

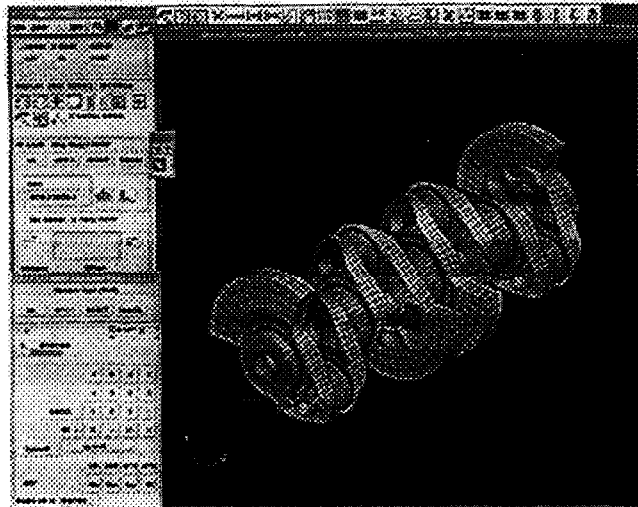
# Driving Your Designs with MSC.Software's Automotive Solutions

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## Abstract

The automotive industry accounts for nearly 30% of MSC.Software's business. It is truly global in nature for us, with our business being spread equally around each of the world regions (Americas, Europe, and Asia-Pacific). "Automotive" includes cars, trucks, SUVs, buses, motorcycles, tires, engines, and components, from OEMs to third-tier suppliers.

This paper briefly describes MSC.Software's automotive solutions. These are comprised of our core software, our automotive-specific software, and our automotive services. This paper provides a glimpse of things you will learn about in more detail during the Conference.



## Introduction

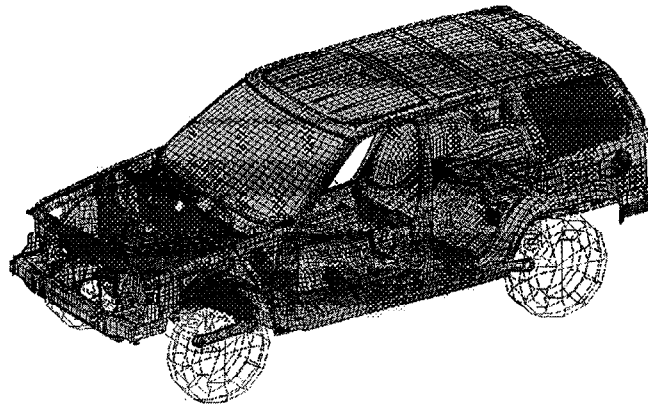
To stay competitive, your company must reduce the time and money it takes to create new vehicles and components. “Competitive” means meeting—and exceeding—customer expectations for styling, safety, performance, comfort, quietness, quality, economy, and affordability, all while meeting business and legislative requirements. The last two years have produced an unprecedented wave of global consolidation—with no end in sight—and this will, in turn, fuel new business issues such as globalization, outsourcing, and supply-chain management. All of these areas have an impact on your designs.

The automotive industry represents 30% of MSC.Software’s business, a significant percentage...and a growing one. While MSC.NASTRAN is the standard for strength and dynamic analyses, other MSC.Software products are also well used. In addition, our automotive services—process advice, process and task automation, and consulting—are rapidly growing and represent real opportunities for breakthrough engineering productivity for you and your company.

This paper describes our automotive solutions, divided into three main areas:

- Core software
- Automotive-specific software
- Automotive-specific services

The descriptions are necessarily brief, since this is an overview paper and since there will be additional, in-depth presentations on these topics during the Conference.



## Core Software

“Core software” is defined as software that is used for a multitude of applications, including those found in the automotive industry. Our core software products are designed to be world-class in their own right, and they also function as platforms on which we build some of our automotive-specific software and services.

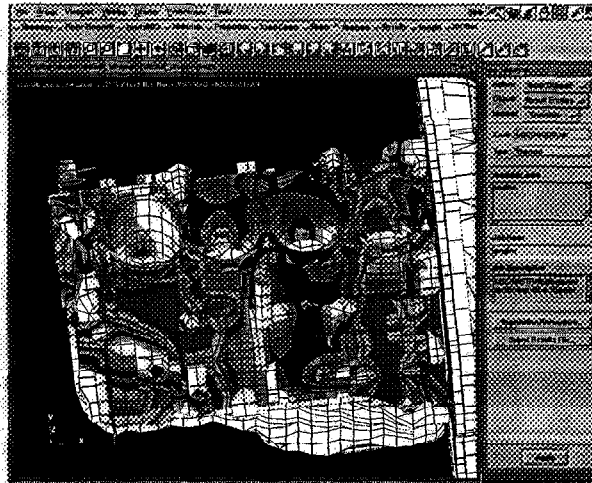
The governing principles for our core software are to provide:

- Enhanced engineering productivity, in terms of process/task automation (via dedicated environments, templates, and workflow managers), numerical and graphics performance, and overall ease of use

- Greater range of simulation, including loads analysis (and kinematics), nonlinear effects, robust design (including probabilistic analysis), manufacturing process simulation, and test correlation
- Increased modeling, manipulation, and analysis of assemblies, from geometry to full FE models to superelements/substructures to matrices from analysis and test
- Continued commitment to data exchange standards such as AP203, AP214, and AP209
- Increased emphasis on advanced visualization techniques and dedicated results processing utilities

Our core software includes our world-class solvers:

- **MSC.NASTRAN.** Version 70.7 will be released in October, with the main feature being support for distributed parallel processing for statics, normal modes, and frequency response analysis. This feature now makes it possible for large NVH jobs to be run during the day, enabling this type of simulation to be an integral part of the design process. Material sensitivity is also added. Over the next two years our emphasis will expand to include more nonlinear capabilities, primarily those that are needed for large, system-type simulation.



