.
This applies to the production of wafers.
Fast, automatic inspection of selected areas on a wafer by white light interferometer or with the confocal mode can provide a perfect analysis of the structures on the wafer.
Due to the flexibility of the CWM 100, finest structures can be analyzed interferometrically and for coarse structures or elements like dies, bonding structures etc. the confocal mode can do the job.



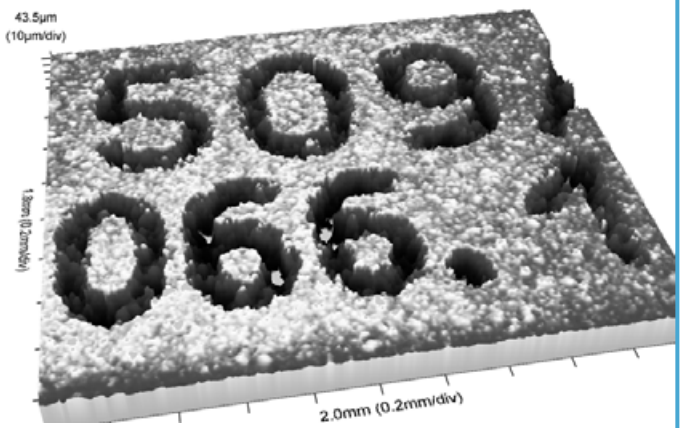
Bond pads with probe marks



Chip structures

MarSurf CWM 100. Parts inspection: Laser marking

Measurement and inspection of semiconductor elements by confocal sensor: 3D evaluation of surface structures and along profile lines. Typical laser markings with deep and rough structures can also be easily inspected and judged as to their quality.



MarSurf CWM 100 for Aspherical Micro Lenses

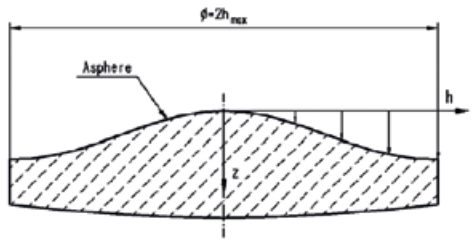
Asphere definition

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:

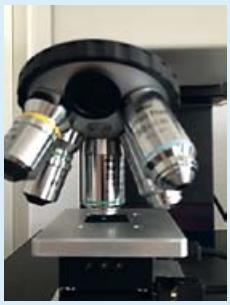
$$z(h) = \frac{\frac{h^2}{R_0}}{1+\sqrt{1-(1+k)\left(\frac{h}{R_0}\right)^2}} + \sum_{n=2}^{5} A_{2n} \cdot h^{2n}$$

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

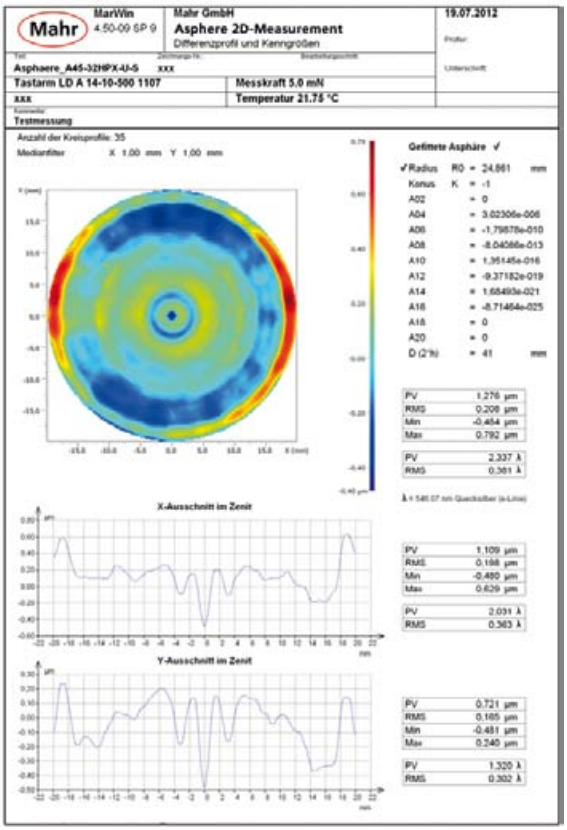


An increasingly more compact and favorable system design is requested from microlenses such as lenses for closed circuit television and lenses in the cameras of mobile phones, for example. For this purpose, in addition to classic spherical lense shapes (sphere-shaped), the optics industry is increasingly producing aspherical (non-spherical) lenses.

