UDC 656 (075)

INVESTIGATION OF THE EFFECT OF THE PERFORMANCE PROPERTIES OF LUBRICANTS ON THE WEAR OF ENGINE PARTS

Alimova Zebo Khamidullaevna
(professor)
Sabirova Diloram Qobulovna
(dotsent)
Niyazova Gulhayo Parpiyevna
Tashkent State Transport University, Uzbekistan (senior lecturer)

Abstract: *This article examines the changes in oil quality during engine operation. The main reason leading to the formation of high-temperature deposits in engines are oxidative processes occurring in the oil volume and on the metal surface. These deposits negatively affect the reliability, efficiency and durability of the engine. The greatest danger of varnish deposition is for piston rings. By filling the gaps formed by the piston rings and the grooves drilled in the pistons, it reduces the mobility of the rings. Therefore, we suggest introducing detergent additives into the engine oil.*

Keywords: *oil quality, contamination, viscosity, alkaline number, varnish deposits, piston rings, experimental data, cleaning additives*

The effectiveness and reliability of the operation of equipment for various purposes depends not only on its design and technological features, but also largely on how correctly selected lubricants and their quality.

Studies of the contamination of lubricating oils under operating conditions of equipment show that in hot climates and high dusty air motor oils are intensively contaminated by mechanical impurities, water, fuel and organic products, which leads to premature aging of the oil.

As you know, in a car engine a large number of moving and rubbing together parts. During the operation of internal combustion engines, their components and parts are contaminated with various deposits.The process of deposit formation is associated with thermo-oxidative transformations of products of incomplete combustion of fuel and oil components. These transformations occur both in the volume of oil and in its thin layer on a heated metal surface. The main reason leading to the formation of high-temperature deposits in engines are oxidative processes occurring in the volume of oil and on a metal surface. These deposits adversely affect the reliability, efficiency and durability of the engine.

It is known that oils for internal combustion engines are operated in conditions conducive to their deep oxidation and thermal decomposition, which ultimately leads to deposits of various kinds of sediments, deposits and the formation of lacquer films on engine parts.

The oxidation of oil in a thin layer on heated engine parts occurs under two fundamentally different conditions - dynamic and static (in flow and at rest). The oxidation of oil in the flow occurs during engine operation, when there is a continuous circulation of lubricating oil and engine parts are constantly lubricated with new portions of it. The oxidation of the oil at rest occurs only when the engine stops, when the oil circulation stops, and the parts retain a sufficiently high temperature for a certain time after the engine stops. And although the oil on the heated parts is at rest for much less time than in the flow, the oxidation of oil under static conditions in some cases has a significant effect on the varnish formation in the engine.

The use of low viscosity oil leads to increased friction (the oil film is squeezed out of the friction zone), heating and increased wear of parts (there is direct contact between the rubbing surfaces).

According to experimental data, the decrease in the alkaline number from 6.0 to 3.38. the oil loses its performance. All this can lead to contamination of internal combustion engine parts with various varnish deposits.

Varnish deposits pose the greatest danger to piston rings. By filling the gaps formed by the piston rings and the grooves made in the pistons, this reduces the mobility of the rings. It is here that high-carbon compounds are formed, which are deposited in the grooves in the form of films.

Taking into account the experimental data we have obtained on changes in viscosity and base number, we recommend adding detergents to the engine oil.

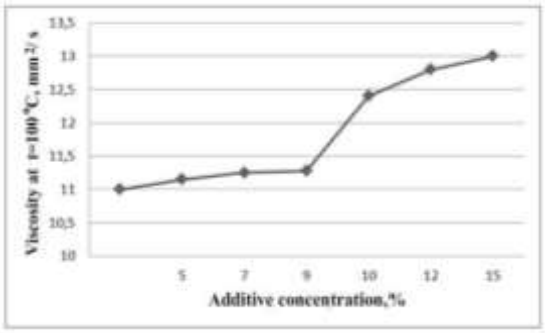
As detergent additives, we used a detergent additive containing phosphorus, sulfur and alkaline earth metal.

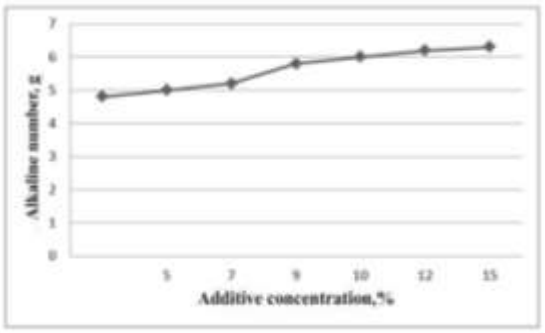
One of the main functions of these additives is the “dispersing” ability, which consists in the fact that they keep the carbonaceous particles formed in the oil in a finely dispersed state. An increase in the size of carbonaceous particles is prevented by the adsorption of additive molecules on their surface.

