

COMBINING WELDING SIMULATION AND CYCLIC LOAD ANALYSIS FOR FATIGUE STUDY OF LASER WELDED JOINT

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ABSTRACT

The demand for laser welded parts and structures is rising in industry. Main benefits of laser welding are lower distortion after welding and high welding speed. The process of laser welding differs from convectional arc welding which brings new possibilities and challenges for joint design. Laser welding benefits are accent in thin sheet structures such as sandwich structures that have good weight to stiffness ratio. In transportation and energy business the governing loading is dynamic and therefore fatigue strength of joint need to be considered. The field of fatigue design is highly rule and standard based and laser welding is relatively new welding process, thus existing fatigue assessments suits poorly for laser welded joints. The welding process can be simulated in order to get the residual state. With simulation phenomena such as residual stresses and microstructure after welding can be received. Residual stresses have significant effect on material stress equilibrium and behavior. With including residual state in cyclic load analysis more precise fatigue estimate can be given.

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