- **MSC.MARC.** This is the newest addition to the MSC.Software suite of solvers, filling the gap between MSC.NASTRAN and MSC.DYTRAN. MSC.MARC also has extensive distributed parallel processing capabilities, and it is world-renowned for its contact algorithms and its extensive material library, both of which have found extensive use in the tire and rubber industries.
- **MSC.DYTRAN.** This product is for highly-nonlinear analyses such as those found in impact. It uniquely combines fluid-structure interaction to facilitate the simulation of tire hydroplaning and occupant safety (airbag-occupant interaction).

These solvers are capable of simulating virtually any mechanical/structural phenomena, ranging from general-purpose (MSC.NASTRAN) to dedicated nonlinear (MSC.MARC) to specialty nonlinear (MSC.DYTRAN). Future work will be undertaken to create seamless transitions between them. In addition, We will expand beyond the “traditional” uses of FEA to move into manufacturing process simulation utilizing the capabilities of MSC.MARC and MSC.DYTRAN.

**MSC.PATRAN** is our general-purpose pre- and postprocessor that supports each of these solvers. Version 9 will be released this October, with the main features being significantly increased graphics performance and support for MSC.NASTRAN’s new

distributed parallel processing and material sensitivity features. Later this year, we will also release AP2xx translators that will facilitate CAD access. **MSC.MENTAT** continues to support **MSC.MARC**, and its features will eventually be merged into **MSC.PATRAN**.

Speaking of merging, selected capabilities from **UAI/NASTRAN** will be merged into **MSC.NASTRAN**, based on market needs. Some performance enhancements have already been merged in, with more to come.

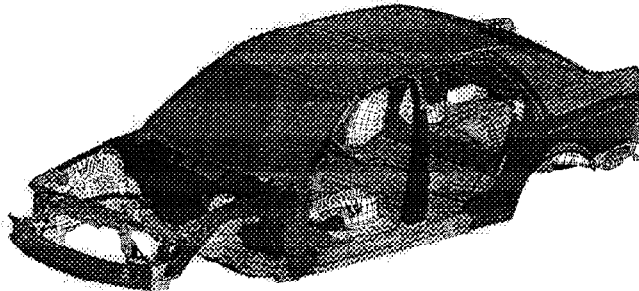
Other core products being used in the automotive industry include **MSC.FATIGUE** for durability analysis, **MSC.AKUSMOD** for internal acoustic modeling and analysis, and **MSC.CONSTRUCT** for topology and shape optimization.

Last year's acquisition of Knowledge Revolution led to the **MSC.Working Model** suite of products for motion, FEA, and visualization/animation. By themselves, these products are closely linked to mid-range solid modelers (**Mechanical Desktop**, **SolidWorks**, and **SolidEdge**), and their visualization capabilities will be extended to work with our core solvers.

### **Automotive-Specific Software**

In addition to our core software, we also offer automotive-specific products and utilities. These include:

- **AMS (Automotive Modeling System)**, for easy modeling of body structures. Version 3, due later this year, will add new features to greatly facilitate the manipulation of assemblies.
- **NVH\_Manager**, a template-based product for setting up NVH simulation using **MSC.NASTRAN**.



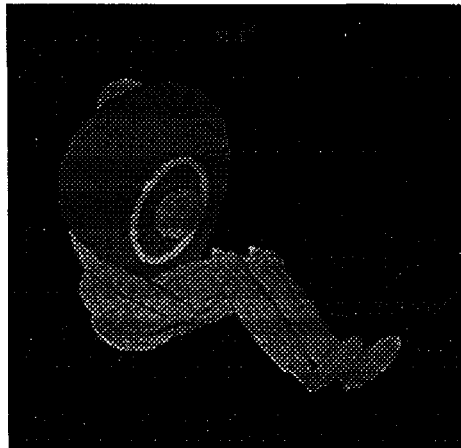
New utilities will soon be added, for spotweld modeling and analysis and for the analysis of head gaskets. Future dedicated utilities will be added based on market needs.

## Automotive-Specific Services

Our software products—core and automotive-specific—apply to everyone. Productivity advantage—relative to your competition—is therefore obtained not from any feature unique to you but, rather, how you apply the software.

The same cannot be said for our services, which have the aim of providing solutions unique to you and to your company's ways of doing design and simulation. These services are extensive, and cover:

- **Process advice**, in which we provide guidance and consulting about defining your technology roadmap and specific processes. Our expertise is primarily in the areas of NVH, durability, strength, design-simulation interoperability, and test-analysis correlation.
- **Process automation**, in which we provide **large-scale custom systems**. The best example is the Predictive Tire Modeling System we are providing for Cooper Tire, to help them reduce their tire development time from 21 to 6 months.
- **Task automation**, in which we provide custom, vertical applications to automate specific tasks. These are built using the **MSC.Acumen** toolkit, which enables drive pages that step the user through a series of tasks. Such custom, vertical apps have been shown to have tremendous productivity gains, with one case documented to cut a 40-day piping design task to less than one day.
- **Software customization**, in which we customize our core or automotive-specific software for your needs



## Summary

This paper presents a brief overview of our automotive solutions. More details will be presented during the Conference.