

## The Role of Strategic Metals in Cr-Al-Pt-V Composition of Protective Bond Coats

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**Abstract :** Different types of coating technologies are widely used for gas turbine blades. Thermal barrier coatings, consisting of ceramic top coat, thermally grown oxide and a metallic bond coat are used in applications for thermal protection of hot section components in gas turbine engines. Operational characteristics and longevity of high-temperature turbine blades substantially depend on a right choice of composition of the protective thermal barrier coatings. At a choice of composition of a coating and content of the basic elements it is necessary to consider following factors, as minimum distinctions of coefficients of thermal expansions of elements, level of working temperatures and composition of the oxidizing environment, defining the conditions for the formation of protective layers, intensity of diffusive processes and degradation speed of protective properties of elements, extent of influence on the fatigue durability of details during operation, using of elements with high characteristics of thermal stability and satisfactory resilience of gas corrosion, density, hardness, thermal conduction and other physical characteristics. Forecasting and a choice of a thermal barrier coating composition, all above factors at the same time cannot be considered, as some of these characteristics are defined by experimental studies. The implemented studies and investigations show that one of the main failures of coatings used on gas turbine blades is related to not fully taking the physical-chemical features of elements into consideration during the determination of the composition of alloys. It leads to the formation of more difficult spatial structure, composition which also changes chaotically in some interval of concentration that doesn't promote thermal and structural firmness of a coating. For the purpose of increasing the thermal and structural resistant of gas turbine blade coatings is offered a new approach to forecasting of composition on the basis of analysis of physical-chemical characteristics of alloys taking into account the size factor, electron configuration, type of crystal lattices and Darken-Gurry method. As a result, of calculations and experimental investigations is offered the new four-component metallic bond coat on the basis of chrome for the gas turbine blades.

**Keywords :** gas turbine blades, thermal barrier coating, metallic bond coat, strategic metals, physical-chemical features

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