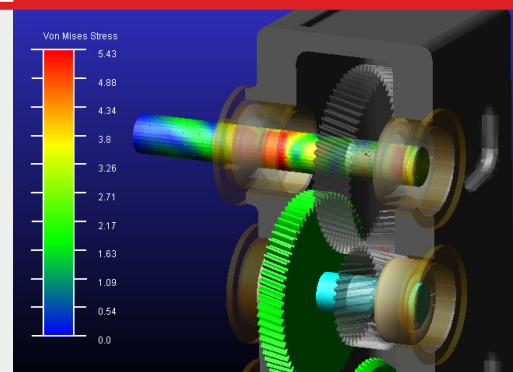# Adams™
Real Dynamics for Functional Virtual Prototyping

Adams

Adams is the world's most widely used multibody dynamics simulation software. It lets you build and test virtual prototypes, realistically simulating on your computer, both visually and mathematically, the full–motion behavior of your complex mechanical system designs.

Adams provides a robust solution engine to solve your mechanical system model. The software checks your model and automatically formulates and solves the equations of motion for kinematic, static, quasi-static, or dynamic simulations.

With Adams, you don't have to wait until the computations are complete to begin seeing the results of your simulation. You can view animations and plots – and continue to refine your design – even as your simulation is running, saving valuable time.

For design optimization, you can define your variables, constraints, and design objectives, then have Adams iterate automatically to the design, providing optimal system performance.

Business Value

- **Improve Engineering Productivity:** Enable efficient communication between various groups of expertise, reduce your dependency on disconnected point solutions, and improve analyst efficiency.
- **Accelerate Time-To-Market:** Gain faster, better insight into overall system design performance.
- **Reduce Manufacturing Costs:** Accurately predict and correct the design behavior much earlier in the design cycle. Achieve an optimal design by analyzing multiple design variations faster.
- **Achieve Lower Warranty Costs:** Predict system-level functional performance, and accurately assess lifecycle service (safety, fatigue, durability). Reduce risk by having better information at every state of vehicle design and development.
- **Drive Innovation:** Explore several design concepts quickly and efficiently.

Adams Package Modules

The following modules enhance the capabilities of Adams by allowing the simulation of systems ranging from simple to sophisticated.

Adams/Solver

Adams/Solver is the powerful, high-performance analysis engine that forms the core of the product continuously developed and improved for over three decades.

Adams/View

Adams/View is an easy to use graphical interface to Adams/Solver functionality. View enables you to import CAD files and build models. Adams/View also has capability to automate many repetitive tasks saving valuable time. You can also create templates and tools for a customized solution.

Adams/PostProcessor

Adams/PostProcessor provides you a comprehensive result post-processing environment. Powerful animation, plotting and reporting functionality are all available to effectively investigate and present your simulation results.

Adams/Flex

Adams/Flex allows the incorporation of component flexibility within your full-system simulations. Adding flexibility provides better insight into the behavior and life of your designs, allowing you to deliver higher quality products faster. Adams/Flex allows the use of existing linear FE models and is tightly integrated with Nastran and Patran.

Capabilities

- Import of CAD geometry formats includin STEP, IGES, DXF, DWG or Parasolid
- Extensive library of joints and constraints to define part connectivity
- Definition of internal and external forces on the assembly to define your product's operating environment
- Model refinement with part flexibility, automatic control systems, joint friction and slip, hydraulic and pneumatic actuators, and parametric design relationships
- Ability to generate flexible parts without the need to import MNF file from FEA software
- Ability to iterate to optimal design through definition of objectives, constraints, and variables
- Automatic generation of linear models and complex loads for export to structural analyses
- Comprehensive and easy to use contact capabilities supporting 2D and 3D contact between any combination of modal flexible bodies and rigid body geometry
- Comprehensive linear and nonlinear results for complex, large-motion designs

High Performance Computing (HPC)

- 64-bit support on Windows and Linux platforms
- Parallel processing support for Adams/ Tire results
- Shared Memory Parallel solver
- State of the art Linear analysis capabilities
- High fidelity Adams-to-Nastran translation utilities to replace manual translation
- HHT integrators for a faster numerical integration of the equations of motion for a dynamic analysis

Adams Basic Package

- Adams View Package (Adams/View and Adams/Exchange)
- Adams/Solver
- Adams Studio Package (Adams/View, Adams/ Exchange and Adams/Solver)

MSC✕Software®

Adams/ViewFlex

ViewFlex module in Adams/View enables users to transform a rigid part to an MNF-based flexible body using embedded finite element analysis where a meshing step and linear modes analysis will be performed. It is our new product module powered by MSC Nastran, allowing one to create flexible bodies without leaving Adams/View and without need for any Finite Element Analysis software. Also, it's a streamlined process with much higher efficiency than the way users have traditionally generated flexible bodies for Adams in the past.

