UDC 622.75:629.7

INCREASE EFFICIENCY USE MOTOR OILS IN CONDITIONS AMC

S.V. Konev , S.S. Zhitskov, D.V.Tsankov
Odessa State Agrarian University

The durability of tractors and cars is mainly limited to motorcycle engines, which largely depends on the quality of used petroleum products, in particular, motor oils. But pure oils, obtained from natural raw materials (oil), even the highest qualities, can not provide durable exploitation of modern and perspective engine models. At this time, motor oils used in agriculture for diesel engines consist of 89 ... 95% of the base, that is, oil butter, and 5..11% of additives. It has been established in the experiments that part of the engine oil additive for tractor engines falls into the sediment during storage, part of it is removed by oil filters of the engine, which in general significantly reduces their quality, which in turn negatively affects the durability of the mechanisms. The dispersion of domestic additives in oils reduces the speed of their coagulation and sedimentation, that is, it increases resistance. The most suitable way of dispersing additives in commercial oils is the hydrodynamic effect on them. The basic physical, chemical and operational properties of oils, improved by hydrodynamic treatment, are higher compared to commercial oils. Wear when working on improved oil is 33% less than on commodity. Application of oils with improved operational properties, additional influence on commercial oil - hydrodynamic treatment, gives an opportunity to increase the motor power of engines by 20-25% without additional technological and design changes.

Key words: tractor, motor oil, the engine, additives, regeneration, adsorption.

Introduction. The durability of tractors and cars is mainly limited to motorcycle engines, which largely depends on the quality of used petroleum products, in particular, motor oils. Increased operational reliability of tractors is one of the most important problems of modern machine building, the solution of which allows you to save money and release a significant amount of production capacity [1,2,4].

Problem. The main properties of the oils, which provide the durability of engines, is the ability to reduce wear and tear of engine parts and ensure their frequency. In that case, if the reduction in the wear of parts can not be achieved by improving the deterioration properties of the lubricant at this stage of their production, this is achieved by increasing the wear resistance of the parts. The cleanliness of the parts depends not only on the properties of the lubricant, but with the increase in engine speed, the temperature regimes of them considerably increase, which contributes to the rapid formation of contaminants. Therefore, it is this property of oil that has a significant effect on the durability of modern engines [4,6]. But pure oils, obtained from natural raw materials (oil), even the highest qualities, can not provide durable

exploitation of modern and perspective engine models. In order to add the necessary qualities of oils to them add special compounds - additives.

Analysis of recent research and publications. At this time, motor oils used in agriculture for diesel engines consist of 89 ... 95% of the base, that is, oil butter, and 5..11% of additives [1,2,4]. However, it is not possible to obtain the oils of the required quality only with the increase in the amount of additives, and in some cases it even leads to negative results. Thus, an increase in the proportion of metal-containing additives dramatically reduces the wear and anti-spill properties of lubricants, violates the normal work of heavy-loaded parts cylinder-piston engine group. Recently, new dispersant and antioxidant soaps have been created, such as bisphenol antioxidants, as well as washing alkylsalicylic additives based on various alkaline earth metals, which considerably improves the performance of engine oils for forced engines. It has been found in the experiments that a part of the engine oil additive for tractor engines falls into the sediment during storage, part of it is removed by the engine oil filters, which in general significantly reduces their quality, which in turn negatively affects the durability of the mechanisms [4,5, 7].

The purpose of research: The reserve for improving the quality of engine oil is the increase in the dispersion of additives, which will allow you to get higher results with the lowest operating costs.

