

Modelling the fatigue crack growth in friction stir welded joint of 2024-T351 Al alloy

Abstract

In this work the fatigue crack propagation within the friction stir welded (FSW) joint of 2024-T351 Al alloy is studied as well as fatigue lifetime of the joint using Walker and Nicholls models. The FSW joint is characterised in terms of the residual stress (using the hole drilling technique), material, and cyclic properties. The material surface is polished in order to avoid any surface irregularities. The crack initiation is detected applying scanning electron microscopy (SEM), however plastic replication technique is used to monitor the crack propagation. The concepts of crack closure, residual stress and stress relaxation are incorporated into both models. Finally the results are validated and compared together regarding to the experiments.

Keyword: Failure analysis; Fatigue; Welding