UDC 622.75:629.7

ENSURING INCREASE OF THE DURABILITY OF VOLUME HYDRAULIC DRIVE USING TECHNOLOGICAL METHODS

[1]**Umynskyi S.M.**, Ph.D., Associate Professor, ymoshi@ukr.net
[1]**Dudarev I.I.**, Ph.D., Associate Professor, 247531@ukr.ne
[2]**Yakovleva N.,** engineer, yakovlevanata1993@gmail.com

[1]**Odessa State Agrarian University, Odesa, Ukraine**
[2]**Odessa National Medical University, Odesa, Ukraine**

The resource-limiting compounds of the hydraulic drive have been installed, the necessary number of parts of the resource-limiting compounds to be restored. The tribotechnical and mechanical-technological properties of the applied electrospark sputtering aimed at improving the wear conditions of resource-limiting HST compounds, the formation of EIP modes with electrodes made of molybdenum Mo, brass and U10, 30G, Sv-08 steels on the working surfaces of parts of hydrostatic structures are substantiated.

Key words: *transmission, spraying, hydraulic system, durability, wear.*

Problem. Today, in the field of mechanical engineering, hydraulic equipment performs many technical tasks, therefore there are high requirements for stability and quality of work. To check the compliance of the equipment with these requirements, various methods of hydraulic equipment diagnostics have been created, such as: statoparametric method, spectral analysis, kinematic method, methods of amplitude-phase characteristics, etc. Each method has its rational scope of application and for each method there is equipment that allows you to carry out control according to the required method. With the change in industrial relations, the planned and preventive maintenance system of machines with planned current and capital repairs was transformed into a system with replacement of aggregates and nodes as needed. In modern economic conditions, repair production urgently needs the development and implementation of universal technologies and means of their implementation, which ensure the increase of the average inter-repair resource of hydraulic units to the pre-repair level. Low-quality counterfeit and high cost contribute to an increase in the number of enterprises that are ready to implement new highly effective technologies for repairing hydraulic units and receive economic benefits from this, and agricultural producers - high-quality repaired hydraulic units at a repair cost of no more than 25 - 30% of the cost of new ones [1]. For modern enterprises that provide high-resource repair of complex units and aggregates of domestic and foreign machinery, universal, resource-saving, environmentally safe technological processes using methods of restoring parts based on the use of thermal energy sources are appropriate.

Analysis of research and publications. A decrease in the pressure in the control line, developed by the booster pump, leads to a decrease in the flow of the hydraulic pump and does not depend on the pressure in the discharge line. about the mechanism of loss of working capacity of the GST. The difference between calculated and experimental values of pressure in the control line for the most important modes of operation of the hydraulic drive (the moment of the start of adjustment and the maximum angle of the oscillating node) is no more than 5%, which indicates the reliability of the conducted research [2]. To maintain the required pressure value in the control line, it is necessary to compensate for the leakage of the working fluid in the resource-limiting compounds, for example, by increasing the performance of the feed pump. In order to confirm or refute this assumption, studies were conducted to determine the dependence of the supply, the control line of which was fed by the regular НШ-18 feed pump and the pump with a larger working volume - НШ-32, on different values of a significant factor - the total area of wear in the "brass - steel" combination spreader".

