

Abstract

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Title: The influence of Al_2O_3 layer formed on aluminide bond coat surface on properties of thermal barrier coatings used for aircraft engine components

The aim of work was to produce of thermal barrier coating on René80 nickel superalloy substrate. TBC consisted of modified aluminide bond coat and columnar ceramic top coat as well. An aluminide bond coat was modified by Pt, Zr or both Pt-Zr doping during low activity CVD aluminizing process. The platinum coating was deposited by electroplating. Ceramic top coat was deposited by PS-PVD method. The influence of Zr and Pt on high temperature oxidation resistance of produced aluminide coatings during 24h cyclic oxidation test at 1100°C was studied. Effect of Al_2O_3 oxide formed into TGO zone on thermal shocks resistance of TBC's was also investigated. The analysis of chemical composition by SEM-EDS and also analysis of phase composition by XRD method of produced coatings was carried out. In order to characterize the microstructure of obtained coatings the microstructural investigations was also performed. Hot erosion tests and also scratch tests of produced coatings were performed to determine functional properties of investigated TBC's. It has been found that the best high temperature oxidation resistance have aluminide coatings modified both Pt and Zr. It was also observed that the best thermal shocks resistance have TBC's with aluminide bond coats modified both Pt and Zr. This is due to more stable and resistant to spallation of TGO zone.

Acknowledgments

Financial support of Structural Funds in the Operational Programme - Innovative Economy (IE OP) financed from the European Regional Development Fund - Project "Modern material technologies in aerospace industry", Nr POIG.01.01.02-00-015/08-00 is gratefully acknowledged.