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TYPES OF HEAT-RESISTANT COATINGS USED IN THE AVIATION INDUSTRY

The exploitation process of gas turbines features various damage to their elements with various effects on their usability. The overheating of the blade material, especially of uncooled blades constitutes damage that is very difficult to identify and a failure hazard that is very difficult to classify.

The article presents the results of testing of selected factors on the condition and degradation of heat-resistant coatings (insulation and protective layers) of gas turbine blades from jet motors for manoeuvring aircraft drive units.

The deliberations were focused on determining the impact of temperature and exhaust fumes on the condition of heat-resistant coatings. The laboratory experiment demonstrated a negative impact of high temperature exceeding the blade's operating range and its duration on the technical condition of the heat-resistant coating. The article's main context regards the assessment of the technical condition of the exploited blade's coatings. The study took into account the chemical and high-temperature impact of the operating factor. The conducted testing allowed determining the changes in the structure and properties of the heat-resistant coatings after long-term impact of exhaust fumes during exploitation.

Each heat-resistant covering and technology of its drawing is developed depending on conditions of its use, temperature modes of operation, ergonomic efficiency. The main method of increasing the operating temperature of the ceramic coating layer is to change the chemical composition of the ceramic by introducing an additional number of alloying rare earth elements. An important method of improving the quality of heat-resistant coatings is to optimize the thickness of the ceramic layer and the formation of a barrier microlayer at the interface.

It was demonstrated that the impact of exhaust fumes with a higher temperature than the operating temperature causes the coating's degradation throughout a longer period of time. It has been found that during the exploitation the quality of coatings decreases non-linearly, which results in deterioration of their protective properties, and, consequently, the durability of gas turbine blades.