

# Flexible Multibody Systems in Adams

## SOLUTION BRIEF

### What it does

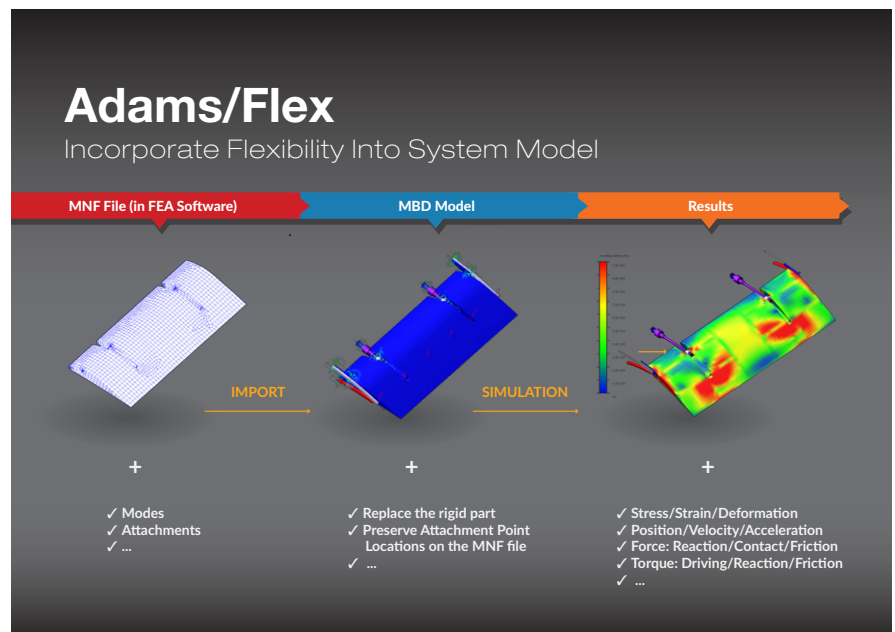
Adams allows you to create flexible parts conveniently even in the presence of large overall motion and complex interaction with other modeling elements.

Engineers can incorporate a linear flexible body, as well as nonlinear flexible parts to solve problems involving large deformations and material nonlinearity.

### Linear Flexible Parts:

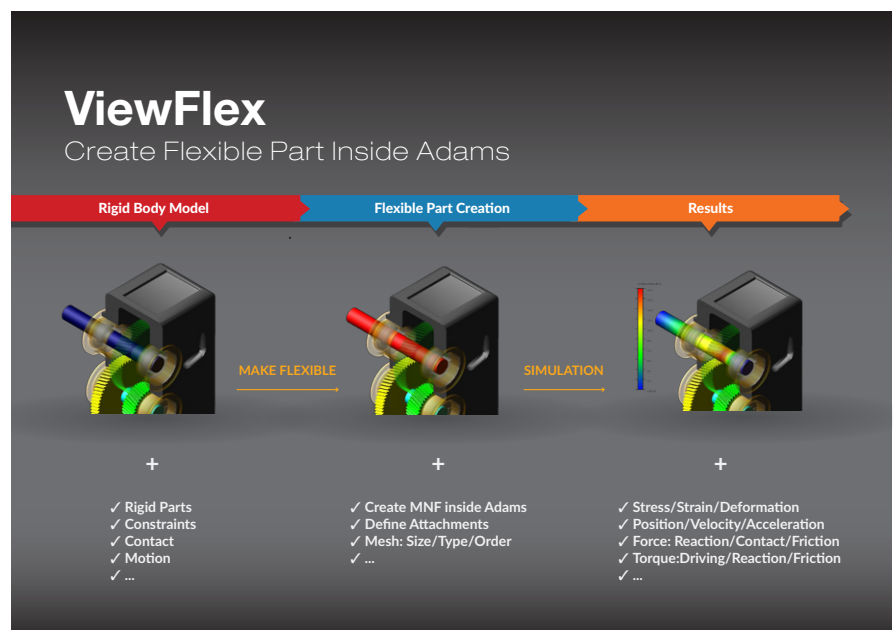
#### 1. Adams/Flex

Adams/Flex allows importing finite element models from most major FEA software packages and is fully integrated with Adams package, providing access to convenient modeling and powerful post-processing capabilities. Replacing some key rigid components with flexible parts will increase the accuracy for load prediction.



