

The Effect of Feedstock Powder Treatment / Processing on the Microstructure, Quality, and Performance of Thermally Sprayed Titanium Based Composite Coating

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Abstract : The performance of a coating is strongly dependent upon its microstructure, which in turn is dependent on the characteristics of the feedstock powder. This study involves the evaluation and performance of a titanium-based composite coating produced by the HVOF (high-velocity oxygen fuel) spraying method. The feedstock for making the composite coating was produced using high energy mechanical milling of TiO₂ and Al powders followed by a combustion reaction. The characteristics of the feedstock powder were improved by treating it with an organic binder. Two types of coatings were produced using treated and untreated feedstock powders. The microstructures and characteristics of both types of coatings were studied, and their thermal shock resistance was accessed by dipping into molten aluminum. The results of this study showed that feedstock treatment did not have a significant effect on the microstructure of the coatings. However, it did affect the uniformity, thickness and surface roughness of the coating on the steel substrate. A coating produced by an untreated feedstock showed better thermal shock resistance in molten aluminum compared with the one produced by PVA (polyvinyl alcohol) treatment.

Keywords : coating, feedstock, powder processing, thermal shock resistance, thermally spraying

Conference Title : ICAM 2017 : International Conference on Advanced Materials

Conference Location : Jeddah, Saudi Arabia

Conference Dates : January 30-31, 2017