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Development of on-line interferometric metrology techniques for high dynamic range surface measurement

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ABSTRACT

The growth of the manufacture of a wide range of featured surfaces (ranging from simple surface geometries to complex free form surfaces) has made surface metrology an essential part of manufacturing. The wavelength scanning interferometer (WSI) can effectively perform fast surface measurements under condition of severe vibration, therefore is suitable to be employed for on-line surface measurements. The performances of the WSI can be improved in terms of scanning speed, dynamic range, lateral and vertical resolution. In order to improve the resolution, the interferometer optics setup is simulated and the point spread function (PSF) calculated to identify the dominant aberration. Different configurations are compared and a solution to minimise the aberration is proposed. The instrument resolution Calculation of the resolution drop along the depth of focus of the instrument is reported. Those simulated result will be compared with real measurements.

Keywords: interferometry, point spread function (PSF), optical transfer function (OTF), optical aberration, diffraction-limited resolution.