

Development of innovative transmissions for aviation

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

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

Objective

The research area Transmissions for Aviation at TU Wien was established by Prof. Michael Weigand in 2008 following the principle that operational safety as well as certification and desing regulations of EASA and FAA are to be taken into account from the outset in all technical improvements and innovations. This also includes tribology and the characterization of lubricating oils. 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 area Transmissions for Aviation is available to manufacturers and suppliers in the aerospace industry as a competent partner for innovations.

It offers theoretical and experimental development of drivetrains for rotorcraft as well as of other transmissions for aviation under special consideration of operational safety and relevant 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 according to certification specifications.

The professorship "Aircraft Design" is currently being established and will offer the master's program "Aviation" at TU Wien.

- new rotorcraft concepts
- improvement of traditional gearboxes
- safety of drivetrains



Results

The concept and design of a complete helicopter drivetrain as well as the required test equipment were successfully developed and realized by TU Wien in cooperation with the Austrian aviation gear manufacturer Zoerkler Gears GmbH for the helicopter Kamov Ka-62.

The enormous potentials of speed variability in flight could be demonstrated in cooperation with Zoerkler Gears and the Technical University of Munich within the transnational research project VARI-SPEED. The functionality of this drive was verified by TU Wien in simulations and the future usability of the new technology for different purposes was successfully evaluated in mission simulations.

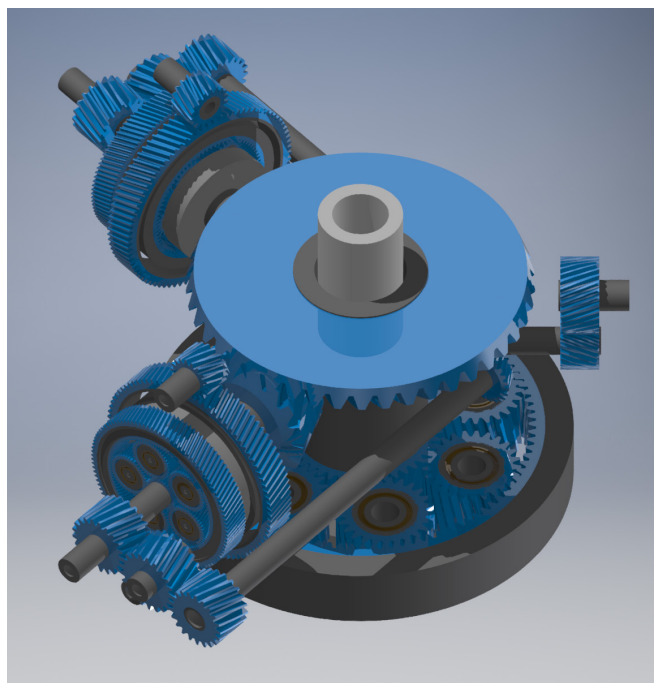
The dangers of loss of lubrication of transmission systems is increasingly being considered. At TU Wien, a number of important factors influencing the survivability of transmission systems were determined. A method for predicting operational safety for early design is also being developed as well as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

International Network

The research area Transmissions for Aviation at TU Wien and its experts are:

- Partner of the European Aviation Safety Agency, EASA – e.g. within the European Rotorcraft Symposium
- Research center of the international Research Association for Drive Technology (FVA)
- Austria's representative at the International Forum for Aviation Research (IFAR)
- Austria's representative in Working Group 1 "Mobility" in the Advisory Council for Aviation Research in Europe (ACARE) – on behalf of the Austrian Ministry for Transport, Innovation and Mobility (BMVIT)
- Member of the German aerospace society Deutsche Gesellschaft für Luft- und Raumfahrt (CEAS / DGLR)
- Member of the Aerospace Gearing Committees of the American Gear Manufacturers Association (AGMA)
- Member of the American Helicopter Society (AHS)
- Member of the Austrian Aeronautics Industries Group (AAI)
- Funded by the national Research Promotion Agency (FFG)

Notes



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

Your benefits

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

- Unique know-how in the field of development, testing and certification of transmissions for aviation
- Innovation for speed-variable drivetrains that allow for dynamically adapting the rotor speed in flight, thereby increasing operational flexibility and flight safety while reducing fuel consumption and noise emissions at the same time
- Scientific expertise – independent of manufacturer, supplier and operator interests
- Over twenty years of experience with transmissions for aviation

Contact

Prof. Dr.-Ing. Michael Weigand
 TU Wien – Institute of Engineering Design
 and Product Development
 +43 1 58801 30601
michael.weigand@tuwien.ac.at
lukas.gammer@tuwien.ac.at

Dr. Hanns Amri
www.vari-speed.ikl.tuwien.ac.at
 +43 1 58801 30611
hanns.amri@tuwien.ac.at