MSC Software

Design Better Machines

Simulation Solutions for the Lifting & Handling Industry

SOLUTION BRIEF

Software & Services Offerings

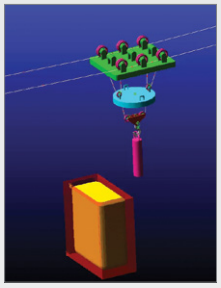
- **How we Help**
  Engineering simulation software, implementation & support, modeling & analysis projects, methods development, and training
- **Who we Help**
  Equipment manufacturers, suppliers, contractors, engineering services firms, and researchers
- **How to Reach Us**
  www.mscsoftware.com

Virtual Prototyping at the Forefront of Design

Lifting and handling equipment share common engineering challenges. Machines deal with heavy loads which can cause problems with stability, fatigue, range of motion, and noise.

Having a working **virtual test machine** to validate new designs before building the first prototype saves companies significant amounts of money, drastically reduces the development time of new products, and leads to quieter, safer and better designs.

With MSC Software solutions, engineers model and simulate a range of engineering problems in a fraction of the time and money compared to traditional “build and test” methods.



System & Sub-System Level Analysis

Virtual Test Solutions:

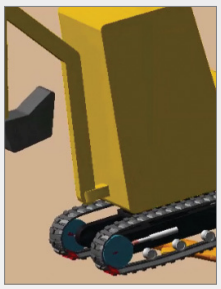
System & Sub-System Level Analysis

- Perform system analysis using functional virtual prototyping
- Leverage System-Level Analysis to identify issues early in the design cycle
- Identify performance issues in subsystems, like chain drive (slip) for forklifts, cables in elevators, gear trains, latches, motor drives, and so on.

Safety & Stability Analysis

As a result of carrying various loads at varying speed and in different types of terrains, lifting and handling equipment is susceptible to tipping over.

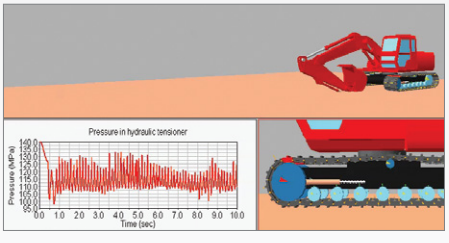
- Conduct Tip-Over Stability Analysis
- Bring more insight into the stability of the equipment to improve future design
- Perform Stability Evaluation and Accident Reconstruction in the virtual test machine to save cost and reduce development cycle
- Study the effects of loading, wheelbase size, vehicle speed, top-heaviness and inclination on the stability of equipment



Safety & Stability Analysis

Controls & Hydraulics Integrated Dynamic Analysis

- Improve both mechanical and control system designs by applying co-simulation
- Get an accurate picture of your mechanism’s real-world operational behavior, with the effects of control systems fully represented



Controls & Hydraulics Integrated Dynamic Analysis

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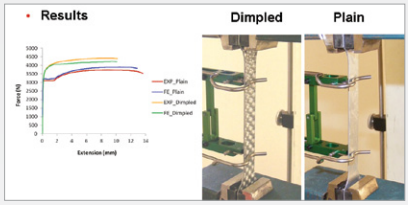
> Marc Nonlinear FEA overcame problems seen with other finite element software packages such as non-convergence and provided reliable and results that matched experimental measurements.
>
> **Dr. Martin English, Design & Dev. Manager, Hadley Industries**



Results correlation (virtual to physical)

> Using the new virtual test method for durability studies, we have reduced the number of physical prototypes from three or four previously, down to one on our two most recent designs.
>
> **Terry Ewanochko, Product Engineer, John Deere Welland Works**

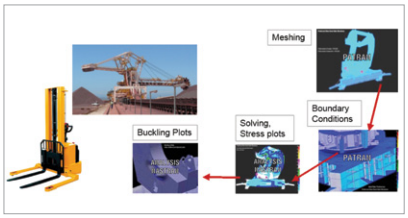
About MSC Software

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.

www.mscsoftware.com

Stress & Structural Analysis

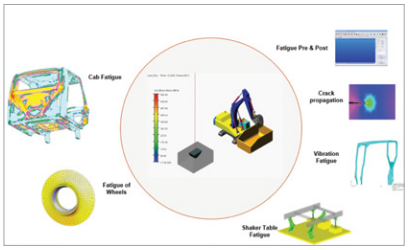
- Conduct FEA analysis of lifting and handling equipment
- Prevent structural failure and reduce risk associated with equipment operation



Stress & Structural Analysis

Fatigue & Durability Analysis

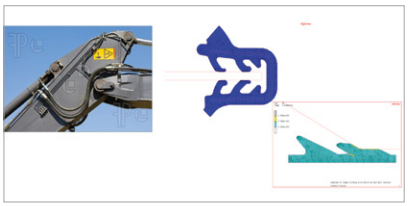
- Conduct failure analysis to address field problems through simulation, such as cracking or vibration fatigue
- Leverage fully featured Stress & Strain-Life solvers
- Calculate damage tolerance using crack growth methods



Fatigue & Durability Analysis

Elastomer Seal Analysis

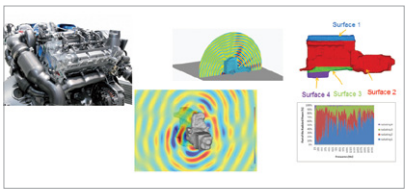
- Use non-linear FEA to simulate the installation of window seals or O rings
- Improve sealing effectiveness by analyzing and optimizing installation forces
- Analyze seal performance with in-service loads
- Study frequency response of seals and mounts
- Analyze flexibility and performance of boots and seals



Elastomer Seal Analysis

Noise & Acoustics Analysis

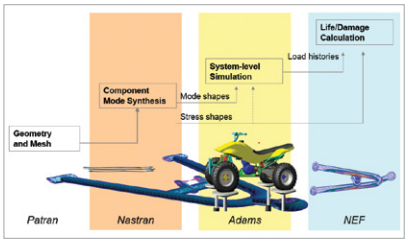
- Address your engine noise issues using numerical Acoustics simulations
- Study intake/exhaust noise issues
- Analyze cooling fan noise issues
- Improve cabin noise insulation
- Reduce high speed elevator noise



Noise & Acoustics Analysis

Multidiscipline Engineering

- Integrate multibody dynamics and finite element analysis methods for more accurate dynamic loading and stress analysis
- Perform more efficient and higher-fidelity Fatigue & Durability analysis
- Leverage integrated multibody-acoustics simulations to analyze radiation noise from Gear Transmission Case



Multidiscipline Engineering

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