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XX МІЖНАРОДНА ФРЕЇКІВСЬКА КОНФЕРЕНЦІЯ З ФІЗИКИ І ТЕХНОЛОГІЇ ТОНКИХ ПЛІВОК ТА НАНОСИСТЕМ

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Technologies and models for effective cleaning of rolling bearings from various types of operational contaminants

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Ensuring the required cleanliness of rolling bearings is a very complex and important scientific, industrial and economic problem. The solution of which makes it possible to increase the accuracy of machines and equipment, which include rolling bearings, and significantly improve their operational properties and durability. As a result, such an approach leads to a reduction in the use of metal, lubricants and energy resources, noise and vibrations. Ensuring technological cleanliness is relevant for both new bearings and those bearings that have been in operation and are reused. The main types of contamination are metal particles (microchips formed during cutting or wear products), corrosion products, polymerization products of lubricants or accidental contamination that falls from the external environment.

The most widely used in industry are ultrasonic cleaning methods, the effectiveness of which is well documented in the special scientific literature, but insufficient to remove existing contaminants. Therefore, they, like the turbulent pulse-magnetic methods widely studied by the team of authors of this work, have a number of disadvantages.

Therefore, to ensure the required industrial cleanliness of bearings, it is necessary to design special equipment and develop appropriate methods, models, and technologies.

In this work, the authors propose technological solutions for the implementation of the rolling bearing cleaning process and a process model based on the use of ultrasonic fields and electromagnetic fields in the working fluid environment (aviation gas, heated water). To ensure the effectiveness of cleaning, the physical fields used are created by appropriate sensors and electromagnets of different power. This allows for a cleaning effect that consists in reducing the forces of adhesion and electromagnetic interaction between contaminants and working surfaces, softening and useful degradation of contaminants (flaking, chipping and possible erosion). After which such contaminants are removed from the working surfaces of the bearings into the filtration zone of the cleaning device using turbulent flows.

Cleaned bearings are subject to conservation or reuse.

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