BACHELOR’S / MASTER’S THESIS

Data Science Techniques Applied in Materials Tribology

Background

Friction and wear govern the reliability, energy consumption and operating limitations of virtually every mechanical device. Thus, these two phenomena have profound implications for our economic prosperity, environmental sustainability and healthcare. In metals, surface and sub-surface microstructural alterations have been deemed the major path for frictional energy dissipation, and therefore, these buried transformations hold the key to making metals more wear-resistant and friction-tunable. To unravel the complex interaction between all controllable and uncontrollable experimental conditions, data-driven analysis techniques (e.g. machine learning) will be used to their full potential. This project is part of our broader efforts to establish a digital platform for experimental work in tribology, and as such will step on already developed solutions.

Objectives

The specific objective of this thesis is to study the influence of load and velocity on friction, wear, and microstructure development of high-purity copper. New test equipment, which was constructed to carry out the necessary experiments, will be integrated with a central data repository to harness the full potential of the raw experimental results. As part of the project, the copper microstructure is to be thoroughly characterized on a scanning electron microscope and analyzed in conjunction with the measured friction.

Requirements

Students in the fields of mechanical engineering, materials science or similar. Previous knowledge in the field of tribology is not necessary. A conscientious and independent way of working, as well as interest in hands-on lab work and affinity to programming are of central importance.

Possible start: as soon as possible

Contact

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