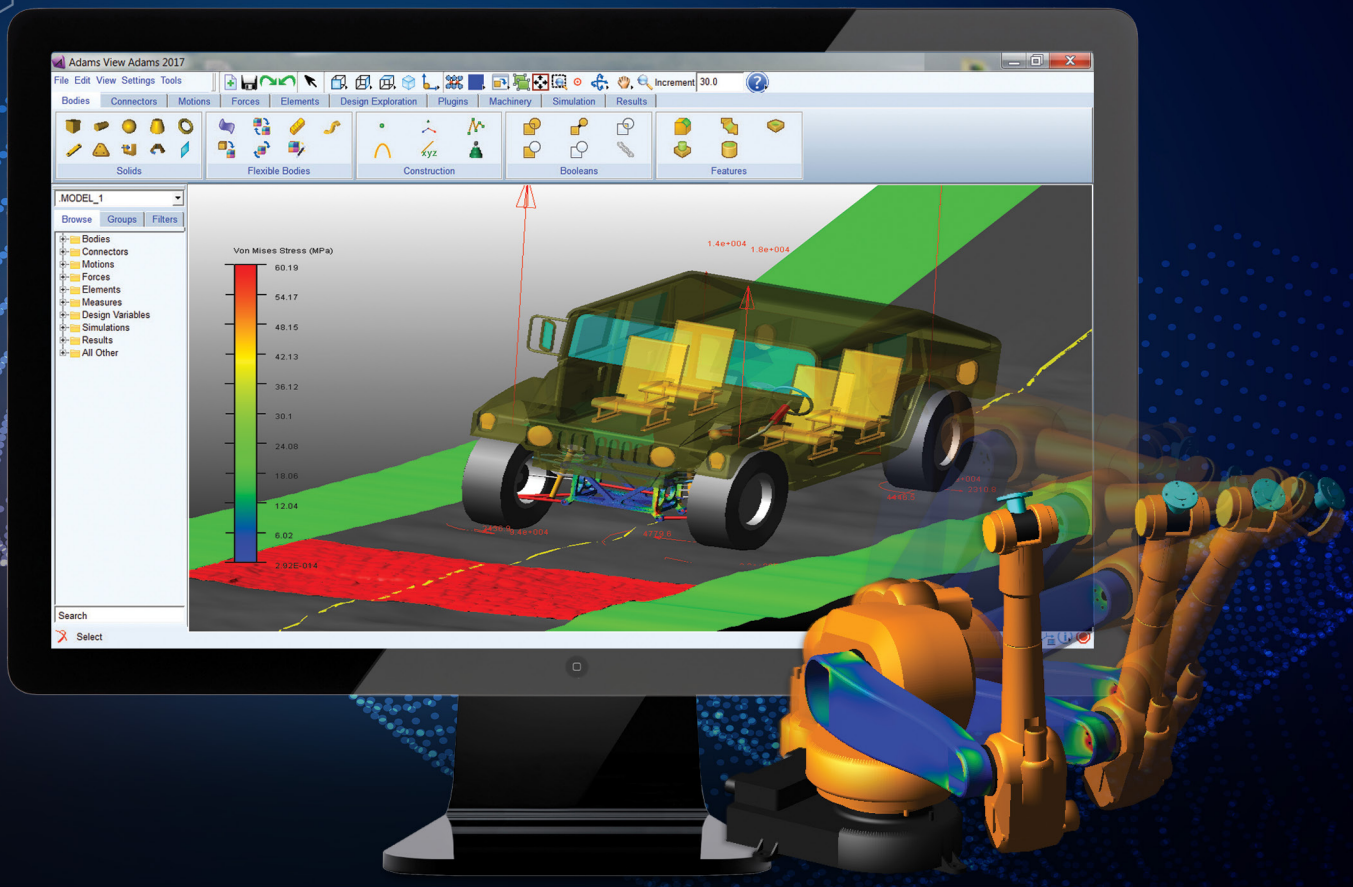
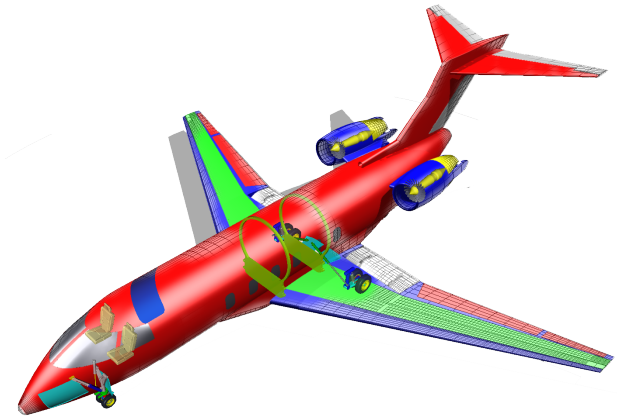
cadence®




