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ELECTROCHEMICAL ANALYSIS OF CARBIDE COATINGS OBTAINED BY HVOF PROCESS

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Nowadays, people have studied coatings that have good wear and corrosion resistances. For this, deposition processes and materials are analyzed to detect the better conditions for each application.

In the case of petroleum industry, which involves extraction, refinery and petrochemical systems, the carbides are the main coatings used, being tungsten carbide the more applied. This is a ceramic material composed of approximately a 1:1 ratio of tungsten and carbon atoms. For practical applications, it is alloyed with > 6% of a softer metal, usually cobalt, witch improves its corrosion resistance.

Tungsten carbide is widely used in industry because of its extraordinary properties. Because of its wear resistance and hardness (9.8 Moe's scale), tungsten carbide is ideally suited for machine parts which are subject to severe service conditions, such as high temperatures, corrosion and abrasion. In recent years, tungsten carbide has emerged as a superior alternative to steel in many industrial applications.

This kind of material is usually applied by thermal aspersion, as detonation (D-Gun), plasma and high velocity oxy-fuel (HVOF). The last one has a long history of applying wear-resistant carbide coatings for aerospace applications, petrochemical applications such as rotating shafts in pumps and compressors, valves and seals, and rolls in pulp & paper mills. Metals and alloys deposited by HVOF produce coatings exhibiting high density with a low oxide content, high corrosion resistance and good resistance to wear.

The present work has as objective the electrochemical analysis of tungsten carbide coatings, obtained by HVOF, for a posterior comparison with other deposition methods. This analysis involves the study of superficial porosity, discontinuities and the coating electrochemical stability, since these parameters define how much the coating is resistant to the corrosion. The coatings were obtained with different stand-off distances and different compositions, which supplies them distinct characteristics.

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