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Influence of the Magnetic Component of Geomaterials on Properties of Friction Pairs

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Abstract

The article presents results of research of mineral products belonging to a serpentines class (geomodificators) after their addition into the industrial hydraulic oil I-20A, with the purpose of increase of wear resistance of friction pairs made from the steel 45 and widely used in the industry. Effective influence of friction geomodificators on the increase of wear resistance due to formation of friction pairs of a wearproof covering on the surface is shown.

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Keywords: friction pairs; factor of friction; surface modifying; X-ray structure analysis; optical microscopy.

1. Introduction

Improvement of tribotestings parameters of parts of machines and mechanisms at the expense of application of technology of modifying of surfaces of friction pairs by geomaterials (serpentinites) found wide application in various areas of a national economy: industrial enterprises, municipal services, water and land transport, power. This technology is used in engines, transfer mechanisms, reducers, bearings, compressors, hydraulic systems, turbines [1-6].

Serpentinites or the coil is a rock with the green shades, based on a mineral serpentine (a subclass of layered silicates), and formed as a result of change (serpentinisation) of magmatic breeds, sometimes also dolomite and dolomitic limestones.

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Serpentines (*geomodificators*) is a group of minerals on the basis of magnesium silicate, sometimes gland of identical structure, but different symmetry, with the general formula $MgO_6(Si_4O_{10})(OH)_8$. Serpentines includes five mineral types:

- Antigorit a lamellar form with glass or nacreous shine (Mg,Fe2+)3Si2O5(OH)4
- Chrithotil a fibrous form with silky shine (clino-chrithotil, orto-chrithotil, para-chrithotil) Mg3Si2O5(OH)4
- Lithardit it is hidden a lamellar form with dim shine of Mg3Si2O5(OH)4. Serpentines minerals have monoclinic or romboedric singoniya

The purpose of the real work was: the research of influence of serpentinites geomodificators of a class after their addition in industrial hydraulic oil on increase of wear resistance of friction pairs from steel 45, and also on formation of structure, properties and morphology of a contact surface at work of friction pairs.

2. Results of work

In work methods of tribotestings parameters by friction machine SMTs-2 [6-7], face friction machine [20], of optical metallography and X-ray structure analysis have been used.

In work results of researches of mineral geomodificators of friction of a serpentine class after addition them are given to industrial hydraulic oil, for the purpose of increase of wear resistance of friction pair from steel 45, which are widely used in the industry.

As modificators used serpentinites with different magnetic properties: high magnetic properties (MP), not magnetic (NMP) and with average magnetic properties (AMP).

Effective influence of geomodificators of a friction with the average magnetic properties (AMP) on increase wear resistance is shown.

2.1 Results of test by friction machine SMTs-2

Tests by friction machine SMTs-2 [6, 19] were machineried out on samples from steel 45 according to the scheme "block - roller" with frequency of rotation of the bottom roller of 300 rpm.

As the lubricant environment industrial hydraulic oil was used. Extra earnings in oil without addition of geomaterials it was machineried out during 300 second at load of 10 kgfs. Further tests proceeded at load of 25 kgfs in the oil environment with addition of geomaterials from different degree of a magnitization.

Apparently from fig. 1, and fig. 2, addition to oil serpentinity with the average magnetic properties (AMP) led to increase of tribotechnical properties of friction pair from steel 45 at the expense increase an adhesive dripping temperature, fig. 2 and reducing coefficient of friction, fig. 1.

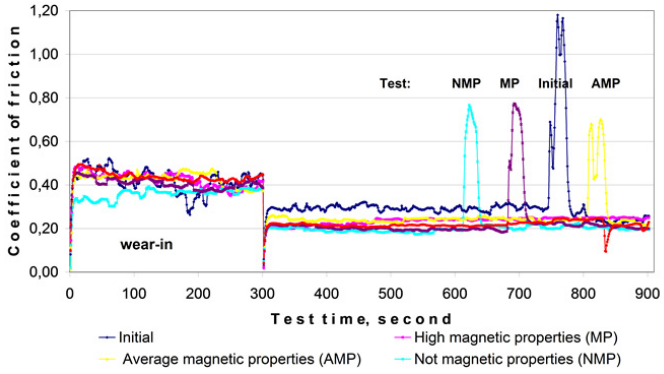

Fig. 1. Kinetics of change of coefficient of friction of friction pair from steel 45 when using the lubricant environment in an initial condition, and after addition serpentinites with different magnetic properties: the high magnetic properties (MP), not magnetic (NMP) and from the average magnetic properties (AMP) at test by friction machine SMTs-2.