# Adams
# Multibody dynamics for functional virtual

# Why Adams for MBD
# Most widely used mechanical system simulation software

Adams stands for Automatic Dynamic Analysis of Mechanical Systems.
It is a Multibody dynamics software that is used to study the dynamics of moving parts, and to determine how loads and forces are distributed throughout mechanical systems. With three decades of innovation and industry leadership, companies across industries choose Adams as their system dynamics solution.



## Accurately predict loads for FEA

Dynamic loads are far more difficult to predict and understand compared to static loads, and this is especially true in systems with multiple moving parts, complex interactions and dynamic phenomena.
Using Adams, engineers can calculate accurate dynamic loads applied through the system to any key component within it. Then, those loads can be used as inputs to component FEA models to get reliable results for stress analysis or fatigue analysis.

## Represent flexibility efficiently in your system conveniently

Adams allows you to create flexible parts conveniently even in large motion systems that include complex interactions with other modeling elements.  Engineers can either create a flexible components by importing MNF files from FEA software or generate flexible parts within the Adams environment using the Adams ViewFlex capability.

## Design confidently with accurate mechanical model for controls system modeling

Nearly every mechanical system includes one or more control systems. By using Adams Controls, you can take your geometrically defined Adams models and easily incorporate them within block diagrams you have created with your preferred control system design software, such as EASY5, MATLAB Simulink or FMI supported tools.

## Accelerate innovation by exploring multiple design concepts

Optimization analysis is important in every design process. Using Adams and Adams Insight, your design team can quickly understand the simulation that was run, investigate which factors have the greatest effect on each response, and easily make design changes and immediately understand how these changes will affect the overall performance of your design.

## Real dynamics for vehicle design and testing

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

## Powerful customization functionality

Another advantage of Adams is its openness of architecture, which provides the ability to customize. This is heavily used by many companies to extend the capabilities of Adams and to integrate it into their process workflows.

## Easy to use, integrated Adams view user interface

Tightly integrated user interface to help you build, analyze and post-process functional virtual prototype models with ease. Designed with a focus on system level analysis, Adams View lets you build models of mechanical systems and simulate the full-motion behavior.

## Building models

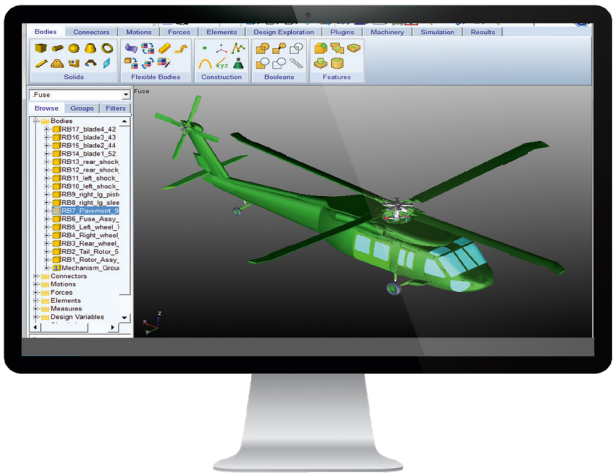
- Import CAD neutral geometry formats including STEP, IGES, DXF, DWG or Parasolid
- Import native CAD geometry formats including CatiaV4, CatiaV5, Inventor, STEP, IGES, Acis, ProE, Creo, SolidWorks, Unigraphics, VDA
- Create rigid and flexible bodies representing the system's moving parts
- Apply constraints to define how bodies are attached and move relativeto each other
- Apply motions to specifically prescribe the movement of bodies within the model
- Apply forces to define loads and contacts between bodies, and compliance and friction within connections

## Testing models

- Run a simulation to test the model's performance characteristics and response to a set of operating conditions
- Use solver parameters to refine simulation performance and accuracy
- Create measures to chart key characteristics of your model during or after a simulation
- Instrument your model with detailed output requests to investigate nearly any aspect of the simulated model

## Adams PostProcessor

- View results in tabular and plotted formats
- Import physical test data for comparison with analysis results to correlate your models
- Compare plots and animations from multiple simulations
- Perform collision and clearance studies
- Use broad animation controls to enhance the quality and realism of your animations



