MODELING & SIMULATION PLATFORM FOR SYSTEMS ENGINEERING

AMESim

APPLICATIONS - AEROSPACE

Photo: *Dassault*

KEY POINTS

- Steady-state and transient simulation.
- State-of-the-art for hydraulic & pneumatic component design.
- Gas and Liquid properties database.
- Fluid cavitation with void content, air release and pulsed air everywhere in the system.
- Advanced line models (wall compliance, frequency dependent friction…) for pipes and hoses.
- Electromagnetic actuator dynamics with saturation and hysteresis.
- Electronic Control Unit integration with the AMESim-Simulink® interface (export/import & co-simulation) for control design and testing.
- Real time possibilities with semi-automatic reduction of models.
- Encrypted models in order to share qualified models between manufacturers and suppliers.
- Easy integrated comparison with experiments.

Photo: *ESA - Arianespace*

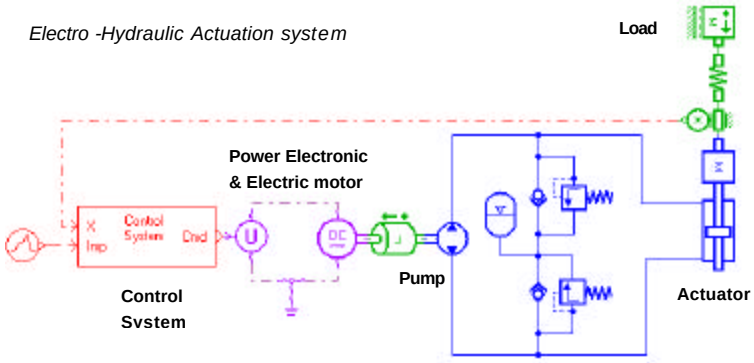
Overview

Over the recent decades, the aerospace industry has significantly contributed to the development of advanced technologies. Projects are generally ambitious and innovative and their experimental validation is complex, expensive, not to say dangerous. In this respect, this industry has been, from the beginning, a field of application for virtual system analysis, allowing engineers to dimension and optimize various systems and components.

Design of Hydraulic Systems & Components

AMESim® and its associated libraries are used by aerospace engineers for designing hydraulic systems and components, studying interaction between components, for sizing of thermal exchangers and thermal transient, for failure & back-up simulation, and for control analysis. Typical applications include steering and braking systems, landing gear, fuel or lubrication systems, winches, flight control actuators, thrust reversers, all types of valves, test bench…

Electro -Hydraulic Actuation system



Design of Pneumatic Systems & Components

Using AMESim for designing pneumatic systems and components answers to challenges raised by systems design analysis, control, component design, interaction between components, failure and back-up simulation…

Designing such systems has been successfully implemented for breathing systems, pneumatic networks and valves.

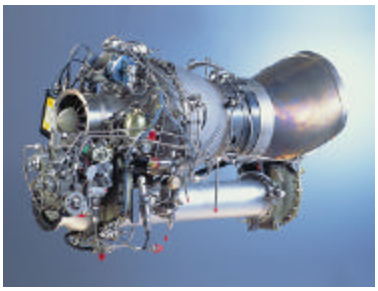


Photo: *Snecma*

Thermal Analysis

The thermal factors must be considered very early in the design process, particularly in aerospace applications, where mass and bulk constraints are severe. AMESim enables you to optimize the design and reduce the number of prototypes and tests by offering a broad range of models and tools. It is made possible to analyze and simulate the behavior of your systems under realistic operating conditions.

Specific Development

IMAGINE helps you in answering specific design challenges through its capability to provide specific developments, which significantly expand the scope of all previously mentioned applications. Typically, specific models or libraries, compatible with standard ones, can be added within the AMESim environment. As a result, the range of applications includes rocket engines, combustion, test benches and many others.

Examples of developments successfully carried out so far have resulted in a rocket engine library, a two-phase flow library, centrifuge or oxygen mask models.

Photo: *Snecma*

Applicable libraries

- Standard ***AMESim Mechanical*** & ***AMESim Signal Control and Observers*** libraries.
- ***AMESim Hydraulic*** and ***AMESim Hydraulic Component Design*** libraries for a system global approach or a component detailed approach.
- ***AMESim Pneumatic*** & ***AMESim Pneumatic Component Design*** libraries for pneumatic systems and components.
- ***AMESim Electro Mechanical*** and ***AMESim Electric Motors and Drives*** libraries for EHA, valve, electromagnetic and electrical actuators.
- ***AMESim Thermal, AMESim Thermal Hydraulic*** and ***AMESim Thermal Hydraulic Component Design*** libraries for fuel and lubrication system.

Our main applications at a glance …

- Primary and Secondary Flight Actuation systems.
- Thrust reverser actuation systems.
- Engine actuators & components.
- Fuel systems.
- Lubrication systems.
- Landing gear.
- Braking systems.
- Breathing systems.
- Air conditioning.
- Hydraulic actuators.
- Attitude & Orbit actuators.
- Rocket propulsion.
- Combustion.
- Failure scenarios…

References

AMESim is successfully used in the aerospace industry for the design of systems and components by a large number of manufacturers and OEMs such as Snecma Moteurs, Dassault Aviation, Goodrich Actuation Systems, Aermacchi, EADS, Turbomeca, Moog, China Aviation Motor Control Institute, IN-LHC, Intertechnique, Hispano-Suiza, CNES, Messier Bugatti, Korea Aerospace Research Institute…

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