STS 15

Airbus A340 BLADE Flight Tests and Data Analysis

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Session Abstract

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The A340 BLADE (Breakthrough Laminar Aircraft Demonstrator in Europe) aircraft was created with the aim of demonstrating the feasibility of designing and building a Natural Laminar Flow wing for use on a commercial aircraft, operating in transonic conditions. Natural Laminar Flow represents the most promising means of reducing friction drag of short-range transonic aircraft, which make up almost 80% of all passenger aircraft produced every year by Airbus.

Significant modifications were made to the A340 aircraft. The original wing structure outboard of the outer engine was removed on both sides and replaced with an alternative wing design known as the laminar panel. These panels were built by a multi-national consortium within the CleanSky project. The laminar panels were heavily instrumented to allow researchers to understand the behaviour of the wings during the flight tests. The main means of detecting the extent of laminar flow on the laminar panels were the infrared cameras mounted at the top of the vertical tailplane.

The flight test programme for BLADE began in September 2017 and was completed in August 2019. The themes of the research flights included:

- Baseline laminarity assessment
- Studying the impact of surface imperfections
- Use of Krueger flaps as anti-contamination devices
- Noise receptivity

The papers of this STS will introduce the BLADE aircraft and will present the current status of the data analysis being done by the BLADE partners within Clean Sky 2.

The following papers are foreseen in this STS 15:

Overview of BLADE Flight Preparation
David Sawyers, Airbus Operations Ltd, Bristol, UK

Analysis of BLADE Baseline Transition Flights
Stefan Hein, DLR, Braunschweig, Germany (inputs from Dassault, Saab, ONERA and Airbus)

Analysis of BLADE Receptivity Flight
Fabien Mery, ONERA, France (support from DLR)

Overview of Analysis from Other BLADE Flights
David Sawyers, Airbus Operations Ltd, Bristol, UK (inputs from other partners)