проводів з гідравлічним баком, гідравлічним розподільником, фільтрувальними елементами, гідроциліндрами, елементи системи дихання гідравлічного бака.

Зроблений аналіз причин потрапляння механічних домішок в гідравлічну систему вказує на те, що «найуразливішим» місцем в конструкції системи є – сапун. Сапун забезпечує, так зване технологічне «дихання» гідравлічної системи, та з'єднує внутрішню порожнину системи з навколишнім середовищем.

Технологічний процес «дихання» гідравлічної системи супроводжується тим, що у внутрішню порожнину системи потрапляє значна кількість механічних домішок, вологи та інших забруднень. Такий технологічний процес «дихання» в гідравлічній системі призводить до процесів окислення робочої рідини – гідравлічної оливи. Продукти окислення підвищують процеси корозії деталей і знижують надійність і довговічність агрегатів і самої гідравлічної системи.

Зменшення забруднення гідравлічної оливи може бути також забезпечено технічними, технологічними і експлуатаційними методами, а саме: підвищенням якості виготовлення і збирання ущільнюючих пристроїв, деталей і вузлів гідравлічної системи; роботами, що виконуються в період експлуатації і технічного сервісу агрегатів гідравлічної системи тракторів.

Висновки. Основними задачами при дослідженні конструкцій навісних гідравлічних систем тракторів є підвищення їх працездатності за рахунок впровадження розробок по герметизації агрегатів гідравлічної системи, що виключає контакт деталей внутрішніх порожнин системи з навколишнім середовищем, а також поліпшення виробничих умов експлуатації машинно-тракторних агрегатів шляхом вибору оптимальних технологічних режимів навантаження деталей і вузлів гідравлічної системи.

Тому створення герметичних гідравлічних систем тракторів, які виключають попадання механічних домішок в гідравлічну оливу, забезпечить зменшення та уповільнення процесів окислення оливи, підвищить її експлуатаційний термін служби, а також довговічність і працездатність деталей і агрегатів гідравлічної системи.

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PLASTIC LUBRICANTS BASED ON WASTE MOTOR OILS

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The technology of obtaining a dispersion medium for plastic lubricants from used lubricants is substantiated, the rational composition of lubricants, consisting of a dispersion medium of purified used motor oil and a dispersed phase in the form of thickeners, is determined.

Key words: *lubricants, impurity, friction, cleaning, operation.*

Problem. A wide range of fuels, lubricants, and plastic lubricants are used in agricultural machinery. The total share of plastic lubricants is not so large (5-6%) compared to diesel fuel and motor oils. However, plastic lubricants can work in those nodes where oils are not able to be contained in non-pressurized systems. Lubricants are more effective when exposed to high temperatures, have higher protective properties, withstand high pressure and shock loads, that is, have all the operational properties so necessary when using them in heavily loaded friction nodes of agricultural machinery. The existing methods of obtaining and compositions of plastic lubricants involve the use of expensive and limited resources, such as petroleum base oils and additives, and their production technologies are energy-intensive and high-cost.

Analysis of research and publications. The performance of lubricants in certain temperature ranges, their oxidizability, protective properties, resistance to aggressive environments, swelling of rubber and polymer products (used as seals), as well as anti-wear properties depend on the properties of the lubricant used as a dispersion medium. The viscosity of plastic lubricant at negative temperatures depends primarily on the viscosity of the dispersion medium, and its evaporation largely depends on the fractional composition and flash point of the oil used as a dispersion medium [1]. One of the important characteristics of plastic lubricant is its lubricating ability, which means the ability to reduce the wear of parts of friction nodes [2]. One of the most important factors when considering used oils as a dispersion medium is the lack of simple and affordable methods for cleaning used oils from aging products: resins, asphaltenes, carbenes, and carboids. Urea should be used as a separating agent for coagulation and removal of impurities from used mineral motor oils. In the case of high saturation of used lubricants, urea dispersing additives should be activated with solvents and alcohols. For spent motor oils on a synthetic basis, it is suggested to use monoethanolamine as a separating agent, capable of "organizing" the rearrangement of bonds, coagulation of impurities in a synthetic environment, and to weaken the effect of detergents - dispersing additives, use alcohols, solvents. A preliminary review of the process of coagulation of separating agents showed the ability to increase impurities by 20-30 times.

