

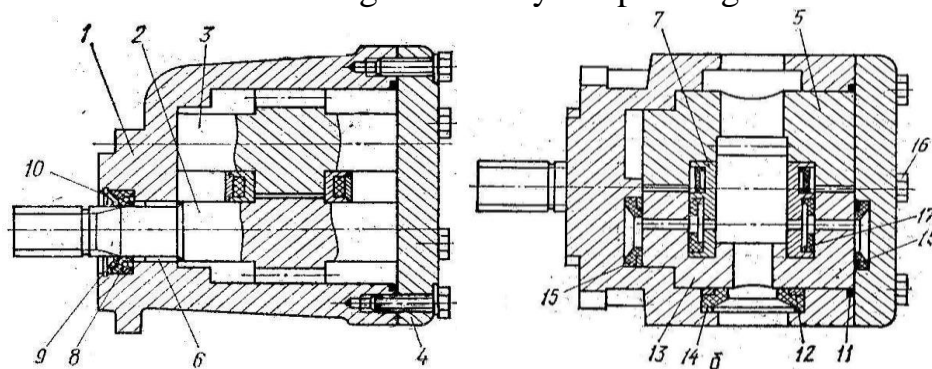
ANALYSIS OF EXISTING TECHNOLOGIES FOR REPAIRING PUMP PARTS

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Pumps of the HIII-K modification (Fig. 1) are widely used in the hydraulic systems constructions due to their high durability in operating conditions.



1 – body; 2,3 – leading and driven gears; 4 – pump cover; 5 – bearing bracket; 6 – centering sleeve; 7 – locking plates; 8 – sealing sleeves of the drive shaft; 9 – support ring of the sealing cuff; 10 – spring ring; 11 – sealing ring; 12 – support plate; 13 – pressure clamp; 14 – cuff of radial pressing; 15,17,18 – cuff; 16 – bolts;

Fig. 1. Structure of the NSh-K pump

In the course of operation, gear pumps of the HIII-K type wear out: bearing and pressure clamps, gears, plates, and rubber seals fail.

The bearing and thrust clamps are repaired by the method of repair sizes. This method is simple and cheap, but has a number of disadvantages: the service life of the parts is reduced, which means the service life of the pump as a whole; when drilling a well, the collar and half-rings under the trunnion of the gears increase in size, which requires the installation of enlarged repair gears, this makes it impossible to use the gears that were in operation; the use of new gears significantly increases the cost of repairing the pump as a whole. [1]

Clips are also restored by surfacing the worn places under the trunnions. In the pressure clamp, the working surface of the liner is welded. After that, the clip is processed to the nominal size. This method of restoration is more productive and profitable, but when the temperature affects the clips, the structure of their crystal

lattice may change, which leads to the destruction of the clips and their intensive wear. It is possible to compensate for the wear of the places under the trunnions of the bearing and pressure cage gears with the help of bushings made of bronze. But the high labor intensity and complexity of manufacturing bushings limits their use. Restoring the normal dimensions of the clips is also possible by installing additional parts made of polymer materials. Places for inserts are bored and polymer half-rings are pressed into them with the help of special molds. The disadvantage of this method is the need to make molds. The advantages of the method are the exclusion of mechanical processing of half-rings after pressing; the connection does not require additional lubrication, the wear of the parts of the pumping unit is reduced.

In the gear, the trunnions, end surfaces and heads of the teeth wear out in a circle [2]. The wear of the teeth along the thickness is insignificant and practically does not affect the operation of the hydraulic pump. Minor wear of the gears is eliminated by grinding the worn surfaces of the trunnions, ends and the outer surface of the heads of the gear teeth to repair dimensions. The disadvantage of this method is the reduction of gear life. Grinding to the repair size is possible only with minor wear. When the dimensions of the gear exceed the limits, they are restored by electrolytic methods or by vibro-arc surfacing with subsequent heat and mechanical treatment. But this method is expensive and requires the use of complex equipment.

Plates worn in the places of contact with the ends of the gears are ground to repair dimensions [3]. The disadvantage of this method is the reduction of the thickness of the plate and the increase of the gap between the plate and the seat, which requires the installation of a compensating plate.

The analysis of existing technologies showed that in most cases the method of repair sizes is used, that is, removal of traces of operation of the working surfaces of parts by mechanical processing to the repair size in compliance with technical requirements for the class of surface cleanliness, geometric shape and physical and mechanical properties.

References

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