3D X-ray computerized tomography of White Etching Cracks (WEC) - DTU Orbit
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This work is focused on demonstrating the possibilities of using X-ray Computerized Tomography laboratory equipment based on density measurements for making 3D maps of White Etching Crack networks in bearings. Four bearing specimens have been investigated that contained different crack morphologies which were visualized in 3D. For crack reconstruction, simple global and local threshold procedures have been successfully applied, although there are certain limitations for narrow cracks or crack tips. Specific features in the crack networks could be identified, such as crack interaction with inclusions, which was verified using microscopy characterization. By using the 3D maps as a guide for sectioning, these features were subsequently investigated with scanning electron microscopy (SEM) and chemical analysis. Through stress calculations it was demonstrated that the depth of the maximum Tresca stress and the location of WEC correlate when the real load and stress history is known. The propagation direction of the WEC is however not defined by critical plane orientation.

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