The Mahr aspheric software (MarSurf, option "Asphere") performs measurements on spherical surfaces. Measured topographies are imported, the nominal form of the aspheres are defined and the residual error is determined compared to the nominal form. The result is a feedback about the manufacturing quality of your product and for injection molds.



MarSurf CWM 100. 3D Measuring - Evaluation of Aspheric

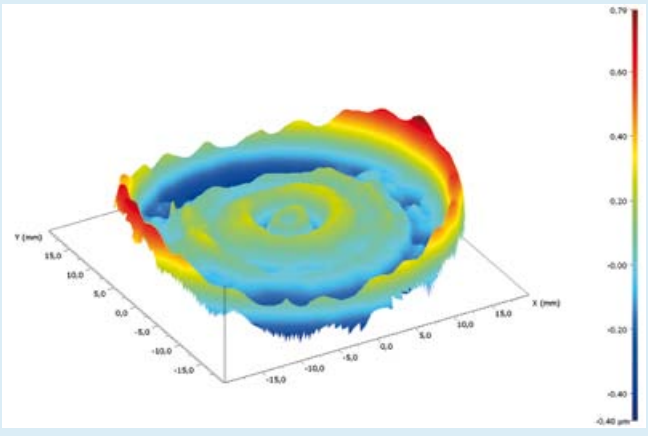


Measuring run

The measurement of the object surface can be done by confocal microscope or white light interferometer to attain the topography of the measured range.

With Mahr aspheric software (MarSurf, option "Asphere"), the measured topography will be compared with the nominal asphere data and both shapes will be best fitted.

The result of that is a differential profile that gives you information about the quality of the microlens manufacturing process.

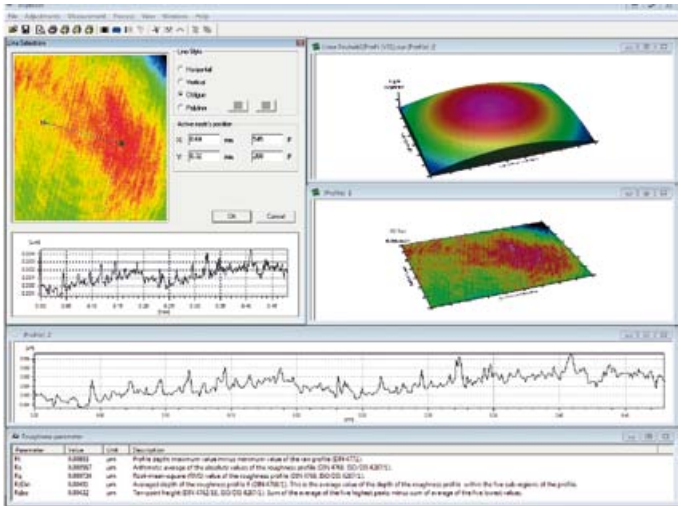


MarSurf CWM 100. Other Application with White Light Interferometer

Roughness measurement on optical surfaces

Fast and precise roughness measurement of optical surfaces by white light interferometer Evaluation of:

