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Study of the Rational Term of Changing the Engine Oil of Gm-Uzbekistan Cars in Urban Operating Conditions''

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The establishment of a rational frequency of crankcase oil replacement, taking into account a complex of influencing factors, such as the recommendations of manufacturers, engine operating modes, climatic conditions, the range of oils on the market, the production base, maintenance costs (TO) and environmental protection issues (OOS) is a very urgent problem.

A large number of studies have been devoted to the establishment of rational terms for the replacement of crankcase oils and the determination of their indicators of the quality of working oils, which underlines the importance of these issues.

According to most authors, it is most correct to assess the actual state of the oil by a set of indicators that would take into account the change in the main properties of oils. Table 1 shows the complex indicators and their rejection values according to the recommendations of some research institutes and firms.

Table 1

The value of permissible deviations of motor oil quality indicators

№	Physical and chemical properties	Meaning
1	Change in viscosity at 100 ° C from the nominal value:	
	- reduction	15-20 %
	- promotion	20-25 %
2	Flash point in an open crucible, not less than	180 °C
3	Total base number, not less than	3 мг KOH/г
4	Fuel content in oil, not more than	0,8 %
5	Wear elements:	
	- iron (Fe), no more	0,100 мг/кг
	- copper (Cu), no more	0,045 мг/кг
	- aluminum (Al), not more than	0,015 мг/кг
	- lead (Pb), not more than	0,100 мг/кг
	- chrome (Cr), no more	0,015 мг/кг
	- silicon (Si), no more	0,015 мг/кг
	- tin (Sn), no more	0,020 мг/кг

Based on the preliminary experiments of cars operated in urban conditions and taking into account the above conclusions, a method for selecting motor oils is developed, which consists of the following stages:

- 1-analysis of scientific and technical literature, research and best practices on the study of motor oils and vehicle operating conditions, selection of the research site;
- 2-determination of the qualitative composition of the necessary information to be obtained during the experiment (based on data obtained in the course of theoretical research);
- 3-the operational experiment consists in observing the vehicles in operation, namely:

- * sampling of motor oils from controlled vehicles at 2000, 4000, 6000, 8000 and 10000 km;
- * laboratory analysis of motor oils;
- * spectral analysis of motor oils;
- * processing of the results of laboratory analysis of- motor oils;
- 4-performance testing of motor oils on vehicles operated in urban conditions ;
- 5-the analysis of the results of the conducted operational tests consists in dividing the received information into groups according to its properties and characteristics and considering each group separately to determine the main links and main links of the object of research. Which consist of the following:
 - Kinematic viscosity of the engine oil;
 - The base number of the engine oil;
 - Engine oil flash point;
 - Mass fraction of wear products in engine oil;
 - Spectral analysis and determination of the number of individual elements of mechanical impurities.

RESULTS OF STUDIES OF PHYSICO-CHEMICAL PARAMETERS OF LOTOS SAE 10W-40 ENGINE OIL

As can be seen from the above data (Table. 2), there is no decrease in the alkaline number to the minimum permissible value (up to 4 mgCON/g).

The viscosity of the oil at an operating time of up to 10,000 km decreases from 14.02 to 12.3, compared with the initial data, which does not exceed the permissible limits.

The flash point of Lotos SAE 10W-40 oil has decreased to 212 °C, by 3 ° C compared to the flash point of fresh oil, which does not exceed the maximum permissible value.

