TECHNISCHE UNIVERSITÄT WIEN
Vienna | Austria

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Aviation at TU Wien

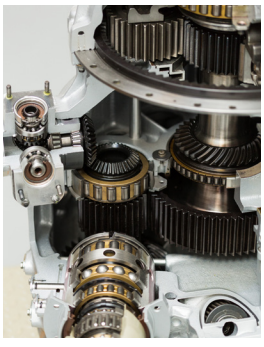
Transmissions for aviation, new lubricants & tribology, aircraft systems & design

Aviation was first introduced as a research field at TU Wien (the largest technical university in Austria, situated in Vienna) in 2008, when the rectorate assigned Dr.-Ing. Michael Weigand to be professor for Machine Elements and Transmissions for Aviation. After successfully attracting additional national funding, a professorship for Tribology (2016) and one for Aircraft Systems and Design (2021) were established. Unique expertise and infrastructure are in place at TU Wien. The objectives are to take a long-term perspective, and to cover a broad spectrum of topics important to international aviation industries.

The three departments act as cooperation partners and enable networking at the university level for industry and government authorities, both at home and abroad. The institute offers unique cooperation opportunities due to its profound knowledge of the EASA regulatory framework. TU Wien provides excellent unbiased know-how; it is an independent research institution.

Transmissions for aviation

Prof. Michael Weigand has worked at TU Wien in Vienna since 2008. He is responsible for teaching courses in machine elements and transmissions for aviation. He studied mechanical engineering at the Technical University in Darmstadt (Germany) and also completed his PhD there. Before joining TU Wien, he worked in leading functions for several companies dealing with transmissions. A special focus was on rotorcraft drivetrains during his work for ZF Luftfahrttechnik in Kassel (Germany) from 2002 untill 2007.



The research unit ‘Machine Elements and Transmissions for Aviation’ follows the basic principle that operational safety as well as certification and design regulations of the EASA and FAA are to be taken into account from the very beginning of every technical improvement or innovation.

International research project ERICA

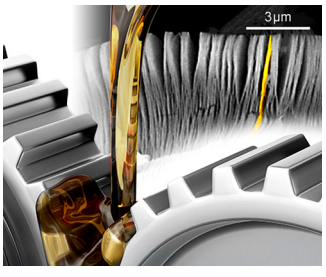
The aim of the unit is to identify new methods for the design and assessment of mechanical drives and to develop innovative, primarily mechanical drive train solutions for novel rotorcraft and engines.

Today’s research topics are rotorcraft drivetrains with variable speed, the safety of rotorcraft drivetrains, as well as the design and development of transmissions for aviation in cooperation with industry.

New lubricants & tribology

Prof. Carsten Gachot received his PhD from Saarland University in Germany in 2012 where he studied the effects of laser interference patterning on the microstructure and topography of metallic surfaces, with a focus on tribological applications. For this work, Dr. Gachot was awarded the European Honda initiation grant in 2011, and he was an academic visitor at the Tribology Group at the Imperial College London.

Prof. Gachot is head of the research group Tribology at TU Wien since 2016. The group investigates lubricant-surface interactions, functionalised surfaces for tribological applications, near surface damages in tribological contacts, and new approaches to model contact phenomena at different scales.



Advanced lubrication
and new 2D-materials

* Gears ‘n’ oil: © iStock | Background: © 2021 American Chemical Society

Aircraft systems & design

Prof. Martin Berens was appointed to the professorship for Aircraft Systems & Design, and joined TU Wien in May 2021. He studied aerospace engineering at TU Berlin (Germany) and aerodynamics at Cranfield University (UK). He investigated the potential of multiple winglet systems to improve aircraft performance in his PhD thesis. Later he joined Airbus, where he led transnational wind tunnel propulsion simulation activities aiming at optimized engine-airframe integration in the context of all Airbus programs, e.g. A350XWB and A320neo.

** © Airbus

A goal at TU Wien is to launch a master's programme in Aeronautics to provide young people with the skills required to meet the challenges of climate-neutral aviation.

Laboratories

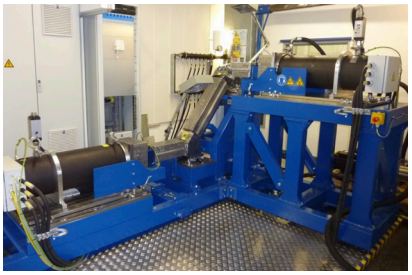
The institute operates a laboratory with several test stands, balancing machines and measuring equipment:

- FZG test rigs
- test stand for tail drive shafts of rotorcraft
- unique universal test stand (300 kW / 2 MW)
- Schenck balancing machine
- Klingelnberg measuring machine for spur and helical gears
- drive train tests rig for dedicated UAVs

All laboratory and test rigs/stands are built to EASA-CS-requirements and are suitable for verification and certification tests.

The Tribology laboratory performs:

- material analysis
- metrology
- advanced chemical analysis
- tribometry
- lubricant testing



Universal test stand in power feedback configuration at TU Wien

A laboratory for aircraft systems is planned, providing the means for:

- student lab work on aircraft systems
- aero-data acquisition
- component testing
- versatile low-pressure air supply

International Network

- partner of European Aviation Safety Agency, EASA – e.g. within the European Rotorcraft Symposium
- member of Helicopter Association international (HAI)
- member of Vertical Flight Society (VFS)
- member of Aerospace Gearing Committee of the American Gear Manufacturers Association (AGMA)
- member of Austrian Aeronautics Industries Group (AAI)
- Austria's representative at the International Forum for Aviation Research (IFAR)
- member and National Contact Point of the European Aeronautics Sciences Network (EASN)
- Austria's representative to Working Group 'Mobility', Advisory Council for Aviation Research in Europe (ACARE)
- member of German aerospace society Deutsche Gesellschaft für Luft- und Raumfahrt (CEAS / DGLR)
- the institute is one of the research centers of the Research Association for Drive Technology (FVA)

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