

Improvement of turbine blade by using protective ceramic coating

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Abstract

Turbines are considered as an initial element of power station factories, which have a key role in functionality of the power station. Due to high cost production of turbine components, increasing service time and efficiency has been one of the most important issues for manufacturer. Super alloys are most favorite materials for this special application. However, corrosion is inevitable cause for the super alloys, thereby reducing service cycle. One of reliable solution for enhancing of the turbine blade is to be protective ceramic coating, by which super alloys are protected in corrosive ambient. In this research, a protective layer of aluminum oxide was coated by electrolyte plasma method on super alloy inconel 738LC. The passive layer is being characterized from both mechanical and physical point of view. Moreover, corrosion resistance properties were evaluated by *potential static* test. Morphological investigation, which is done by electron microscopy, shows a protective layer with 13.3 μm in thickness. X-ray diffraction and EDX analysis confirmed aluminum oxide as major phase of the layer. Mechanical performance of sample with protective coating is considerably enhanced rather than that sample without coating. In addition corrosion characterization showed that the layer increased sensibly resistance to corrosion.

Keyword: Turbine, Superalloy, protective coating, electrolyte plasma