

PROJECT

VIEERC

Virtual Integration of Electrical Equipment and Rig Correlation

Funding: European (7th RTD Framework Programme)

Duration: Mar 2013 - May 2015

Status: Complete with results

Total project cost: €550,000

EU contribution: €275,000



Call for proposal: SP1-JTI-CS-2012-02

[CORDIS RCN : 110746](#)

Objectives:

In this proposal, AÉROCONSEIL - AKKA is the proposal coordinator and the only participant. AÉROCONSEIL - AKKA has a strong expertise in the field of aircraft electrical simulation and V&V activity and is confident in its capacity to perform tasks required in this call.

This project is composed of 3 work packages (WP): Simulation platform development, verification of electrical performances and tests procedure definition, necessary to realise the 5 deliverables expected.

The duration of 3 WP is in accordance with the deliverables due dates.

The major identified risks are the T0 postponement beyond October 2012 and the inputs deliveries dates (models): AÉROCONSEIL - AKKA can manage such well-known risks.

Positive impacts are expected from AÉROCONSEIL - AKKA, such as competitiveness in new electrical architectures knowledge.

Parent Programmes:

[FP7-JTI - Specific Programme "Cooperation": Joint Technology Initiatives](#)

Institute type: Public institution

Institute name: European Commission

Funding type: Public (EU)

Other programmes: JTI-CS-2012-2-SGO-04-005 Virtual integration of electrical equipment and rig correlation

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EU Contribution: €275,000

Technologies:

Aircraft design and manufacturing
Electric aircraft

Development phase: Validation

Key Results:

Executive Summary:

The emergence of new electrical equipment on aircraft led us to consider new architectures for electrical networks. These architectures, such as HVDC, should permit energy distribution optimisation in order to reduce losses. In this sense, and in order to optimise the costs related to testing of these new architectures, numerical simulation is an inevitable solution. This project will aim to model electrical equipment, to enable the simulation of the HVDC network that will be representative of the networks that will be flown on future aircraft. To achieve this, a model specification was redacted, which has allowed the evaluation of models delivered by OEMs (representativeness and robustness). These models were then incorporated into a simulated network, and tests were conducted in order to compare the results with tests performed on physical bench. A big part of the work was also to specify all tests that have to be performed on the physical bench.

Project Context and Objectives:

Whilst aircraft systems have had increasingly more electrical and commercial loads to support, the 115VAC standard has not significantly changed over the last 50 years and most aircrafts have similar electrical generation and distribution architectures.

The A350 features 230VAC distribution that allows weight saving for power feeders and wiring to supply power users. Recently, some aircraft manufacturers introduced +/-270VDC distribution (HVDC).

In this context, evaluation of HVDC electrical networks seems to be primordial. Also, in order to control development costs, simulation tools are increasingly used.

Consequently the project main objective is to use simulation as a V&V tool, to evaluate new electrical networks and HVDC power centre.

V&V activities aim to demonstrate compliance of equipment and technologies with the following top-level objectives of the CLEANSKY SGO project:

- Objective 1 : Electrical networks

In CLEANSKY SGO framework, an advanced electrical architecture has been proposed beyond this state of the art, with primary focus on +/-270VDC distribution. The Project Objective 1 is to determine power quality (HVDC, 230VAC, 115VAC), voltage drops, protection performances, busbar transfer or EMC performances.

- Objective 2 : More-electrical users

Based on engineering review and experience from other research projects or aircraft programs, the Project Objective 2 is to characterise "more-electrical" users.

- Objective 3 : Design environment

A main goal of the CLEANSKY SGO project is to validate network integration, and correlate behavior of real equipment test and model simulation.

Equipment operation will be characterized by simulation means (Saber) and by tests on physical test rig. Test request plans (concerning Saber models simulation and laboratory equipment test) will be used to define the rationales of the tests and identify potential non-compliance, risks or limitations.

Project Results:

AEROCONSEIL tribute to CLEANSKY SGO project (VIEERC) is articulated following 3 axes:

- Axe 1: Saber Model Evaluation

- Definition of Saber models specification / Integration Test

A reference document has been redacted for equipment suppliers and Saber model supplier, to define requirements applicable to developed stand-alone models, and in order to develop a simulation platform allowing addressing simulation V&V items.

- Reception & evaluation of equipment's models

Two types of models have been delivered by models suppliers in the frame of CleanSky:

- Specific models: Models developed by equipment supplier, representative of their equipments that will be delivered on CleanSky bench.

- Generic models: Models developed by model supplier, representative of generics equipments, and can be parameterised.

All these models (around 45 generic and 40 specifics, at different level of maturity) have been evaluated by AEROCONSEIL. Evaluation notes have been shared with model suppliers.

• Axe 2: Saber Model Simulation

- Pre-integration simulations :

Some simulation platforms have been developed by AEROCONSEIL based on generic models, in order to support the pre-integration phase.

- Integration of models on a simulation platform :

Integration and simulation have been performed with representative models sent by suppliers. Results have been consigned into test reports.

A complete network, representative of the test bench electrical configuration, using CleanSky Saber models has been developed.

- Correlation of simulation results with test rig :

In order to facilitate correlation between simulation and measurements, AEROCONSEIL have developed a tool that configures automatically a Saber network according to a file extracted from test rig (describing the power centre configuration).

• Axe 3: V&V and Test request

- Definition of a V&V plan:

A reference document has been redacted.

- Definition of Simulation test request:

Reference documents have been redacted in order to define Simulation Tests Request.

- Definition of detailed laboratory test request:

Detailed testing procedures have been redacted, in order to highlight equipment's performances and determine compliance with V&V expectation and with network norms.

Potential Impact:

Performance in terms of power quality, voltage drops, protection and busbar transfer have been characterised via integration and tests of representative numerical models. Models and integrated test benches developed in the CleanSky framework will be highly useful in the future, in order to simulate easily the behaviour of integrated equipments and to evaluate the pertinence of the HVDC network.

"More-electrical" users (WIPS, ECS, RDPC, SSPC) have also been characterised by Saber model development. These models can be easily integrated into existing network simulations, in order to evaluate their impact on an existing system.

Activities performed in the CleanSky framework will allow in the future to evaluate easily the behavior of a new design by simulation, in order to reduce physical tests that are costly in terms of time and money.

Transport electrification, Vehicle design and

STRIA Roadmaps: manufacturing

Transport mode: Air transport

Transport sectors: Passenger transport, Freight transport
Environmental/Emissions aspects, Other

Transport policies: specified

Geo-spatial type: Other

