TECHNISCHE UNIVERSITÄT WIEN
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Development of innovative transmissions for aviation

– new rotorcraft concepts
– gearboxes for engines
– safety of drivetrains

For operations such as rescue, fast passenger transport and special cargo transportation, rotorcraft are needed that allow for higher speeds and more flexible operations than the helicopters currently being built.

Special rotorcraft are becoming more and more important in this context. New configurations such as compound helicopters and tiltrotor aircraft are being developed in Europe, Russia and the USA. Mechanical drive train technology in particular is facing completely new challenges.

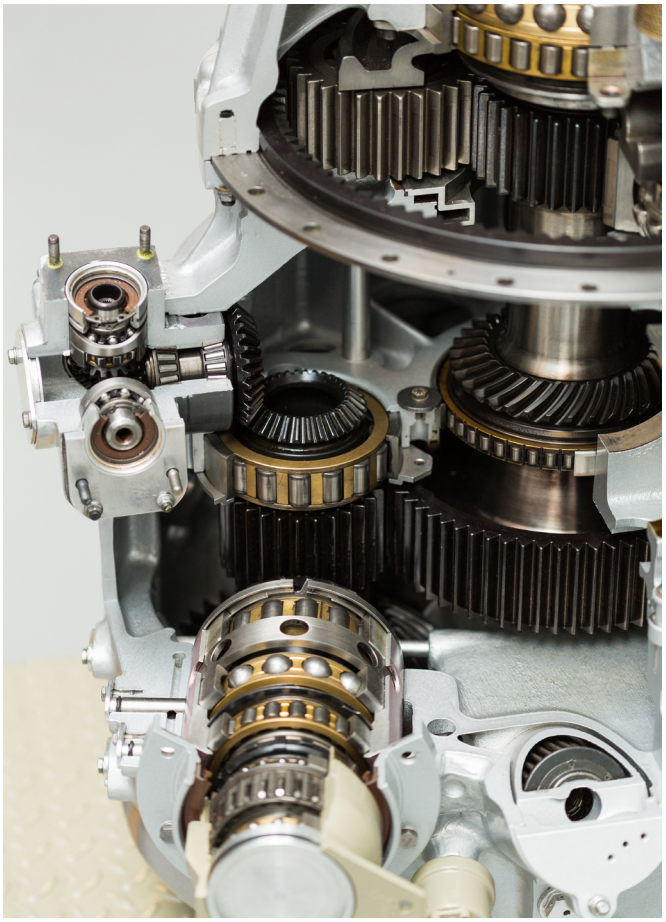
Objective

The research unit Transmissions for Aviation at TU Wien, the largest technical university in Austria, was established by Prof. Michael Weigand in 2008. It 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. The unit also covers tribology and the characterization of lubricants. The aim 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.

Competence

The research unit Transmissions for Aviation is available to manufacturers, suppliers, operators and authorities in the aerospace industry as a competent partner for innovation.

It offers the theoretical and experimental development of drivetrains for rotorcraft as well as of other transmissions for aviation, under special considerations of operational safety and correlated aviation regulations. Mechanical tests and trials as well as metallurgical investigations are carried out in test laboratories at TU Wien or in cooperation with TÜV Austria, the leading testing, inspection and certification agency in Austria. The test facilities of TU Wien are also suitable for verification runs that are required by certification specifications.



A new professorship ‘Aircraft Design’ has been established and will soon offer a master’s program ‘Aeronautical Engineering’ at TU Wien.

Results

The concept and design for a complete helicopter drivetrain as well as the required test equipment were successfully developed and built by TU Wien in cooperation with the Austrian transmission systems supplier Zoerkler Gears GmbH for the helicopter Kamov Ka-62.

The enormous potentials of speed variability in flight has been demonstrated in cooperation with Zoerkler Gears and the Technical University of Munich within the transnational research project VARI-SPEED.

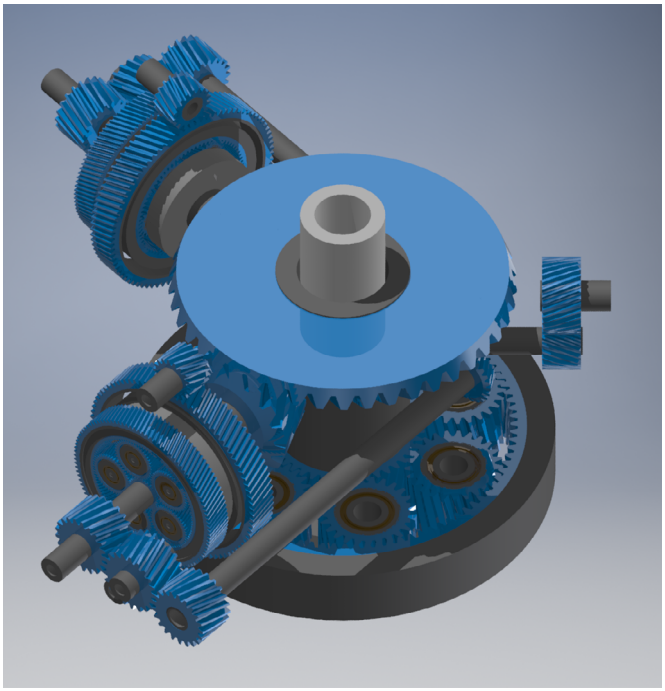
The functionality of this speed variable drive was verified by TU Wien in simulations, and the future usability of this new technology was successfully evaluated in various mission simulations. Design details as well as the dynamic behaviour of a well known rotor system are now being investigated, using the Sikorsky UH-60 Black-Hawk helicopter as a reference.

The dangers of the loss of lubrication in transmission systems is increasingly being considered. At TU Wien, a number of important factors influencing the survivability of transmission systems were determined. A method for predicting operational safety is being developed as well as predictive tools for the weight of rotorcraft transmissions in early design stages.

Gearboxes for engines are an increasing field of teaching and research of the research unit. Planetary gear stages for engines (geared turbofan technologies) as well as gearboxes for novel concepts based on battery or hydrogen and/or fuel cell technology are designed and developed in research projects and/or projects with industry.

International Network

- partner of European Aviation Safety Agency, EASA – e.g. within European Rotors Symposium and Trade Fair
- member of Helicopter Association international (HAI)
- member of Aerospace Gearing Committee of the American Gear Manufacturers Association (AGMA)
- member of propulsion committee of VFS (Vertical Flight Society)
- member of Austrian Aeronautics Industries Group (AAI)
- Austria's representative at the International Forum for Aviation Research (IFAR)
- member of Board 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)



Design of a drivetrain with compound split for a helicopter with main and tail rotor configuration

Your benefits

The Transmissions for Aviation research unit and its experts at TU Wien offer you:

- unique know-how in the field of the design, development, testing and certification of transmissions for aviation
- innovation for speed-variable drivetrains that allow for dynamically adapting rotor speed in flight, thereby increasing operational flexibility and flight safety while reducing fuel consumption and noise emissions
- scientific expertise – unbiased and independent of manufacturers, suppliers and operators interests
- over twenty years of experience with gearboxes and transmissions for aviation

Contact

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