In today’s competitive engineering landscape, the ability to “Simulate Reality” is more than just a catchphrase. It lies at the heart of a company’s ability to succeed... or fail. It is no longer enough to get a new product ready for market in 36 months or even 24 months. The ever-shorter design-to-market cycles, the slashing of expenses, and a reduced workforce are the realities of today.

In order to succeed, companies must be able to:

• explore thousands of new ideas quickly and accurately;
• filter out the least promising concepts;
• understand what attributes matter most in producing an optimal design; and
• realistically test and evaluate form, fit, and function of the new design.

These demands are why every major automotive OEM and nearly every tier one supplier, as well as aerospace, rail, and consumer product manufacturers, and even racing teams, use functional virtual prototyping solutions from MSC.Software. Our software is being used to deliver innovative product designs, increase collaboration, and reduce time, costs, and risk in the product development process.

At its most basic level, functional virtual prototyping enables engineering teams to build, test, review, and improve their mechanical system designs before committing to physical prototypes. The MSC.ADAMS suite of tools allows companies to simulate and quantify motion performance for kinematic validity, joint reactions, clearances and collisions, packaging envelopes, motor and actuator sizing, work-cycle times, and precise positioning. Users can quickly explore design variations and plot the results in tables or graphs as well as visualize the results with physically realistic 3D animations.

By adding industry-specific products onto this motion simulation foundation, manufacturers are able to capture their industry knowledge, utilize templates tailored to their engineering processes, and develop consistent virtual prototypes that guide them in making critical design decisions.

As a company’s virtual prototyping process matures, it can further leverage its investment by adding modules for design of experiments, durability, vibration, controls, and part flexibility. This enables manufacturers to move from using virtual prototypes for trouble-shooting their designs to a standardized process for new product development that supports true multi-attribute optimization and global collaboration.

• Analyze design changes much faster and at a lower cost than physical prototype testing requires
• Reduce risk by getting better design information at every stage of the development process
• Improve quality by exploring numerous designs to optimize full-system performance
• Easily vary the kinds of analyses being performed – with simulation, there is no need to modify physical instrumentation, test fixtures, and test procedures
• Work in a secure testing environment, without fear of losing critical data to instrument failure or falling behind schedule due to poor weather conditions
The MSC.ADAMS portfolio of software products is broadly classified into four main groups: Core Products, Extension Products, Industry-Specific Products, and CAD Interface Products.

Core Products form the basis for all other offerings and include a general-purpose modeling environment ADAMS/View, a state-of-the-art solver ADAMS/Solver, and a post-processing environment ADAMS/PostProcessor.

**MSC.ADAMS CORE PRODUCTS**
- ADAMS/View
- ADAMS/Solver
- ADAMS/PostProcessor

Extension Products extend the modeling capabilities offered through the core products by including descriptions for part flexibility, adding controls and hydraulics, and allowing analysis for vibration and durability. In addition, users are provided with sophisticated tools for experimenting with their virtual prototypes.

**MSC.ADAMS EXTENSION PRODUCTS**
- ADAMS/Insight
- ADAMS/Flex
- ADAMS/AutoFlex
- ADAMS/Linear
- ADAMS/Controls
- ADAMS/Vibration
- ADAMS/Durability

Industry-Specific Products are tailored to assist engineers in the automotive, aerospace, and rail industries. These offerings allow engineers to quickly build and test their designs by providing both standard and customized templates and test suites common within each industry.

**MSC.ADAMS INDUSTRY-SPECIFIC PRODUCTS**
- ADAMS/Car
- ADAMS/Chassis
- ADAMS/Driver
- ADAMS/3D Road
- ADAMS/Tire
- ADAMS/Engine powered by FEV
- ADAMS/Driveline
- ADAMS/Aircraft
- ADAMS/Rail

CAD Interface Products allow users to either explore the motion behavior of their designs without leaving their familiar CAD interface or transfer data from CAD packages to MSC.ADAMS for further analysis.

**MSC.ADAMS CAD INTERFACE PRODUCTS**
- ADAMS/Exchange

MSC.Software also provides software offerings that embed MSC.ADAMS capabilities within leading CAD packages. Contact your MSC.Software representative for more information on these embedded solutions.
ADAMS/View provides high-end modeling and visualization capabilities in one seamlessly integrated environment. In addition, any element of ADAMS/View’s interface – including the toolbox, icons, and menus – can be customized to suit your specific needs.

With ADAMS/View, you build a virtual prototype of a mechanical system just as you would build the physical prototype – creating parts, connecting them with joints, assembling the system, and driving it with physically accurate forces and motions. You can apply springs, dampers, contacts, and friction to improve the fidelity of the simulation. ADAMS/View supports parametric modeling so that the model can be easily modified and used in designed experiments.

For visualization, ADAMS/View provides the ability to animate your models and view key measures of specific simulation data even as your simulation is in progress. This helps you quickly zero in on areas of your model needing refinement. You can apply these capabilities at the very earliest stages of your design, so you can identify and correct problems quickly.
ADAMS/PostProcessor is the primary graphical interface for visualizing MSC.ADAMS simulation results. The software’s streamlined, single-window interface, including a treeview and context sensitive toolbars, allows synchronized animation and plotting. You can also easily superimpose the results of multiple simulations for useful comparison.

The post-processing results are displayed as either graphs or animations in viewports. The software highlights appropriate tools for working in the selected viewport’s mode. You can arrange up to six viewports on a page and also configure multiple pages independently. Page layouts and plot formats can be stored for repeated usage saving you time and helping you standardize report formats.

ADAMS/PostProcessor is available either stand-alone or integrated within the ADAMS/View environment. Stand-alone operation improves start-up speed and reduces overall memory consumption.

Once a virtual prototype is built, you can simulate its dynamic behavior using ADAMS/Solver’s state-of-the-art numerical solution capabilities. ADAMS/Solver is particularly suited to handle complex mechanical systems undergoing large overall motion. The software checks your model, and formulates and solves the equations of motion for kinematic, static, quasi-static, and dynamic simulations.

ADAMS/Solver uses the Euler-Lagrange method to automatically formulate the equations of motion. For the solution of the resulting set of nonlinear differential-algebraic equations, you can choose from a number of sophisticated numerical integrators. The list of integrators provided with ADAMS/Solver includes some that are particularly suited to solving systems with widely different natural frequencies. Both variable-step and fixed-step integrators are supported. Access to a wide range of parameters enables you to further tune the solver and improve solution efficiency and robustness.

