PROJECT

NT-GTF

New technologies for very low noise gear fan concepts

Neue Technologien für extrem leise Getriebefankonzepte

Funding: National (Germany)
Duration: Jan 2007 - Sep 2010
Status: Complete with results

Background & policy context:

It is expected that the air traffic increases in future. For cost and environmentalism reasons, the fuel consumption of future airplane generations needs to be reduced. To achieve this objective, the engines should be more fuel efficient.

Objectives:

It is the objective to increase the efficiency of the airplane turbines.

The NT-GTF project focused on the following approach: To realize different numbers of revolutions in the turbine, a geared turbofan is implemented. The undocked and unattached numbers of revolutions obtain a higher efficiency. Furthermore, this concept can reduce the noise of the turbines significantly.

To apply the “geared turbofan“-concept in reality, the NT-GTF project focused on 2 issues: The research on new materials for weight reduction, and improvements in terms of Control engineering.

Methodology:

In a first step, the single components must be improved. But in addition, it is necessary to test the interaction of the different components. For a reliable result, tests on the ground and during flights provide realistic conditions. The NT-GTF project is divided into 3 work packages:

- WP1: GTF ground-/flight-test
- WP2: lightweight materials
- WP3: de-centralized control system

Parent Programmes:
LuFo IV - Federal research programme aeronautics LuFo IV

Institute type: Public institution
Institute name: Federal Ministry of Economics and Technology (BMWi)
Funding type: Public (national/regional/local)

Partners:

Germany:
MTU Aero Engines GmbH

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According to the different work packages, the following results have been achieved:

- **WP1: GTF ground-/flight-test:** In a first step, definition and coordination tasks were necessary to implement a suitable metrology and sensor system. Then, the geared turbofan engine for demonstration was built in cooperation with Pratt & Whitney (Middletown). The test phase started in November 2007. First on a test facility on the ground, later flight tests were carried-out. All tests were successful.

- **WP2: lightweight materials:** For the turbine casing, the lightweight material “ATI 718Plus” was tested. The experiments proofed the superior attributes of the new material. Furthermore, the material “TiAl” (titanium aluminide) was tested for a possible usage in turbine blades. The basic feasibility of the new design was confirmed.

- **WP3: de-centralized control system:** A de-centralized Engine Control Unit ECU was developed. The key element is an electric fuel supply system: This system provides a demand-based circulation of fuel without a Fuel Metering Unit FMU. In a verification process, the best approach to realize such an ECU was figured out.

Findings of the study are published by a final report (German only), which is available online via the Technical Information Library (TIB) of the Hannover University: [http://edok01.tib.uni-hannover.de/edoks/e01fb11/644798459.pdf](http://edok01.tib.uni-hannover.de/edoks/e01fb11/644798459.pdf)

**STRIA Roadmaps:** Vehicle design and manufacturing

**Transport mode:** Air transport

**Transport sectors:** Passenger transport, Freight transport

**Geo-spatial type:** Network corridors