HIGH TEMPERATURE OXIDE RESISTANT COMPONENTS OF PERSPECTIVE HIGH STRENGTH INTERMETALCERAMIC COMPOSITE COATINGS

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The project envisages the elaboration of the technologies for sputtering the composite coatings with different functional purposes: protective (temperature proof, wear proof, corrosion proof, etc.) and specialized (for instance, friction reduction in friction couples). The functional coverings are planned to be realized on the basis of metals (Ti, Al, Cu, Mo) and their compounds.

The specified elements concern a category of the most responsible details that limit the resource of vehicles. Elaborating the special protective and restoring coatings can essentially increase the reliability of their works.

The principal indicators of the effect achieved should be confirmed by the corresponding tests and also by the analysis of structure and physical and mechanical properties of coatings, namely, the protective coatings should meet the required exploitation characteristics (improved corrosion stability, the improvement of tribotechnical properties, etc.).

The paper deals with the creation of fundamentally new multicomponent coatings applying the technologies of ion - plasmous sputtering. The functional intermetalceramic (IMCER) coating based on aluminium and titanium is sputtered by applying vacuum installation.

Further blades tests for heat resistance are conducted in air – in an electric furnace and in the environment of glowing chlorine sulphide ash. During the tests the heat resistance was quantitatively assessed accordingly to a factual weight increment at the expense of oxidation; there was used an analytical balance. The study of microstructure was carried out by means of a focused-beam microscope.

The first stage of the test involved a high-temperature annealing of the blades in furnace atmosphere under the temperature of 950°C in the course of 200 hours.

The test results obtained revealed a considerable increase in the heat resistance of the IMCER coating in comparison to that of the zirconium-aluminium (5…15 times higher, depending on the duration of temperature action).

Testing of various category products on heat resistance in scorching chlorine sulphurous ash environment also confirmed the effectiveness of the offered protective coating. IMCER coatings differ with 2…3 times higher heat resistance in comparison to aluminized ones.

Distinctive features:

- high coating adhesion to the substrate on the strength level of a weak metal or an alloy in the coating-substrate system;
- simplicity, stability and availability of the technological process for applying coatings under the series production conditions.

Another crucial point is that the elaborate technologies of composite coatings creation by means of ion-plasma sputtering are highly technological, ecologically safe and resource saving, which means that they meet the modern requirements of production organization.