

Fracture mechanics and its application in the fatigue behavior of reinforced welded hand-holes in aluminum light poles

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Abstract

Fracture mechanics can be defined as a methodology that is used to predict and diagnose failure of a part with some kind of existing crack or flaw. These models can be used to aid in the examination of laboratory experiments and possibly give an explanation into its fatigue life. This study utilized AFGROW as the fracture mechanics software. All models were used on a previous study conducted on aluminum light poles containing hand-holes and reinforcement (when applicable). The ultimate goal of this study was an attempt to replicate the laboratory results from these previous studies and to gain a deeper understanding of the failure modality. In total, eight fracture mechanics models were created to achieve this goal. Of these models, three contained an initial break, two had a beta correction added, one contained an open hole, and two were modeled as a plate. From all of the fracture mechanics models, models containing plates yielded the best results when it came to replicating lab results. Some finite element analysis (FEA) in ABAQUS was used in conjunction with the fracture mechanics models.

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