POSTER EXPOSITION

Poster 6

University of Strathclyde Glasgow

Investigation of fatigue and fracture mechanics properties of structural steels in adverse environments

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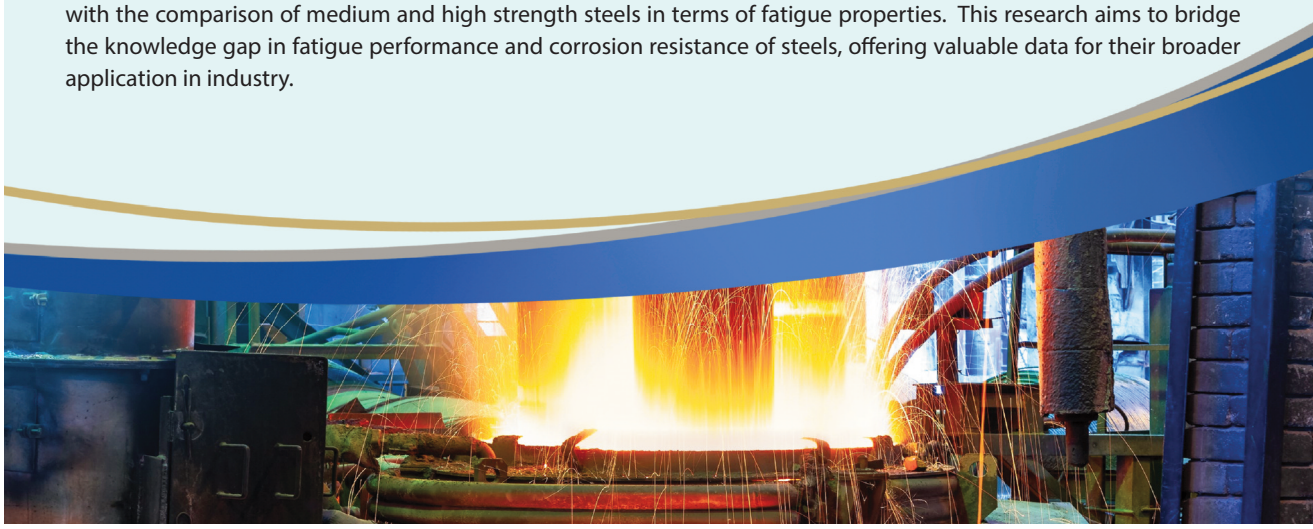
ABSTRACT:
With the growing demand for lighter and stronger structures, high-strength steels such as S700, S690, and S960 are gaining prominence due to their superior yield strength. These materials offer the potential for weight reduction while maintaining structural integrity, contributing to sustainability. However, the higher strength grades of steel have higher costs compared to the medium strength steels like S275 and S355. Additionally, higher yield strength does not necessarily translate to improved fatigue and fracture properties, and available literature on the fatigue performance of these steels is sparse, primarily due to the high cost of testing.

This research presents a comprehensive comparative analysis of the total fatigue life of several steel grades, ranging from low to high strength. The study assesses both crack initiation and crack propagation phases. Crack initiation is investigated using an ultrasonic fatigue testing machine, while crack propagation is examined with a servo-hydraulic Instron machine. Moreover, the study evaluates the impact of corrosion on the fatigue properties of these steels. Fractographic analysis is also conducted to provide insights into failure mechanisms across the tested grades. Concluding with the comparison of medium and high strength steels in terms of fatigue properties. This research aims to bridge the knowledge gap in fatigue performance and corrosion resistance of steels, offering valuable data for their broader application in industry.



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