Research results. In the process of preparing plastic lubricants, a number of technological equipment is used, including reactor tanks, mixers, homogenizers, dispersers and. etc. In the case of agricultural production, where the volumes of used plastic lubricants are relatively small, the use of complex, expensive, high-performance equipment is impractical. At the stage of theoretical research, we will consider a scheme when, in the process of obtaining a dispersion medium, its thickening with a dispersed phase, heating, mixing, etc., are carried out in one object - a reactor - mixers. The efficiency of the friction assembly largely depends on the properties of the lubricant, the composition and amount of anti-wear, anti-seize additives, the ability to remove heat from the friction surface, resist oxidation processes under the influence of temperatures, etc. [3]. The effectiveness of the plastic lubricant in the friction nodes is judged by a number of single and complex indicators. The level of anti-wear properties of the lubricant is judged by the amount of weight wear of the friction pair. In contrast to industrially used dispersion media, refined used oils contain up to 30% of antioxidative, antiwear, and anticorrosive additives that did not work, which is a positive fact [36]. However, spent refined motor oils contain a certain amount of oxidation products compared to base, commercial oils, which increase the acid number of lubricants and limit their performance characteristics, which is a negative factor. As is known from literary sources, the temperature characteristics of lubricants are determined by the composition and type of thickeners or dispersed phase [4]. The composition of the dispersed phase affects the mechanical one

and colloidal stability of lubricants, protective, anti-corrosion properties of lubricants. At the same time, thickeners must dissolve well in the dispersion medium. The elements of the mixture of the dispersion medium and the dispersed phase must be "susceptible" to each other, not to cause chemical reactions that change the physical essence, except for the one necessary to obtain the results. Such thickeners mainly include soap. Calcium soap is most often used as a thickener in Solidol Z lubricant. In Litol-24 lubricant, lithium soap is used as a dispersed phase. To carry out the research, the cubic residues of synthetic fatty acids KZSZHK, having an acid number of 70 mg KOH/g, were used as a soap component. Characterizing the structure of the lubricant, it should be noted that changing the composition of the 90:10 dispersion medium to the dispersed phase leads to its fluidity and delamination, and with a ratio of 70:30 to the cracking of the lubricant. It should be noted that the properties of the lubricant, namely the droplet temperature, depends on the viscosity of the dispersion medium. For our case of obtaining lubricants under the conditions of APC, used motor oils with a kinematic viscosity of 10±0.5 mm2/s are mainly used. Accordingly, the percentage ratio of the calcium soap used depending on the viscosity of the dispersion medium can be taken as constant. Adhesive properties of plastic lubricants depend on a number of known factors, primarily their composition (dispersed phase) and conditions of use. Plastic lubricants placed in the bearings must stick to the surfaces of the cages, balls, and rollers and hold fast enough on the parts, regardless of mechanical and thermal effects, keeping a film on the lubricant on the friction surface. Without delving deeply into the physics and chemistry of the adhesion process, as a result of experimental research, comparative tests of commercial lubricant samples Solidol - Zh and Litol - 24 and experimental samples of lubricant compositions were carried out. In the process of conducting the research, the effort to separate the "break-off" of metal surfaces that collided with each other through a layer of lubricant was evaluated. Studies of the adhesive properties of synthetic and mineral-based Litol-24 analog lubricants (used motor synthetic and mineral oils) showed that mineral-based Litol analog lubricants had a pull-off load 10% higher than mineral-based analog lubricants. Plastic lubricants used in friction units of tractors and combines are exposed to static and dynamic loads of different magnitude, duration and direction. The limit of shear strength determines the practical limit of the transition of the lubricant from a state of rest to plastic flow when shear stress is applied. The evaluation of the shear strength limit allows to characterize the operational properties and quality of lubricants, the correctly selected concentration of the thickener (dispersed phase). The temperature at which the strength limit becomes zero and the lubricant changes from a plastic to a liquid state determines the upper temperature limit of its use in the friction unit. The principle dependence of the deformation on the shear stress at a constant speed represents the maximum shear stress corresponding to the shear strength limit, and the shear stress is established during the corresponding deformation. The strength limit for Litol, Solidol type lubricants established by practical observations should be at least 0.1 kPa at the maximum application temperature, and within 0.3...1.5 kPa at normal temperatures. **Conclusions:** For coagulation of impurities in used lubricants and subsequent removal of impurities, resins with a dispersed composition of <1 μm, it is advisable to use separating agents in the form of alcohol solutions of urea and monoethanolamine, capable of thickening particles of impurities 20-30 times. The rational composition of plastic lubricants, consisting of 80% dispersion medium - purified used motor oils and 81% purified used oil % 12 - oxystearic acid with an aqueous solution of lithium hydroxide for the Litol - 24 lubricant analogue, was determined.

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