

Article

Influence of Surface Position along the Working Range of Conoscopic Holography Sensors on Dimensional Verification of AISI 316 Wire EDM Machined Surfaces

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Abstract: Conoscopic holography (CH) is a non-contact interferometric technique used for surface digitization which presents several advantages over other optical techniques such as laser triangulation. Among others, the ability for the reconstruction of high-sloped surfaces stands out, and so does its lower dependence on surface optical properties. Nevertheless, similarly to other optical systems, adjustment of CH sensors requires an adequate selection of configuration parameters for ensuring a high quality surface digitizing. This should be done on a surface located as close as possible to the stand-off distance by tuning frequency (F) and power (P) until the quality indicators Signal-to-Noise Ratio (SNR) and signal envelope ($Total$) meet proper values. However, not all the points of an actual surface are located at the stand-off distance, but they could be located throughout the whole working range (WR). Thus, the quality of a digitized surface may not be uniform. The present work analyses how the quality of a reconstructed surface is affected by its relative position within the WR under different combinations of the parameters F and P . Experiments have been conducted on AISI 316 wire EDM machined flat surfaces. The number of high-quality points digitized as well as distance measurements between different surfaces throughout the WR allowed for comparing the metrological behaviour of the CH sensor with respect to a touch probe (TP) on a CMM.

Keywords: conoscopic holography; depth of field; non-contact measurement; quality