A built-in function expression language allows you to write complex functions to describe forces or motions. The software also supports user-written subroutines, thereby allowing you to further customize your solution capabilities. Engineers worldwide rely on the simulation results from ADAMS/Solver to guide them in refining and optimizing their designs.

**Solution**

**ADAMS/Solver**

**FEATURES**

- Kinematic, static, quasi-static, and nonlinear dynamic solutions
- Support for user-defined subroutines
- Linear Solvers – Calahan and Harwell
- Integrators – stiff methods (Gear’s and Modified Gear’s), non-stiff methods (Runge-Kutta and ABAM), and a fixed-step method (Constant_BDF)
- Formulations – Index 3, Stabilized Index 2, Stabilized Index 1

**BENEFITS**

- Save time by letting the software formulate your equations of motion
- Achieve fast and robust simulations through the use of advanced numerical solution techniques
- Include user subroutines to further leverage your efforts

**Modeling and Visualization**

**ADAMS/PostProcessor**

**FEATURES**

- Simultaneous viewing of data plots and animation
- Results analysis tools for signal processing (FFT, Bode, Filters)
- HTML report and tabular data displays
- Clearance studies
- Color contours for flexible bodies
- Advanced lighting control
- Movie file export (Windows only)
- Print to image formats such as jpeg, png, tif, pict, hpgl, and Postscript

**BENEFITS**

- Improve your understanding of system performance
- Easily share simulation results through plots, reports, and animations
- Save time in repeated usage through customized layouts
FEATURES

- Investigation strategies: design studies, Monte Carlo studies, design of experiments, sweep studies, perimeter studies, and single and multi-objective optimization
- Specify custom strategies or use a strategy created with another program
- Response Surface Methods (RSM) fit polynomials to the results, providing useful approximations of system behavior and information on system interactions
- Compute response variability based on parameter tolerance information
- Merge experiments from various domains which share inputs
- Merge test results with results from analytical experiments for further analysis
- Web posting of interactive experiment results
- Export to Excel, MATLAB, and Visual Basic formats for collaboration
- Can be run stand-alone or in conjunction with other MSC.ADAMS modules

BENEFITS

- Collaborate on design specifications throughout your engineering enterprise
- Distinguish between key and insignificant design parameters
- Identify effects of design parameter interaction
- Conduct design trade-off analyses
- See the impact of design decisions on a broad range of customer requirements
- Improve design robustness by considering manufacturing variations upfront

As the complexity of a design increases, so does the number of interrelated design options. Varying just one design parameter at a time fails to account for the interaction between parameters, and trying many different parameter combinations requires many individual simulations. This can leave you with an overwhelming amount of data, which can cause difficulty in identifying and communicating the critical and non-critical design parameters.

Using ADAMS/Insight, engineers can perform systematic experiments with virtual or physical prototypes, gain in-depth understanding of system behavior, and share this new understanding with the entire engineering team. Investigation strategies can be applied to components and subsystems, or extended to evaluate multi-domain problems, enabling cross-department design refinement. ADAMS/Insight encourages collaboration at all levels of the organization, including suppliers, through web pages or spreadsheets that provide the simulation data in an interactive format so designers, analysts, and project managers can participate in 'what-if' studies without accessing the actual simulation model. By sharing your findings in this way, you can improve communication and speed up decision-making within your engineering team.
How will part deformation impact the performance of your mechanical system? Will there be damaging contact? Will it cause system lock-up and premature failure? Will the control system perform according to specification? ADAMS/Flex enables engineers to study the influence of flexible parts interacting in a full mechanical system.

Using component mode synthesis techniques, finite element analysis (FEA) modal results of components are integrated within full-system simulations. This approach allows fast simulation with no overhead from insignificant or inactive modes. Visualization of modal stress and deformation on all moving parts enables fast identification and communication of the precise time that high loading conditions occur. Results such as part deformation, load histories, and frequencies provide valuable input for downstream analysis of stress, fatigue, and noise and vibration.
FEATURES

- Automatically mesh Parasolid geometries imported from CAD system or modeled directly in MSC.ADAMS (ADAMS/Exchange required for import of Parasolid geometries)
- Support for extrusion mesh with options for section definition, centerline, and mesh properties
- Parameterized centerline and attachments; select and store centerline reference frames
- Automatically specify attachments of Parasolid meshed objects
- Results include eigenshapes, eigenfrequencies, and generalized mass and stiffness matrix of the component
- Computes stress modes for ADAMS/Durability

BENEFITS

- Perform early evaluation of flexibility effects
- Perform parametric studies on the flex body
- Support simultaneous consideration of structural and dynamic requirements

With ADAMS/AutoFlex, you can access the powerful capabilities of flexible body analysis directly in MSC.ADAMS without the need to use a full-fledged finite element tool. This capability is very useful for early analysis of the effects of flexibility in your systems when detailed finite element representations may not yet be available. Using ADAMS/AutoFlex, you can quickly build a parametric flexible body representation of a component, analyze the system, make changes to the flexible body and evaluate the effect of the changes, all within the familiar MSC.ADAMS environment.

By eliminating time-consuming data transfer steps, ADAMS/AutoFlex has a direct impact on your ability to analyze multiple configurations at the conceptual stage of your development process. Furthermore, the results from ADAMS/AutoFlex have been correlated against the industry-standard finite element package MSC.NASTRAN.
As a critical tool in the product development process, MSC.ADAMS gives you the power to realistically model and simulate the full-motion behavior of complex mechanical systems. Your ability to predict the response of a mechanical system is significantly enhanced when you add the optional ADAMS/Linear model.

ADAMS/Linear’s key function is to “linearize” or simplify the nonlinear MSC.ADAMS equations. The resulting set of equations enables you to calculate the natural frequencies (eigenvalues) and mode shapes (eigenvectors) associated with your mechanical system design. This output is especially useful in helping verify the fidelity of MSC.ADAMS models. For example, many mechanical systems such as satellites and space probes are difficult to test in their normal operating environments.

However, it is relatively easy to perform an FEA or experimental modal test of these systems to determine their natural vibrational characteristics. ADAMS/Linear can then be used to compare these FEA or modal test results with the linear frequency-domain characteristics of an MSC.ADAMS model.

For engineers who design mechanical systems involving automatic controls (e.g., ABS, guidance systems, and speed controllers), ADAMS/Linear can be a powerful tool. It effectively bridges the gap between control system design and MSC.ADAMS mechanical system simulation capabilities by providing a mathematical description of the initial uncontrolled system upon which to base your control system model.

