

Tribological Characterization of Multimaterial Designs Using a Twin-Disc Test Rig

Master's thesis

Initial situation:

Multimaterial designs combine a high-performance material in the contact zone with a lightweight or cost-effective material in the supporting structure. Such concepts offer considerable potential for reducing the mass and material consumption of gears. Before their application in real gear systems, the influence of the material combination and functional layer thickness on friction, wear and contact load capacity must be determined under controlled and reproducible conditions. A twin-disc test rig enables rolling–sliding contact conditions representative of gear contacts to be investigated.

Objective:

The aim is to characterize the tribological behavior of selected multimaterial designs under rolling–sliding contact. Multimaterial specimens with different combinations of materials and functional layer thicknesses will be tested and compared with monomaterial reference specimens. The results will be used to evaluate whether lightweight multimaterial designs can maintain the required friction, wear resistance and contact performance.

Experimental programme:

- Manufacture or prepare twin-disc specimens with different material combinations and functional layer thicknesses.
- Perform tests under defined normal load, rolling speed, slide-to-roll ratio, temperature and lubrication conditions.
- Measure friction coefficient, contact temperature and wear.
- Compare the multimaterial specimens with the monomaterial references.

Requirements:

- Interest in the field of tribology
- Ability to work independently and well-structured

