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ABSTRACTS

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ANALYSIS OF THE HEAT PROCESSES OF FORMING THE ALUMINIDE COATING ON THE GAS TURBINE BLADES

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Testing the heat and corrosion stableness of the nickel heat-resisting alloys samples and the experience of the turbine blades performance at the ship and stationary power plants have shown that the coatings made by the method of saturation from suspensions with heating in the air are present better exploitation properties in oxide and corrosion-active media in comparison with the corresponding protecting layers (aluminising, aluminum-silicification), obtained from powders or employing other popular methods [1, 2, 3].

With the help of analysis of physical-chemical and heat processes, taking place in the process of heating the aluminum suspense deposition, applied on the steel surface and with the research of the procedure of forming the coating on different classes of materials, it is stated that the formation of the protective layer takes place by means of crystallizing the melt, resulted from the base dissolving in the liquid aluminum. The moving forces of this processes are not only differences in thermo-dynamic potentials of the hard metal atoms in the crystal grid and in liquid metal, but also a substantial gradient of temperature between the overheated, relatively to the isotherm, saturated melt of aluminum and lining. This process also results in the concentration of the melts with the alloyed elements of the nickel alloy, especially with chrome, increasing the resistance of nickel blade alloys to the sulphate-oxide corrosion. The process of crystallization is not equilibrium due to the high speed of the heat elimination from the surface of the overheated liquid phase sector and the solid base.

Aluminising (aluminum-silicification) from suspensions with heating in the air can be used for improving the properties of coating obtained by the methods of electronic-beam evaporation and condensation or ion-plasma spraying. The liquid phase provides "healing" of the micro pores of this type of coating, while the high rate of the process (10…25 min) provides the possibility of local applying the coatings, then the comparatively low temperatures of the parts heating, coinciding with the temperature of aging and burning out of the majority of nickel heat-resistant alloys, will provide the technological and the cost advance in comparison with aluminising in powders.

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