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THEORETICAL EVALUATION OF THE PROPENSITY OF MOTOR OILS TO OXIDATION

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ABSTRACT

Annotations

Changes in the use of oils, the state of the intensity of changes in the duration of the use of oils in the engine lubrication system, theoretical expressions of characteristic dependencies are revealed. In the course of operation, information is provided that allows obtaining results on indicators characterizing the working process of lubricants operating in the engine.

KEYWORDS: oil, aromatic hydrocarbon, sulfur, condensation, approximation, detergent, oil plenka, tensile, sump, substances, pollution, concentration, oil, speed, filtration.

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Original Article

INTRODUCTION

In agriculture, the salinity of modern foreign tractor and agricultural machinery is increasing on account of production in joint ventures and import from abroad. Modern foreign techniques differ from existing techniques in that they are made up of a large number of expensive and complex parts as well as details. This, in turn, increases the relevance of their full use of technical resources [1]. In the last 20 years, due to environmental standards, internal combustion engines have constantly undergone significant changes. At the same time, trends in the production of modern engines, the technology of producing used oils and additives, require new solutions. In order to achieve this objective, we identified the study of the components of local and foreign oils as the task of our study. It is known to us that the production and use of motor oils requires a lot of testing methods, ensuring high efficiency in the process.

Taking into account the fact that the indicators that are part of the normative documents of Motor oils have a more technological characteristic, it is more important to determine which of them has a chemical significance. Changes in the process of using lubricants were determined by the frequency of use of fasteners, characterizing the state of the intensity of the change in the timing of the use of lubricants in the lubrication system of the engine. In the process of use, it is possible to obtain results from indicators that characterize the state of the working process taking place in the engine [2].

Theoretically, the working capacity of the oil through the following ratio ($\varphi_м$) the coefficient of tension of the oil can be determined by the following formula[2]

$$\varphi_м = N_e/Q_н \tag{1}$$

In here N_e–effective power; $Q_н$ –production capacity of oil pump.

Accordingly, depending on the fat content, the amount (T) is determined by the following formula: [1]

$$T = 10(29,11 – 23,7x + 24,13\ y + 1,1H) \quad (2)$$

In this x-total amount of aromatic hydrocarbons in oil; y-composition of monoaromatic hydrocarbons; H-composition of sulfur and condensate hydrocarbons

It is recommended to determine the probability of effective use of Motor oil in terms of its ability to combat the development of processes that lead to a decrease in the quality of oil in the engine. Such processes also include, in particular, the oxidation process of oil. To assess the intensity of this process in the engine, according to the following formulaK_0it is recommended to use the criterion:[3]

$$K_0 = \frac{0{,}0175 g_e N_e(\alpha-1)}{D \cdot S \cdot i}, \quad (3)$$

In this, g_e–comparative fuel consumption, N_e - effective power, α- excess air coefficient, D - diameter of cylinders, S -road, i - number of cylinders.

$K_0$with an increase in size, the working capacity of the oil decreases. In the development of pronounced concomitant, the pressure of the oil is much higher-in the high-temperature zone (K_0^1) a criterion that describes the oxidation and is approxymaxed by (3) expression was recommended:[2]

$$K_0^1 = \frac{g_o}{g_m} \cdot \left(\frac{T_{\max}}{T_{kp}} \right), \quad (4)$$

In hereg_0-oxygen consumption in one cycle; g_m-may surfing in a cycle; $T_{мах}$-the maximum temperature of the oil film in the cartridge.

The oxidation of the oil in the engine intensifies to the account of sulfur in the fuel. To assess the effect of oil on oxidation, it is recommended to use the following criterion:[2]

$$K_S = \frac{q_e \cdot N_e \cdot \beta}{60\pi D \cdot S \cdot i}, \quad (5)$$

In here β – sulfur content in fuel.

In the engine calculated by the sulfur content in the oil, the working time of the oil ($T_м$) is determined by the following expression: [4].

$$T_M = \frac{k_1}{k_2} \cdot \frac{V_H \cdot \beta}{S_T}, \quad (6)$$

In here, $S_т$–amount of burning sulfur; V_H-the amount of oil initially injected into the engine; $к_1$ and$к_2$-cons

The Oil Change Time (T) calculated by the results of the neutralization process depends on the sulfur content in the combustion products, the lubrication system capacity, the amount of oil being added and the efficiency of the detergent in the oil [5].

$$T = \frac{C_0 (V - g_M \tau)}{\frac{m\beta \cdot b_0 \cdot S_v}{32 \cdot K_{\Pi} \cdot K_{вал}} - C_0 g_M}, \tag{7}$$

In here C_0 –initial metal composition in the detergent; V-oil system capacity; dm-the amount of oil to be added; τ -the working time of the oil before the oil change without additional additives; m- atomic weight of the metal in the detergent; β- share of exhaust gases in tact;b_o- passing gas meter, S_v- sulfur content in combustion products; 32-atomic weight of sulfur; $K_п$ and $K_{вал}$ – process pressing and tensile coefficients

The ability of the engine oil to work is also influenced by the degree of its contamination, in particular, the presence of external contaminants in it.

With an increase in the degree of impurities in the oil, its working capacity decreases. According to specially conducted calculations, the presence of contaminants in the oil decreases the concentration of detergent during the use of oil.

We can see in the expression that the decrease in the concentration of Detergent depends not only on the presence of contaminants in the oil, but also on the intensity of the additives: [7,8]

$$\Delta C = \left(C_0 - \frac{V}{Q_s} \right) e^{-\frac{Q_S t}{G_0}} + \frac{V}{Q_s}, \tag{8}$$

In here C_0 – the initial concentration of additives in the ointment; G_0 –decrease in the number in the fat content Q_S - lubrication system is the general intensity of cleaning from impurities contained in the lubricant and reducing the alkalinity of the lubricant.

Ochki film deterioration of the quality of oil in the process of using the engine Snowman is an impetus to the intensification of negative processes, the result of which negatively affects the reliability of the engine. Among such processes, it is possible to include the formation of soot. This condition limits their working capacity under conditions of exploitation of oils.

We enter a new indicator describing the work of the oil for the autotractor engines, in which the method of entering the tank under pressure is used.

When the xavo input method is used under pressure, the camshaft is operated by high-speed rotations. Printing on the Shatun porshen group increases, and the details of the cylinder porshen group complicate the working conditions. Bunda lubrication system requires swelling.

The formula for Iiodes with the introduction of air under pressure will have the following appearance:

$$K_0^t = \frac{g_0 + g_0^t \cdot n^t}{g_M + g_M \cdot n^t} \cdot \left(\frac{T_{\max}}{T_{kp}} \right)$$

g_o- oxygen consumption during the cycle; g_M -oil consumption during the cycle; g^t-oxygen consumption in one cycle of turbocompressor work;

n^t–coefficient describing the work of turbocompressor; T_{max}-the maximum temperature of the oil, $T_{кр}$ – limited temperature of oxidation

CONCLUSIONS

The theoretical expression for the rate of addition (V) of 1 additives, as well as the elimination of contaminants in oil (Qx), has been developed

- As a result of the neutralization process, it was determined that the calculated oil change time (T) depends on the sulfur content in the combustion products, the lubrication system capacity, the amount of oil added and the efficiency of the detergent in the oil.
- In the process of theoretical study of antioxidant and dispersive properties, the presence of additives and contaminants was determined.
- Description of the work of the ointment for iodine, where the method of entering the air under pressure is used and K_0^t the expression of mshlab has been released.

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