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EFFECT OF ETHANOL AND LEAD GASOLINE MIX ON CHARACTERISTICS OF LUBRICANTS

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ABSTRACT - The results of a study of application of the mix of ethyl alcohol with leaded gasoline (MB 98), i.e. its effect on the characteristics of lubricants are presented. The effect of application of ethyl alcohol in an engine is more significant if applied in a mix with unleaded gasoline. However, due to the comparison of lubricant characteristics with the known characteristics during use of leaded gasoline MB 98, we had to use the above-said fuel.

Fuel was mixed with 10% ethyl alcohol. Given the problems of layering of gasoline and ethanol, special attention was paid to obtaining a stable mixture. The mix was prepared for an appropriate quality of gasoline and appropriate climatic conditions and a stabilizer was chosen. Tertiary butyl ether in 2.2% concentration was added as stabilizer. In real conditions of exploitation mixing of certain quantity of water with fuel can occur so that we simulated those conditions by adding 0.1% of water into the mixture.

High-quality synthetic engine oil SAE 5W-30 intended for otto and diesel engines that meet EURO 4 requirements on emission of exhaust gases was used in the test. A high-temperature test of 100 motor hours (MH) at full load of motor was used according to the oil manufacturer's instructions. Samples of oils are taken in the test and its characteristics are examined, and at the end of the test, the engine is disassembled and all moving parts such as bearings, pistons, piston rings were inspected and measured.

The results have shown that there were no significant changes in chemical characteristics of oil. There was a change of viscosity as a consequence of penetration of fuel into oil. Regardless of dilution of oil, oil has sufficient alkaline reserve after the test. High concentration of lead was observed, much bigger than with the use of gasoline without ethyl alcohol. Upon checking the bearings, it was determined that there was no wear-out, therefore lead in the lubricant originates from fuel. Wear-out of parts of engine such as cylinders, bearings and piston rings has not been increased compared with the results obtained when gasoline without ethyl alcohol was used, so that small concentrations of wear-out metals were present (copper, aluminium and chrome).

Application of mixture of ethanol and gasoline on the engine has no significant effect on lubricant. Also, wear-out of parts of engine is within permitted limits and smaller compared than when gasoline without ethyl alcohol is used, which is not expected. Due to multiple increase in the quantity of lead in the lubricant, further analyses need to be undertaken in order to determine the cause.