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INFLUENCE OF TEMPERATURE ON THE CORROSION AND TRIBOCORROSION BEHAVIOUR OF HIGH-STRENGTH LOW-ALLOY STEELS USED IN OFFSHORE APPLICATIONS

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Abstract

Tribocorrosion is an important failure cause of High-Strength Low-Alloy steel (HSLA) components in offshore applications due to the synergistic effect of wear and the corrosiveness of seawater. In this work, the effect of temperature on the tribocorrosion behaviour of two steel grades has been investigated by performing tribocorrosion tests under reciprocating sliding at two electrolyte temperatures. The total material loss due to corrosion in the unworn surface and due to tribocorrosion in the wear track was quantified. Sliding was found to accelerate the corrosion in the unworn area. Furthermore, temperature was confirmed to have an important effect on the tribocorrosion behaviour of the steels, in terms of higher material losses due to corrosion at higher test temperature.

Keywords: High Strength Low Alloy steel; Tribocorrosion; Seawater; Offshore

1. Introduction

The materials working in offshore applications, are subjected to very harsh environmental conditions that accelerate their degradation. In marine environments, several phenomena take place simultaneously, which can shorten the useful life of structural materials leading to unpredicted failures. In the case of mooring systems, for instance, tribocorrosion plays an important role in terms of premature failure of components [1]. On one hand, the relative motion between chain links and connectors generated by waves, wind and ocean currents [2,3] leads to a continuous wear process in the contact surfaces. Moreover, corrosion is another important phenomenon to take into consideration in marine environments. The components that are continuously submerged or located in the splash zone of offshore structures, are subjected to high rate Download English Version:

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