What is it?

Efficiently designing and testing mechanical systems is a challenge for some engineers due to lack of smooth integration between system dynamics and finite element analysis (FEA) software domains.

The Adams-Marc co-simulation enables engineers to perform co-simulation between Marc nonlinear FE technology and the Adams Multibody Dynamics (MBD) software. By doing so, multibody dynamics engineers can increase model accuracy by including non-linear structural behavior; and Finite Element Analysis (FEA) engineers can study components with realistic boundary conditions. Coupling the technologies also produces time savings for nonlinear FEA software users since some of the rigid moving parts can be solved in Adams, which dramatically decreases the total solution time.

Who is it for?

- Adams users who want to incorporate material nonlinearity, geometric nonlinearity or contact nonlinearity into their system model.
- Marc users who deal with mechanisms that include moving parts, and want to increase simulation productivity by using co-simulation.
- Anyone who is interested in performing coupled multidiscipline solution between Multibody Dynamics and Nonlinear FEA.

What is the Workflow?

Adams-Marc Co-simulation for Nonlinear Parts Integration in System Model

[Diagram of Adams-Marc co-simulation process]

Adams

Marc

Define Interaction Points

Define Interaction Points

Position

Force

Use case scenario: ATV hitting an obstacle

Software & Services Offerings

- **How we Help**
  Engineering simulation software, implementation & support, modeling & analysis projects, methods development, and training

- **Who we Help**
  Product design and manufacturing engineers in transportation, machinery, consumer products and biomedical industries, parts suppliers, and researchers

- **How to Reach Us**
  [www.mscsoftware.com](http://www.mscsoftware.com)

Adams

As the world’s most widely used Multibody Dynamics (MBD) software, Adams improves engineering efficiency and reduces product development costs by enabling early system-level design validation. Engineers can evaluate and manage the complex interactions between disciplines including motion, structures, actuation, and controls to better optimize product designs for performance, safety, and comfort. Along with extensive analysis capabilities, Adams is optimized for large-scale problems, taking advantage of high performance computing environments.
How can we help you?

Engineering Expertise You Can Trust

Getting started is easy.

Our extremely skilled engineers are experts at utilizing Computer Aided Engineering (CAE) for analyzing fatigue behavior. Our team is highly efficient in applying Adams and Marc for solving almost any type of co-simulation challenge.

Flexible Services Offerings

We provide consulting support based on your specific requirements. This could range from performing analysis for you on a project basis to providing full time staff members to help you create repeatable processes in-house.

MSC’s services team can help your company in a variety of ways:

- Quick Start Project
- Knowledge Transfer
- Mentoring
- Staff Augmentation
- On-site Support
- Methods Development
- Training
- Hotline Support

Sample Project:

Adams-Marc Co-simulation Makes System Analysis 15 Times Faster than Pure Nonlinear FEA Analysis

We were looking for an approach that would allow us to simulate the performance of our torque modulators, including material and geometric nonlinearities, in a fraction of the time so that we could integrate advanced nonlinear analysis into the design process.

The Adams-Marc co-simulation capability more than satisfies our guideline of ‘reasonable results in a reasonable time.’ With up to a 90% reduction in computation time, optimization using advanced nonlinear FEA becomes practical. Such development provides a great benefit and is crucial for our product development and we are proud to work together with MSC in future projects.

Dr. Steve Jia, Chief Engineer, Litens Automotive Group