"DEVELOPMENT OF WEAR RESISTANT HIGH VELOCITY OXY-FUEL COATING ON SUPER ALLOYS"

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ABSTRACT

Degradation of materials due to wear at room temperature or at elevated temperature is encountered in large variety of engineering industries. Wastage due to wear of components in heat exchanger tubes, gas-turbines and other structural materials in coal-fired boilers are recognized as being the main cause of downtime at power generation plants. The cause increased interest in the wear and friction properties of alloys and the development of wear protection systems in industrial applications is an important topic from both engineering and an economic perspective. An approach where in mechanical strength is accomplished by alloy development and wear resistance by surface coating is now generally acceptable practice in fossil fuel energy processes. The use of appropriate wear resistant coatings with good thermal conductivities offers an avenue to minimize material degradation and to extend component life. The High-velocity oxy-fuel (HVOF) processes belong to the family of thermal spraying techniques, and are widely used in many industries to protect the components against wear, erosion and corrosion. High velocity oxy-fuel thermal spray process using oxygen and liquid petroleum gas as the fuel gas have been used successfully to deposit NiCrAl alloy on Nickel based super alloy Nimonic-75. Under the given spray parameters seemingly layer structured coating has been achieved. The coatings are characterized regarding their microstructure, porosity and micro hardness. The unique micro structure containing flat un-melted particle improves the wear resistance of the coating. The wear performance of the HVOF sprayed coatings was found to be further improved by furnace heat treatment to grow stable α-Al2O3 oxide layer.