

DEVELOPMENT OF NICKELBASE ALLOY WITH METAL MATRIX COMPOSITE ZIRCONIUM BORIDE WITH INORGANIC COATINGS FOR HIGH TEMPERATURE ENVIRONMENTS

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Abstract

Gas turbine engines Designers strive to achieve high performance levels through various means and increasing turbine entry temperature is among the most used operational features to achieve this functionality. Advances in materials as well as developments in thermal barrier coating technology have significantly contributed in achieving this functionality. This dissertation work presents a thin film sensor based approach for experimental evaluation of temperatures on hot section aero gas turbine engine components made of nickel based alloy with- coating (Zirconium boride). Coating characterization is carried out from the point of view of metallurgical, mechanical and thermal properties. During metallurgical evaluation, coated samples are characterized for quality by optical and electron microscopy. In addition, samples are subjected to conduction and convective heat transfer studies with the aid of special burner rigs developed for the purpose. Coating on both materials showed that plasma high velocity oxygen fuel technique produces denser and higher quality coating as compared to the other option. Evaluation of thermal conductivity on coatings on both materials showed that thermal conductivity of conventional material was higher than that on material. Thermal fatigue properties on coated material as compared to that of conventional material.

Keywords: Nickel base Alloy, Zirconium Boride, Coatings, High Temperature and Gas turbines.