**FEATURES**
- Computation of system-level eigenmodes
- Computation of linearized state matrix
- Animation of mode shapes
- Computation of energy distribution in modes

**BENEFITS**
- Achieve a more robust design for your MSC.ADAMS simulations
- Correlate MSC.ADAMS simulations with your finite element analysis (FEA) or modal test results
- Improve the design of systems for which stability is a critical concern
- Generate output that facilitates the design of control systems

**PREREQUISITES**
- ADAMS/View
- ADAMS/Solver
Nearly every mechanical system includes one or more control systems. Your own mechanism designs may contain hydraulics, electronics, pneumatics, fluidics, and more. The inclusion of these control systems can greatly influence the operational behavior of your designs. Typically, control systems are best represented mathematically with block diagrams, while motion representation is geometry-based and normally studied using animations and graphs.

As a controls engineer, ADAMS/Controls helps you integrate the worlds of motion simulation and control system design. You can take your geometrically defined full-system MSC.ADAMS models and easily incorporate them within block diagrams you have created with your preferred control system design software. The mechanical model includes mass properties of the system’s parts and is able to account for friction, gravity, contact, and other physically accurate phenomena. You can use either the MSC.ADAMS integrator or the control application’s integrator to handle demanding controlled mechanism simulation problems. Additionally, finite element modal results can be integrated in the dynamic model to accurately simulate component flexibility and modal vibrations occurring in the controlled mechanical systems. The result is a complete and accurate picture of your mechanism’s real-world operational behavior, with the effects of control systems fully represented.

As a systems engineer, you can use ADAMS/Controls to read your controller design into the MSC.ADAMS interface for simulation of the entire system. You then compile code developed using The Mathwork’s Real-Time Workshop and import it into your MSC.ADAMS model for further analysis.
Noise, vibration, and harshness (NVH) are important considerations in the performance of many mechanical designs, such as automobiles, airplanes, railcars, and satellite systems. But designing for optimum NVH can be problematic. Excitations in one part of a system may interact with another part of the system, creating problems and making isolation of the cause difficult. Design parameters to achieve optimum NVH often conflict with other attributes such as durability and dynamic performance, and physically testing NVH performance is time-consuming and expensive.

ADAMS/Vibration allows you to study forced vibrations within your MSC.ADAMS models using frequency domain analysis to identify, isolate, and refine system-level vibrations. For instance, you can drive a model of an automobile over a bumpy road and measure its response. Both inputs and outputs are described as vibrations in the frequency domain. Using ADAMS/Vibration, you can assemble models of various subsystems, perform linear vibration analysis, and use MSC.ADAMS post-processing tools to provide root cause analysis and design target setting analysis. Output data can be used in NVH studies to predict the impact of vibration on the rider’s experience in an automobile, train, plane, or other vehicle. You can also include the effects of hydraulics and controls on system behavior.

Physical testing in the test lab or in the field is expensive and typically occurs only at later stages of the design process. Using ADAMS/Vibration, you can perform physically accurate system-level vibration tests early in the design process, reducing design time and expense. You can linearize your system and then compute the eigenvalues, eigenmodes, transfer function, and power spectral density (PSD). This approach is faster and provides improved frequency-domain accuracy compared with the previous time domain-based approach.

### FEATURES
- Forced response analysis of a model in the frequency domain over different operating points
- Include effects of hydraulics, controls, and user subsystems
- Frequency-domain input functions (swept sine amplitude/frequency, psd, rotational imbalance)
- Frequency response functions for magnitude and phase characteristics
- System modes analysis including attachment characteristics and other nonlinear characteristics
- Forced response and individual mode response animation
- Tabulation of contribution of model elements to kinetic, static, and dissipative energy distribution in system modes
- Design studies, DOE, and optimization using vibration results and parameterized vibration inputs
- Interface with MATLAB or MATRIXx for further analysis of ABCD matrices

### BENEFITS
- Study system-level vibration in the same way system-level motion is studied
- Investigate the influence of parameter variation on the vibratory behavior of the complete system
- Perform vibration analysis at various operating points by combining time-domain and frequency-domain simulations

### PREREQUISITES
- ADAMS/View
- ADAMS/Solver
**ADAMS/Durability**

**FEATURES**

- DAC or RPC III files for time-history data input/output from road, lab, or mathematical data to drive MSC.ADAMS simulations
- Modal Stress Recovery - import modal information and recover stresses or strains
- Animation of dynamic stress or strain on flexible bodies
- Modal stress or strain measures, such as von Mises, maximum shear, principal, or individual components of stress or strain, for plotting time histories
- Interface with FEA programs such as ABAQUS, ANSYS, and MSC.NASTRAN
- Interface to nCode’s FE-Fatigue for performing, importing and displaying results of component fatigue life prediction analyses
- High-pass, low-pass, band-pass, and band-stop filters for filtering out noise or unwanted frequencies in test data

**BENEFITS**

- Streamline process for predicting fatigue life of components
- Enhance collaboration between CAE and test departments
- Reduce time and costs required to perform durability testing
- Improve durability performance of products
- Evaluate stress and fatigue at the product level

**PREREQUISITES**

- ADAMS/View
- ADAMS/Solver

Durability testing is a critical aspect of product development. Good durability characteristics often conflict with other attributes, such as ride and handling or NVH (Noise, Vibration, and Harshness). Finding a way to balance competing requirements is necessary, but the traditional physical testing process can cause delays in development. With ADAMS/Durability, you can use existing MSC.ADAMS models to drive fatigue life prediction tools.

MSC.Software has partnered with MTS Systems Corp. and nCode International to make ADAMS/Durability a complete solution for durability testing. Virtual Test Lab technology from MTS interfaces with ADAMS/Durability to provide dynamics models of standard mechanical test systems. ADAMS/Durability also provides a convenient interface to MSC.Fatigue and to nCode’s FE-Fatigue packages for performing fatigue life prediction of components. Common test data formats such as DAC and RPC are supported for both input and output. With ADAMS/Durability you can choose to perform conceptual stress or strain studies within ADAMS/View, or more detailed stress or strain analyses in MSC.NASTRAN or ANSYS. ADAMS/Durability also extends the capabilities of ADAMS/PostProcessor to animate dynamic stress or strain on flexible bodies, or plot time histories of nodal stress or strain measures, such as von Mises, maximum shear, principal, or individual components of stress or strain.
The Functional Digital Vehicle™ is a virtual prototype of a complete vehicle, combining accurate mathematical models of the chassis subsystems, engine and driveline subsystems, steering subsystems, controls, and the body. Full-vehicle performance can be simulated on a virtual test track or in a virtual test lab to simulate and refine real-world behavior. Design attributes and simulation results can be shared among global engineering teams to evaluate and optimize vehicle performance.

