Effective use of motor oil resources of the tractor of the company "Claas" in the conditions of Uzbekistan

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Annotation: The article describes in detail the reliable operation of modern high-performance and complex "CLAAS" techniques, the correct selection of lubricants and compliance with the optimal operating procedure, as well as the results of the analysis of friction elements of motor oils. It is necessary to compare the quality indicators determined on the basis of research and the concentration of friction elements in the oil with standard values. In order to determine the recommended engine oil change intervals in the engines of CLAAS tractors, it is necessary to determine their quality indicators and the concentration of friction elements in the oil. In order to maintain the performance of the oil, it is recommended to add additives during operation. Study of wear conditions of oils used in internal combustion engines. Determination and justification of the limit working life of oils used in internal combustion engines. Study and justification of properties of interchangeable oils used in internal combustion engines. It is necessary to develop scientific justification and recommendations for increasing the service life of the oils used in internal combustion engines.

1. Introduction

UzCLAAS Agro LLC, which was established on the basis of the decision of the President of the Republic of Uzbekistan dated March 19, 2010 on the establishment of a joint venture for the production of agricultural machinery with the "CLAAS" concern, started production of agricultural tractors in 2010. In 2003, the German "CLAAS" concern bought a 51% stake in the French tractor manufacturing company "Renault Agriculture" (in 2006, the share of the "CLAAS" concern in the "Renault Agriculture" company increased to 80%) and produced tractors under the "CLAAS" sales center. began to issue.

2. Materials and methods

One of the main factors in ensuring the uninterrupted operation, durability and reliability of modern high-performance and sophisticated CLAAS equipment is the correct selection of lubricants and compliance with the optimal operating procedure.

It is known that the climatic conditions of Uzbekistan correspond to the sharply changing continental conditions compared to the American and European climates. This, in turn, is closely related to the oil hydration of internal combustion engines.

The operating conditions of Central Asia affect both the process of natural deterioration of oil quality and the operation of the lubrication system.

shows. As a result, it is necessary to reduce the periodicity of mandatory operations for servicing the lubrication system compared to the standards established for the middle region of our country, to take additional measures to ensure the reliable and long-term operation of the, to reduce the wear of parts and the costs of their repair [1, 2, 3, 4].

The high temperature of the environment and intense solar radiation worsen the cooling of parts and oil, causing their temperature to rise. This condition leads to a decrease in the viscosity of the oil, a decrease in the bearing capacity of the oil layer between the friction surfaces of the crankshaft bearings and other components. All this makes their working conditions close to marginal exploitation.

An increase in air temperature accelerates the oxidation processes in the oil, causing its wear and tear and the effect of its deposits to decrease. Due to sudden changes in air temperature during the day, the amount of water in the oil increases as a result of the conversion of atmospheric air into water in the crankcase wall and parts, which, combined with oxidizing phenomena, leads to an increase in the aggressiveness of the oil and a decrease in the alkali number. It was found that 1% of water in the oil increases the bending of the piston rings by 1.8...2 times. An increase in water in the oil worsens its filterability, reduces the permeability of filters, and creates conditions for malfunctions. In this respect, centrifuges have certain advantages over filters. The formation of water in the oil causes this paper filter to clog and change its structure, resulting in large impurities enters the system and accelerates the bending of engine parts [5, 6, 7, 8].

One of the main characteristics that affect the internal combustion engine lubrication system and engine performance in the climate of the Central Asian region is that the amount of air on the side of the road and in the field is high, and the abrasive properties of dust are high. At a height of 0.65 m above ground level, 66% of the dust consists of small dispersed particles up to 10 μm in size. They enter the engine crankcase through oil filler necks, oil metering holes, and even very small imperfections in the joints of external parts. The smallest dust (up to 3 μm), which is not retained in oil filters, collides with oxidation products and oil polymerization products and forms thin colloidal particles, which can increase the size of dust particles and accelerate friction. In addition, gentle cleaning quickly clogs the holes of the filter, increases their internal resistance, and worsens oil filtration. They get into the gap between the rubbing parts and cause rapid wear of the surfaces. Therefore, it is recommended to use the method of gentle cleaning of the oil in full flow mode with frequent replacement of filter elements [9, 10].

It is necessary to determine the physico-chemical properties of oils and the amount of active elements remaining in its composition, and to add additives for a certain purpose depending on their residual amount and properties. These works, in turn, require theoretical and practical research. The fact that the climate of Uzbekistan is hot and dusty causes the amount of dust in the air to change the quality of the oil. This leads to corrosion of engine parts and an increase in the consumption of fuel and lubricants [11]. Use motor oils wisely

Research work on determining replacement periods is being conducted based on the requirements set by state standards.

