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Dynamics of Adhesion Control for Different Lubricants

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Abstract

The article presents two examples of testing the adhesion properties for the lubricants of two sorts, namely: plastic and liquid in dynamics. Maintaining perfect control of the adhesion characteristics for different lubricants in contact with surfaces (for example: metal, plastic, glass, ceramics, alloys, composites and so forth) constitutes a very important aspect of the process. It is common knowledge that a bad lubricant cannot work correctly in any mobile mechanical junctions. In this case the temperature will usually increase; the wear and tear will grow as well. So, here we aim at suggesting new devices to control both the adhesion and the quality of the two types of lubricants. New devices showed very good practical results, so we recommend these novelties to be used not only in-lab but in-situ for multiple pairs of friction in mechanisms and machines.

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1. Introduction

Unfortunately there are many bad lubricants which the unscrupulous people, using aggressive publicity, try to sell. From time to time they make bold to say that their new lubricant is the best in the world. Using it we can supposedly get super-effect in operation for our pairs of friction. They establish that even a very small amount of their lubricant helps to decrease the wear practically to zero. But it is the rude fraud. In this situation both person and the technical equipment suffer. At the present day many consumers don't have a simple and rapid devices and especially test benches to control many important characteristics of lubricants. Among many factors we must really know the adhesion during the rotation of parts in mechanisms and machines (shafts, pin and others). Active standards and rules aren't good in practice. Statics tests can not reflect the real picture for different lubricants about

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their behavior in operation. That's why it is needed to work out such devices which can quickly show us the adhesion and the quality of lubricants. It's the main aim of this work.

2. The essence of the adhesion control for the plastic lubricant

The new test bench or device which is demonstrated below (fig. 1) was made some months ago.

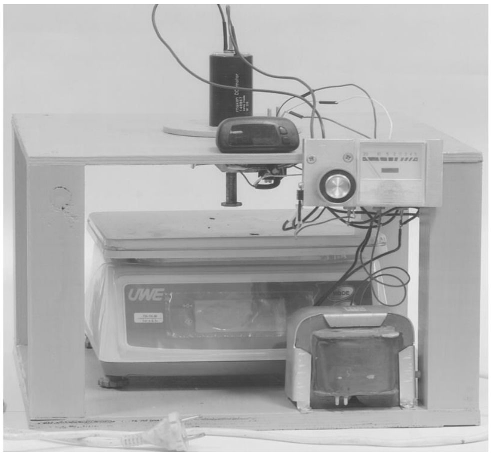

Fig. 1. The common view of the adhesimeter

The main parts of this device are the next:

- high-speed engine/motor on the upper shelf of the frame;
- the shaft which is connected with the motor and has got the plate on its other end to hinder for our plastic lubricant to fall down freely;
- transformer;
- precise scales;
- transducer of velocity to change and control the rotation of the shaft;
- light and transparent glass which we place on the scales before the trial.

The measured amount of plastic lubricant we put on the shaft around the diameter. The next step is the placing of the glass on the scales to fix the weight of it. After this action we begin to switch the motor using special button. Rotating it slowly we increase the velocity for the shaft. At the definite moment small amount of plastic lubricant begins to be cut off from the rest lubricant and from the shaft. When the first drops of the lubricant will fall on the glass the precise scales shows this situation. At this moment we have to fix the velocity of rotation for our shaft.

The finish of test is then when all lubricant will be on the bottom and walls of the glass. So we get the full range of the velocity in dynamic when adhesion is present. At the same time we get the oblique control of the plastic lubricant too.

Using this method we can change the condition in which we make this test. Namely, we can easily change the temperature. Placing inside the chamber heating element we increase the temperature (fig. 2).

For example, here they are two results of testing the lubricants. 1) Unirex №3 ISO L-XADHB 3 DIN 51825-K 3 N-10 NLGI 3 (Esso): $v_{\min}$ =3280 min^{-1} and $v_{\max}$ = 3340 min^{-1}; 2) Russian lubricant ВНИИНП-207Е $v_{\min}$ = 2480 min^{-1} and $v_{\max}$ = 2575 min^{-1}.

Moreover this control of adhesion we can realize if the temperature is below zero using the refrigeration chamber [1-20].

So the first task is completely solved.