These additives are obtained by the reaction of alkylphenol with phosphorus pentasulfide and calcium salts.

These additives have the ability to improve the quality of oils. The action of such additives is based on their ability to loosen, wash away deposits from the surface of parts and transfer insoluble substances into suspension and keep these particles in this state without enlargement.

Based on this, we analyzed the motor oils M-10B_2 and alkylphenol with phosphorus pentasulfide and calcium salts. Having determined the dissolution of the alkylphenol with phosphorus pentasulfide and calcium salts in engine oil, we determined the physicochemical parameters of the engine oil for various concentrations of additives.





According to the results of laboratory studies of tests with the introduction of additives in the $M10B_2$ engine oil, physico-chemical parameters gave a positive result compared to $M10B_2$ oils. The alkaline number increased from 4.8 to 6.5, and the flash point rose to 224^0C, which indicates the effectiveness of the added additive. This means that using this additive will increase the life of the engine oil.

REFERENCES:

1. Jerichov, B. B. Automobile maintenance materials: textbook. allowance. state architect build un-t - SPb., 2009 .- 256 p.
2. Kirichenko N.B. Automobile maintenance materials: Textbook. – M.: Publishing Center "Academy" 2012.-208 pp.
3. Alimova, Z. X., Kholikova, N. A., Kholova, S. O., & Karimova, K. G. (2021, October). Influence of the antioxidant properties of lubricants on the wear of agricultural machinery parts. In IOP Conference Series: Earth and Environmental Science (Vol.868,No.1, p.012037).
4. Hamidullayevna, A. Z., & Ismailovich, I. K. (2023). Improving the ability of motor oils to the effects of high temperatures. Open Access Repository, 4(04), 77-81.
5. Alimova, Z. (2023). Effect of activation of alkaline additives in oils for wear of engine parts. Scienceweb academic papers collection.
6. Alimova, Z., & Ibrahimov, K. (2023). Dependence of changes in the properties of motor oils on the operating conditions of the engine. International Bulletin of Applied Science and Technology, 3(4), 288-292.
7. Hamidullayevna, A. Z., & Ismailovich, I. K. (2023). Causes of changes in the properties of motor oils in the high temperature zone of the engine. American Journal of Applied Science and Technology, 3(01), 1-5.
8. Hamidullayevna, A. Z., & Ismailovich, I. K. (2023). Antifriction Properties of Lubricants and Their Effect on the Viscosity of Oils. European Journal of Emerging Technology and Discoveries, 1(1), 65-68.
9. Alimova Zebo Khamidullaevna, Sobirova Dilorom Kobulovna, & Yuldasheva Gulnora Buranovna. (2021). Improve The Physico - Chemical Properties Of Hydraulic Oils Way Of Introduction Of Additives. The American Journal of Engineering and Technology, 3(12), 1–5.

10. Xamidullayevna, A. Z., & Ahmatjanovich, M. M. I. (2021). Study of Anti-Corrosion Properties of Lubricants and Ways to Improve them. Design Engineering, 3811-3819.

11. Alimova, Z., Axmatjanov, R., & Sidikov, F. (2023). Vliyanie ekspluatatsionnых svoystv masel na texnicheskoe sostoyanie dvigatelya. Evraziyskiy jurnal texnologiy i innovatsiy, 1(4), 241-244.

12. Sobirjonov, A., Alimova, Z. X., Niyazova, G. P., Ayrapetov, D. A., & Siddikov, R. B. (2021). Prevention of corrosion and accelerated wear of agricultural machinery. Ilkogretim Online-Elementary Education Online, 20(5), 7482-7486.

13. Khamidullaevna, A. Z., & Faxriddin, S. (2022). The aging process of motor oils during operation. European International Journal of Multidisciplinary Research and Management Studies, 2(06), 166-169.

14. Zebo, A., & Bakhtiyor, S. (2022). Oxidation of motor oils during operation engines in military equipment.

15. Alimova, Z. (2020). Ways to improve the properties of lubricants used in vehicles. VNESHINVESTROM",–2020.

16. Hamidullayevna, A. Z., & Ismailovich, I. K. (2023). Improving the ability of motor oils to the effects of high temperatures. Open Access Repository, 4(04), 77-81.

17. Hamidullayevna, A. Z., & Ismailovich, I. K. (2023). Antifriction Properties of Lubricants and Their Effect on the Viscosity of Oils. European Journal of Emerging Technology and Discoveries, 1(1), 65-68.

18. Khamidullaevna, A. Z., Akhmatjanovich, M. M. I., & Magdiev, K. I. (2022). Causes of changes in the viscosity parameters of motor oils during operation. Web of Scientist: International Scientific Research Journal, 3(10), 156-160.