The foundation of the Functional Digital Vehicle is ADAMS/Car. ADAMS/Car was developed in collaboration with a consortium of automakers including Audi, BMW, Renault, and Volvo, and is now the standard functional virtual prototyping tool of choice at more than 200 automotive companies and suppliers worldwide.

ADAMS/Car has been used in almost every type of vehicle design, from compact passenger cars to heavy trucks and buses. Vehicle engineers can explore “what-if” studies quickly as they animate their vehicle’s behavior and plot the dynamic results. They can refine and test their design, in a series of iterations, until they are confident the design will pass initial physical prototype tests. ADAMS/Car’s template-based modeling and simulation tools greatly speed-up and simplify the modeling process. Users simply enter the required data into the templates, and ADAMS/Car automatically constructs subsystem models and full vehicle assemblies. This helps ensure consistency throughout vehicle design. ADAMS/Car’s data libraries enable engineers to select components such as bushings, bump stops, and shock absorbers to integrate into subsystem models, saving users from entering all of the data associated with each component. In Template Builder mode, experienced engineers can create their own custom templates to capture their proprietary engineering processes. These can then be made available to novice users of the ADAMS/Car technology, enabling them to perform standardized vehicle maneuvers.
ADAMS/Car Conceptual Suspension

ADAMS/Car Conceptual Suspension module provides the modeling functionality of a conventional suspension, without the time-consuming task of building a multibody suspension model. Toe, camber, and wheel-rate curves and a compliance matrix obtained from a Kinematics & Compliance test are used to define suspension characteristics. These curves provide the location and orientation of the wheel center for any given wheel height and loading condition. Users can design both compliant and kinematic suspension models. Compliant models include the effects of suspension bushings.

ADAMS/Car Suspension Design

ADAMS/Car Suspension Design provides the same test results obtained with a physical suspension on a test rig or on a test track, but at significantly reduced cost and time. You can create a virtual suspension design with the aid of a template, then modify parameters, such as hardpoint locations and bushing parameters, and quickly identify the optimal design to meet your specifications. Test rigs are included for conducting several standard suspension tests such as single wheel travel, parallel wheel travel, and steering motion.

ADAMS/Car Vehicle Dynamics

The Vehicle Dynamics module provides numerous maneuvers for full vehicle testing. Users combine front and rear subassemblies to build a full vehicle and then subject it to standard tests such as ISO lane change, straight-line braking, cornering, and many others. Add-on modules such as ADAMS/Driver, ADAMS/Tire Handling, and ADAMS/3D Road provide additional capabilities for simulating vehicle performance. Results can be viewed through animations or in the form of plots.

ADAMS/Car Vehicle Dynamics also requires:
- ADAMS/Tire Handling or user-supplied tire model
- ADAMS/Car Suspension Design

These conceptual suspensions are extremely valuable in the early stages of development, as initial design concepts are tested and benchmark activities carried out, by minimizing physical testing and improving initial design quality. With conceptual suspensions, users can identify desired vehicle characteristic targets even before the detailed suspension design is known. Engineers are able to speed up simulation times since the number of equations to be solved is significantly reduced.
If you need to model standard automotive subsystems and components or manage a large number of analyses on your suspension or full vehicle models, ADAMS/Chassis is the right solution for you. ADAMS/Chassis is an analysis-oriented automotive product that offers an extensive library of industry-standard modeling templates and analyses. In addition, the template and analysis libraries can be extended through customization.

With ADAMS/Chassis’ unique fingerprint technology, you have the ability to manage up to 50 separate analyses at one time. Fingerprints can be used to analyze one model in several different situations, several different models in the same situation, or any combination thereof. When used in combination with ADAMS/Insight, ADAMS/Chassis provides an industry-leading platform for developing, analyzing, and optimizing your half or full-vehicle systems. The strong data link with ADAMS/Insight allows you to perform sweep studies on any parameter in your model, conduct statistically designed experiments, explore the effects of manufacturing tolerances, and optimize your design.

ADAMS/Chassis uses state-of-the-art data storage formats (XML) and object-oriented scripting technologies (Python), which enable easier communication and interface with other applications.
ADAMS/Driver

How will your proposed vehicle design handle on an icy road? Will the anti-lock brake system perform as expected? How much would it cost to perform this test on a physical test track? With ADAMS/Driver, you can test drive your vehicle design today, without the delays common in the physical world. ADAMS/Driver enables you to simulate the actions of a vehicle’s driver: steering, braking, accelerating, gear-shifting, and operating the clutch. When used in conjunction with ADAMS/Tire, an optional add-on module, ADAMS/Driver allows you to study 3D driving effects such as banked curves and hills.

With ADAMS/Driver, you start by defining driver characteristics to specify how aggressively the vehicle will be driven. For example, you can distinguish between racecar drivers and passenger car drivers, or, even more specifically, between individual racecar drivers. Then you specify a driving maneuver, such as a steady state turn, braking in a turn, ISO lane change, cross wind testing, or split μ braking. Using this information, ADAMS/Driver determines and communicates to ADAMS/Solver the resulting steering wheel angle or torque, accelerator position, force on the brake pedal, position of the clutch pedal, and gear number, leading to a more realistic simulation of the dynamic behavior of your vehicle design.

Unique to ADAMS/Driver is its ability to adapt itself to the dynamics of a specific vehicle, and to learn and remember its properties in much the same way that a human driver does. It is especially valuable when used to optimize vehicle designs with feedforward and feedback control systems, such as anti-lock brakes, four-wheel drive, four-wheel steering, driver assistance systems, and integrated vehicle dynamics controls.

ADAMS/3D Road

ADAMS/3D Road lets you model many types of three-dimensional smooth roads, such as parking structures, racetracks, and highways. A smooth road is one in which the road curvature is less than the curvature of tire. The highly advanced road module algorithms and code were developed for the MSC.Software by Yoav Lahav (www.genesim.co.il).

