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TECHNOLOGICAL PROVISION OF TRIBOLOGICAL PROPERTIES OF THE SURFACE OF STAINLESS STEEL BLADES BY MEANS OF STRUCTURING BY HIGH-SPEED MILLING AND LASER IMPACT

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Abstract. The aim of this work is to develop technological support for the tribological properties of the surface of stainless steel blades, creating LIPSS structures on their surface by structuring the surface through high-speed milling and laser influence.

*Keywords***:** steam turbine blade, high-speed milling, laser impact, hydrophobic, tribological properties.

Introduction. The intensification of technological processes and the enhancement of hydrophobicity on technological surfaces are priorities in modern engineering, including green energy. The use of laser methods and high-energy processes in high-speed milling on metal surfaces allows improving the efficiency of these surfaces, providing conditions for reducing the coefficient of friction and decreasing the hydrodynamic resistance during the flow of technological fluids for the effective modernization of turbine blades. As the development of progress advances, the application of the method of surface modification by ultra-short laser pulses in the nano-fem to the second range is becoming increasingly important, making it possible to create laser-induced periodic surface structures (LIPSS), including on metal surfaces. Thus, the symbiosis of milling, as a high-energy mechanical method, and laser high-energy influence, for forming hydrophobic surfaces on hydro machines blades that work in harsh production conditions, is of interest. From the perspective of the development of green energy, at this stage, it appears promising to explore the possibility of generating electricity from the charge of a droplet formed during its movement on a hydrophobic surface.

The main goal is to examine the process of fluid flow around the blade. The study of the slipping effect of droplets in symbiosis with turbulence processes is of interest. During the interaction of the blade surface and working medium in the working process, hydrophobic surfaces reduce the coefficient of friction of droplets on the surface.

The developed technology will be applicable to the manufacture of hydrophobic surfaces of turbine blades and other hydro machines as well as other parts of various mechanisms in different industries, which will improve their efficiency and increase their service life.

Hydrophobic surfaces for engineering can provide protection against wear, corrosion and oxidation, as well as superior lubrication. These surfaces can also reduce friction forces and improve the operational characteristics of components. In addition, they can provide improved sealing properties and better adhesion to other materials.

The goal of creating hydrophobic surfaces is to reduce the surface tension between the processed material and liquids, preventing water and other liquids from sticking to the surface. This can help protect materials and metals from corrosion, as well as provide a non-slip surface with increased wear resistance.

Conclusion. The issue of improving the efficiency of technological surfaces through the use of laser methods and high-energy processes in high-speed milling of metal surfaces is being considered. The application of these methods allows for the creation of hydrophobic surfaces on the blades of hydro machines that operate in harsh production conditions, reducing the coefficient of friction and hydrodynamic resistance during the flow of process fluids. Additionally, the possibility of generating electricity from the charge of a droplet formed during its movement on a hydrophobic surface is being explored. The developed technology will be used for the production of hydrophobic surfaces on turbine blades and other hydro machines, as well as other parts of various mechanisms in different industries, which will increase their efficiency and service life. Thus, it can be argued that the creation of hydrophobic surfaces through laser processing and high-speed milling and their further use in machine building is a relevant and promising topic for research and implementation in production.

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