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ELECTROCHEMICAL BEHAVIOUR OF TUNGSTEN CARBIDE (WC) ON STEEL CARBON

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Carbides are binary chemical composite of carbon and metals extensively used in industrial applications that demand wear resistance and high temperature resistance. Nowadays, they are quite used as coating of equipment components in petrochemical industries, refineries, plastic industry and aeronautical.

The carbides are normally used in the form of powders been better applied by flame-spray (FS), plasma, detonation (D-gun) and high velocity oxy-fuel (HVOF) processes.

Cemented carbides are usually applied to give the maximum of protection against the erosion, but is apparent that the majority of the applications in industrial environments must not only resist the erosion, but also be resistant to damage caused by corrosion. From the aspect of corrosion, the discontinuities are very important. The coating itself may be resistant to corrosion, but the highly corrosive medium can penetrate to the substrate, the service life of the equipment and pieces reduce significantly. Thus, it is very important to measure the degree of coating discontinuities and its electrochemical behavior. In most alloys, cobalt has been used as metal binder phase, due to its adhesion and adequate mechanical properties. Cobalt, however, has low corrosion resistance and to improve the wear resistance in aggressive environments, others alloys composition have been formulated. Chromium and nickel are alloying elements used to improve corrosion resistance of carbide coatings. How to correlate their alloy concentration to corrosion behavior considering processes parameters is the aim of the presented work.

It was used electrochemical techniques, such as Linear Anodic Polarization on electrochemical parameters study for different powder compositions and processes conditions. It was determined the coating corrosion rates as well as the degree of coating discontinuities on steel substrates. All the used samples were obtained by Detonation Gun technique.

It was observed the positive influence of chromium and nickel alloying on corrosion resistance of coatings. A relation between chromium and nickel content and the anodic current charge density was obtained.

The coating processes parameters also were analyzed showing great influence at coating corrosion behavior.

The applied electrochemical technique shows a good sensibility for the proposed coating evaluation.

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