ADAMS/3D Road is integrated with the ADAMS/Tire Handling module, which means that ADAMS/Tire stores 3D road details in a standard TiemOrbit road data file (.rdf) format. You can reference a 3D Road model as you do any other road data file by selecting your desired road from an appropriate database. Both ADAMS/Car and ADAMS/Chassis include an event that uses ADAMS/3D Road. Graphics for the road are automatically generated for animation purposes. If your 3D road requires path-following capabilities, you may use an appropriate driver control file (.dct) and driver control data (.dcd) file to specify the driver inputs and vehicle path. When used in conjunction with ADAMS/Car or ADAMS/Chassis, and ADAMS/Driver, you can use ADAMS/3D Road to specify the path the vehicle will follow without using an auxiliary driver control data file.

ADAMS/3D Road is integrated with the ADAMS/Tire Handling module, which means that ADAMS/Tire stores 3D road details in a standard TiemOrbit road data file (.rdf) format. You can reference a 3D Road model as you do any other road data file by selecting your desired road from an appropriate database. Both ADAMS/Car and ADAMS/Chassis include an event that uses ADAMS/3D Road. Graphics for the road are automatically generated for animation purposes. If your 3D road requires path-following capabilities, you may use an appropriate driver control file (.dct) and driver control data (.dcd) file to specify the driver inputs and vehicle path. When used in conjunction with ADAMS/Car or ADAMS/Chassis, and ADAMS/Driver, you can use ADAMS/3D Road to specify the path the vehicle will follow without using an auxiliary driver control data file.

FEATURES
- Fully integrated with ADAMS/Car and ADAMS/Chassis
- Integrated with ADAMS/Tire Handling Module
- 3D graphics generated automatically in ADAMS/Car and ADAMS/Chassis

BENEFITS
- Study effect of road characteristics such as bank angle and slope on vehicle dynamics
- Create realistic animations

PREREQUISITES
- ADAMS/View
- ADAMS/Solver
- ADAMS/Tire Handling

ADAMS/View

ADAMS/Solver

ADAMS/Tire Handling
ADAMS/Tire

**FEATURES**

- Accurate and proven methodologies
- Adheres to TYDEX Standard Tire Interface
- Supports user-written tire models
- Wide range of tire models for handling, ride comfort, and durability applications

**BENEFITS**

- Save time by using industry-standard tire models
- Compute the effect of tire forces on other parts of your vehicle assembly

**PREREQUISITES FOR ALL ADAMS/Tire MODULES**

- ADAMS/View
- ADAMS/Solver

The ADAMS/Tire product family provides a broad range of methods for simulating the force and torque that tires produce to accelerate, brake, and steer vehicles. You can select tire models for performing handling or durability studies, based on your product design and testing requirements. Tire models for handling are useful for studying vehicle dynamic responses to steering, braking, and throttle inputs. You can analyze the lateral accelerations produced for a given steering input at a given vehicle speed. Tire models for ride comfort and durability are useful for generating road load histories. These models can help you calculate the effects of road profiles such as pothole, curb, or Belgian block to support fatigue analysis and ride comfort evaluations.

MSC.Software and the Road Vehicles Research Institute of TNO – an independent applied science research organization based in the Netherlands – have joined forces to provide global automotive companies with a comprehensive set of handling tire models and simulation software.

The ADAMS/Tire Handling module lets you easily model the forces and torques acting on a tire as a vehicle moves down a road. You can use these models to predict large-displacement vehicle dynamics behavior during any maneuver. Various handling tire models are provided with this module depending on the input data available, ranging from simple tire properties for the Fiala and University of Arizona models, to extensive and detailed tabular tire test results in the Smithers model and the Delft (Pacejka "Magic Formula") model.
ADAMS/Tire 3D Contact

ADAMS/Tire 3D Contact is a tire-road contact model that computes the volume of intersection between a road and tire and the resulting force on the tire. The road is modeled as a set of discrete triangular patches and the tire as a set of cylinders. When combined with a handling tire model, this model lets you simulate a vehicle hitting a curb or pothole, or moving on rough, irregular road surfaces.

ADAMS/Tire FTire

Performing durability and ride comfort studies in motor vehicles requires accurate prediction of loads on systems and components. The FTire module for ADAMS/Tire allows you to include the effects of tire behavior on system loads. This solution bridges the gap between a pure handling tire and time-consuming finite element based methods. A unique flexible belt and advanced algorithms provide a reliable combination for computational speed and excellent model detail and fidelity.

FTire is a 3D nonlinear tire model. The tire belt is represented as a ring of up to 100 small point-mass elements. The elements connect to each other and the rim via nonlinear springs and dampers. This ring of elements may bend both in-plane and out-of-plane relative to the wheel rim. FTire is also able to capture the effects of radial stiffening at high speeds. Accurate forces and moments acting on the spindle, resulting from multiple and simultaneous contact points, are calculated automatically, providing accurate inputs for durability and comfort analysis.

ADAMS/Tire Swift

Developed by TNO, ADAMS/Tire Swift is a tire model for virtual on-the-road testing of a vehicle’s handling performance with high tire dynamics. It is a rigid ring tire model and can capture the effect of vibrations up to 60 Hz in the lateral direction and up to 100 Hz in the vertical and longitudinal directions. The Swift tire model can handle combined slip conditions as well as transient slip up to full sliding. The Swift model uses an effective road input approach to handle enveloping effects as the tire moves over short obstacles.

ADAMS/Tire Motorcycle Tire

Also developed by TNO, the motorcycle tire model is based on the popular MF-TYRE from TNO with additional coefficients to handle large inclination (camber) angles, typical of cornering motorcycles. Because of its ability to handle large inclination angles, the motorcycle tire model is also a good choice for rollover simulations of passenger cars and light trucks.
EFERENCES
- Complete simulation solution for component, subsystem, and system level design
- 3D modeling for all components and subsystems
- Easy customization of the interface through open architecture and dialog-box builder
- Standard interface provides virtual component test rig for component design validation and dynamometer test rigs for subsystem and complete system, including steady state rpm, and rpm sweep tests

BEENITS
- Identify and solve engine design problems at the earliest stages of development, when the cost of correcting mistakes is low
- Capture corporate engineering knowledge and expertise through the use of templates
- Reduce the number of physical prototypes required, saving time and money and keeping the development schedule on track
- Produce more reliable powertrain systems, thus lowering vehicle warranty costs and improving customer satisfaction

REQUISITES FOR ALL ADAMS/Engine MODULES
- ADAMS/View
- ADAMS/Solver

As the design-to-manufacture cycle accelerates, engine development groups have to keep pace while designing fuel-efficient, maintenance-free, high-torque engines – not to mention engines that run smoothly, with low vibration and noise. How will your engineering team meet the challenges of developing reliable, efficient, and powerful engines in less time?