#### 2. ViewFlex

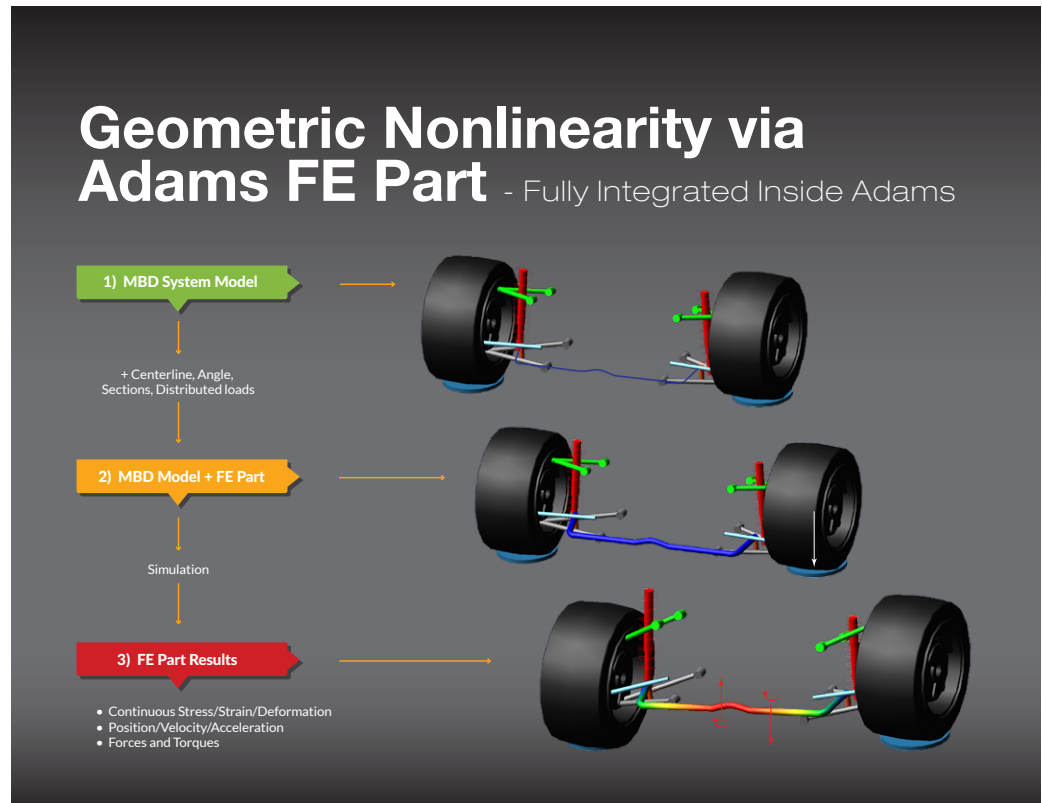
The ViewFlex module in Adams/View enables users to transform a rigid part to an MNF-based flexible body within the Adams environment using embedded finite element analysis where a meshing step and linear modes analysis will be performed. It is powered by MSC Nastran, allowing one to create flexible bodies without leaving Adams/View and without reliance on 3rd party 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.