- PV (Pt)
- rms (Rq)
- Ra
- Rz
- and other roughness parameters



Polished aspherical lens

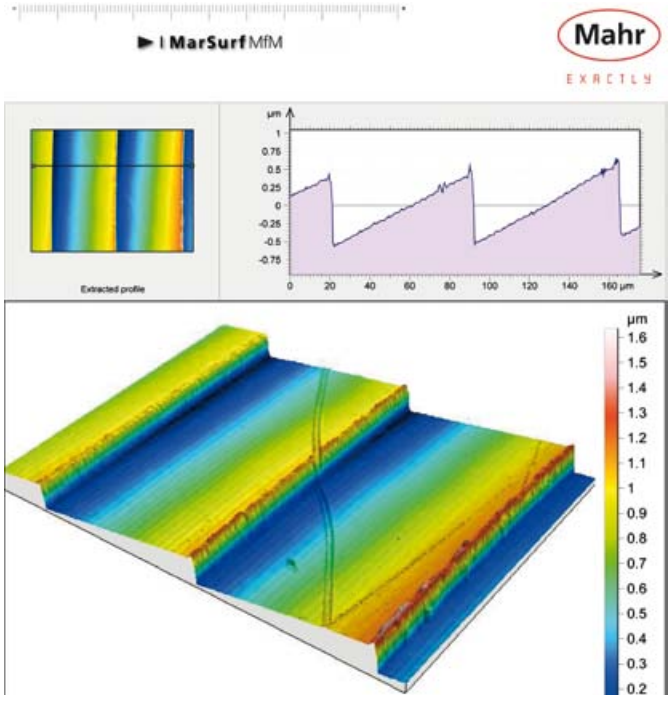
MarSurf CWM 100. Other Application with Confocal Sensor

Diffractive plastic optics

Measurement of diffractive optics by confocal sensor.

Evaluation of surface and profile lines.

With the MarSurf CWM 100, also steep edges of most diffractive optics can be analyzed and measured correctly.



MarSurf CWM 100 3D Measurement System

Advantages

Surface scanning sensor ideally suited for fast-paced measurement of smallest to medium sized surface details. Excellent, high resolution reproduction of even microscopic surface details.

- Microscopic technology dedicated to the reproduction of tiny surface features down to the physical limit
- Video real time surface scanning technology for fast and reliable results
- Robust, maintenance free, long-living construction:
  Base table plate and column made of granite-hardstone
- Large assortment of premium quality objectives available
- Measurement of topography, height, shape and position
- Larger analysis areas by fully automated stitching process
- Fully automated multi-position and multi-tasking measurement runs
- Dedicated for applications in:
  - Quality control and R&D
  - Mechanical engineering and materials science
  - Semiconductor industry
  - Optical industry
  - Medicine technologies

MarSurf CWM 100. Technical Data

Light source	High performance LED with 505 nm									
Camera	FireWire CCD 780 x 580 pixel, upto 48 f/s 1 MP and more pixels on request									
Measuring principle	**WLI - White Light Interferometer**		**KFM - Confocal Microscope**							
Measuring range	Over 4 mm (depending on lens)		10 mm (depending on resolution in z and lens)							
							Lenses ELWD			
Lens	**20x**	**50x**	**10x**	**20x**	**50x**	**100x**	**10x**	**20x**	**50x**	**100x**
Numerical aperture	0.4	0.55	0.5	0.75	0.8	0.9	0.3	0.4	0.6	0.9
Working distance (mm)	4.7	3.4	1.2	1.0	1.0	1.0	17.3	19.0	11.0	2.0
Field of view (µm x µm)	960 x 720	384 x 288	1920 x 1440	960 x 720	384 x 288	192 x 144	1920 x 1440	960 x 720	384 x288	192 x 144
Resolution, lateral (µm)	1.24	0.50	2.5	1.24	0.50	0.25	2.50	1.24	0.50	0.25
Resolution, axial (nm)	0.1	0.1	1.2	3	2	1	40	20	3	1
	Other lenses (2.5x, 5x, 10x, 100x) on request.						Other lenses (also water-dip-lenses) on request.			

Object table: 100 mm x-y, cnc-controlled. Other dimensions on request.
Z-axis: 100 mm travelrange. Other dimensions on request.

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