In partnership with FEV and an international consortium of leading engine manufacturers, MSC.Software has created a suite of software tools to deliver our vision of the Functional Digital Engine™. Providing a standardized set of simulation tools and methods based on the MSC.ADAMS dynamic simulation foundation, ADAMS/Engine powered by FEV allows all engineering departments – design, testing, and research and development – to share engine models and data, while capturing engine design expertise in a template-based software environment.

ADAMS/Engine provides you with functionality to create a comprehensive engine virtual prototype. The software incorporates a template-builder that enables experienced users to build their own design templates from libraries of core and engine-specific modeling elements such as belts, bearings, cams, gas forces, push rods, and valve springs. Users simply enter the required data into the templates, and ADAMS/Engine automatically constructs subsystem models and full-engine systems. This ensures modeling consistency throughout the engine simulation process and speeds the design process.
ADAMS/Engine Base

The ADAMS/Engine Base package includes engine modeling elements at their lowest level of fidelity, enabling users to quickly build an entire engine and estimate the loading on the engine mounts. The Engine Base module can also be used to build a conceptual-level subsystem (e.g., a valvetrain), which is then combined with a more detailed subsystem (e.g., a chain drive) built with a different ADAMS/Engine module. The advantage of this approach is that the simulation takes into account realistic excitations from other sub-systems, while giving the user the ability to focus and refine the sub-system of primary interest. The resulting models are smaller and therefore run faster than models where all sub-systems are built at a very high level of fidelity. To facilitate this approach of managing sub-system model fidelity, the ADAMS/Engine Base module is included in the Chain Drive, Timing Belt, Valvetrain, Accessory Drive, Basic Cranktrain, Advanced Cranktrain, and Gear modules. ADAMS/Engine Base is also available for purchase as a separate module.

ADAMS/Engine Chain Drive

This module allows you to model roller and bush chains, as well as toothed or “silent” chains. You can investigate the transmission error caused by the chain vibration, determine the chain tension for durability assessment, or optimize the tensioner device to improve the performance in terms of noise. A sprocket element allows you to model the different sprockets with the appropriate tooth profiles, and switchable model complexity lets you decide between a detailed representation of the chain or a constraint-based modeling approach. The constraint-based approach allows for a coupling between the sprockets of the chain drive based on the sprocket tooth number.
**ADAMS/Engine Timing Belt**

With the Timing Belt module, you can study belt dynamics, calculate durability requirements, compute noise and vibration excitations, and determine bearing loads and critical system frequencies. Components include trapezoidal and deviation pulleys, tensioners, and belts. You can decide what model complexity you need – a detailed representation of the timing belt or a constraint-based modeling approach, which enables a coupling between the pulleys of the timing belt based on the pulley tooth number. Other capabilities allow you to study friction losses and accessory load requirements.

**ADAMS/Engine Valvetrain**

Using the Valvetrain module, you can design a valvetrain with component dimensions and calculate its dynamic behavior at high speeds, such as lift-off and rev limit. You can also calculate valve accelerations, bounce, seating velocity, coil clash, spring forces, and torsional vibrations of the cam shaft. Capabilities include the generation of cam profiles based on valve lift data, and new crosshead (bridge), pivot follower, and rocker arm elements.

**ADAMS/Engine Accessory Drive**

The Accessory Drive module allows you to study dynamic phenomena in an accessory drive, including events such as turning on the air conditioning or accelerating. Components include pulleys, tensioners, and belts, including poly V belts. You can use different friction coefficients for each side of the belt, as well as choose between a detailed representation of the belt or a constraint-based modeling approach.
ADAMS/Engine Basic Cranktrain

The Basic Cranktrain module allows you to model cranktrains for any type of engine and determine free forces to balance the system as well as internal forces. Model fidelity can be adjusted to the task at hand in the engine development process at all times, while retaining most of the data from the previous step. For example, you can model the crankshaft as rigid, torsional flexible, or flexible. A wizard helps you quickly compose any engine layout in terms of an inline or V configuration and define the number of cylinders; it even allows the creation of a W engine with up to 24 cylinders. The wizard also assists in automatically creating engine components such as pistons, connecting rods, bearings, and gas forces, resulting in a fully functional and parametric template. Three different types of engine mount elements are included: a simple representation based on linear stiffness, and two frequency-dependent mounts that represent rubber and hydro mounts. A virtual test rig, consisting of up to five rotating masses coupled with rotational spring-dampers, can be used to represent a physical test rig and to perform standard events, such as an RPM sweep.

ADAMS/Engine Advanced Cranktrain

The Advanced Cranktrain module allows users to conveniently incorporate flexible components into system-level engine virtual prototypes. With this capability, users can now optimize their designs in terms of weight, durability, and NVH. A number of high-fidelity component models are included in the module to represent various parts of the cranktrain such as journal bearings (including a detailed oil film model), a dual-mass flywheel, and frequency-dependent engine mounts.

ADAMS/Engine Advanced Cranktrain also requires:
- ADAMS/Flex

ADAMS/Engine Gear

ADAMS/Engine Gear allows users to easily incorporate gears in an engine simulation, and to model them to varying levels of fidelity. At the highest level, users can model the tooth-to-tooth interaction of gears, with friction, to study the influence of lash and the tooth meshing on gear vibration. Additionally, the tooth loads can be obtained for durability assessments.
FEATURES

- Powerful tool for conceptual driveline layout and design
- Modeling environment for building common driveline components, including differentials, prop shafts, transfer cases, and gearboxes
- User-friendly environment for manipulating driveline component parameters
- Comprehensive set of standard experiments, such as split μ surface, impulse torque at flywheel, tip-in/tip-out, clutch misuse, and more

BENEFITS

- Thoroughly test your driveline concept before building physical prototypes
- Study the influence of driveline components on overall system behavior

PREREQUISITES

- ADAMS/View
- ADAMS/Solver
- ADAMS/Tire Handling or user-supplied tire model
- ADAMS/Car Vehicle Dynamics

As part of the vision of the Functional Digital Vehicle™, driveline design and analysis capabilities are facilitated within the same environment used for vehicle handling, ride, and comfort studies. Using a common environment and databases, ADAMS/Driveline enables driveline virtual prototypes to be shared and used for cross-disciplinary optimization for ride and handling, durability, vibration, and controls.