Adams/Durability

Adams/Durability extends the capability offered by Adams/Flex to recover stresses on flexible bodies. Results from an Adams solution are combined with modal stresses from FE to more accurately predict the stress in a flexible body. These stresses and strains can then be used to complete a life/damage calculation with fatigue prediction software such as MSC Fatigue. The widely used DAC and RPC3 file formats are also supported.

Adams/Vibration

Adams/Vibration allows you to study forced vibration of your Adams models using frequency domain analysis. Adams/Vibration results can be used in NVH studies to predict the impact of vibrations on passenger comfort in an automobile, train, plane or other vehicle. You can also include the effects of controls on the system behavior.

Adams/Controls

Adams/Controls helps you to easily integrate the worlds of motion simulation and control system design in true multidisciplinary fashion. With this module, you can incorporate your Adams models within block diagrams in your preferred control system design software. Alternatively, you can directly import actuators and/or controllers from the controls design software into the Adams simulation environment. Currently, Adams/Controls support Easy5 from MSC Software and Matlab/Simulink from The Math Works, Inc.

Adams/Exchange

Adams/Exchange allows the import or export of common geometry formats into and out of Adams. There is no need to recreate model geometry each time you transfer data between CAE tools. Among the supported formats are Parasolid, STEP, IGES and DWG/DXF. When you import a model from your preferred CAD system, you can use the model's geometric features to quickly position forces and constraints for your motion simulation.

Adams/Tire FTire

Adams/Tire FTire software is an optional module that can be used to add tires to your mechanical model and to simulate maneuvers such as braking, steering, acceleration, free-rolling, or skidding. It lets you model the forces and torques that act on a tire as it moves over roadways or irregular terrain. You can use Adams/Tire to model tires for either vehicle-handling, ride and comfort, and vehicle durability analyses.

Adams/Insight

Adams/Insight is a powerful aid for design refinement. It allows you to determine the sensitivity of output objectives to key model parameters by launching simulations for several design variants defined by a variety of design-of-experiments (DOE) methods. These simulation results are used to construct a response surface which Adams/Insight can help you assess and improve. With that response surface, Adams/Insight can publish an interactive html page where non-CAE experts within your organization can quickly and confidently perform what-if studies viewing
the relationship between input parameters and important design objectives.

Adams/Car

With Adams Car vertical products, engineering teams can quickly build and test functional virtual prototypes of complete vehicles and vehicle subsystems. Working in the Adams vehicle vertical environment, automotive engineering teams can exercise their vehicle designs under various road conditions, performing the same tests they normally run in a test lab or on a test track, but in a fraction of time.

Adams/Machinery

Adams/Machinery is a new Adams product fully incorporated inside the Adams/View environment. It contains multiple modeling productivity modules which enable users to create common machinery components more efficiently than by using the more generic standard Adams/View model construction functionality alone.

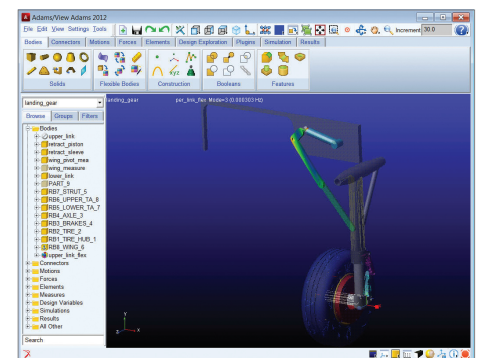### Optional Adams Horizontal Add-On Line Items:
- Adams/Insight
- Adams/Linear
- Shared Memory Parallel (SMP)
- Adams/Flex
- Adams/Durability
- Adams/Vibration (GUI and Solver)
- Adams/Controls
- Adams/Mechatronics
- Adams 3D Road
- Adams Tire Handling
- Adams Viewflex
- Adams/Tire Ftire
- Adams CAD Translators
- Adams/Controls

Optional Adams Horizontal Packages:
- Adams Structures Bundle (Flex and Durability)
- Adams Controls Bundle (Controls, Mechatronics, and Vibration)
- Adams Ground Vehicle Bundle (Tire Handling and 3D Road)
- Adams Interactive Flex Bundle (Adams Viewflex and Adams/Flex)

Optional Adams Vertical Packages and Studios:
- Adams Car Studio (Car Plug-In, Car Suspension, SmartDriver, Ground Vehicle Package, and Vehicle Solver)
- Adams Chassis Studio (Chassis GUI, Chassis Utilities, Smart Driver, Ground Vehicle Package, and Vehicle Solver)
- Adams Car Ride Plug-in (Car Plug-In, Car Ride GUI, and Solver Extension)
- Adams Driveline Package (Car Plug-In, Driveline GUI, and Solver Extension)
- Adams Machinery - Bearing Module
- Adams Machinery - Belt Module
- Adams Machinery - Cable Module
- Adams Machinery - Chain Module
- Adams Machinery - Gear Module
- Adams Machinery Module Bundle (Includes all Adams/Machinery Modules)
- Adams Machinery Studio (Adams Studio and Machinery Module Bundle for New Users)