



CURVED OPTIC SURFACE INSPECTION

MP2100: Surface Roughness for Small and Large Optics

The measurement of the surface roughness is an important issue in the performance of curved optical lens or mirror. Roughness control of the curved optical surface becomes especially important to minimize light scattering. In this application note, we report our latest progress in the analysis of curved optic roughness control, made possible with the MP2100 Non-Contact Surface Profiler.

The MP2100 can measure most types of curved optics including transparent, non-transparent and reflected surfaces.

The MP2100 can measure roughness in many configurations which can be useful during polishing and coating stages of the lens. It is during these crucial stages that the evaluation of the optical part takes place to improve the optical fabrication process. Currently, Chapman Instruments' surface profiler is the only non-contact system that is capable of measuring roughness on curved optics. Figure 1 shows linear and circumferential roughness measurements on a curved lens using the MP2100. Figure 2 shows a 10 mm x 10 mm 3-D area scan of a curved lens surface. The surface roughness characteristics at a particular area of the curved lens can be viewed and analyzed with our 3-D tool. Figure 3 shows a 0° to 90° (5 mm) circumferential scan of a lens surface with several of the surface topography statistics. This is only a small representation of the potential surface statistics available.

Measurement Geometries

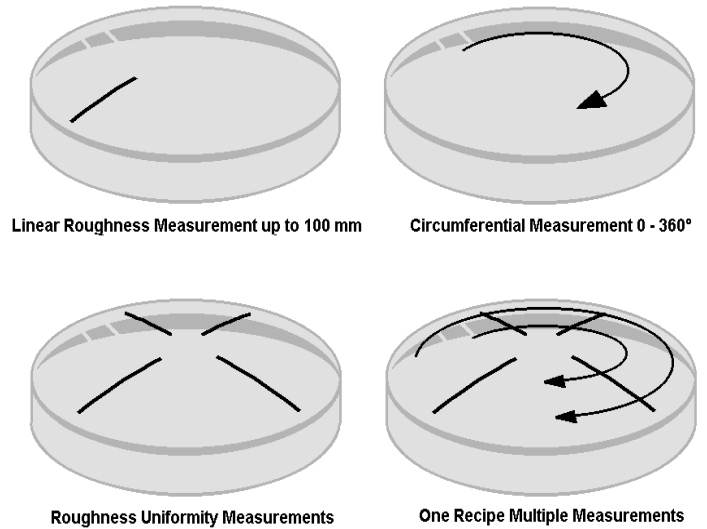


Figure 1: Measurement geometries on a curved lens with MP2100 surface profiler. Linear measurement up to 100mm and circumferential measurement of complete 360° provide comprehensive roughness data.

10 mm x 10 mm 3-D Surface Plot

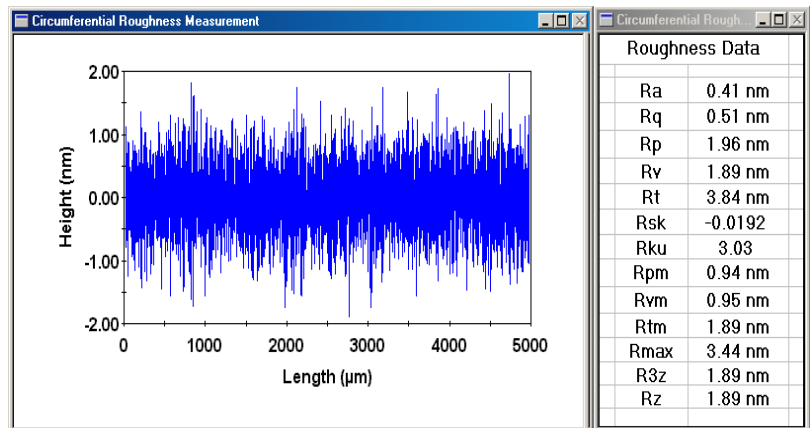
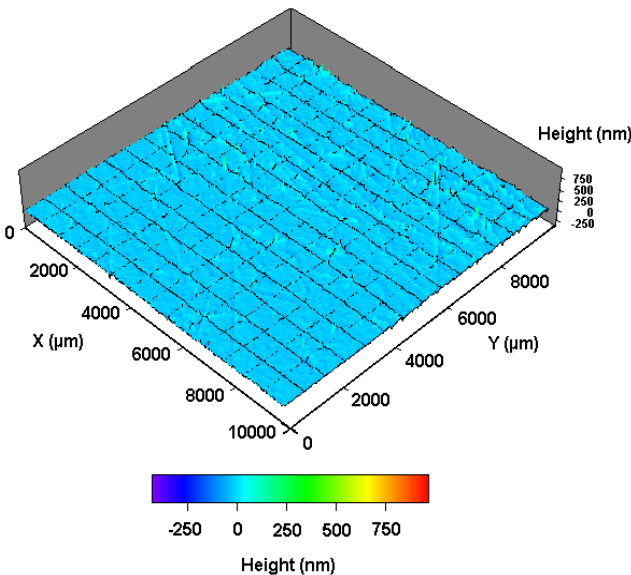


Figure 3: 0° to 90° (5 mm) circumferential measurement surface topography statistic

Figure 2: 10 mm x 10 mm 3-D area surface topography view of a curved lens

CURVED OPTIC SURFACE INSPECTION WITH MP2100

System Features

Applicable to measure very large telescope optics
Measurement at any location on planar surface
Integrated CCD Nomarski Viewing System
PC Pentium computer
Windows XP® based operational software
Complete 360° Circular Scan
Autofocus/Autotracking
Programmable sample positioning
Automated event logging and viewing
Password security
Vibration isolation table workstation

Performance Specifications

Vertical Resolution: 0.01 nm
Horizontal Resolution: 0.5 μm
Linear Scan Length: Up to 100 mm
Circular Scan Length: Complete circumference
X and Y Stage Resolution: 1 μm
Theta Stage Resolution: 0.001 Degree
Data Sampling: 50 nm (minimum)

Options

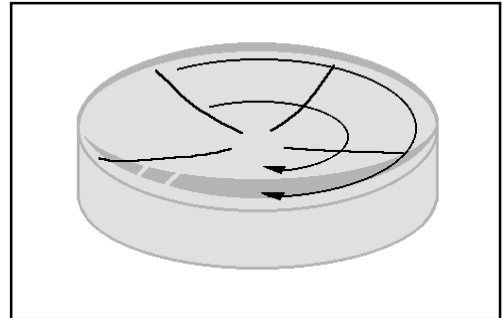
Nomarski Viewing System Printer
Color Printer
NIST Roughness Standard

Software

Roughness Parameters: Ra, Rq, Rp, Rv, Rpm, Rvm, Rt, Rz, Rsk, Rku, and more
Waviness Parameters: Wa, Wq, Wp, Wv, Wt
Other Parameters: Histogram, Cumulative Distribution, Power Spectrum, Slope, etc.
Programmable Cutoff Filter: Conforms to SEMI, ANSI B46.1 and ISO standards

Curved Lens Measurements

- Complete 360 degree circular scans at any radius
- Surface and edge defect inspection
- A single keystroke to implement a customized measurement sequence
- Rapid circular scan at outer edge
- Surface roughness at any location, linear or circular measurement geometry.



Multiple linear and circumferential roughness measurement on the curved-in lens

