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CALCULATION OF THE ARCHARD'S WEAR COEFFICIENT OF THE POLYMER-BASED COMPOSITE SLIDING BEARINGS

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Testing of the tribological properties could be quiet expensive and long. For these reasons, nowadays trend is to make a numerical model which would provide quite quick and satisfactorily accurate result of a component's wear. The most exploited approach of the numerical calculation of wear is the one based on the Archard's equation of wear. To perform this simulation it is necessary to determine Archard's constant K.

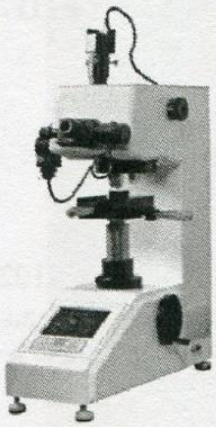
$$\Delta V = k\frac{LF}{H}$$

In order to determine this constant, it is necessary perform the experiments which will provide the information of the worn volume in dependence of sliding distance and radial load, and afterwards return it into the Archard's equation.

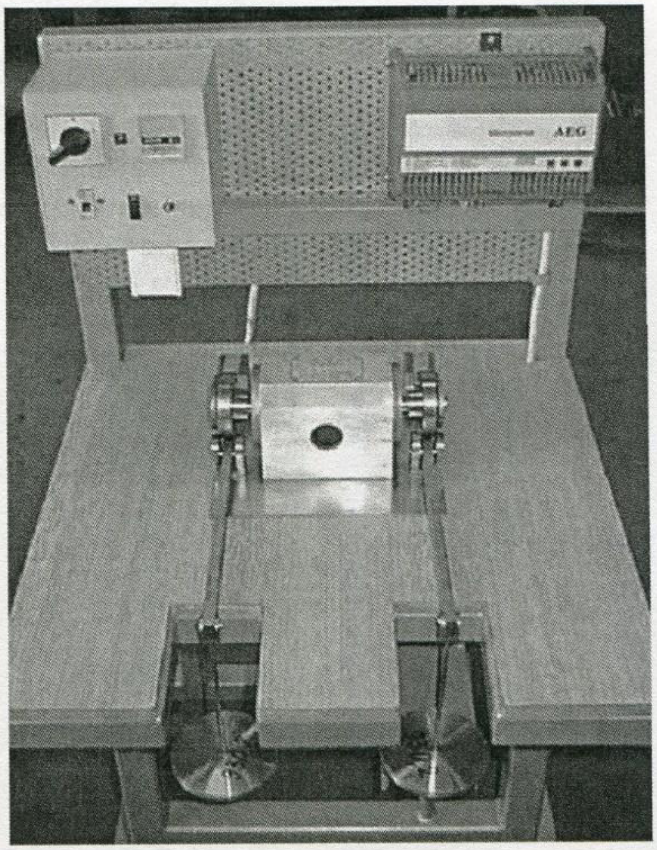
Experimental steps that should be performed are:

1. Measuring the thickness of the specimen's wall before and after process of wearing by means of 3D microscope. These data were used to calculate worn volume ΔV (Figure 1a).
2. Measuring of specimen's hardness by Micro Vickers Hardness Tester (Figure 1b).
3. Wearing of specimen by means of custom made tribometer USL 5-30 (Figure 1c).

a) HIROX KH-7700 3D Microscope



b) Micro Vickers Hardness Tester TH710



c) Tribometer USL 5-30

Figure 1. Test rig

For the experimental conditions for the pair in contact during the wearing process it was taken: sliding distance L=20000 m, sliding velocity v=1 m/s and radial load: F≈400 N.

Analyzing the wall thickness of the bearings, before and after wearing process, it was noted decrease of about 0.3 mm. Using this value it was calculated worn volume $\Delta V=1.208\cdot10^{-7}$ m^3.

Applying the force of 0.245 N during the time of 10 s on Micro Vickers Hardness Tester, it was obtained the hardness of specimen of 10 HV.

Combining above calculated data into the formula of the Archard's wear, it was obtained Archard's constant k for polymer-based sliding bearings.

The calculated value is $k=1.51\cdot10^{-6}$, which is in accordance to the data obtained from the literature for the materials similar to the specimen of this research.

Further research will go in direction of simulating wearing process by making a numerical model, which will take into account the data obtained from this experimental research.

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