JUL.16-18 LC2019 Changchun , CIOMP

From aspheres to non-circular cylindrical optical surfaces – manufacturing and testing

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Digital interferometer is widely used for evaluating optical surfaces due to its outstanding sub-nanometer accuracy and precision. In this paper, we will summarize its advantages and then describe its applications in industry, especially in both absolute flat and cylindrical surface and measurements. Inner surfaces measurement of cylindrical ring can be achieved without map stitching, by a Fizeau interferometer with a special cone. The alignment of this arrangement, however, is very crucial to the accomplishment. Any small misplacement of the cone or hollow cylinder from their ideal settings may result in large measurement errors. These errors are not intuitive and hard to be removed if their origins are not well understood. In other words, it is very important to know how these measurement errors are generated from the optical misalignment in order to eliminate them. Transmission flat has normally 1/20 wavelength PV. However, when a flat surface under test is better or much better than the transmission flat, we need the absolute flat measurement. We developed a new method to be easily able to achieve the accuracy of 1/100 wavelength PV. We have dedicated our efforts to do so. The theoretical analysis, computer simulations, and experimental validation are presented in the paper.

SHORT BIO:

Sen Han obtained his BE and ME from Changchun Institute of Optics and Mechanics, China and Ph.D.from University of Stuttgart, Germany. Dr. Han is the Professor of University of Shanghai for Science and Technology, China, the adjunct professor of University of Arizona and a SPIE Fellow. Dr. Han won R&D 100 Awards twice in USA. Dr. Han is a co-founder for H&L Instruments.

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