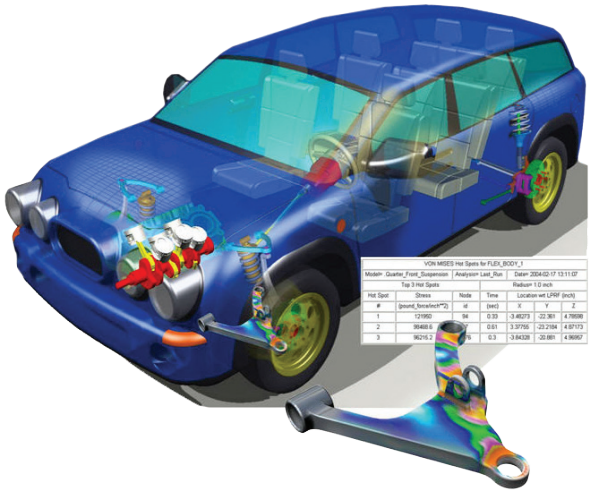
## Optimizing models with Adams Insight

- Access advanced DOE capability to improve product design by understanding interaction of key parameters and performance goals
- Take advantage of popular statistical methods to define the model set
- Assessments of response surface quality and objective sensitivity to factors guide refinement of the simulation set
- Publish interactive web pages which enable viewers to easily interrogate the model's response to varied factors

> *The Adams model has subsequently been used to perform an extensive parameter study to find the root cause and solutions to the observed gear resonance.*
>
> Christina Exner, Achates Power

## Adams multidiscipline solutions

Adams enables engineers to evaluate and manage the complex interactions between disciplines including motion, structures, vibrations, and controls to better optimize product designs for performance, safety, and comfort.



## Adams Controls

- Connect your Adams model to block diagram models you've developed with control applications such as Easy5® or MATLAB®
- Run co-simulation between Adams and other software that supports the FMI standard

## Adams Mechatronics

- Access advanced pre-processing for Adams Controls
- Setup and couple a control system to a mechanical system
- Ideal for complex integrations

## Adams Flex

- Integrate FEA-based flexible bodies into your model
- Better represent structural compliance
- Predict loads and displacements with greater accuracy
- Examine the linear system modes of a flexible model
- Broad and convenient control over modal participation and damping

> *Adams simulations permitted us to get different loading conditions to be studied through an FE analysis, putting to evidence the most critical loading combinations.*
>
> Dr. Peter Tutzer, Bugatti

## Adams ViewFlex

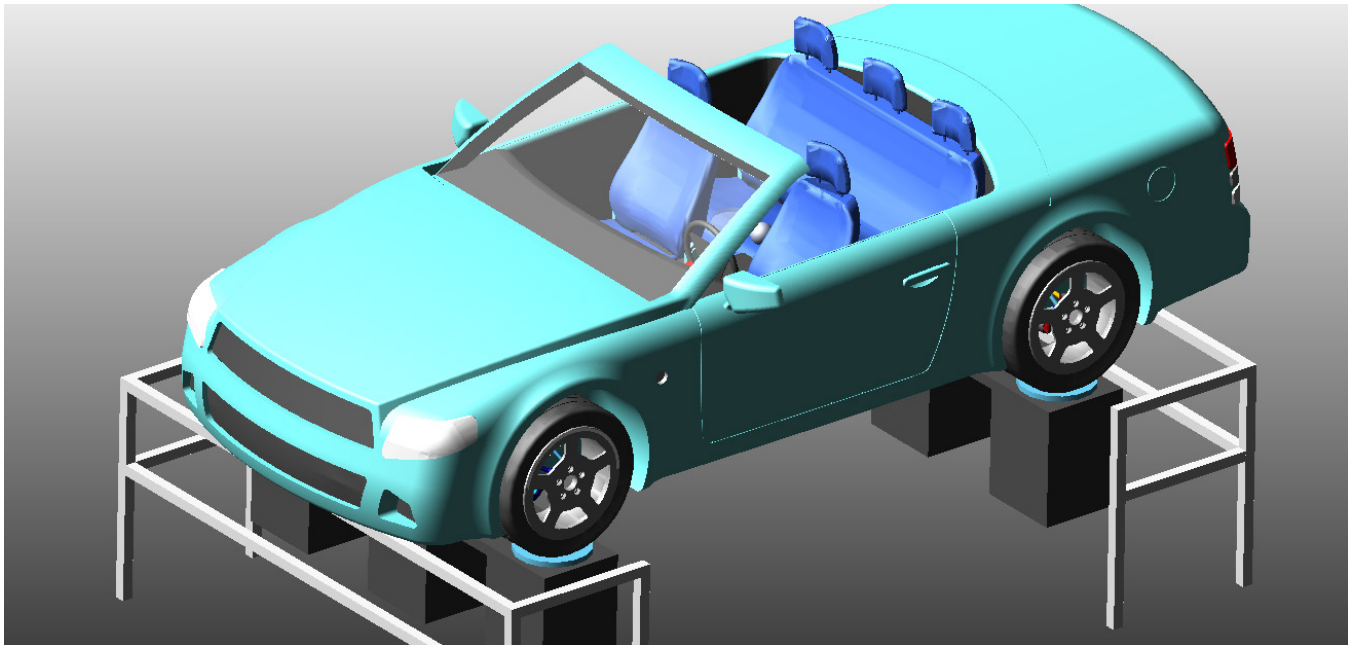
- Create flexible bodies entirely within Adams View or Adams Car
- Reduce reliance on 3rd party FEA software using built in MSC Nastran technology

