

Tribology, a loss leader for the choice of wear-resistant roll materials

A.C. MAGNEE^{1,a}, J-C. HERMAN^{2,b}

¹University of Liège, Physical Metallurgy, ²CRM, Liège, Belgium, General Manager,

^aA.Magnée@ulg.ac.be, ^bherman@rdmetal.ulg.ac.be

Abstract: The materials are directly associated with the development of science and technology; they play a leading role in the context of our daily activities. The successful development of new energy sources, applications or innovative techniques is often confronted with the problem of creating reliable materials. Thus progress in many areas is dependent on the improvement of the properties of existing materials and the perfection of solutions that can pertinently answer the demands of specific applications.

The selection of materials today constitutes a basic element for the success of high-performance and innovative products: it has become a major challenge in an industrial context. Any rational selection involves a characterization, modelling and design approach.

For many years now, the training courses of engineers in elite schools have been oriented along the lines of a twin classical approach, the strength of materials and descriptive knowledge of materials. The damage aspect has been practically limited to the phenomena of corrosion or fatigue of structures.

Immersed in the reality of the daily industrial context, the engineer sometimes finds himself confronted with situations involving damage that he cannot promptly resolve due to lack of theoretical and practical knowledge in an area where he is supposed to be fully competent.

During the last few decades, following the pioneering work “sustainable development” by the OCDE committee in 1969, tribology, the study of friction and wear has established itself as a science in its own right given its impact on the economic profitability of the industrial sector.

In the seventies, few devices for characterizing wear were available in laboratories. One of the most widely used was a primitive version of “pin on disc”, namely a device for measuring wear and friction by rotary slip, between two metal pieces, a disc and cylinder.

Results which were too often produced, that is to say measurements which were inconsistent, resulted in contradictory classifications of the performances of the materials tested resulting in a loss of credibility for this kind of test, the emerging science of tribology appeared like an “imbroglio science”.



A sustained effort in this field, involving at the same time designers of tribometric systems, classification of types of wear in terms of reaction systems and modelling of the behaviour of materials by phenomenological laws established by physics, makes it possible today to better certify the predicted performance and life duration of materials used in industry.

In this context, we will adhere more specifically to a synthesis of tribometric studies carried out over a number of years at CRM and the University of Liège in the area of rolls, forged or cast, whether they be for work or as back up, for hot or cold rolling in “high chromium” alloys or in “tool steels”.

Keywords: *roll materials, wear, friction, abrasion, thermal fatigue*