Research results. Acoustic rarely phase-processing materials have been used in agricultural machinery and agro production. With its help you can substantially intensify the main technological processes and in some cases obtain qualitatively new indicators of agricultural products. The main factor affecting the stability of the solution of additives in motor oil is the size of their particles. If the particle size is the same and small enough (about 10 nm.), Then the conditions that arise when operating in the engine and storage of oil, can not make a noticeable negative impact on the stability of additives. The dispersion of domestic additives in oils reduces the speed of their coagulation and sedimentation, that is, it increases resistance. The most suitable way of dispersing additives in commercial oils is the hydrodynamic effect on them. This makes it possible to obtain particles of rather small sizes without contacting the tool with processed particles, and it occurs much faster compared with other methods [3,4,5]. When the ultrasonic waves are propagated in a liquid medium, there are three effects - sound wind, sound pressure and cavitation Moreover, the destruction of solid particles occurs at the expense of cavitation, for the emergence of which requires a certain power. Minimal ultrasonic power required for cavitation in mineral motor oils within the range of 9 ... 50 kW / m. Three types of electromechanical emitters are used for this purpose: electrodynamic, magnetostrictive and piezoelectric. Magnetostrictive converters can give sound power up to several hundred kilowatts per square meter with a useful efficiency of 50 ... 60%. In the process of testing, the following works were carried out: rolled up of tractors in a flow of 60 working hours according to the factory instructions; removed heads from engine blocks and applied artificial bases on the inner surface of cylinder liners in their area for more wear. Micrometers of cylinder liners were carried out in the same zone. The artificial bases are deposited

in the form of wells cut in the sleeves of the UPLO-6 devices. The results of the micrometerization of the cylinders of the engines are given in Table 1, and the size of the wells in Table 2. The engine of the tractor with the economic number 1024 was filled with commodity motor oil of the mark M IOG TU 38 101650 - 96, and the engine of the tractor 1023 was the same commodity motor oil, but further processed by ultrasonic waves. Motors during the comparative tests worked on diesel fuel of the mark "L" GOST 305 - 93. Engines D - 65H, loaded with commodity and improved oil produced 480 motor hours. After every 120 engine hours of engine operation, samples of engine oil and sediment from oil filters with simultaneous determination of the total mass of deposits in oil filters were selected. In the case of engine oil, ash content was determined according to GOST 1451 - 95, kinematic viscosity according to GOST 33 - 96, mass fraction of insoluble precipitates according to GOST 20684 - 95 and alkaline number according to GOST 11362 - 96. Results of analysis of oil samples and mass of deposits in oil filters are given in Table 3. The preliminary analysis of the obtained results of the samples of oils shows that the mass fraction of insoluble precipitates in the improved oil is twice less than in the market, and the alkaline number at the end of the test at 0.3 mg KOH per gram of oil is greater. The viscosity in the product oil is 0.5 cSt more than that of the improved. The value of the oil indicators makes it possible to make a suggestion that the wear of the engine parts that worked on the product oil with improved operational properties by an additional one-time hydrodynamic effect on it will be less than that of the working oil. Analysis of the results of measurements given in Table. 1 confirms the proposal to reduce the wear of engine parts, working on oil, improved by processing. Thus, the average and total wear of the sleeves of engines working on the marketable and improved oil, respectively, is 0.015 and 0.01 mm. Consequently, the wear of an engine that works on improved oil is less than 33% [4,5,6,8].

Table 1. **Dimensions of cylinders of engine D-65N in zone of maximum wear**

№ Sleeve	The plane of measurements	Dimensions, mm									
		The exploit. №1024					The exploit. №1023				
		micrometers		wear			micrometers		wear		
		1	2	in the square measurement.	We d mean sleeves	We d mean computer sleeves	1	2	in the square measurement.	We d mean sleeves	We d mean computer sleeves
1	2	3	4	5	6	7	8	9	10	11	12
1	A-A B-B C-C D-D	110,05 110,06 110,07 110,04	110,07 110,07 110,11 110,03	0,02 0,01 0,04 0,01	0,015		110,02 110,01 110,01 110,02	110,06 110,01 110,05 109,98	0,04 - 0,04 0,04	0,010	

