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Diamond-Like carbon coatings-Orientants work surfaces lubricated components friction elements

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The traditional method of reducing friction losses in the machines is to create energy and resource lubricants that reduce friction and wear reduction concomitant rubbing parts by optimizing the viscosity-temperature properties of these oils for liquid lubrication regime and the introduction of their composition additives for various purposes. These additives function in the boundary lubrication and provide improved anti-friction and anti-wear properties of oils. Most of them are expensive products; moreover, they often include compounds of elements adversely affecting the environment during manufacture, storage, handling and disposal.

We propose another alternative method of increasing the lubricity oils, based on the features of the adsorption of molecules of the lubricant on the friction surfaces, which are deposited on the diamond coating-orientant. These coatings provide a predetermined orientation of the molecules in the boundary layer separating the friction surfaces, which in turn enhances the tribological characteristics of the lubricant.

Coating applied ion- plasma process for condensing carbon plasma by a specially developed technique. Depending on the required tasks and application techniques, the film thickness can range from 100 nm to 10 microns at a hardness of 4000..9800 HV, and under the additional alloying various elements of technology allows the coating with special characteristics.

Tribological studies were conducted on laboratory friction machines, one of which (the machine DS-3) makes friction standard ball of steel ShKh-15 on a rotating disk of the same steel in the implementation method for estimating the temperature of the lubricating oil capacity, and on the other (machine VP-1) evaluates antiwear and antiriction properties of these same oils at alternating friction roller standard 8 mm diameter steel ShKh -15 on the plates of the same steel, hardened to 920 - 950 HV on the working surface which previously grinded and polished to a value of Ra=0.05 - 0.07, applied to a monocristalline coating-orientant and amorphous coating. The coating thickness were 2.0±0.5 mm. For comparison wheels were tested and similar steel plates, but without the coating.

To improve the tribological properties the monocrystalline coatings were doped tungsten and tested for friction machine VP-1, compared with the steel without coating at various loadings in synthetic oil PAO-4. The experiment results, the doping of monocrystalline carbon coating by tungsten significantly reduces the coefficient of friction almost throughout the tribological tests. Obtained in these tests wear of steel plates ShKh-15 uncoated and coated monocrystalline carbon doped tungsten have been measured using the profiler - Caliber 201. Throughout the range studied loads, wear investigated coatings was an order of magnitude higher than the uncoated steel.

Thus, deposition on the surface of the friction monocrystalline carbon coatings-orientants including doped largely improves both antifriction and antiwear properties of the lubricant base fluids.