Correlating the local geometry of welded joints evaluated from 3D-scans with their fatigue strength by probabilistic fracture mechanics

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Abstract

Welded joints have a large variation of their geometry and is one important reason for the comparable large scatter regarding their fatigue life. This study presents and tests an approach for the probabilistic fatigue assessment of welded joints based on their individual local geometry. This approach is adopted from the IBESS research cluster and combined with previous work regarding the evaluation of geometrical parameters from 3D-surface scans. The fatigue life was calculated based on 26 fatigue test series. In this study the fatigue strength calculated by the IBESS approach tended to be overestimated in some cases that is mainly related to the underestimation of the scatter range of the simulated fatigue tests according to the real results. Geometrical parameters were varied in the IBESS calculations and showed that no significant influence on the calculated fatigue strength was determined for weld toe radii > 2 mm and flank angle $> 30°$.

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