DSHplus for Aircraft Hydraulic Systems

Aircraft hydraulic systems are designed for high levels of safety, using multiple levels of redundancy. In this context, modern fly-by-wire systems require higher levels of redundancy, than manual systems to maintain the same levels of safety. In addition, the system complexity increases with aircraft weight.

Many design approaches exist to meet this high level requirement and each of such systems comes with its own specific architecture and, as a consequence to that, must be designed and tested exclusively.

Aircraft designers have to certify to airworthiness regulators, by analysis and test, that the solutions meet requirements. To quickly evaluate design alternatives and to shorten development time, aircraft designers consequently have a strong demand for actuator simulation models to virtually test and optimize those systems.

General Capabilities of DSHplus

DSHplus is a simulation environment specialized on the dynamic non-linear calculation of complex hydraulic and pneumatic systems and components. In particular DSHplus is used for verification of system function, for analysis of the system dynamics, for system revisions, for component selection and design, in the fault diagnosis and for training purposes.

For the analysis and optimization of the system or component DSHplus offers users a specialized fluid power integrated CAE solution. Many libraries are available for the realistic depiction of hydraulic and pneumatic systems. To automate the simulation DSHplus provides various pre- and post-processing modules.

DSHplus also has numerous interfaces and add-ins to integrate with almost any development environment. Open technology standards such as FMI or DSHplus-STC guarantee a cross-application access to external simulation programs, e.g. via co-simulation. For the virtual commissioning of plant and machinery DSHplus-PLCI allows communication with PLC controllers.

Solution Highlights

DSHplus is able to support the general engineering of aircraft hydraulic systems with simulation models at typical system level detail as well as with high-fidelity physical models, which allow a comprehensive performance analysis and which also support simulation driven optimization techniques, to improve the system's performance.
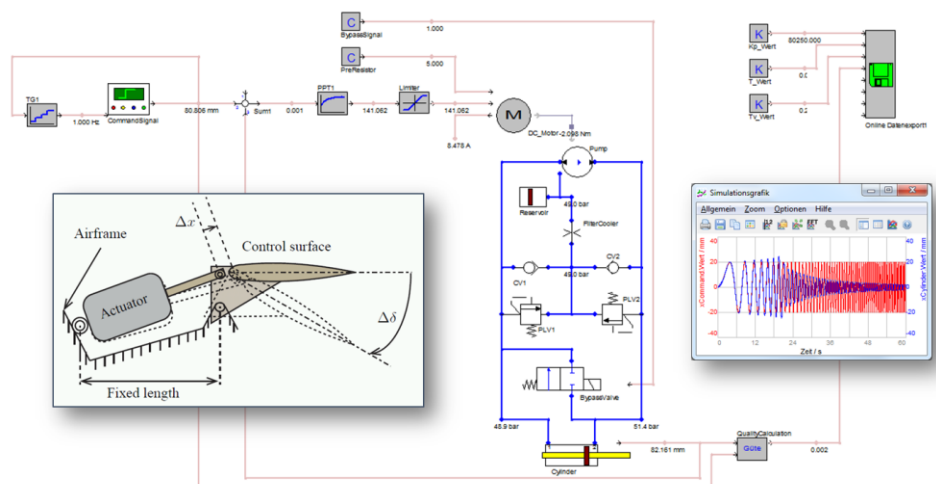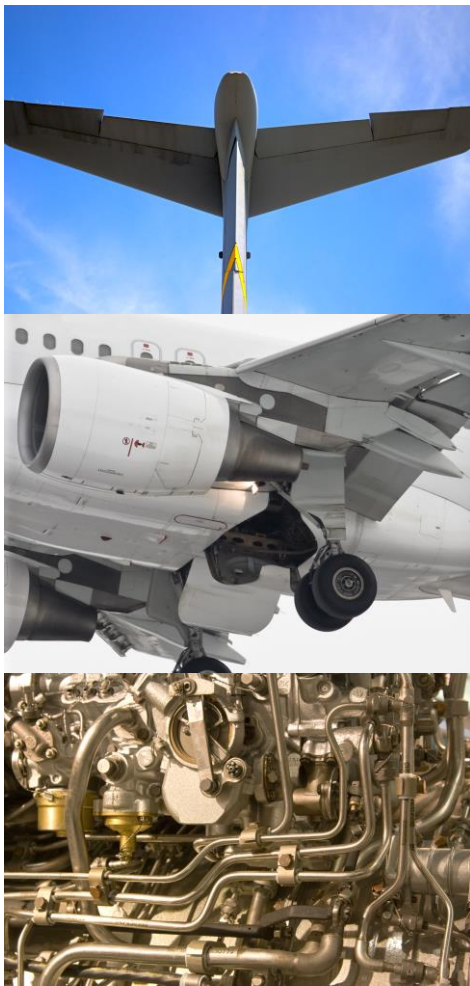
Aerospace Capabilities

On actuator level DSHplus can set-up models for:

- Primary flight control surfaces (rudder, elevator, aileron, active (multi-function) spoiler …)
- Secondary flight controls (high lift (flap / slat), horizontal stabilizer, spoiler, thrust reverser)
- Landing gear systems (extension and retraction, locking, braking, steering, shock absorber …)
- Cargo doors
- Thrust reversers, etc.

On system level DSHplus completes the simulation model with pumps, all sorts of valves, reservoirs, accumulators, and the hydraulic pipe network. Thus it is possible to analyze and optimize power consumption and power distribution of the system.

A critical part of the system's design is the architecture of the hydraulic pipe network. In this context DSHplus hydraulic pipe models support the investigation of water hammer effects (such as caused by too rapidly closing valves) and the analysis of pipe network resonance (such as induced by the pump's flow fluctuations).

Available Interfaces

As a part of Altair's HyperWorks Partner Alliance, DSHplus offers multiple options to exchange data and to interface with programs out of the HyperWorks suite.

FLUIDON is a member of Matlab® Third Party Program and DSHplus models can be interfaced with Matlab® Simulink®.

More information on DSHplus at: www.fluidon.com

DSHplus models can be used as actuator models in MotionSolve (Co-Simulation Interface)

DSHplus models can be used in HyperStudy (DSHplus Calc)

DSHplus models can be interfaced with Matlab® Simulink®

Altair Partner Alliance

DSHplus models can be used in VisimSimulate (FMI Interface)

DSHplus results can be stored as Altair Data Format (abf)

MathWorks Partner