
Model prediction of fatigue crack propagation in base and corroded metal

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This study was inspired by an experiment with injection pumps sea water for the operation of an oil production platform. In these machines, fatigue is a major cause of deterioration of mechanical parts. A fatigue failure usually originates at a point of stress concentration such as a sharp, a notch, a metallurgical inclusion or micro-crack. Once a crack is present in a material, it will tend to grow under the influence of cyclic loading. The crack may be initiated by fatigue or may be caused by an impact, or similar event; once the crack is released it will grow to a critical length and product the fracture of the concerned component.

To investigate the cause of damage, the fatigue test machine was used in the laboratory. The tests were performed on steel 17-4 PH in the following two conditions: base material, corroded material.

The present study is aimed at comparison between simulation and experimental investigating both on the fatigue crack growth behavior in ambient environment for a stainless steel 17-4 PH and the same metal with corroded effect produced by sea water.

Comparison between simulations and experimental results is done. Thus helping to reduce costs and optimize the number of experimental tests needed for alloy characterizations.