

Structure and properties of thermal sprayed nanostructured Cr₃C₂-25(Ni₂₀Cr) coatings

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Coatings containing chromium carbide particles distributed in a nickel-chromium alloy matrix have been used for corrosion and wear resistant applications. One of the shortcomings of these coatings is its low hardness, and consequent lower wear resistance, compared to WC-Co coatings for long term high temperature applications. Nanostructured coatings in general have exhibited higher hardness and strength. This paper presents the microstructure of coatings prepared by high velocity oxygen fuel (HVOF) spraying using as-received and nanocrystalline Cr₃C₂-25(Ni₂₀Cr) powders. Hardness measurements across sections of the two types of coatings revealed a marked increase in the hardness and fracture toughness of the nanostructured coating. The erosion-oxidation behavior of the two types of coatings were evaluated in a test rig at different temperatures and erodent impact velocities. Marked improvements in the wastage behavior of the nanostructured coatings was improved.