2	A-A B-B C-C D-D	110,05 110,05 110,05 110,05	110,05 110,09 110,07 110,08	- 0,04 0,02 0,03	0,023	0,015	110,03 110,03 110,03 110,03	110,03 110,04 110,03 110,04	- 0,01 - 0,01	0,005	0,010
3	A-A B-B C-C D-D	110,04 110,05 110,06 110,05	110,05 110,09 110,06 110,07	0,01 0,03 - 0,02	0,015		110,04 110,04 110,05 110,04	110,04 110,06 110,08 110,05	- 0,02 0,03 0,01	0,015	
4	A-A B-B C-C D-D	110,05 110,03 110,03 110,05	110,05 110,04 110,04 110,06	- 0,01 0,01 0,01	0,008		110,04 110,05 110,04 110,05	110,05 110,06 110,05 110,05	0,01 0,01 0,01 -	0,008	

Table 2. **Dimensions of wells cut into cylinder liners of engines Д-65Н (holes sliced in the zone of greatest wear of cylinder liners)**

The person No. tr-ra	Sample mastialy	Worked out moto / hours to the beginning tested it	Rooms sleeves	Size holes, dividing the scale						
				number of holes				Average value	Wear	
				1	2	3	4		sleeves	total
1024	commodity	60	1	90/72	85/X	100/67	89/73	93/70,7	22,3	41,43
			2	95/25	103/42	84/59	82/22	91/37	54,0	
			3	95/45	92/18	82/30	76/X	89,7/31,3	58,4	
			4	100/69	83/62	97/66	85/45	91,5/60,5	31,0	
1023	polished	60	1	70/34	80/X	77/27	87/51	78/37,3	40,7	40,58
			2	85/65	90/42	65/34	87/33	81,8/43,5	38,3	
			3	92/46	90/X	94/62	103/75	96,3/61	35,3	
			4	90/45	85/34	105/39	102/71	95,5/47,5	48,0	

Bench tests of engines were also carried out. The bench tests were carried out on engines D-65N. The first cycle of bench tests was carried out at loading power of the engine at 75-90% of the maximum for 320 motododin on commercial oil grade M-10M GOU and oil treated with a hydrodynamic apparatus. Engine tests were carried out after it was rolled over 30 engine hours according to the factory instructions, and an additional 70 mo / dd when the engine power was loaded at 55-80% of the maximum. The braking of the D-65N engine was carried out at the booth of the mark KI 5543-GOSNTI, and the gross oil was measured every 10 operating hours of the engine before the start of the change by weighing the

impregnated oil on scales of the type VNTS-2, accounting for fuel consumption was carried out by reducing the volume in the measuring banks. Every 2 hours of engine operation, the logs of the devices, which show the power loading, the temperature of water and oil, the speed of the crankshaft and the pressure of the oil in the lubrication system of the engine, were recorded in the magazine. Before the start of the experiment, the engine was disassembled with micrometry of the main parts of the cylinder-piston group, the cutting of artificial bases in the cylinder liners, assessment of the pollution of the pistons by lacquer deposits. Repeated micrometers were carried out after 50 moons.

Conclusions. The basic physical, chemical and operational properties of oils, improved by hydrodynamic treatment, are higher compared to commercial oils. Wear when working on improved oil is 33% less than on commodity. Application of oils with improved operational properties, additional influence on commercial oil - hydrodynamic treatment, gives the opportunity to increase the motorcycle of engines by 20-25% without additional technological and design changes.

REFERENCES

1.Bilokon Y. Yu., Okocha A. I.(2004). Fuel and lubricants and other operational materials. -K .: Center for Spiritual Culture. -448 p.

2. Bilokon Y. Yu., Okocha A. I.(2002). Tractors and cars. -K .: Harvest. -322 p.

3.Gershgal DA, Friedman V.M.(2006). Ultrasonic technological equipment. M., Energy, 420 p.

4. Grushetsky C.M., Bendera I.M., Kozachenko O.V. et al., Ed. S. SM Grushetsky, Bendery I.M.(2014). Technical service in the APC: Educational-methodical complex: Teaching. manual for students is engineered. special directly "Processes, machines and equipment of agro-industrial production" Kamyanets-Podilsky: FSP Sysyn Ya.I., 680 p.

