Abstract

Tribological and Corrosion Performance of Alloy 718 coated with WC/Co Applied by HVOF

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Nickel-based superalloys, such as Inconel 718 and Inconel 625, are widely used in oil and gas industry due to their mechanical and Chemical properties. The extraction and processing environments involve high temperatures, high pressures, and corrosive environments. Nickel alloys offer high mechanical strength at elevated temperatures, and excellent resistance to corrosion and oxidation, ensuring safety and a longer service life for components that use them. Inconel 718 has high corrosion resistance, but its application is limited due to low hardness and wear resistance. One method of solving this problem is to combine heat treatment with application of coatings. The present work carried out a comparative study of the tribological and tribocorrosive properties of nitride Inconel 718 and Inconel 718 with a WC/Co coating, applied by the HVOF method, which was chosen due to the obtention of a dense layer with low porosity, improving the wear resistance of the material. The surfaces were characterized using X-ray diffractometry (XRD), microhardness, and scanning electron microscopy (SEM) techniques. The tribological, tribocorrosive, and corrosive properties were evaluated in five environments: (a) Distilled water saturated with CO_2; (b) distilled water with sodium chloride; (c) distilled water saturated with H_2S; (d) distilled water with sodium chloride and saturated with CO_2; (e) distilled water with sodium chloride, CO_2 and H_2S. Where in the end the surfaces will be compared across three requirements: i) corrosion current and potential, ii) wear rate, iii) wear rate considering the synergistic effect of tribocorrosion.

Keywords: Inconel 718, Corrosion, Tribocorroeion, Wear