

MotionSolve is an integrated solution to analyze and optimize multi-body systems. MotionSolve offers powerful modeling, analysis, visualization, and optimization capabilities for simulating complex systems. You can perform kinematic, dynamic, static, quasi-static, linear, and vibration analyses. MotionSolve helps you to understand and improve the performance of your product.

Product Highlights

- Comprehensive multi-body solution to optimize mechanical system performance
- Easily model, analyze, review, and optimize your mechanical system
- Validated across several automotive, aerospace, and general machinery applications
- Extensively correlated to test data through partnership with customers

Benefits

Reduce Product Development Time

Build simple models early in the design phase and add complexity as the design evolves. MotionSolve supports a large set of modeling elements and a variety of analysis methods to facilitate this. Through virtual testing, you avoid time consuming physical testing and get to the right answer earlier.

Improve Product Quality

Build multi-body models that have the fidelity to capture phenomena of interest to you and accurately solve the underlying equations to characterize product behavior. Examine the product behavior to determine if the design meets your need.

Accelerate Product Innovation

Evaluate the behavior of complex systems in realistic settings. In conjunction with Altair HyperStudy®, perform design

of experiments (DOE) and stochastic simulation to characterize and optimize product performance. In conjunction with Altair OptiStruct®, use the computed loads for accurate component optimization.

Reduce Design and Manufacturing Risk

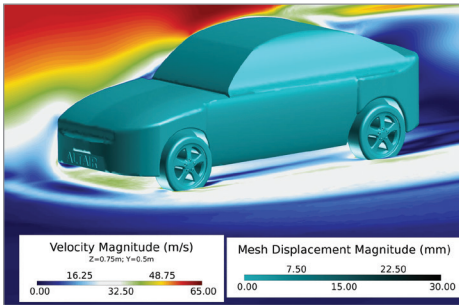
Through virtual testing evaluate a wide variety of alternative concepts and designs very quickly and choose the best design. Moreover, as the design evolves, validate updated designs with models that have already been built.

Capabilities

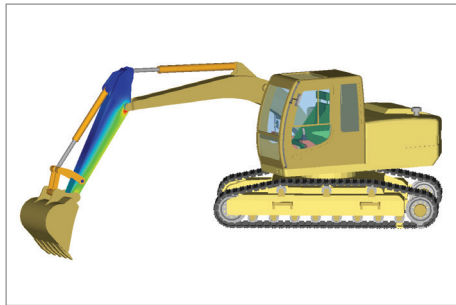
Modeling

MotionSolve supports a rich set of modeling elements that allows you to build multi-body systems with the desired degree of complexity. MotionSolve offers built-in integration with the CAD, FE, Controls, Hydraulics, CFD, and Optimization.

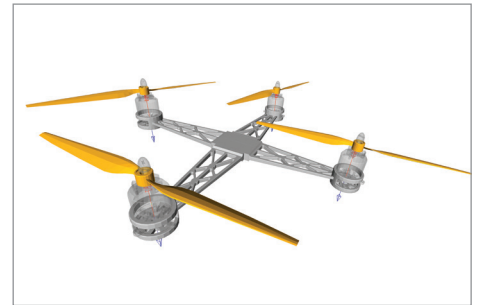
Learn more:
altairhyperworks.com/motionsolve



Computational fluid dynamics coupled with multi-body dynamics



Excavator flexbody simulation



Unmanned Aerial Vehicle dynamics analysis

The modeling capabilities include:

- Common system-modeling entities
 - Mass- and inertia-bearing rigid elements
 - A library of constraint connectors
 - A library of force connectors
 - General 3D contact
 - Generic nonlinear algebraic and differential equations
 - Motion input
- Advanced modeling elements
 - Flexible bodies
 - Joint friction
 - Higher-pair joints between surfaces and curves
 - Contact between deformable curves / surfaces
 - Distributed loads
 - Transfer functions & State Matrices
 - Splines for inputting test data
 - Frequency & Amplitude
 - Dependent Bushings
 - Event sensors
 - User-defined elements to model non-standard entities

Analysis

With MotionSolve, you can evaluate the dynamic behavior of systems, study vibration characteristics, assess the performance of control systems in realistic situations, perform packaging studies, generate realistic loads to predict component life and damage, and improve your system's performance. These are done through the built-in analysis methods. If these analyses are not adequate, you can create your own analyses methods and use these in MotionSolve.

MotionSolve provides many options for studying system behavior.

- Six integrators to solve a large variety of dynamics problems. This includes

implicit/explicit, stiff/non-stiff, and DAE/ODE based methods of numerical integration.

- Four static/quasi-static solvers to compute static equilibrium configurations and loads. The algorithms together cover force imbalance and energy minimization methods.
- Automatic redundant constraint detection and removal
- Kinematic analysis for motion driven systems
- Linear analysis with state matrix export, eigenvalue computation, and modal energy distribution tables
- Co-simulation to solve multi-physics problems
- Your own custom analyses specified in user-subroutines

Vehicle Dynamics, Durability & NVH Simulation

MotionSolve contains special purpose tools for the automotive market. It provides a wizard-driven, vehicle library that enables you to assemble realistic vehicles easily. Subsequently, you can perform half vehicle events and full vehicle driving maneuvers. You can also script your own events. With support for TNO, FTire, and CD Tire, MotionSolve provides tires and roads of varying fidelity for your applications. With automated reporting, MotionSolve makes it easy for you to understand the dynamic behavior of vehicles. With these core capabilities you can study vehicle dynamics, perform rough road simulations for component durability, and study the NVH characteristics of your vehicle.

General Machinery & Mechanism Simulation

MotionSolve provides a comprehensive 3D-Contact capability that enables you to easily build and analyze complex systems that may contain thousands of contacts. Parallel processing is used to obtain fast solutions.

An automated report generation capability helps you easily review and understand system behavior and share it with others.

Easy Customization

MotionSolve is easily customized with Fortran, C, C++, and Python user subroutines. Custom solver functions and subroutines may be developed to capture the physics underlying unique components; solver messages can be customized to meet your special requirements; custom analyses can be created and used with models defined in MotionSolve. Results from the solver can be tailored to fit any CAE output format.

HyperWorks Integration

With MotionSolve, HyperWorks delivers a complete mechanical system simulation environment. You can:

- Easily build multi-body models in MotionView® as well as in HyperMesh®
- Solve these in MotionSolve
- Understand system behavior visually with the HyperView® and HyperGraph® post-processors
- Improve system fidelity by generating reduced flex-bodies with the OptiStruct® FE Solver
- Perform system level DOE, optimization and stochastic studies with HyperStudy®
- Perform component optimization with OptiStruct
- Couple with AcuSolve®, to solve problems involving rigid body motion with fluid force effects