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ANALYSIS OF METHODS FOR CLEANING ENGINE PARTS IN REPAIR PRODUCTION CONDITIONS

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Technological processes of cleaning repair facilities permeate the entire production process of service enterprises. At each stage of cleaning, it is necessary to remove contaminants that differ in composition, strength and adhesion to the surface. The complexity of cleaning engine parts is the presence of contaminants that are difficult to remove, as well as the structural complexity and high requirements for the quality of cleaning [1].

A feature of engine parts contamination is high adhesion and the ability to firmly adhere to surfaces. Conditionally, contamination can be divided into sediments, varnish deposits and carbon deposits, which include resins, asphaltenes, carbenes and carboides. In addition, operational contamination includes products of combustion and thermal decomposition of fuel - particles of soot and coke-like substances. It should be taken into account that the mechanical properties of contamination vary widely: from the properties of purely viscous and viscous-plastic substances to solid, strong formations. In connection with the cleaning surface, contamination can be divided into three main groups: adhesion-bound, surface adsorption-bound, firmly bound.

For cleaning machine components and parts, most enterprises use petroleum products and only some have mechanized means. At the same time, the costs of cleaning parts can be significantly reduced by using effective detergents and low-energy washing equipment. The entire variety of technological cleaning methods can be combined into three groups: jet, immersion and special.

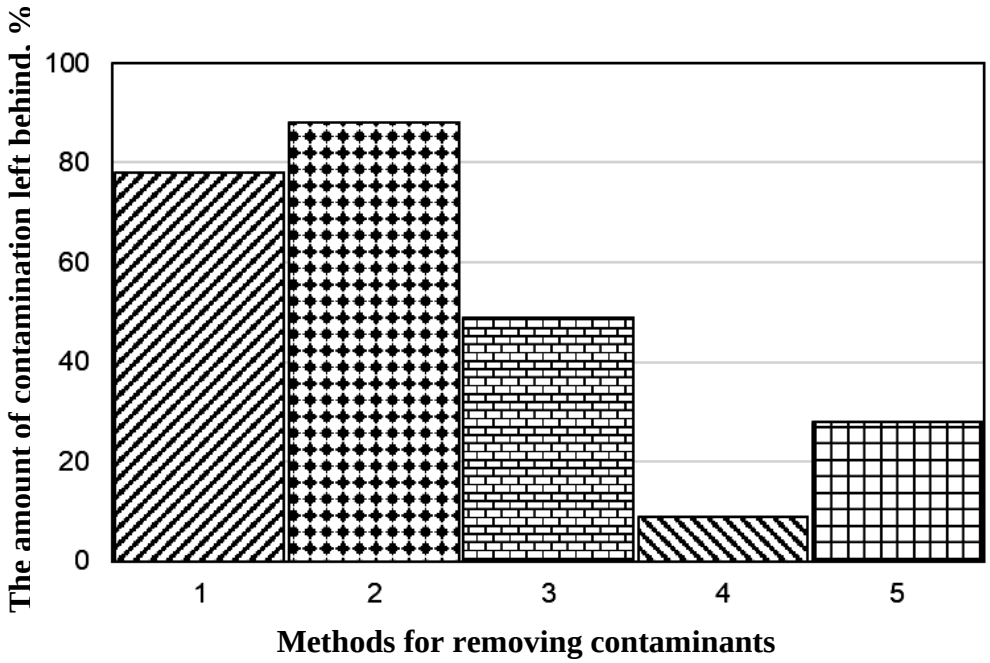
In jet cleaning, the physicochemical factor of the impact of aqueous solutions of synthetic detergents is supplemented by the mechanical impact of the jet on the contaminants that need to be removed. When using jet machines, effective cleaning is achieved only in the area of direct contact of the jet of the detergent solution with the contaminated surface.

Cleaning of repair objects by immersion involves a complex effect on contamination of physico-chemical and mechanical factors. Mechanical action is carried out by submerged jets of washing liquid, vibration, electric discharges in the liquid, etc.

Special methods include cleaning parts from dirt that is difficult to remove: remains of hardened carbon deposits, carbon deposits, scale, old paint and varnish coatings. This group includes purely mechanical methods of removing dirt, and ultrasonic cleaning [2].

The main advantages and disadvantages of existing methods of removing contaminants and their impact on the degree of surface cleanliness are shown in Fig. 1 and in the table 1.

Analysis of the influence of the method of removing contaminants on the quality of cleaning the surface of engine parts shows that the most qualitative and effective is ultrasonic cleaning at frequencies of 20...40 kHz, at which the amount of contamination does not exceed 9%. The use of the ultrasonic method is highly effective, allows you to remove stubborn contaminants from parts of complex configuration and achieves a relatively high quality of cleaning. However, the existing technology of ultrasonic cleaning of parts at enterprises does not allow to ensure the optimal process mode. Improving the quality of work is possible only with the use of an automated ultrasonic cleaning system taking into account the specific features of the equipment used, cleaning objects and ultrasonic parameters of the emitter.



1 – immersion cleaning in organic solvents; 2 – jet cleaning in aqueous solutions; 3 – mechanical cleaning; 4 – ultrasonic cleaning (frequency 20...40 kHz); 5 – ultrasonic cleaning (frequency 400...600 kHz)

Fig. 1. The influence of the method of removing contaminants on the quality of surface cleaning

Table 1

Methods for removing contaminants from engine parts

Name of the cleaning method			
Immersible in organic solvents	Jetting in aqueous detergent solutions	Mechanical manual	Ultrasonic
Advantages			
Accessibility, versatility	Accessibility, use of safe detergents, high performance	Versatility, simplicity	Ability to remove various contaminants, clean parts of various shapes, high productivity
Disadvantages			
Fire hazard, toxicity, harmful effects on the environment	Insufficient cleaning quality when removing solid contaminants and cleaning closed cavities	Low labor productivity	The need for highly qualified maintenance equipment, the difficulty of cleaning large-sized body parts

References

1. Dashyvets H., Garbut D. Analysis of methods for assessing the quality of cleaning repair objects. Матеріали VI Міжнародної науково-практичної конференції «Технічне забезпечення інноваційних технологій в агропромисловому комплексі» (01–25 листопада 2024 року). Запоріжжя, 2024. С. 224-226.

2. Дашивець Г. І. Обґрунтування способів, прийомів і обладнання для очищення агрегатів в умовах ремонтних підприємств // Праці Таврійського державного агротехнологічного університету. Вип. 9, т. 4. Мелітополь: ТДАТУ, 2009. 169 с.

Research supervisor: Dashyvets H., Ph.D., Assoc.