5.Gorovoy G.V.(2006). Diagnostics of engine on change of composition of motor oil. - Agrarian Bulletin of the Black Sea Coast, collection of scientific works, Engineering. Whip 34.-196 c, S. 34-37.

6. Zabrodsky V.M., Topilin G.E.(2004). The working capacity of tractors. - Moscow: "Kolos",- 18 p.l.

7. Topilin G.E., Uminsky S.M., Chuchui V.P.(2014). Operational traction of tractors. Simexprint Publishing House, ISBN 978-966-2771-35-0. 593 p.

8. Uminsky S.M., Topilin G.E., Inituin S.V. (2009). The use of hydrodynamic devices in technological processes. TES publishing house and printing house., ISBN 978-966-2389-04-3.184 p.

ПОВЫШЕНИЕ ЭФФЕКТИВНОСТИ ИСПОЛЬЗОВАНИЯ МОТОРНЫХ МАСЕЛ В УСЛОВИЯХ АПК

Конев С.В., Житков С.С., Цанков Д.В.

Ключевые слова: трактор, моторное масло, двигатель, кавитация, присадки.

Резюме

Долговечность работы тракторов и автомобилей, в основном, ограничивается моторесурсом двигателей, в значительной степени зависит от качества применяемых нефтепродуктов, в частности, моторных масел. Но масла в чистом виде, полученные из природного сырья (нефти) даже

самых высоких качеств, не могут обеспечить долговечную эксплуатацию современных и перспективных моделей двигателей. В это время моторные масла, используемые в сельском хозяйстве для дизельных двигателей, состоят из 89 ... 95% основы, то есть нефтяного масла, и 5..11% присадок. Опытами установлено, что часть присадки из моторных масел для тракторных двигателей выпадает в осадок в период хранения, часть удаляется маслофильтры двигателя, в общем значительно снижает их качество, а это, в свою очередь, негативно влияет на долговечность работы механизмов. Диспергирования отечественных присадок в маслах снижает скорость их коагуляции и седиментации, то есть повышает устойчивость. Наиболее приемлемым способом диспергирования присадок в товарных маслах является гидродинамический влияние на них. Основные физико-химические и эксплуатационные свойства масел, улучшенных путем гидродинамической обработки, выше по сравнению с товарными маслами. Износ при работе на улучшенном масле на 33% меньше, чем на товарном. Применение масел с улучшенными эксплуатационными свойствами, дополнительным воздействием на товарное масло - гидродинамической обработкой, дает возможность увеличить моторесурс двигателей на 20-25% без дополнительных технологических и конструкторских их изменений.

INCREASE EFFICIENCY USE MOTOR OILS IN CONDITIONS AMC

Konev S.V., Zhitkov S.S., Tsankov D.V.

Key words: tractor, motor oil, the engine, additives, regeneration, adsorption.

Summary

The durability of tractors and cars is mainly limited to motorcycle engines, which largely depends on the quality of used petroleum products, in particular, motor oils. But pure oils, obtained from natural raw materials (oil), even the highest qualities, can not provide durable exploitation of modern and perspective engine models. At this time, motor oils used in agriculture for diesel engines consist of 89 ... 95% of the base, that is, oil butter, and 5..11% of additives. It has been established in the experiments that part of the engine oil additive for tractor engines falls into the sediment during storage, part of it is removed by oil filters of the engine, which in general significantly reduces their quality, which in turn negatively affects the durability of the mechanisms. The dispersion of domestic additives in oils reduces the speed of their coagulation and sedimentation, that is, it increases resistance. The most suitable way of dispersing additives in commercial oils is the hydrodynamic effect on them. The basic physical, chemical and operational properties of oils, improved by hydrodynamic treatment, are higher compared to commercial oils. Wear when working on improved oil is 33% less than on commodity. Application of oils with improved operational properties, additional influence on commercial oil - hydrodynamic treatment, gives an opportunity to increase the motor power of engines by 20-25% without additional technological and design changes.