

ANALYSIS OF WORK PROCESSES OF PARTS CLEANING BY IMMERSION

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During operation, equipment is exposed to significant contamination, which complicates further operation of the machines, reduces their reliability and efficiency, and causes accelerated wear of component connections, corrosion, and aging of component materials.

Immersion units are the main equipment of repair companies for cleaning parts from strong asphalt-resin deposits that are difficult to remove. The principle of operation of immersion equipment, the main technological element of which is a bath with a washing solution, is to use the ability of solutions to clean repair objects from dirt by destroying adhesive bonds. To initiate and intensify the cleaning process, the solution is heated and forced to a turbulent state. The rate of removal of contaminants depends on the gradient of the fluid flow velocity in the boundary layer with the surface, therefore, when designing installations, they try to create variable-speed flows in the bath, to cause turbulent flows, which will ensure a decrease in the boundary layer and increase the velocity gradient..

The method of intensifying the immersion cleaning process can be hydraulic, pneumatic, vibratory, and mechanical [1].

Hydraulic activation of the liquid in the washing chamber is created by hydraulic swirlers, which are located on the bottom and side walls of the bath. Turbulence of the flow of the washing solution is created by submerged jets. The intensity of dirt removal depends on the speed of spreading the washing solution over the surface being cleaned and the diameter of the nozzle from which the submerged water jets flow..

With pneumatic intensification of the process, two fundamentally different schemes for creating turbulence in the washing solution are possible: blowing compressed air (or steam) through a system of bubblers in the bath or creating the effect of vacuum bubbling. In the first case, the air breaks up into individual bubbles and rises to the top through the entire mass of the liquid. In the second, a vacuum is created above the surface of the solution in the washing chamber, where the air flows contained in the liquid are directed. These flows create turbulence in the solution and carry the destroyed contaminants to its surfaces.

In vibration intensification, the objects to be cleaned are given a reciprocating motion based on a low-frequency oscillation principle. Vibrating agitators are used as high-frequency activators that impart vibration directly to the cleaning solution..

Mechanical activators of immersion washing machines are divided into three types: rotary, screw and blade. In rotary machines, cleaning objects are loaded into containers that are suspended from a crossbar and perform a rotational movement. Activation of the cleaning solution and the cleaning process are carried out by periodically immersing the containers in the bath, moving them inside the bath and lifting them above the bath to drain the solution from the container openings. When cleaning in machines with screw activators, objects are loaded into the drum and moved inside, intensively washed with the solution. Mechanical blade activators are placed inside the washing bath and during operation direct a submerged jet of cleaning solution to the cleaning objects.

References

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