

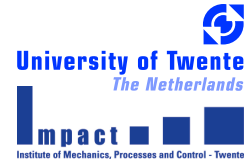


Influence of wear on lubricated systems Experimental work

I. Crăcăoanu and D.J. Schipper

Phone +31-(0)53-4892476, e-mail i.cracaoanu@utwente.nl
University of Twente, Faculty of Engineering Technology,

Laboratory for Surface Technology and Tribology, P.O. Box 217, NL 7500 AE Enschede



Introduction

The challenge for engineers and designers of mechanical systems is to control wear because of the complexity and the losses caused to the industry.

In the last decades the knowledge in material science and mechanical engineering increased considerably but still is problematic to predict the wear rate and how to reduce wear.

In literature wear is described as: "wear is a dynamic process which incorporates surface and material properties, operating conditions, stresses, lubricant oil film and geometry".

Objective

To develop a model which predicts friction in lubricated systems when wear takes place and validate this model by experiments.

Method

In design of machine elements it is important to know the transition from boundary (BL) to mixed lubrication (ML) and from mixed to complete fluid lubrication (EHL) which is presented in the Stribeck curve.

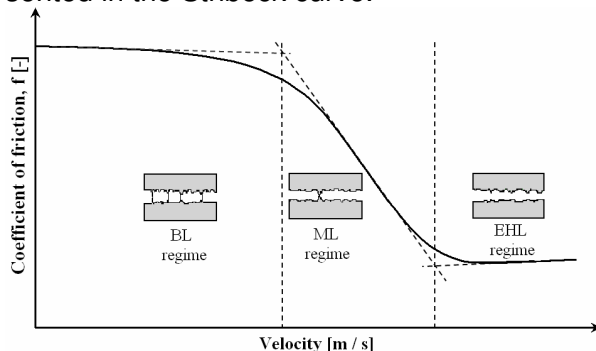


Fig. 1: Stribeck curve and lubrication regimes.

The information from Fig.1 can be used to select the parameters so that the components of lubricated systems operate in a preferred regime to minimize or avoid wear. In [1] is described the model in which wear affects the Stribeck curve.

Results

Experimental work was performed on a pin-on-disc tribometer [Fig.2]

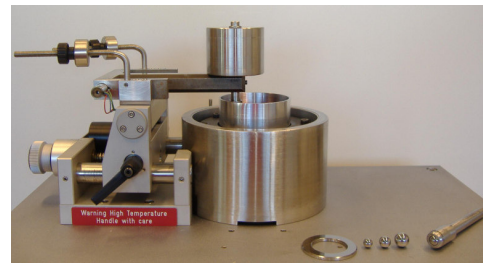


Fig.2: Pin-on-disc tribometer.

Friction as result of wear was measured under conditions:

Load $F = 0.5-20$ N, sliding distance up to 200 km, room temperature, sliding velocity 0.05-1.15 m/s, lubricant viscosity $\eta = 0.02$ Pa·s.

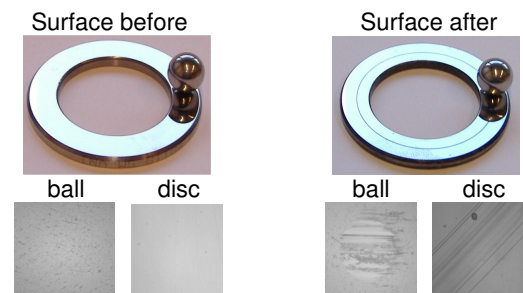
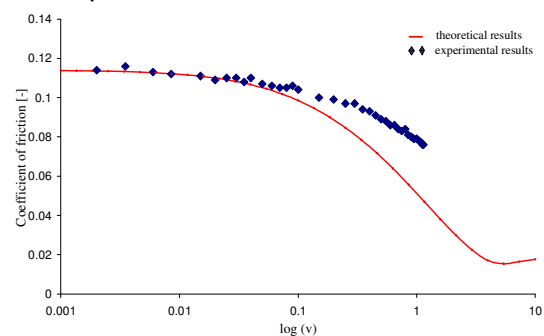


Fig. 3: Ball and disc surfaces - wear tests.

In Fig. 4: the experimental and model results are depicted.



Literature

[1] Crăcăoanu, I., "Influence of macroscopic wear on the Stribeck curve" – poster 2006 EM