MotionSolve for Aerospace

Optimize Aerospace System Performance

MotionSolve – Altair delivers a multibody integrated solution to analyze and improve mechanical system performance. In the aerospace industry, MotionSolve is used to simulate dynamic systems including ground aircraft operation (taxi, takeoff, landing, braking and rejected take-off), landing gear retraction and evaluation of gear forces, flap mechanism, flight control and dynamics, door opening mechanisms, helicopter design, satellite control and packaging study of seats.

Solution Highlights

- Improve landing gear performance. Study vibrations associated with gear walk, chatter, squeal, shimmy; simulate system behavior during different maneuvers (takeoff, taxi, landing, retraction, lowering, steering, braking, and more.)
- Simulate rigid and flexible bodies

- Access library of constraints, motion inputs, concentrated loads, distributed forces and realistic bushings
- Simulate flight controls via Controls co-simulation with Simulink and Simulink Code Import
- Perform hydraulics/Pneumatics co-simulation with DSHPlus (Fluidon)

- Choose from tire and road models (FTire, CDTire, TNO DELFT-TYRE)
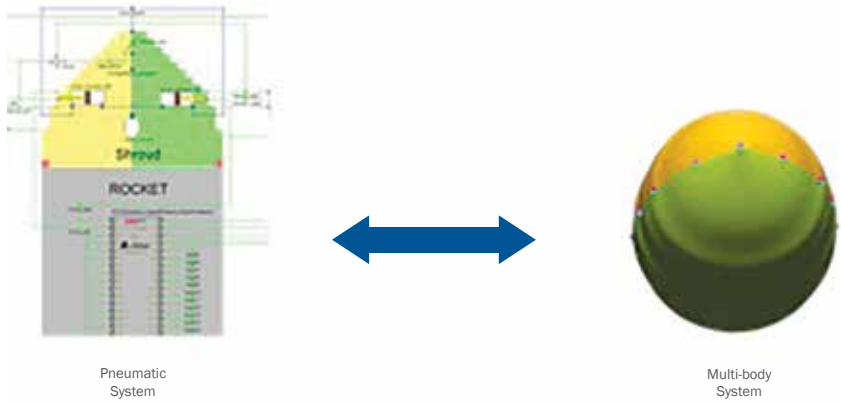- Automate mapping of multi-body loads

Aerospace Capabilities

- Flexible and rigid parts
- Sophisticated non-linear components including bushings, dampers, stoppers, air and gas springs, flex bearing forces, friction/stiction
- Library of constraints, motion inputs, concentrated loads
- Integration with controls, hydraulic and pneumatic systems
- Tire and ground models
- Model distributed loads on flexible parts or model aerodynamics via live coupling between multi-body and computational fluid dynamics
- Accurate setup for component loads prediction for operating conditions where flight measurements are not available
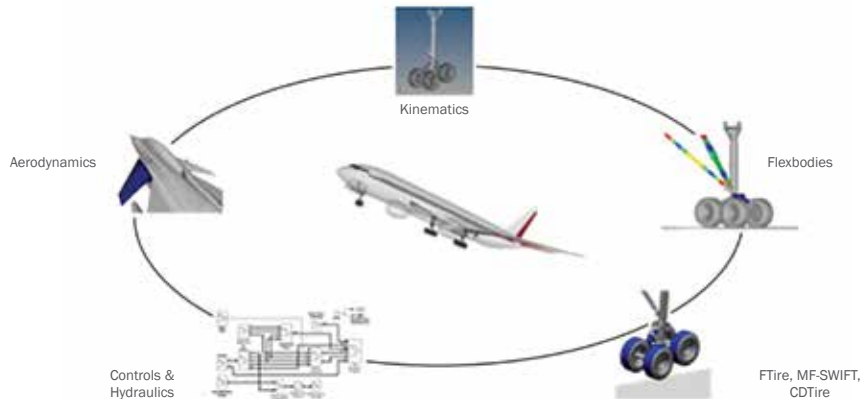- Automated utilities to map multi-body simulation loads to FEA

Interfaces

- Industry standard CAD and FEA software
- Controls, pneumatics & hydraulics
- Fluid dynamics
- Fatigue analysis
- Optimization and design exploration

General Capabilities

- Creation of parametric templates to extend core functionality
- Python, MATLAB, C++ & Fortran user sub-routines
- Analyses types: Static/quasi-statics, kinematics & dynamics, linear, assembly analysis
- Rich library of modeling elements
- Aerodynamics – coupling with computational fluid dynamics

Multibody simulation with MotionSolve helps engineers to model complex dynamical systems with different levels of fidelity in a single modeling environment. It is crucial to generate the simplified real time models from validated high fidelity models.

Pneumatic System

Multi-body System

Rocket Stage Separation and Shroud Separation Simulation

Kinematics

Aerodynamics

Flexbodies

Controls & Hydraulics

FTire, MF-SWIFT, CDTire

Multi-disciplinary solution