«The study of oxide films on the surface of a piston of aluminum alloy after micro-arc oxidation»

V. A. Likhanov, M. L. Skryabin
The problems and prospects of technology MDO are still relevant and attract the attention of many researchers. In light of the development of modern technologies, it has become possible to determine the qualitative and quantitative elemental composition of various alloys very accurately and quickly, and at the same time to analyze the obtained coatings in a comprehensive manner. Our work is aimed not only at obtaining of the MAO coating, but also in the future to conduct operational research mid-term evaluation of the properties and stability of the obtained films when working in conditions of high temperatures and pressures.
• For MDO was chosen piston group diesel engine D-245.7. The chemical composition of the piston group was determined to determine the compliance of the GOST alloy and the correct electrolyte selection. It was determined by energy dispersive x-ray fluorescence spectrometer EDX-720P/800P designed for rapid non-destructive determination of qualitative and quantitative elemental composition of solid and liquid samples, powders, granules, wafers, films. Its principle of operation is based on excitation of fluorescence radiation of atoms of the studied substance by radiation of low-power x-ray tube. Fluorescent radiation from the sample is selected by a semiconductor detector SDD-type, where the quanta of different energies are converted into electrical pulses, the amplitude of which is proportional to the energy absorbed by the quanta. The pulse repetition rate of a certain amplitude is proportional to the concentration of the chemical element in the sample. The use of this equipment made it possible to determine the content of components up to thousandths of a percent, and to conduct a comprehensive analysis of the phase composition of the alloy.
Conclusions

**Figure.** A longitudinal section of the surface of a piston of aluminum alloy, obtained by electron scanning microscope

- The obtained results allow us to recommend the use of oxide films obtained as a result of MDO to protect the pistons of thermal engines and reduce the heat stress of piston groups. The hardened alloys obtained in the MDO process are currently undergoing operational tests at elevated temperatures and pressures. A comprehensive analysis of microstructures after operational tests will be described in detail in the relevant scientific publications.
Contacts

V. A. Likhanov, M. L. Skryabin
Vyatka state agricultural Academy, Kirov, Russia
E-mail: max.dvs@mail.ru