## Nonlinear Flexible Parts:

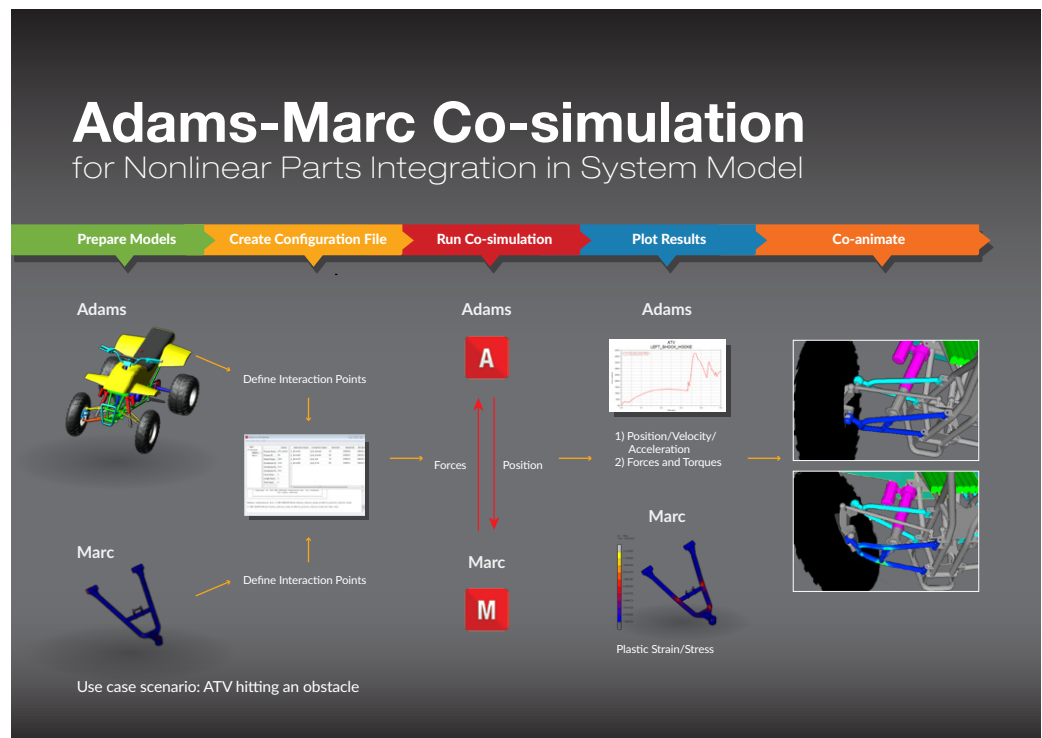
### 3. FE Part - NEW

The FE Part is a wholly Adams-native modeling object which has mass and is accurate for very large deformation cases (that is, geometric nonlinearity) of beam-like structures. It provides a fast way to model geometrically nonlinear parts in system model.



### 4. Adams-Marc Co-simulation

The Adams-Marc Co-simulation enables users to perform real co-simulation between world-class Marc nonlinear FE technology with world-class Adams MBD code. With that, MBD engineer can increase model accuracy by including non-linear structural behavior. It's especially beneficial for applications involving high deformation of viscoelastic materials. Re-meshing can be required using this co-simulation.



Here's a table showing the difference between each flexible body integration technique:

<b>Adams Flexible Component Options</b>				
	<b>Linear</b>		<b>Nonlinear</b>	
	<b>Adams/Flex</b>	<b>ViewFlex</b>	<b>FE Part</b>	<b>Adams-Marc Co-simulation</b>
<b>Nonlinearities</b>				
Geometric Nonlinearity	No	No	Yes	Yes
Material Nonlinearity	No	No	No	Yes
<b>FEA Dependency</b>				
Import Files from FEA Software Required	Yes	No	No	Yes
FEA Software Required for Adams Simulation	No	No	No	Yes
<b>Modeling Options</b>				
Contact with Rigid Part	Yes	Yes	Yes	Yes
Contact with Linear Flexible Part	Yes	Yes	No (forthcoming)	No
Contact with FE Part	No	No	Yes	No
Shape Type	General	General	Beam-Like	General
Geometry Creation	External	Adams Native or External	Adams Native or External	External
Distributed Mass	Yes	Yes	Yes	Yes
Distributed Load	Yes	Yes	Yes	Yes
<b>Simulation</b>				
Pre-requisites	Adams/Solver	Adams/Solver +Adams/Flex	Adams/Solver	Adams/Solver + Marc
Type	Adams Native	Adams Native	Adams Native	Co-simulation
<b>Postprocessing</b>				
Adams Stress/Strain Recovery (XY plot)	Yes	Yes	Yes	Yes (in Marc)
Adams Stress/Strain Recovery (animated contour plot)	Yes	Yes	No	Yes (in Marc)
Load Export for External FEA	Yes	Yes	Yes	N/A
FEA Stress/Strain Recovery	No	No	No	Yes

## About Adams

As the world's most famous and widely used Multibody Dynamics (MBD) software, Adams improves engineering efficiency and reduces product development costs by enabling early system-level design validation.

[www.mscsoftware.com/adams](http://www.mscsoftware.com/adams)

## About MSC Software

MSC Software is one of the ten original software companies and a global leader in helping product manufacturers to advance their engineering methods with simulation software and services.

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