Research results. Therefore, the use of a 1.77 times higher productivity in the control system of the feed pump will allow to increase the supply in the injection line by 9.4% and the volumetric efficiency from the limit value of 0.76 to 0.83. of higher productivity (НШ-32) allows, with the same wear of parts and gaps in the joints, to compensate for the leakage of the working fluid in the joints for a longer time, to maintain the required values of the pressure in the control line and the angle of inclination of the rocking assembly. This proves that the drop in actual supply and volume efficiency is more affected by the angle of inclination, and not by the total leakage [3]. This hypothesis is undoubtedly valid for individual aggregates and open hydraulic systems. In a volumetric hydraulic drive, has a more complex effect on actual volumetric flow and volumetric efficiency. The total volumetric internal leakage of liquid through the gaps in the connections, on the one hand, reduces the actual supply by the amount of leakage, on the other hand, it reduces the pressure in the control line, preventing the tilting of the pumping hydraulic pump assembly to the required angle. Performance evaluation of volumetric hydraulic drives is carried out by bench tests, which make it possible to reliably determine the technical condition and establish the reasons for the failure of hydraulic units. Currently, there are two methods of evaluating the performance of volumetric hydraulic drives GST-112: static and dynamic [4]. The evaluation of the technical condition was carried out dynamically on the IGS-01 test stand. High-pressure valves that were in operation were installed in the valve box of the MPA-112 hydraulic motor. A Webtec throttle-flow meter was used to measure the developing pressure in the injection lines. As a method of technological influence on the parts of the resource-limiting compounds of the volumetric hydraulic drive GST-112, electrospark treatment (EIO) was chosen, which allows both to strengthen the working surface of the brass distributor and to apply a layer of metal coating to the piston and spool. factors, the change of which affects the functional properties of the processed

working surface of the parts. Such factors include the energy parameters of the installation, the properties of the materials of the part and the electrode, the kinematics of the movement of the electrodes, etc.

The properties of the part and electrode materials, pulse energy, pulse frequency, hardening time, and electrode movement speed have the greatest influence. Single-factor and multi-factor experiments were conducted to find the optimal technological modes of EIO, which provide the necessary functional properties for a given part material and various combinations of electrode materials. Among the factors, the main technological regimes of the electrospark hardening process are: pulse energy Wu, (J), pulse supply frequency f u (Hz) and hardening time b (min). The purpose of the one-factor experiment was to determine the values of the ranges of changes in the technological regimes of the EIZ, which affect the microhardness of the strengthened working surface. brass distributor GST-112, various electrode materials. The results of the inspection showed that the most common defects in the joints are: wear of the working surfaces of brass and steel distributors; wear of the inner surface of the cylinder block bushings and the outer surface of the pistons; wear of the inner surface of the opening of the valve box body and the outer surface of the spools. When the energy increases to 0.072 J, for each electrode material, the microhardness of the strengthened surface increases, when it is further increased by more than 0.2 J, it decreases: for the brass electrode, it approaches the microhardness of the main material, 175.180 MPa, for the molybdenum electrode, it is 198.194 MPa. The maximum microhardness is obtained at a pulse energy of 0.07 J and is: 204 MPa for a brass electrode and 205 MPa for a molybdenum electrode.

Conclusions: Resource-limiting compounds and the degree of their influence on HST have been established. EIO was chosen as a technological tool for the implementation of the proposed approach. The possibility of increasing the durability of hydrostatic transmissions by restoring working units as a technological tool - electrospark treatment - has been proven. 2. Theoretically justified factors determining the efficiency of the GST: the total volumetric internal leakage, the amount of control pressure and the angle of inclination of the rocking node of the node.

References

1. Vasiliev, B.A. Hydraulic machines / B.A. Vasiliev, N.A. Greek M.: Agropromizdat, 2008. 272 p.

2. Alekseeva, T.V. Technical diagnostics of hydraulic drives. // T.V. Alekseeva, V.D. Babanska, T.M. Bashta and others. In general ed. T.M. Towers. M: Mashinobuduvanya, 1989. 264 p.: illustrations

3. Bulei, I.A. Designing repair enterprises of agriculture/I.A. Buley, A.V. Shpilka, I.S. Nahirskyi. Kyiv. 1991. 416 p.

4. Ioniv, P.A. Modeling of loads in the pumping units of adjustable axial-piston hydraulic machines / F.Kh. Burumkulov, A.V. Stolyarov, A.P. Senin // Proceedings of the State. 2012. Vol. 110, part 2. P. 148-153.