

Siemens PLM Software

LMS Imagine.Lab for aircraft fuel systems

Facilitating the complete design of fuel systems and thermal integration analysis

Benefits

- Accurately predict the fuel free surface in the reservoir for optimized fuel transfer and tank cascading
- Ensure fuel system safety by performing flammability reduction means analysis
- Track the oxygen composition and ensure safe inert conditions in reservoirs
- Assess the impact of failure or abnormal situations
- Optimize overall energy consumption
- Analyze transient flight conditions

Summary

LMS Imagine.Lab™ software for aircraft fuel systems helps you design complete fuel systems, including elements such as fuel distribution, fuel temperature management and ullage composition tracking. Application areas include the thermal integration of the aircraft fuel system.

The aircraft fuel systems solution is based on the LMS Imagine.Lab Amesim™ software multi-domain system simulation environment. Using a scalable approach, this solution allows you to manage multidisciplinary systems for advanced aerospace fuel system design, such as pressurization, fueling, refueling and defueling of tanks with complex shapes, accounting for aircraft attitude and acceleration, venting, onboard inert gas generation system (OBIGGS), fuel distribution networks and overall energy management.

The solution enables you to easily handle highly complex fuel system designs, and accounts for multiple phenomena (wing bending and twisting) in dynamic conditions (temperature and pressure variations). You can design aircraft fuel systems with higher efficiency and lower weight and optimize energy consumption while managing fulfillment of certification requirements.

LMS Imagine.Lab for aircraft fuel systems

Features

- Deal with complex shape reservoirs from CAD data
- Account for environmental conditions, aircraft attitude and acceleration during flight missions
- Accurately compute the center of gravity of fuel
- Use tank gauges to calibrate gauging system and evaluate the unusable amount of fuel
- Gas mixture library with up to 20 species, including the ability to accurately model the ullage composition and track oxygen concentrations
- Model pumps, ejector pumps and valves
- Provide support for heat exchangers with different modeling levels
- Functionality suitable for various aircraft architectures and technologies
- Automatic creation of the 3D view of fuel systems, including animated free surfaces inside fuel reservoirs

Flammability reduction mean analysis and inerting systems

With the fuel systems solution, you can assess the fuel tank flammability of the fleet and evaluate if an inerting system is required. Then the OBIGGS system can be sized to ensure safety. Using the complete aircraft mission, you can validate the inerting system performance.

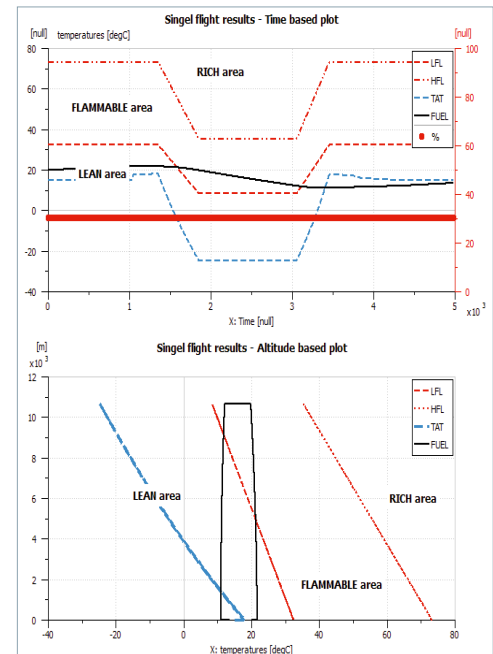
This solution helps you fulfill regulations by assessing the transient oxygen mass fraction, analyzing the fuel transfer from tank to tank (including gravity and force) and then guaranteeing the in- and out-pressure balance.

Aircraft refueling

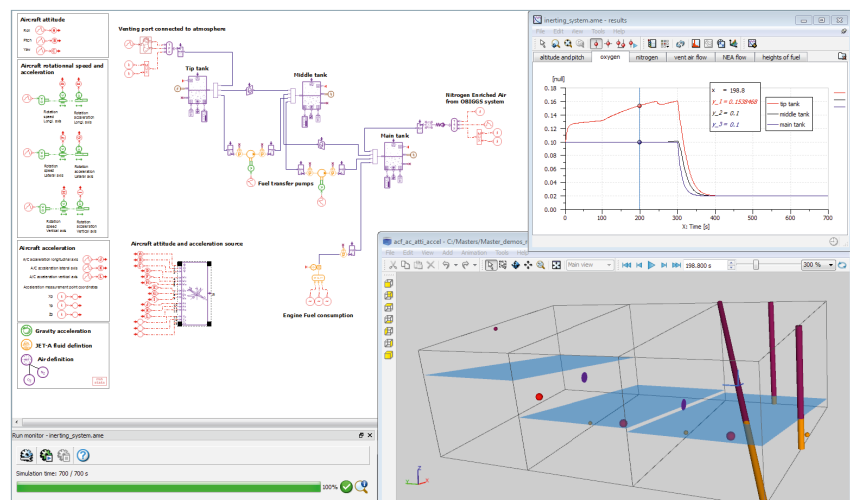
With the aircraft fuel system solution, you can easily define and analyze refueling strategies. The solution enables you to size venting systems by using the complete aircraft mission and validating it during descent or diving maneuvers.

