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Effect of fatigue on Mechanical Behaviors of Weld Overlay ENiCrMo-3 on 25CD4 Steel Substrate Using SMAW Process

Djilali. ALLOU, Djamel Miroud, Sarra. DJEMMAH

Abstract : In the present study, we investigated the effect of fatigue on the mechanical behaviors of weld overlay ENiCrMo-3 on a 25CD4 steel substrate using the SMAW process. The microstructure of the ENiCrMo-3/25CD4 substrate interface primarily consisted of columnar Ni-?. a diffusion gradient of Fe, Cr, and Ni elements from the melting limits towards the type II boundary near the interface. Based on the fatigue test results, the specimen, which was tested at the ultimate tensile strength, exhibited superior fatigue endurance compared to the first specimen tested at the ultimate tensile strength. elasticity limit. This suggests that the material had greater fatigue resistance when subjected to a percentage of the ultimate tensile strength, as it withstood a greater number of cycles over a longer duration. The electrochemical behavior of the ENiCrMo-3 overlay and the 25CD4 substrate in a NaCl 3.5% solution indicated the presence of galvanic corrosion. The Tafel curves demonstrated that the corrosion process could be divided into two parts, emphasizing the aggressiveness of Cl⁻ ions. Electrochemical impedance spectroscopy (EIS) measurements showed that the resistance to charge transfer of the ENiCrMo-3 hardfacing was greater than that of the substrate/ENiCrMo-3 interface and the substrate itself

Keywords : 25CD4 steel substrate, ENiCrMo-3 hardfacing, fatigue behavior