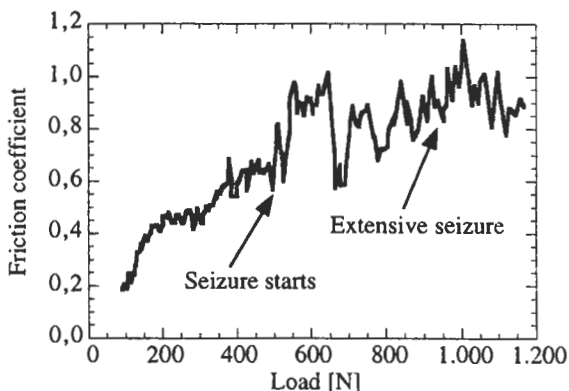
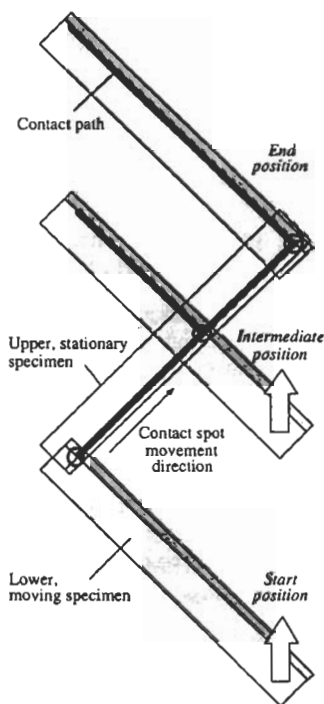


A new universal test for tribological evaluation

Sture Hogmark, Staffan Jacobson, Olle Wänstrand
Uppsala University, Department of Materials Science
S-751 21 Uppsala, Sweden

ABSTRACT

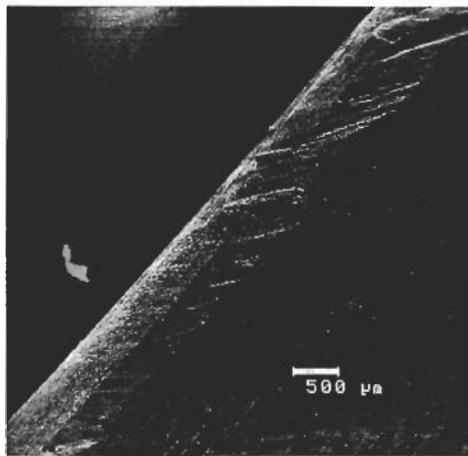
A new test for assessing the friction and wear properties of materials and lubricants is presented. Two elongated test specimens, preferably bars or rods, are used. The orientation of the test specimens and their relative motion (sliding or rolling or a combination of both) during testing is arranged in such a way that the contact spot moves along a contact path on each specimen, and each spot along this path on one specimen will only make contact to one spot on the other specimen, and vice versa, see Fig. 1. By contact spot is here meant the area over which the contact load is distributed.



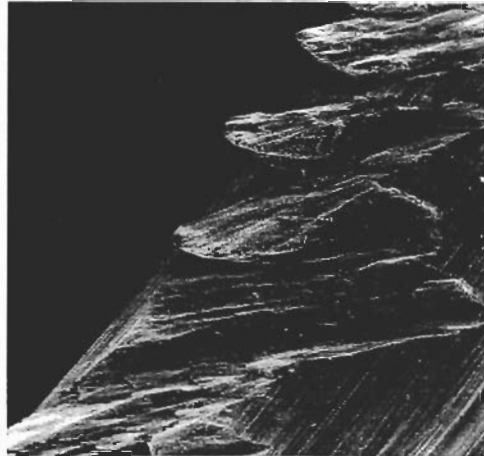
a)

b)

Fig. 1 a) Typical shape and movement of specimens during testing in the new device.
b) Friction recording during a test of self two mated Si-alloyed steel bars with the load continuously increasing from zero.



a)



b)

Fig. 2 SEM pictures of the contact path of the specimen tested in Fig. 1a. The radius of the test bars is 2 mm.

- a) At the position of seizure onset
- b) Extensive seizure at higher load.

The sliding or rolling can either be unidirectional or reciprocal, and the normal load can be kept constant or varied according to any pre determined pattern, e.g. ramped from zero as in Fig. 1b.

A single pass experiment in this test resembles the test procedure often used in scratch testing of coated specimens. In scratch testing, the tip is usually made of diamond. For the present test used in coatings evaluation, it is possible to have one specimen coated and select the same material of the counter specimen which is expected in the application of the coated component. Thus, the friction and adhesion assessment performed in this would better simulate actual conditions.

It is also convenient to study the specimens of this test after testing, i.e. in a scanning electron microscope, to reveal the mechanisms of deformation and wear. In a test where e.g. the load increases with the sliding distance, it is strait forward to correlate any SEM observations from a particular spot along the contact path with the corresponding load value.