ECOLOGICAL GREASES

J. JANECKI, J. DRABIK, E. PAWELEC
Institute for Terotechnology, PL 26 – 600 Radom, ul. Pulaskiego 6/10, POLAND;
e-mail: maria.szczerek@hapek.itee.radom.pl

Keywords: grease, tribological properties

ABSTRACT
The degradation process of natural environment caused by waste products, among others used lubricants, contributed to increase in the interest in ecologically safe products. The natural environment degradation causes an existing trend of maximal reduction of harmful substances emission to the environment. It is connected with the necessity of elaborating new technologies of lubricant formulations. The greases are an significant source of environment pollution.

Therefore it seems to be necessary and justified to start activities aimed at manufacturing lubricants with elimination or considerable reduction of the contents of toxic chemical compounds. Because of the safety of use and possibility of eliminating problems connected with utilization, the newly-elaborated lubricants should have an ecological character.

In this situation it is important to elaborate non-toxic and biodegradable grease, which after losing its maintenance properties will not be harmful for the ecosystem.

The basic objective of the carried out experiments was to elaborate lubricating grease with a higher degree of biodegradation than the grease made on the base of the mineral oil. Greases with an improved degree of biodegradation with keeping their non-toxic character and properties of usefulness were created as a result of replacing the mineral dispersion phase with vegetable oils [1].

The additives improve some characteristics of the base grease and confer other additional properties. The additives must also be acceptable as non-toxic products. Each additive must be used at the minimum amount, to obtain the required performance.

Elaboration of new generation lubricants with elimination or considerable reduction of contents of toxic chemical compounds was the first stage of undertaken work. Achievement of this aim was possible thanks to use of the nontoxic oil base, ecologically safe thickeners as well as modifiers improving useful properties. Complex research work concerning tribological properties, oxidising and toxicological resistance and moreover determination of the biodegradation degree have been carried out within the framework of the work.

The final effect of the work execution is ecological, both non-toxic and biodegrading greases, meeting requirements concerning greases meant for use in friction pairs, low and high loaded and at the same time not threatening the ecosystem, even when products of wear will get to the environment [2].

The measurement of lubricating properties of the dispersion phases and newly-created greases was carried out on the basis of standardized investigations on the four-ball tester (Fig. 1).

![Figure 1: The course of changes of the moment of friction at the linearly increasing load for the vegetable oil I and mineral oil II](image)

Good lubricating properties assessed on the basis of the wear indexes with a permanent and linearly increasing load, prove a high quality of selected dispersion phases – vegetable oils.

Favourable results of tribological tests obtained for vegetable oils enabled to successfully use them as dispersion phases of lubricating greases (Fig. 2).

![Figure 2: The course of changes of the moment of friction at the linearly increasing load for the grease I and grease II](image)

This grease is based on non-toxic components and vegetable base oil. From tribological point of view the developed grease meets requirements for typical bearing greases. The non-toxic grease is characterized by beneficial set of physical, chemical and tribological parameters. It has high useful standard and it is not hazard for ecosystem therefore this grease can be applied in food industry and in other branches of industry too.

REFERENCES