According to the conducted studies, during the period of use of motor oils, it is suggested and recommended to add necessary additives in the process of operation in order to restore their performance [11, 12].

How to solve the problem Agrimot 15W40 motor oils used in the ARION630S tractor were sampled at regular intervals and quality indicators were determined according to state standards. In order to determine the period of reasonable replacement of motor oils, it was found necessary to determine the change in their quality indicators during the period of operation and the concentration of corrosion elements collected in its composition. Research work was carried out in Surkhandarya, Fergana, Tashkent regions.

Table 1. Permissible physical and chemical parameters of motor oils

№	physical and chemical indicators	Amount
1	Change in viscosity at a temperature of 100o C	17,54

	- decrease (on demand)	12,5
	- increase (on demand)	16,3
	Ignition temperature, max	220
	Total alkaline index, max	6,80
	Diesel fuel in oil, max	
2	Deflection elements, not more than the specified value:	
	- iron (Fe)	100
	- copper(Cu)	30
	- Aluminum(AI)	30
	- lead(Pb)	30
	- chromium (Cr)	20
	- silicon (Si)	35

The amount of elastic elements of motor oils was determined according to GOST 20759-90. The amount of metal contained in the motor oil of the obtained sample was determined by the method of standard-spectral analysis, and the results are presented in tables 2, 3, 4.

3. Results and discussion

Table for determining the amount of friction elements in Agrimot 15W40 motor oil.

Table 2. Surkhandarya region

Sampled,	The amount of metal in the oil, (mg/kg) , accepted						
motorcycle	Fe	Pb	AI	Cu	Cr	Si	Sn
watch	100	30	30	30	20	35	30
50	75,47	3,82	15,79	14,81	4,48	8,15	1,1
100	78,02	3,91	15,84	14,90	4,51	7,54	1,3
150	84,32	4,41	16,77	15,10	5,78	7,79	1,4
200	97,18	4,77	18,12	16,24	6,01	7,97	1,7
220	**102,8**	4,85	26,45	18,84	7,61	9,54	1,8
250	**109,2**	5,35	28,86	26,96	9,78	11,06	2,3

Table 3. Fergona region

50	77,16	2,20	15,34	14,60	4,37	8,10	1,0
100	81,10	3,15	16,74	15,44	4,90	8,81	1,67
150	90,7	4,97	18,10	16,78	5,13	8,99	1,78
200	98,0	5,45	19,74	17,20	5,40	9,10	1,97
220	101,6	6,87	25,06	19,37	6,84	10,87	2,13
250	106,2	8,65	28,9	24,45	7,48	12,68	3,19

Table 4. Tashkent region

50	87,10	3,18	20,84	19,06	5,29	9,48	1,26
100	88,11	3,24	21,6	19,14	5,38	9,67	1,33
150	89,24	3,80	21,9	19,37	5,49	9,71	1,40
200	94,56	4,10	24,12	24,7	6,45	10,54	1,56
220	102,1	4,82	26,16	24,7	7,86	12,65	1,70
250	104,5	5,76	28,67	25,34	6,57	11,17	1,90

According to the results of the conducted research, it was observed that the content of Fe-iron element in Agrimot 15W40 motor oil exceeds the limit specified in the GOST requirements when it reaches 220 moto hours. But the amount of other types of metal elements in the oil meets the requirements of GOST.

4. Conclusions.

Taking into account the above-mentioned problems, the scientific justification of increasing the efficiency of oils when using promising CLAAS techniques used in the conditions of Uzbekistan is considered

To achieve this goal, it is necessary to solve the following issues:

The reliable operation of CLAAS machines, increasing the productivity, first of all, is the optimal and correct selection of lubricants for these machines.

1. In the climatic conditions of Uzbekistan, the high temperature and large amount of dust particles lead to deterioration of oil quality.
2. It is necessary to compare the quality indicators determined on the basis of research and the concentration of friction elements in the oil with standard values.
3. In order to determine the recommended engine oil change intervals in the engines of CLAAS tractors, it is necessary to determine their quality indicators and the concentration of friction elements in the oil.
4. In order to maintain the performance of the oil, it is recommended to add additives during operation.
5. Study of wear conditions of oils used in internal combustion engines.
6. Determination and justification of the limit working life of oils used in internal combustion engines.
7. Study and justification of properties of interchangeable oils used in internal combustion engines.
8. It is necessary to develop scientific justification and recommendations for increasing the service life of the oils used in internal combustion engines.

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