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## TRIBOTECHNICAL COMPONENTS OF MODERN ENGINE OILS - ADVANTAGES AND DISADVANTAGES

Tribotechnical compositions of engine oils are the most controversial in modern automotive chemicals. They are used to increase power, repair minor damage to engine parts, reduce friction, increase fuel economy, increase resources, and reduce vehicular emissions. The positive aspects of such additives are actively advertised by manufacturers. Let us deal with a number of negative points. Mineral additives are harmful by clogging the oil channels. Shaking them before use is recommended and this fact comes to prove once again that the additive contains small solid particles. The use of such additives leads to a marked reduction of the oil pressure when passing through the oil filter. Another point to be raised is that the cylinder has a surface finish called honing in the form of very small lines and permit the grease to remain on the walls of the cylinders. Metal plating additives have the opposite effect because the film of the metal-plating layer disappears and the process of more intensive wear begins.

Molybdenum motor oils should be mentioned separately. These are solid additives to the lubricant that is introduced into the engine oil and forms friction-reducing layers on the metal surfaces. An ore component with a sulfur compound is produced. It is purified, resulting in turned into dark crystals, which, interacting with the metal, leave a trace of green-gray tint. Molybdenum disulfide lubricants have excellent adhesion to the metal surfaces of mechanisms. More specifically, the molecular structure of molybdenum disulfide is a strong bond of 1 molybdenum atom with 2 sulfur atoms. Sulfur atoms are close in size to metal atoms. As a result, sulfur provides high adhesion properties, attaching to the surface of loaded parts. Thus, the bond between sulfur and molybdenum molecules is strong, and the connection between sulfur molecules is weak. It turns out that the rubbing surfaces are actively covered with a protective layer of molybdenum molecules, while these molecules freely slide in relation to each other. As a result, metal surfaces do not contact each other, friction and overheating are eliminated, and wear of parts is reduced. Moreover, molybdenum in the oil is stable that means it is constantly in suspension without settling on the surfaces. The still formed molybdenum film is small in thickness, it is not able to reduce the design clearances in the engine and disrupt the free flow of oil to the loaded vapors. Molybdenum characteristics work best when combined with other components. However, the latest studies have shown that these additives in lubricants are effective in industrial units like winches and gears with cylindrical teeth. The results for high-speed gasoline engine are mostly negatives. Engine with molybdenum disulfide oil is a physical mixture, not a chemical solution. The size of the solid particles of molybdenum disulfide is quite large. When the motor is running, the particles enter not only the required friction zones, but also the piston rings, where such additives are not desired. In the friction pair "cylinder-compression ring" there are no loads exceeding the welding threshold, and the velocities are at the level at which the antifriction properties of molybdenum disulfide lose the adsorption (boundary) layer of mineral oil without extraneous suspensions. Lubricants containing molybdenum disulfide at high temperatures do not rarely lead to coking or deposition of solid combustion products in the piston rings, which adversely affects the performance of the cylinder-piston group. As a result, gases get into the lubricant through the piston rings, which largely leads to high thermal loads and, therefore, to the increased formation of unwanted deposits. This fact explains why motor oils containing molybdenum disulfide are not recommended for use by large automotive companies. And friction reduction can now be achieved with special synthetic base components, but molybdenum. Ester is prized for its lubricating ability and can be compared to castor oil. The latter is still partly used in racing cars. Esters have a high adhesive capacity and form a very stable lubricating film, thus the advantage of synthetic oils is their extremely high thermal stability. In fact, all the shortcomings or adverse effects of tribotechnical components appear only in their long-term use.

Each automobile oil contains specially selected additives and substances in different quantities. Each manufacturer of motor oil keeps information about additive package under lock and key. Hence it is not known how a particular additive interacts with the finished oil. Moreover, it is not advisable to mix oils of the same composition, but different manufacturers. If you add additional tribotechnical components to the engine in an emergency, then oil should be changed at the first opportunity