Driveline models can easily be integrated into a full-vehicle prototype to explore interactions between the driveline and chassis components. Using this template-based tool, engineers can model driveline components and simulate dynamic system behavior for a variety of operating conditions. By simply entering design parameters, differentials, propshafts, transfer cases, and gearboxes are automatically created. Gear forces, backlash, bearing models, viscous coupling, and limited-slip differentials are applied from a detailed elements library. Components can be easily activated and deactivated to study their influence on overall system behavior. A comprehensive set of standard experiments, as well as the capability to design custom experiments efficiently, is provided.

ADAMS/Driveline provides a powerful tool for a wide range of applications. Full-vehicle handling analyses in front-wheel, rear-wheel, and all-wheel drive modes are supported, as are studies of torque transfer and distribution, gyroscopic and balancing effects, bearing dynamics and elastics, and noise and vibration excitations at the component level. You can also study the influence of flexible components on your design and investigate dynamic behavior and secondary motion at high operating speeds. Control system analysis, packaging studies, and component fatigue load prediction for durability studies are other ways you can use ADAMS/Driveline to fully explore your driveline design.
MSC.Software’s concept of the Functional Digital Aircraft™ allows engineers to combine accurate mathematical models of landing gear, airframes, engines, cargo, and stores (such as weapons or fuel tanks) into complete virtual prototypes that can be tested, refined, and optimized in the computer before physical prototypes are created.

To support this vision, MSC.Software has developed the ADAMS/Aircraft suite of software tools. Using ADAMS/Aircraft, engineering teams can quickly build a complete, parameterized model of a new aircraft, easily defining its landing gear layout, wheel arrangement, energy absorption, and other vital characteristics. Then, without leaving their engineering workstations, the team’s members can fly the model through a battery of standard dynamic simulations to determine the vehicle’s flotation, stability, loads, passenger comfort, and more. Virtual test measurements can be analyzed immediately and virtual test equipment can be quickly modified.

The template-based environment, database structure, and standardized data formats in ADAMS/Aircraft facilitate the sharing of models and data between organizations, including suppliers and customers, thereby enabling efficient engineering communication and product development. This process also ensures modeling and simulation consistency throughout the aircraft design and analysis cycle.

ADAMS/Aircraft provides two-way interfaces with CATIA, MSC.EASY5, MSC.NASTRAN and other CAD, finite element analysis, and control software for exact subsystem definitions. The result is a complete and consistent aircraft model that provides full insight into the aircraft design – complete because all of the key design data, geometry, flexibility, controls and hydraulics systems are integrated with the functional virtual prototype, and consistent because the data does not have to be re-entered.

**FEATURES**

- Complete simulation solution for component, subsystem, and system-level design
- Large library of modeling elements
- Number of standard templates for landing gear, nose and main wheel, and airframe
- Standardized suite of full-vehicle and subsystem tests
- Customizable interface

**BENEFITS**

- Identify and solve design problems at the earliest stages of development, when the cost of correcting mistakes is low
- Capture corporate engineering knowledge and expertise through the use of templates
- Reduce the number of physical prototypes required, saving time and money and keeping the development schedule on track

**PREREQUISITES**

- ADAMS/View
- ADAMS/Solver
ADAMS/Aircraft Landing Gear

The ADAMS/Aircraft Landing Gear module is the first release in the Functional Digital Aircraft™ suite of products. This template-based modeling and simulation tool greatly simplifies landing gear design and simulation. Users simply supply the required data to the templates, and subsystem models and full-system assemblies are automatically constructed. Aircraft engineers are able to quickly build, test, and refine aircraft landing gear designs, exploring many “what-if” alternatives.

The Landing Gear module also provides powerful simulation capabilities, standardized for industry-recognized procedures. The landing gear can be attached to a drop test rig and tested under various drop mass, metering pin, and impact angle combinations, duplicating the real-world results manufacturers use to validate their designs. A retraction/extension can also be performed to size the actuators and hydraulic valves. The landing gear can be quickly attached to a rigid or flexible airframe and put through the same paces that the real aircraft landing gear will experience: taxi, turning, braking, takeoff, and landing.

Aircraft engineers can change design parameters and create their own field conditions and then directly compare the critical data with side-by-side animations and plot families. The complete simulation test suite provides the same data expected from physical tests, such as load-stroke curve, hydraulic demand during retraction, and tire forces. Analytical results have been validated against physical tests, so the results can be relied upon for accuracy.

ADAMS/Aircraft Landing Gear provides basic tire functionality to study turning, straight braking, symmetric landing, static attitude, tipback, drop, shimmy, and carrier launch. This basic tire model includes a 2D point-follower road-contact model and tire force models (modified Fiala and user-written).

To achieve higher-fidelity tire handling behavior in cases involving comprehensive slip (asymmetric landings, turning while braking) and during dynamic taxi over 3-D runway surfaces, the optional ADAMS/Aircraft Handling Tire module is available. Additionally, MF-Tire, Swift, and Ftire models may be used with ADAMS/Aircraft Landing Gear.
ADAMS/Aircraft Handling Tire

An extension to the basic tire capabilities provided with ADAMS/Aircraft Landing Gear, the ADAMS/Aircraft Handling Tire module provides access to modified Fiala, UA (University of Arizona), and TR R-64 tire models, which offer the following capabilities:

- 3D or 2D road-contact
- Comprehensive slip (turning while braking and asymmetric landings)
- Dynamic taxi on 3D roads (1-cosine or actual road profiles)
- Shimmy

Custom tire models based on user-supplied data or company-proprietary tire algorithms can easily be included.

All of the ADAMS/Aircraft Handling Tire module’s analytical tire models include tire carcass deformation effects, which can be important in asymmetric landings or during extreme turning and braking.

All of the ADAMS/Aircraft tire models (basic tire model included within ADAMS/Aircraft, and the optional ADAMS/Aircraft Handling Tire module) include options for selecting different friction models, such as a slip ratio-based model or slip (scrub) velocity-based friction decay models. In addition, all tire models include an optional first-order lag on the slip angle, which is useful in most landing gear shimmy analyses.

