

Abstract

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A doctoral dissertation on the topic "Improving the wear resistance of thread gauges used in the aviation industry" carried out as part of the implementation doctorate project was carried out at Yasa Poland Sp. z o. o. – producing housings and manifolds of hydraulic actuators. The dissertation is an interdisciplinary combination of analysis of the state of knowledge and research in the area of materials engineering - in the field of selection of material and anti-wear coatings, extending the life of thread plug gauges, in the area of tribology - in the field of testing the wear resistance of coatings and materials from which thread gauges are made, and in metrology area - in the field of measurement of thread plug gauges.

The aim of the doctoral dissertation was to develop the concept, methodology, and implementation for the production of thread gauges with anti-wear coatings produced by Arc-PVD and PACVD methods with increased wear resistance, as well as the selection of material with increased wear resistance for the production of gauges based on own research. The idea was to develop a solution that would not only increase the service life of the gauges, but also extend the time between their individual calibrations, minimize the phenomenon of material sticking on the thread gauge surface during inspection of manifolds made of aluminum, and enable the regeneration of worn thread gauges.

In the literature part of the doctoral dissertation, a review of the state of knowledge in the field of classification and characteristics of thread gauges and their wear processes, methods of increasing their service life, as well as the materials and coatings currently used in their production. An analysis of materials used in the aviation industry for the production of hydraulic manifolds used as counter-samples during operational tests of gauges in industrial conditions was also presented.

The research part presents the methodology, results of measurements, and tests carried out in laboratory and industrial conditions - focusing on issues in surface engineering, tribology, and metrological measurements. They included measurements of geometric parameters, examination of surface morphology and microstructure, wear resistance tests, and mechanical properties. The .250-28 UNF-3B STI thread plug gauge was selected for testing as a representative gauge commonly used in the aviation industry to verify the threads of aircraft components.

The results of the research carried out after their analysis, taking into account the economic aspect, confirmed the validity of the assumptions made to increase the durability of thread gauges, thus confirming the research hypotheses adopted in the dissertation.