

Wear Behavior of Intermetallic (Ni₃Al) Coating at High Temperature

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Abstract : Air plasma spraying system was utilized to deposit Ni₃Al coatings on AISI 321 steel samples. After thermal spraying, the nickel aluminide intermetallic coatings were isothermal heat treated at various temperatures. In this regard, temperatures from 500 °C to 800 °C with 100 °C increments were selected. The coatings were soaked for 10, 30, 60 and 100 hours at the mentioned temperatures. These coatings were then tested by a pin on disk method. It was observed that the coatings exposed at comparatively higher temperature experienced lower wear rate. The decrease in wear rate is due to the formation of NiO phase. Further, the as sprayed and heat treated coatings were characterized by other tools such as Microhardness testing, optical and scanning electron microscopy (SEM) and X-Ray diffraction analysis. After isothermal heat treatment, NiO was observed the main phase by X-Ray diffraction technique. Moreover, the surface hardness was also determined higher than cross sectional hardness.

Keywords : air plasma spraying, Ni -20Al, tribometer, intermetallic coating, nickel aluminide

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