- Modified Fiala Tire
  
The Modified Fiala Tire model in ADAMS/Aircraft Handling Tire is an extended Fiala model (Fiala, E., “Seitenkrafte am rollenden Luftreifen,” VDI-Zeitschrift 96, 973 (1964)). It is useful in analyses where inclination angle is not a major factor and where longitudinal and lateral slip can be considered unrelated. This tire model uses a table look-up load-deflection curve, which can be nonlinear, and tire damping to compute the normal force. The load-deflection curve is input by the user, and is a single curve. Representative data is included within the product.

- Modified UA (University of Arizona) Tire
  
The Modified UA Tire model is an extension of the University of Arizona tire model developed by Drs. P.E. Nikravesh and G. Gim (Gim, Gwanghun, “Vehicle Dynamic Simulation with a Comprehensive Model for Pneumatic Tires,” Ph.D. Thesis, The University of Arizona (1988)). This tire model is used in analysis when comprehensive slip is required. It uses a table look-up load-deflection curve, which can be nonlinear, and tire damping to compute the normal force. The load deflection curve is input by the user, and is a single curve. Representative data is included within the product.

- Modified NASA TR R-64
  
This tire model, based on NASA Technical Report R-64, “Mechanical Properties of Pneumatic Tires with Special Reference to Modern Aircraft Tires” by Smiley and Horne, is familiar to most aircraft engineers. The user supplies general tire characteristic data, and empirical-based models are used to construct the tire stiffness characteristics. Representative data is included within the product.
ADAMS / Rail

FEATURES

- Preload, linear, stability, and dynamic analysis
- Standardized data formats
- Suspension design
- Dynamic wheel-rail contact and track modeling
- Wear prediction
- Coupler design
- Comfort, curving, creep and bogie analyses
- Traction/braking simulation
- Powertrain/driveline design
- Derailment and rollover prediction

BENEFITS

- Explore “what-if” alternatives and refine your railcar design before building and testing a physical prototype
- Analyze design changes much faster and at a lower cost than physical prototype testing would require
- Easily vary the kinds of analyses being performed without modifying physical instrumentation, test fixtures, and test procedures
- Share models and data between organizations, including suppliers and customers, enabling efficient engineering communication and product development

With ADAMS/Rail, engineers can accurately model complete railway vehicles and realistically simulate their behavior in motion. This lets users study, refine, and optimize railway vehicle performance all on the computer, before running physical tests.

An engineering team can quickly build a complete, parameterized model of a new railway vehicle, easily defining its suspension, wheel set, wheel-rail contact, and other vital characteristics. Then, without leaving their engineering workstations, the team’s members can run the model through a battery of kinematic, static, and dynamic simulations. They use these tests to determine the vehicle’s stability, derailment safety, clearance, track load, passenger comfort, and more.

Rail engineers from the commercial and academic worlds have contributed to ADAMS/Rail development, and their expertise is embedded in the tool. Development began in 1993 in collaboration with NedTrain Consulting, an offshoot of N.V. Nederlandse Spoorwegen (Dutch Rail). In 1996, ArgeCare e.V., well known in the field of railway dynamics for its popular MEDYNA software, joined the ADAMS/Rail development consortium. In 2002, a strategic relationship to develop an interface between ADAMS/Rail and AEA Technology Rail’s advanced railway dynamics software VAMPIRE was announced.
The ADAMS/Rail template-based modeling and simulation tool greatly simplifies the tasks of rail vehicle design and analysis. To build a rail vehicle, you simply supply the required assembly data into forms that use familiar rail engineering naming conventions. You are able to quickly define front and rear bogies (including wheel sets, bogie frames, primary and secondary suspensions, dampers, and anti-roll bars) and bodies using standard templates. Then ADAMS/Rail automatically constructs subsystem models and full-system assemblies.

To model tracks, the ADAMS/Rail user defines the track centerline by specifying the analytic layout parameters: curvature, cant, and gauge. Track measured data are specified as irregularity parameters: alignment, cross level, and gauge variation. Rail profiles and inclination can progressively be evolved along the track to carefully model switch layouts.

Users define wheel-rail contact by specifying the type and properties of the contact elements for each wheel as a function of the track longitudinal coordinate. Parameters needed for each wheel-rail interconnection are automatically calculated according to wheel and rail parameters. Contact is modeled between one wheel and one rail with generalized force elements, and contact models can even switch along the track.

Three different contact levels provide specific tools for specific applications. The linear contact element permits stability studies for determining critical speed, as well as qualitative analysis of the vehicle’s behavior. The tabular contact element allows dynamic simulation involving nonlinear contact phenomena, such as comfort, stability, and curving, when there is no multi-point contact. Finally, the general contact element enables simulation of multi-point contact and second-order effects.

ADAMS/Rail users can integrate applications within their existing engineering processes. Two-way interfaces allow the free exchange of data with CAD, finite element analysis, and control system design packages. The result is a complete virtual prototyping environment for building and testing railway vehicle designs.
ADAMS/Exchange provides a selection of industry-standard two-way interfaces for transferring data between MSC.ADAMS and CAD/CAM/CAE software. With ADAMS/Exchange, your choice of translators includes IGES, STEP, and DWG/DXF, all from the Product Data Exchange Library (PDE/Lib). Whether you have generated wiremesh, surface, or solids geometry for your mechanism model, you can use these interfaces to easily transfer it to and from the MSC.ADAMS software environment.

With ADAMS/Exchange, you will find it easy to import model geometry from other CAD/CAM/CAE software environments into MSC.ADAMS. You simply select “Import” from the pull-down “File” menu, and a convenient “File Import” dialog box walks you through the process. ADAMS/Exchange automatically converts your model geometry into MSC.ADAMS geometric elements without the need for re-entering data.

You can also create a preliminary model of your mechanism in MSC.ADAMS, simulate its motion, and then use ADAMS/Exchange at any point in the simulation to transfer the model’s geometry to other CAD/CAM/CAE software for further analysis and refinement. This capability is especially useful when, for example, you need to do a quick upfront check of your design concept to assure adequate clearances.

MSC.Software provides software offerings that embed MSC.ADAMS capabilities within leading CAD packages. Supported CAD platforms include AutoCAD/Mechanical, Mechanical Desktop, and Inventor from Autodesk; CATIA V5 from Dassault Systemes; and Solid Edge from EDS. Contact your MSC.Software representative for more information on these embedded solutions.

MSC.Software also has OEM arrangements with Dassault Systemes (for SolidWorks) and EDS (for I-deas and Unigraphics) that provide MSC.ADAMS capabilities for use within their respective applications. Contact representatives from the CAD vendors directly for information on these solutions.