

Durability of an adhesively bonded joint between steel ship hull and composite superstructure pre-exposed to marine environment.

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Abstract

This paper outlines an experimental investigation into the durability of large-scale adhesively bonded joints immersed in a 3.5 wt% NaCl solution for 10 weeks at 50°C. Two aged and one unaged specimen were subjected to tensile testing up to failure, and three aged and one unaged specimen were loaded up to ~3.5 million fatigue cycles followed by a residual tensile test. The shear, longitudinal, and peel strain values in adhesive bulk (evaluated by the digital image correlation (DIC) technique) are significantly higher at the gripped sides due to the asymmetrical design of the steel brackets. The shear strength and stiffness of statically and fatigue tested specimens are found to be identical. The shear strength values are significantly higher than the requirements following from the design. All specimens failed by sudden delamination of the composite plate. Post-mortem analysis showed no corrosion travel at the interface of steel and adhesive.

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