## Adams Durability

- Perform modal stress recovery of flexible bodies within Adams
- Export loads to popular FEA software including MSC Nastran for detailed stress analysis
- Integrate with MSC Fatigue to do component life prediction

## Adams Vibration

- Analyze the forced response of a model in the frequency domain over different operating points
- Transfer your linearized model from Adams products to Adams Vibration completely and quickly
- Create input and output channels for vibration analyses
- Specify frequency domain input functions, such as swept sine amplitude/ frequency, power spectral density (PSD), and rotational imbalance



## Adams vehicle vertical solutions

With Adams Car vertical products, engineering teams can quickly build and test functional virtual prototypes of complete vehicles and vehicle subsystems.

### Adams Car

- Analyze design changes much faster and at a lower cost than physical prototype testing would require
- Work in a more secure environment without the fear of losing data from instrument failure or losing testing time because of poor weather conditions
- Run analyses and what-if scenarios without the dangers associated with physical testing
- Perform a repeatable set of tests on a global basis, ensuring that you work with common data, tests, and, most important, results

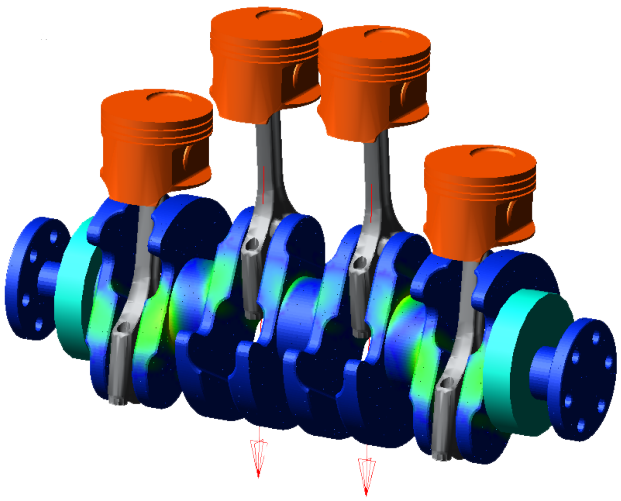
### Adams Driveline

- Model and simulate driveline components and study the dynamic behavior of the entire driveline during different operating conditions
- Explore the interaction between driveline and chassis components, such as suspensions, steering system, brakes, and the vehicle body
- Apply a specific torque to your driveline model
- Alter the driveline geometry and analyze the driveline

> *Adams Car was instrumental to tune all subsystems at their best before any real prototype was available… Testing several configurations on the virtual prototype required a matter of hours; doing the same on the real prototype would have been impossible*
>
> Dr. Peter Tutzer, Bugatti

## Efficient solvers with high Capabilities for higher productivity

As a powerful numerical analysis application, Adams Solver automatically solves the equations of motion for kinematic, static, quasi-static, and dynamic simulations. It is designed to build, test, and refine mechanical system models.



## High performance computation

- Enable parallel evaluation of Jacobian matrix
- Enable parallel thread for results computation
- Enable parallel execution of LU factorizations

## Unique capabilities

- Use state of the art Linear analysis capabilities
- Use high fidelity Adams-to-Nastran translation utilities to replace manual translation
- Use HHT integrators for a faster numerical integration of the equations of motion for a dynamic analysis

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