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Optimization of APS Process Parameters Using a Design of Experiment for CSZ (CeO₂ Stabilized Zirconia) CoatingsEkrem Altuncu¹, Fatih Ustel²¹Kocaeli University Sch.of Asim Kocabiyik, Kocaeli, Turkey ²Sakarya University/ Metallurgy-Mats. Eng. Dept., Sakarya, Turkey

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Air Plasma Sprayed (APS) Ceria Stabilized Zirconia (CSZ) coatings have been extensively used as alternative material to Yttria Stabilized Zirconia (YSZ) in the gas turbine industries due to the good mechanical properties and hot corrosion resistance at elevated temperatures. Due to the high velocity and temperature gradients in the plasma jet, any changes in the process parameters can result in significant changes in the particle properties and consequently in the microstructure of the coating. For increasing coating quality, operational process parameters as plasma gas flow rates, plasma current, spray distance must be optimized. The statistically designed taguchi experiments and regression analysis are used to determine the effects of processing parameters on mechanical and microstructural properties of coatings. The effect of changing the processing parameters on properties such as density, thickness, deposition efficiency and the amount of porosity in the coatings has been investigated in this study. Results showed that the CSZ has a higher deposition efficiency and denser microstructure than the YSZ systems.

Keywords

Plasma Spraying

Stabilized Zirconia

Coating Quality

Process Optimization

Deposition Efficiency