GEORGE MASON UNIVERSITY

Corrosion Fatigue Life Prediction Via Static Tensile Testing

GMU-24-044

Rapid Assessment of Crack Initiation Life Using Static Tensile Testing and Electrochemical Analysis

Description:

This technology enables fast and cost-effective prediction of corrosion fatigue crack initiation life in metallic materials using electrochemical data obtained from static tensile tests. By bypassing traditional, time-consuming corrosion fatigue tests, the technology offers a streamlined approach for evaluating long-term durability of components exposed to cyclic mechanical and corrosive stresses.

Problem:

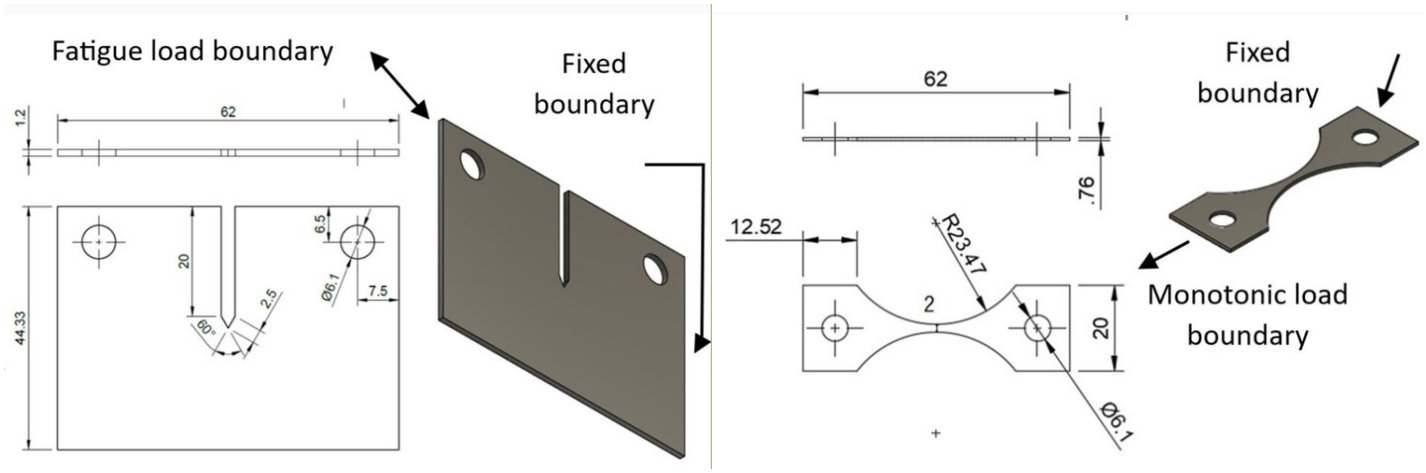
Traditional corrosion fatigue testing is expensive, time-consuming, and often requires destructive methods to assess crack initiation and service life of metallic structures.

Solution:

The technology provides a non-destructive, empirical approach for predicting corrosion fatigue behavior using electrochemical data from simple tensile tests, supported by material analysis and finite element modeling. This allows accurate estimation of service life without the need for fatigue-specific testing.

Advantages:

- Eliminates need for costly and lengthy corrosion fatigue tests
- Enables rapid assessment of fatigue crack initiation life
- Non-destructive and inexpensive
- High-throughput capability
- Applicable to various corrosive environments and metallic materials
- Provides strong correlation between static and fatigue corrosion properties
- Reduces downtime from premature repairs or replacements
- Informed by electro-chemo-mechanical interactions for higher accuracy



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