PROJECT

TIMPAN

Technologies to IMProve Airframe Noise

Funding: European (6th RTD Framework Programme)
Duration: Sep 2006 - Nov 2009
Status: Complete with results
Total project cost: €5,260,175
EU contribution: €2,965,000

Call for proposal: FP6-2005-AERO-1
CORDIS RCN: 81474

Background & policy context:

During the last decades, the replacement of older jet-powered aircraft by aircraft with high bypass ratio engines, progressively encompassing efficient acoustic design rules and noise reduction technologies, has significantly reduced the noise impact from individual aircraft operations on communities near airports. However, the continuous growth in air traffic makes it is necessary to achieve further noise reductions to ensure the air transport industry's sustainable growth.

In the report, European Aeronautics - a vision for 2020, a group of people gave their view on the future of air transport: challenging noise reduction targets were defined; perceived noise levels must be reduced by 50%, i.e. -10 dB per aircraft operation by 2020.

To achieve such reductions, all fields of investigation have to be pursued simultaneously by reducing the noise at source: use new configurations with profitable installation effects and improved aircraft procedures around airports so as to limit the noisy areas to airport boundaries. In recently designed aircraft, contributions from airframe noise (mainly due to the interaction of the airflow with the aircraft airframe) and engine noise sources to the overall aircraft noise are quite balanced at approach.

The approach noise source reduction challenge has to be addressed by reducing airframe noise to the same level as engine noise. Dominant airframe noise sources, which are due to the deployment of both high-lift devices and landing gears, are to be considered.

Objectives:

TIMPAN addressed airframe noise by tackling both landing gears and high-lift devices, which are the two main contributors to approach airframe noise. The investigations planned in TIMPAN are:

- the development and assessment of innovative technologies for airframe noise reduction application: a breakthrough technology for source noise reduction is required to meet the long-term objectives. TIMPAN will rely on state-of-the-art research findings of disciplines way beyond the aero-acoustics domain.
- the improvement of low-noise designs, for generic aircraft components, which will take results from previous research investigations, such as EC (RAIN, SILENCE(R)), national or company-funded research projects linked to airframe noise investigations. They will target shorter-term objectives.

These investigations focussed on principles and will be applicable to any type of commercial/business aircraft, including new configurations such as those developed in NACRE. Furthermore, the approach proposed in TIMPAN includes a performance, cost and integration assessment of the technologies with multidisciplinary evaluation.

Methodology:

TIMPAN was organised into three main work packages:
A. Landing gear noise reduction

B. High-lift device noise reduction

C. Technology evaluation

In both technical work packages (A) and (B), the work was split between the proof of concept of innovative technologies and the improvement of current State-of-the-Art low-noise design.

Various innovative technologies were investigated, including plasma actuation, air blowing, use of meshes for landing gear, and slat-less configurations and flow control techniques for high-lift devices. All these activities, led by research and academic partners, were achieved in parallel, and concluded with laboratory tests to measure their noise reduction efficiency.

The conventional design tasks include, in addition to research and academia, the airframe noise partners from industry. On landing gear activity, it was planned to use the Silence(R) advanced gear as a basis and improve the design, in particular treating the currently noisier systems. The advanced design for high-lift devices concerns the wing leading edge acoustic liner and the aero-acoustic design process of a high-lifted configuration.

Transversally, the technology evaluation was performed, specifying the needs in terms of integration, cost and performance, and analysing the results at aircraft scale, if relevant, with the use of three virtual aircraft platforms.

**Parent Programmes:**

**FP6-AEROSPACE - Aeronautics and Space - Priority Thematic Area 4 (PTA4)**

**Institute type:** Public institution

**Institute name:** European Commission

**Funding type:** Public (EU)

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Technologies:

- Noise testing, modelling and reduction
- Aircraft noise reduction at source

Development phase: Research/Invention

Key Results:

The first deliverable was the assessment of the efficiency of a selection of innovative concepts that could be tomorrow's breakthrough in airframe noise-reduction technologies.
The second deliverable was the improvement of proven low-noise technologies, which will have a direct impact on community noise for short-term new aircraft projects (2010-2015), with the expected reduction of 6 dB for landing gear noise and 4 dB for high-lift device noise levels compared to the 2000 State-of-the-Art. In both cases, a technology assessment will help to identify the potential impact of such findings in terms of overall aircraft noise reduction, integration, costs, etc., so further research needs will be also identified.

TIMPAN will benefit European aerospace companies, the academic/research world and European citizens beyond its main noise reduction objective by:

- Increased economic competitiveness of European companies in the world market.
- Enhanced research skills and expertise in research establishments and academia, through the development and application of new techniques, which to a large extent will be carried out by PhD students or young scientists.
- Expanded employment opportunities in the EU's aircraft industries and their associated supply industries, including high-technology SMEs.
- Noise reduction for populations around airports, and thus improved quality of life and health.

**Technical Implications**

The TIMPAN low noise main landing gear configuration provides more than 7 EPNdB main landing gear source noise reduction, which results in a total aircraft noise reduction of 1.5 EPNdB for otherwise unchanged high-lift devices and engine noise levels.

Documents:
- [Extracts of Public Information (Other relevant documents)](#)
- [Final Report Summary - TIMPAN (Technologies to IMProve Airframe Noise)](#)

**STRIA Roadmaps:** Vehicle design and manufacturing

**Transport mode:** Air transport

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

**Transport policies:** Environmental/Emissions aspects

**Geo-spatial type:** Other