Results of studies of spectral analysis of engine oil LotosSAE 10W-40

Silk number			Viscosity at 100 C			Flash point		
Mileage km	Experimental data	Theoretical data	Mileage km	Experimental data	Theoretical data	Mileage km	Experimental data	Theoretical data
0	8,13	8,13	0	14,02	14,02	0	214	214,08
1000	7,75	7,751	1000	13,84	13,843	1000	214	214,05
2000	7,37	7,369	2000	13,66	13,662	2000	214	214,04
3000	6,99	6,999	3000	13,48	13,487	3000	214	213,97
4000	6,61	6,641	4000	13,3	13,318	4000	214	213,84
5000	6,23	6,295	5000	13,12	13,155	5000	213	213,65
6000	5,85	5,961	6000	12,94	12,998	6000	213	213,4
7000	5,6	5,639	7000	12,76	12,847	7000	213	213,09
8000	5,29	5,329	8000	12,65	12,702	8000	213	212,72
8500	5,05	5,031	8500	12,58	12,563	8500	212	212,29
9000		4,745	9000		12,43	9000		211,8
10000		4,471	10000		12,303	10000		211,25
11000		4,209	11000		12,182	11000		210,64
13000		3,959	13000		12,067	13000		209,97
14000		3,721	14000		11,958	14000		209,24
15000		3,495	15000		11,855	15000		208,45

Mileage	Experimental data	Theoretical data	Experimental data	Theoretical data	Experimental data	Theoretical data	Experimental data	Theoretical data	Experimental data	Theoretical data	Experimental data	Theoretical data	Experimental data	Theoretical data
	Fe	Fe	Pb	Pb	Al	Al	Cu	Cu	Cr	Cr	Si	Si	Sn	Sn
0	0,031	0,029	0,020	0,021	0,008	0,007	0,009	0,009	0,010	0,01	0,002	0,002	0,014	0,014
2000	0,044	0,04508	0,035	0,03128	0,009	0,00856	0,015	0,01464	0,011	0,01074	0,004	0,00352	0,015	0,01464
4000	0,058	0,06172	0,047	0,04092	0,011	0,01044	0,021	0,02076	0,011	0,0114	0,006	0,00568	0,016	0,01576
6000	0,082	0,07892	0,056	0,04992	0,013	0,01264	0,025	0,02736	0,012	0,01198	0,008	0,00848	0,017	0,01736
7000	0,085	0,08773	0,057	0,05418	0,015	0,01386	0,029	0,03084	0,013	0,01224	0,010	0,01012	0,018	0,01834
8500	0,097	0,10120	0,058	0,06027	0,016	0,01584	0,035	0,03628	0,013	0,01259	0,013	0,01288	0,020	0,02003
10000		0,115		0,066		0,018		0,042		0,0129		0,016		0,022
12000		0,13388		0,07308		0,02116		0,05004		0,01324		0,02072		0,02504
14000		0,15332		0,07952		0,02464		0,05856		0,0135		0,02608		0,02856
15000		0,16325		0,0825		0,0265		0,063		0,0136		0,029		0,0305

As can be seen from Table 2, when the oil is running over 8500 km, the iron concentration increases and reaches the maximum permissible value (100 g / t).

When the operating time of the oil over 15,000 km lead concentration reaches the maximum allowable value (0,100 mg/kg) (table. 2).

When the operating time of the oil over 8400 km aluminium concentration increases rapidly and exceeds the maximum allowable value (0.012 mg/kg) (table. 2).

When the operating time of the oil over 12,000 km, the concentration of copper increases and reaches the maximum allowable value of (0,045 mg/kg) (table. 2).

When the operating time of the oil over 15,000 km, the concentration of chromium reaches the maximum allowable value (0.015 mg/kg) (table. 2).

When the operating time of the oil over 10,000 km silicon concentration reaches the maximum allowable value (0.015 mg/kg) (table. 2).

When you run 8,500 km, the concentration of tin reaches the maximum allowable values (0,020 mg/kg) (table. 2).

MAIN CONCLUSIONS

1. The analysis of modern methods for determining the rational frequency of crankcase oil replacement revealed the need for their improvement, taking into account the analysis of energy-saving properties, as well as the specific operating conditions of the oils under study.
2. The developed standard tribospectral method for analyzing crankcase oil indicators allows us to identify the possible resource of the oil under study.
3. The improved method of comparative operational studies of oils allows us to take into account the main factors affecting the lubrication system of cars operating in urban conditions, and therefore, this method of operational studies can be used for other similar studies.

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