Performance verification of focus variation and confocal microscopes measuring tilted ultra-fine surfaces - DTU Orbit (09/11/2017)

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The behaviour of two optical instruments, scilicet a laser scanning confocal microscope and a focus-variation microscope, was investigated considering measurements of tilted surfaces. The measured samples were twelve steel artefacts for mould surface finish reference, covering Sa roughness parameter in the range (101—103) nm. The 3D surface texture parameters considered were Sa, Sq and Sdq. The small working distance of the confocal microscope objectives influenced the measurement setup, preventing from selecting a high tilting angle. The investigation was carried out comparing measurements of flat surfaces (0° tilt) with measurements of 12.5° tilted surfaces. The confocal microscope results showed a high sensitivity to tilting due to the laser beam reflection on the metal surfaces. The focus variation microscope results were more robust with respect to the considered angular variation, although they were out of the instrument operating range except for one of the twelve artefacts.

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