

Effects of harmonised procedures on tribological testing

Mirco Kröll^{2)*}, Reinhard Grundtner¹⁾, Francesco Pagano³⁾, Erik Nyberg⁴⁾, Vuokko Heino⁵⁾, Dirk Spaltmann²⁾ and Thomas Gradt²⁾

¹⁾ AC2T research GmbH, Wiener Neustadt, Austria

²⁾ Federal Institute for Materials Research and Testing (BAM), Berlin, Germany

³⁾ Fundación Tekniker, Eibar Guipuzcoa, Spain

⁴⁾ Luleå University of Technology, Luleå, Sweden

⁵⁾ VTT Technical Research Centre of Finland Ltd, Espoo, Finland

*Corresponding author: mirco.kroell@bam.de

i-TRIBOMAT will provide the world's first Open Innovation Test Bed dedicated to analysing and simulating materials in tribological systems. In order to make necessary results of tribological tests comparable, harmonised ways to produce data are mandatory. Many sources influence the outcome of a tribological test. Different approaches of institutes were evaluated resulting in best practices via quality management tools minimising the impact on results.

Keywords (from 3 to 5 max): standards, data management, harmonisation, tribo-testing, quality management

1. Introduction

Within the European Horizon 2020 project i-TRIBOMAT renowned institutions combine their tribo-testing as well as analytical capabilities to provide services for research and industrial applications via an Open Innovation Test Bed to be founded within this project.

Combining testing services requires procedures which ensure that the data generated are trusted, comparable and reproducible, irrespective of the location of the institution, the type and layout of equipment used, the way of analysing the results and of the operator executing the test. Especially tribometers are designed to model the contact situation of real applications. Due to the lack of a standard, this has led to a huge number of test rigs built by institutions for various applications. Moreover, for reciprocating movements at least four methods are known to calculate the coefficient of friction, one of the most common outputs of tribo-tests, yet it is not widespread, to specify the calculation used [1]. Quantification of wear also suffers from a lack of harmonisation. These are only some examples, how a tribo-test can be carried out and interpreted differently.

At the end, high quality data are essential, especially since they are the basis of up-scaling simulations to predict material performance on components level, which is another part of i-TRIBOMAT.

2. Methods

Improved Round-Robin tests were carried out in order to identify the currently applied methods of tribo-tests used by partners collaborating in creation of the combined test bed. The results were analysed, especially with respect to the abovementioned sources of influences on tribological testing.

Quality management mechanisms followed by responses dealt with expected deviations, resulting in a minimisation of the impact on the result by these sources. After having exercised these responses, best practises were described and established, being the core of harmonised procedures within the consortium at the end.

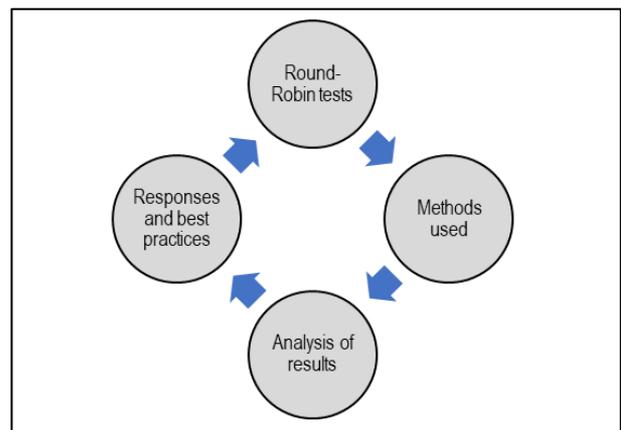


Figure 1: Schema of actions used to harmonise different procedures.

3. Discussion and summary

Harmonised procedures are mandatory not only to create the combined testbed, which will contain more than 100 tribometers, but also to align the characterisation methods used to describe the tribological contact and behaviour. In the current contribution, it will be shown, how these efforts and procedures improve the quality of the data.

4. References

- [1] I. Llavori, I., Zabala, A., Aginagalde, A., Tato, W., Ayerdi, J.J., Gómez, X., "Critical Analysis of Coefficient of Friction Derivation Methods for Fretting under Gross Slip Regime", Tribology International Volume 143, March 2020, 105988

Acknowledgement:

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 814494, project i-TRIBOMAT. More details: <https://www.i-tribomat.eu/>.



European
Commission

Horizon 2020
European Union funding
for Research & Innovation