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ULTRASONIC STRENGTHENING OF MUD PUMP'S WORKING SURFACE

Z. Odosiy, B. Shuliar
Ivano-Frankivsk National Technical University of Oil and Gas, Ivano-Frankivsk, Ukraine

Up- to-day requirements to the capacity of drilling oil and gas boreholes put the high specifications to quality, durability and operational reliability to of machines in oil and gas industry. Among it drilling pumps take a particular place, as it ensures uninterrupted mud pumping in the hole during the drilling. Drilling pumps works under hard conditions as much as it has to pump over the fluids of wide range and various parameters. Having the data of proximity function density allocation of time reliable work to normal or logarithmic normal allocation is typical in case failure of machines and its mechanisms happened as a result of wear of parts and fatigue. For machine parts is typical to work in sign-variable load, significant place take effects of fatigue, wearing, corrosion, ageing, corruption. In connection with it a number of details and units distinguished in separate groups of replaceable parts. In solution of increasing durability of rod observing two directions: assistance of constructional methods or technological way.

For researches was chosen steel 40 (Chr), its physical and chemical characteristics are particularly suit economic and running requirements for mud pump's rod. Besides such choice was conditioned, this material is used in manufacturing rods on DMP.

Samples were antecedent heated to T = 850 °C with hardening in oil, then low tempering at t = 180 °C and high tempering t = 560 °C during 2 hours and normalization. Heating for hardening was realized in quenching bath (72% $BaC1_2$ + 28% NaCl in mass ratio). Before samples having been put in the bath, it was heated in kiln during 2 hours. Cassettes with samples were put in bath for 20–30 minutes.

After hardening and tempering samples were washed in boiling water for one hour, after were air-cooled to room temperature. It allowed to provide satisfactory hardenability and remove sample's hogging. Hardness of steel 40 (Chr) with high tempering was 30HRC and for low tempering 50 HRC.

Tests of heating and low temperatures on stability characteristics of the detail's surface layer after researched finishing were realized with application of additional heat treatment with its tempering under 150 °C and inl liquid nitrogen under -196 °C for 2 hours.

Time of the aging in the desiccator was counting from the moment of reaching given temperature after loading samples. Cold working was made in the Dyuar vessels filled with liquid nitrogen. Loading of samples in the dessicator was made after the stregthing.

Sample's grinding after heat treatment for receiving measures was made on the automatic cylindrical grinding machine 3B12 with grindstone ЭB25CM1K with high cooling of water emulsion for the next working conditions: speed of grindstone spinning $V_{кр} = 39{,}5$ m/c, speed of detail' s spinning $V_{д} = 31$ m/c, longitudinal feed $S_{пд} = 0{,}2$ m/c, cross-feed $S_{пд} = 0{,}006$ mm/c.

Tempering of white layer caused increasing of steel resistance to corrosion cracking [1]. So tempered white layer received after mechanical and ultrasonic finishing of steel 40 (Chr), increasing resistance to corrosion cracking compare with white layer without additional heat treatment on 5% [2]. In our case increasing reached 19% in comparison with white layer without additional heat treatment, what is explained of emission fine-dyspersated carbides in the process of prolonged tempering.

REFERENCES

1. Руденко, П. А. Отделочные операции в машиностроении : справ. / П. А. Руденко, М. Н. Шуба, В. А. Огнивец. – Киев : Техника, 1985. – 136 с.

2. Herring, C. Diffuzinal viscosity of a policristalline solid / C. Herring // J. Appl. Phys. – 1950. – 21. – № 4. – P. 437–471.

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ВЛИЯНИЕ ИЗНОСА НАПРАВЛЯЮЩИХ КРЕЙЦКОПФА ПОРШНЕВОГО НАСОСА НА ЕГО КИНЕМАТИЧЕСКИЕ ПАРАМЕТРЫ

В. В. Остапович

Ивано-Франковский национальный технический университет нефти и газа, г. Ивано-Франковск, Украина

Поршневые насосы нашли широкое применение в роторном и турбинном бурении нефтяных и газовых скважин, в системах поддержания пластового давления при добыче нефти, а также в нефтепереработке в связи с тем, что насосы других типов оказываются непригодными вследствие интенсивного износа деталей гидравлической части. Особенно повышенные требования предъявляются к надежности насосной установки при бурении скважин, поэтому используют два насоса, один из которых является резервным, так как технологический процесс бурения является непрерывным.

В работе [1] уделялось большое внимание повышению долговечности деталей гидравлической части поршневых насосов: втулок, поршней, штоков, уплотнений штоков, клапанов, которые подвергаются различным видам изнашивания и являются сменными деталями без учета износа деталей механической приводной части. Наши обследования насосов показали, что износ деталей