Selection of wear testing with LTAD

Selection of tribological tests is a subject of major importance in technology, since many technical decisions are based on results obtained with these tests. If a certain wear test is selected, an important question that arises is to what extent the tribological data can be transferred into service conditions. In this sense, field tests are preferred. Nevertheless, field test are much longer than laboratory tests and may result in very high costs. Another important point is that in field tests, it is more difficult to control the test variables.

Those responsible for choosing each type of test have to consider each case individually. There is not a general solution. Although, there are some hints that can help to select the best test to be carried out for each case.

Following, some suggestions to choose the right laboratory wear test are listed.

i. Characterize the technical surfaces, including interfacial films or fluids, pH, chemical composition, temperature, etc.;

ii. Identify the kinematic and dynamic parameters, such as relative velocity between surfaces, nominal contact pressure, reciprocating movement, among others;

iii. Identify the wear mechanisms in field conditions;

iv. Verify if the applied test parameters in laboratory tests are able to reproduce the wear mechanisms observed in service conditions;

These basic recommendations will certainly help to extrapolate wear results in a more secure manner.

At this point it is useful to become familiar with the basic wear mechanisms. They are abrasion, surface fatigue, adhesion and tribochemical reaction. The following Figure shows these wear mechanisms.

Abrasion and surface fatigue are determined by the mechanical interactions between the opposing surfaces (see **Fig. a** and **b**), while adhesion and tribochemical reaction are influenced by both mechanical action and chemical reactions (**Figs. c** e **d**).

Still concerning the selection of tribological tests, it is worth mentioning the difficulty in dealing with polymeric materials.

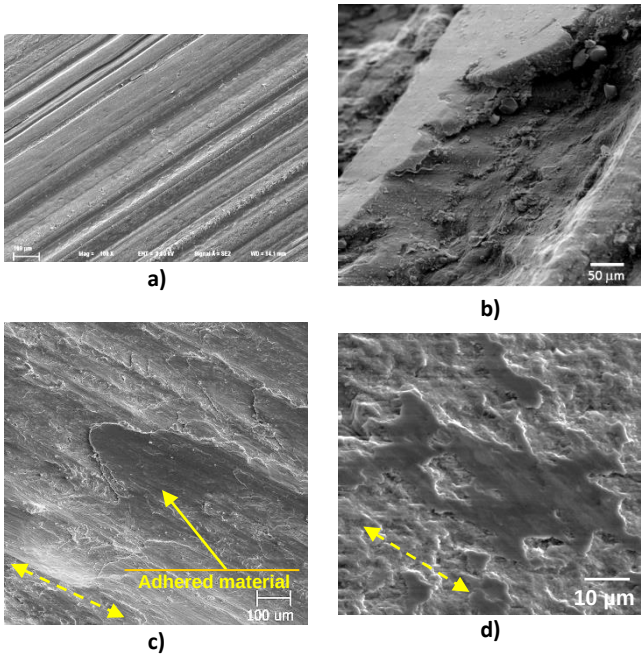

Fig. – Wear mechanisms, **a)** abrasion in flexible riser pipes, **b)** surface fatigue in a gear tooth, **c)** adhesion in termo-sprayed hardfacing and **d)** tribochemical reaction in high speed steel after sliding against 52100 bearing steel.

Polymers have a relationship between elastic modulus and hardness much lower than that measured in metals (one tenth or less). This relationship E/H is directly proportional to the plasticity index, and it indicates if the asperity contact will be of elastic or plastic type. As a consequence of this, the surface contacts involving polymers are much more prone to be of the elastic type.

Therefore, in surface contacts involving polymeric material, it is much more difficult to reproduce nominal pressure of field parts when testing them in small scale. These difficulties are especially greater at specimen borders. Additionally, in submerged tests, the weight loss measurement is affected by water or by any other test fluid that may be absorbed.

Due to these problems, in some cases it is preferred to carry out tests using mid or large scale samples.

The tribological tests available in LTAD are indicated in our internet web site (see address below). If you have a specific wear configuration that is not available in our facilities, we can develop it for you.

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