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Evaluation of the aluminide coating on cleaned internal passages of used gas turbine blades

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ABSTRACT

Internal cooling channels of several first stage serviced blades of a gas turbine were cleaned using conventional chemical picking with acidic and alkaline solutions, as well as with abrasive flow machining, adopted as a novel method serving this purpose, and subsequently aluminized by pack cementation. The effectiveness of the cleaning methods in removing the oxidation products together with the quality of the produced coatings were studied and compared using microstructural analysis and thermal shock tests. The results show that caustic cleaning with a solution of 45 weight percent potassium hydroxide at a temperature of about 150°C and a pressure of 10 kPa for about 100 hours, produces less contaminated coatings with a cleaned surface fraction of about 80%, with no signs of cracks within the coating after thermal shock tests for 100 one-hour cycles at 900°C.

Keywords: Gas Turbine blade, Aluminide coating, Internal cooling channels, Oxide removal, Refurbishment

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