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Accelerating Innovation

# Synopsys and EADS/IMACS

## EADS Innovation Works run Virtual Electrical Tests for A350 XWB using the Saber/Aseris Integration

*In order to perform a reliable prediction of the electrical behavior for modern airplane systems, we require accurate simulation models and a tool that can handle the complexity of a platform like the A350 XWB. Therefore, we perform system simulations in Saber and leverage the integration with Aseris to achieve accurate results. This ensures that our product meets the quality standards we demand."*

**Richard Perraud**
EMC Expert, EADS Innovation Works

### The High Rising Requirements in Aerospace

Increasing competitive pressures to deliver airplane platforms that are reliable and provide heightened levels of passenger comfort, as well as reduced fuel consumption, create quite a stretch for airplane manufacturers. The growing use of power electronics and carbon fiber reinforced plastics (CFRP) in new aerospace platforms helps to address these requirements. However, the expanded use of these features is also causing enormous new challenges for the engineers dealing with the development of the electrical system, as they must ensure compliance with stringent safety and quality requirements governing aerospace applications. The validation of the electrical network quality and behavior of the electromagnetic compatibility (EMC) has become especially challenging throughout the entire airplane development process.

### The Challenges of Validating EMC for the A350 XWB

The size of aerospace platforms, as well as the fact that real prototypes of an airplane are usually not available until late in the development cycle, leaves numerical simulation as the only choice to validate the behavior of the electrical system early in the design process. For this reason, model-based development techniques have been used for many years now for the design and qualification phase of aerospace applications. In particular, for electromagnetic effects on airplanes such as lightning, high Intensity electric fields and EMC, simulation is heavily applied to explore the behavior of the network implementation. On the other hand, sizing and optimizing the functional current path has become a major driver for the design. The primary challenge is to consider the effects of the grounding network on the behavior of the overall electrical network. Simulations for the entire system are conducted in Saber.

### Modeling Strategy for the A350 XWB

Managing the large and complex structures in electromagnetic simulations for a complete airplane mandates the use of reliable and robust tools, without which it would not be possible to gain confidence in the results. The airplane system simulation requires a particular modeling approach, dividing the overall electrical system into two parts from a modeling perspective. The distributed nature of the wiring harness system requires a

*The integration between Saber and Aseris enables an important part of the airplane development process, which relies on a virtual prototype based approach. The new partnership with Synopsys helps us to better advance the integration between both tools and serves the demand of EADS, Airbus and other aerospace companies along the supply chain."*

**Toufic Abboud**
CEO, IMACS

structural modeling approach using a 3D simulation, which is carried out in Aseris. The same applies to the fuselage of the A350 XWB to model the grounding network characteristics accurately. The 3D simulation of the structure is performed with a Boundary Element Method (BEM) technique whose features are most appropriate for the problem to be solved. The discrete components of the electrical network like motors, power converters and other devices are modeled using a lumped element approach in Saber, in which Saber's model library provides all needed components.

## Benefits of using the Saber/Aseris Integration

Carrying out a system simulation for the entire electrical network requires assembling the 3D models for the fuselage and cabling structure in Aseris, as well as the discrete set of functional components in Saber. In addition, the overall simulation solution must cover a large frequency band where equipment is interconnected with cables. This is only achievable through leveraging the integration of reliable electromagnetic tools. The strong experience in electromagnetic modeling of EADS/IMACS implemented in Aseris is combined with the outstanding capability of electrical models and power network simulation in Saber. Saber is recognized as the de-facto standard simulator for aerospace electrical applications. The integration between Saber and Aseris allows engineers to reuse the complex 3D electromagnetic models from Aseris in Saber through a fully automated model exchange interface. A vector fitting technique is used to approximate the admittance matrix linking the voltages and currents and subsequently producing a model directly applicable to Saber. This interface method is also a real advantage for exchanging models between aircraft manufacturers and suppliers, where protection of intellectual property is required. The tool integration has proven to be very reliable for diverse scenarios of aerospace risk analysis.

## Synopsys, EADS Innovation Works and IMACS launching Partnership to improve Saber/Aseris Tool Integration

To further improve the integration between Saber and Aseris, the three parties Synopsys (tool provider for Saber), EADS Innovation Works (user of Saber and the integration with Aseris) and IMACS (technical development and distribution of the Aseris tool) have entered into a partnership agreement. The objective of this new partnership is to gain closer technical cooperation to expand the capabilities of the integration between Saber and Aseris. This will include an expansion of providing more functionality for better EMC analysis, as well as reducing project time for end-users by decreasing simulation time required for Aerospace systems in Saber by using further optimized EMC models created by Aseris.

*"Saber plays an instrumental role in the product development flow for aerospace products to stay competitive, meet the challenging time-to-market deadlines and cost requirements of our products.*

**Richard Perraud**
EMC Expert, EADS Innovation Works