PROJECT

**ADFCS-II**

**Affordable digital fly-by-wire flight control systems for small commercial aircraft (second phase)**

**Funding:** European (5th RTD Framework Programme)

**Duration:** Feb 2001 - Mar 2004

**Status:** Complete with results

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**Background & policy context:**

The aim of this project (GRD1-2000-25261) was to bring the proven benefits that accrue from the introduction of digital fly-by-wire technologies to the small commercial aircraft market. This required the application of innovative architectures and techniques in order to reduce the cost to an affordable level.

The name ADFCS stands for Affordable Digital Flight Control Systems. It is not a phonetic acronym that is easily pronounced but it does clearly explain the simple goal of the project, and clarity is one of the key requirements to attaining certification clearance for safety critical applications. The project was a partnership between industry, research organisations and universities from Greece, Israel, Italy, Poland, the Netherlands and the United Kingdom. The project started in 1998 and, through a contiguous second phase, was completed in 2004 with a total duration of 6 years.

**Objectives:**

This project followed-on from ADFCS (Brite/Euram Project BE97-4098), which set out to develop an architecture and design methodology that would reduce the cost of ownership (development, acquisition, operation, and maintenance) of Fly By Wire (FBW) technology and make it affordable to small commercial aircraft applications. The goal of the second phase was to provide; a mix of new tools; new methodologies; clear design requirements; and new system architectures to provide a cost-effective platform for the designs.

Digital Fly-by-Wire technology has become state-of-the-art for all modern large commercial aircraft. The additional initial cost of acquisiti

**Methodology:**

The work was conducted using a combination of simulation and rig evaluation activities.

Multi-partner simulations were integrated using a synthetic environment (SE) simulation tool that was developed during the first phase of the project and evolved and expanded during the second phase.

One objective of ADFCS-II was to improve the utility of the tool by taking into account the industrial partner’s needs, which are summarised as:

- Modularity, model architecture based on the interconnection of several atomic models, each of them representing a specific system HW/SW component;
- Flexibility, in terms of availability of different simulation models of the same physical component developed with different level of details;
- Real-time compatibility, in order to allow rapid and user-friendly desktop to real-time

**Parent Programmes:**

FP5-GROWTH KA4 (AERONAUTICS) - New Perspectives in Aeronautics

**Institute type:** Public institution

**Institute name:** European Commission, Directorate-General for Research (DG Research)

**Funding type:** Public (EU)
Partners:

**Denmark:**
Fairchild Dornier GmBH

**Greece:**
University of Patras

**Israel:**
Israel Aircraft Industries; Israel Institute of Technology

**Italy:**
Alenia Aeronautica; Centro Italiano Ricerche Aerospaziali; University of Naples

**Poland:**
Warsaw University of Technology

**The Netherlands:**
National Aerospace Laboratory; Delft University of Technology

**United Kingdom:**
BAE Systems

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**Key Results:**

The project achieved most of its objectives, as summarised in the Final Technical Report, and supported by detailed technical reports on individual topics.

- Design tools and processes were identified to help and increase the efficiency of the FCLAW design process. A Flight Simulator assessment activity identified an initial set of performance goals pertinent to this class of aircraft. Avionics knowledge and engineering experience allowed the pilot ranking and assessments to be extrapolated into full coverage, although more simulator assessment work is required to verify the extrapolated extreme boundaries. The MathWorks MATLAB/Simulink based design tools and simulation package brought a signi

**Technical Implications**

Three levels of dissemination and intentions of use are applicable to the project:

- The hardware items manufactured by individual organisations remain with the organisations that produced them.
- The aircraft data supplied by IAI remains the property of IAI and will not be disseminated outside of the project partners.
- The design and development tools and processes developed within the project remain the joint
property of the project partners with free access rights being granted to any EU University for educational purposes.

- In seeking to improve the efficiency and standardisation within the EU industry, the technical reports and findings of the project are freely available for dissemination within the EU.

**Policy implications**

None

**STRIA Roadmaps:**
Cooperative, connected and automated transport, Vehicle design and manufacturing

**Transport mode:** Air transport

**Transport sectors:** Passenger transport

**Geo-spatial type:** Other