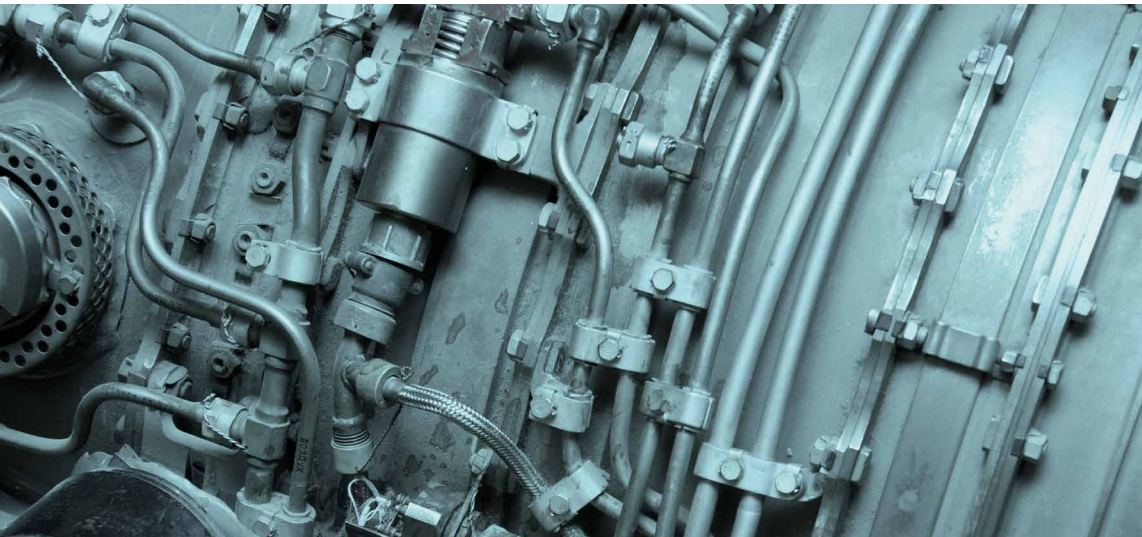
You can also validate the geometry for mass transfer to get the time to refuel the aircraft by analyzing the fuel transfer from tank to tank.

The solution can be used to calibrate the gauging system, and validate the number of gauges as well as their locations in different tank compartments.



Finally, the solution enables you to validate architecture choices, and analyze static electrical discharge and overpressure in the refueling network in order to adhere to regulatory constraints and run realistic failure-case analyses.

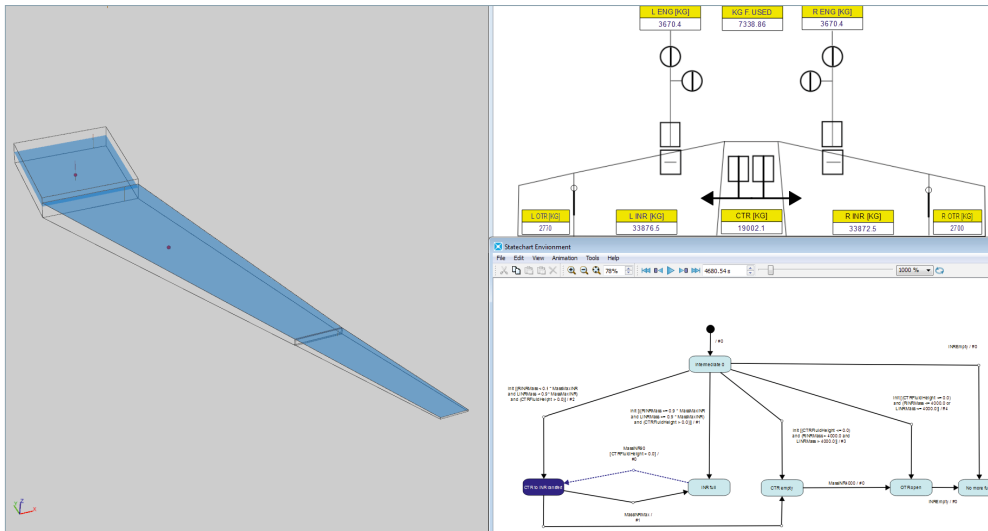




Aircraft fuel system management

The solution is also critical to better define aircraft fuel system management over a complete mission. Taking into account the aircraft mission enables you to validate the fuel control system and control the positioning of the center of gravity.

The solution enables you to model a fuel system for sizing purposes, and study fuel consumption and control strategies for the overall system.



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