

# Altair® RADIOSS™

A Complete Finite Element Solver  
for Structural Analysis

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## A Complete Finite Element Solver for Structural Analysis

Altair® RADIOSS™ is the premier finite element solver for linear and non-linear simulations. RADIOSS is used by top companies to simulate structures, fluids, fluid-structure interaction, sheet metal stamping, and mechanical systems. The robust, multidisciplinary solution allows manufacturers to maximize durability, noise and vibration performance, crashworthiness, safety, and manufacturability of designs in order to bring innovative products to market faster.

### Benefits

#### Scalability, Quality, and Repeatability

- RADIOSS multi-processor and multi-domain solutions offer extreme scalability to increase solution throughput in modern cluster and multi-core environments.
- The diagnostic capabilities of the solver provide unparalleled model debugging, leading to the accurate simulation of design behavior and making the simulation process less prone to modeling errors.
- Special provisions in RADIOSS guarantee repeatability of results regardless of the number of processors used in parallel computation.

#### Fast Computation Speed for Large Models

- Highly efficient solution algorithms for linear, non-linear, and modal analysis problems compared to conventional solvers.
- Using intelligent memory management, RADIOSS easily simulates structures with millions of degrees of freedom (DOFs) without any model size restrictions.

#### Accurate Results

- Modern element formulations eliminate errors often associated with bad modeling practices.

#### Cost-Effective NASTRAN Replacement

- The most popular linear analysis problems can be solved with RADIOSS.
- Deeply integrated in HyperWorks, RADIOSS increases end-user efficiency and significantly reduces corporate investments in third-party solver solutions.

#### Crash and Impact Solution

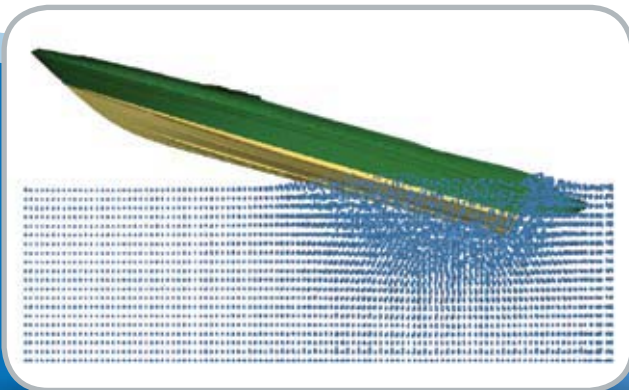
- RADIOSS has been a market leader in crash and impact solutions for over 20 years and continues to advance state-of-the-art technology to meet challenges in safety engineering for all industries.

#### Optimization Ready

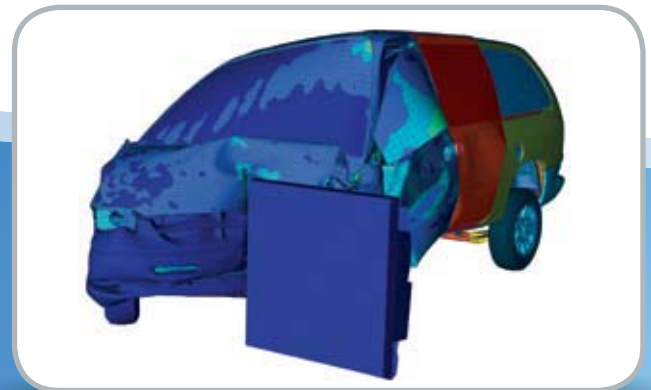
- Rapidly improve design performance by utilizing the leading-edge optimization solutions in OptiStruct on analysis problems.

#### Responsive Support Organization

- RADIOSS technical support is very responsive in reacting to user input. A rigorous quality assurance organization makes it possible to implement new features quickly and without regression in quality.



Smooth Particle Hydrodynamics (SPH) Analysis



Safety and Crash Evaluation

## Capabilities

RADIOSS has been an industry standard for dynamic loading simulation from crash to high-speed impact for over 20 years. Automotive and aerospace companies value the contribution it makes to understanding and predicting design behavior in complex environments. In recent years, through the addition of implicit finite element solver capabilities, RADIOSS has also become a widely used option for standard analyses and linear dynamics such as frequency response analysis.

### Solver Solutions

Finite element solutions in RADIOSS are:

- Linear static analysis
- Non-linear explicit dynamic analysis
- Non-linear implicit quasi-static analysis
- Normal modes analysis for real and complex eigenvalues
- Linear buckling analysis
- Frequency response analysis
- Random response analysis
- Linear transient response analysis
- Linear coupled fluid-structure (acoustic) analysis
- Linear steady-state heat transfer analysis coupled with static analysis
- Fatigue analysis
- Explicit Arbitrary Euler-Lagrangian (ALE) formulation
- Explicit Computational Fluid Dynamics (CFD)
- Smooth Particle Hydrodynamics (SPH)
- One-step (inverse) and incremental sheet metal stamping analysis

Innovative element formulations provide accurate and robust solutions. A complete set of elements including shell, solid, bar,

scalar elements, as well as rigid elements and bodies is available. A comprehensive collection of linear and non-linear material, failure and contact models is provided for modeling complex events.

Advanced composites modeling and simulation is leading the industry. External matrices may be used for modeling. Matrix generation is provided through static reduction and Component Modes Synthesis (CMS).

### Comprehensive Material Library

- Correlated material laws and rupture models include definitions for concrete, foam, rubber, steel, composites, biomaterials.
- Multiple failure criteria may be applied to any material.
- Crack propagations can be followed using an XFEM method.

### NASTRAN Environment Compatible

- Many RADIOSS solutions use standard NASTRAN type input syntax and write analysis results in both NASTRAN PUNCH and OUTPUT2 formats to support legacy models and compatibility within NASTRAN environments.

### Easy-to-Read Output File

- The RADIOSS output file contains clear and understandable warning, error, and information messages.

### Workload Management Interface

- Minimize job turn-around time by employing PBS Professional to efficiently schedule and manage RADIOSS compute workload on server infrastructures.

### Automated Robustness Studies and Design Optimization

- Easily perform optimization and robustness studies through RADIOSS's tight coupling with OptiStruct and HyperStudy.

### Safety

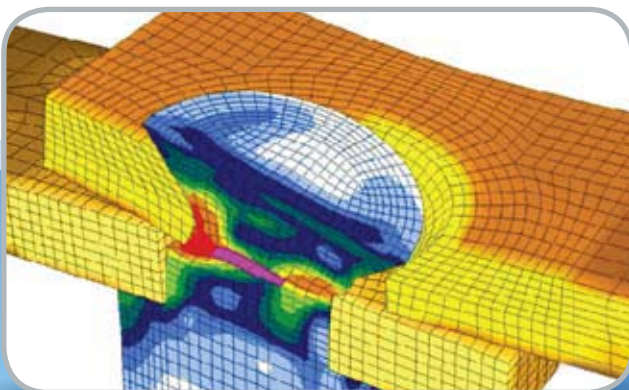
For vehicle occupant safety simulation RADIOSS has direct access to a large library of finite element dummy, barrier and impactor models. RADIOSS provides the most comprehensive toolset in the industry through partnerships with First Technology (FTSS) and TASS. In addition, the HyperCrash modeling environment provides outstanding support for automotive crash and safety simulation with RADIOSS.

### Mechanical Systems

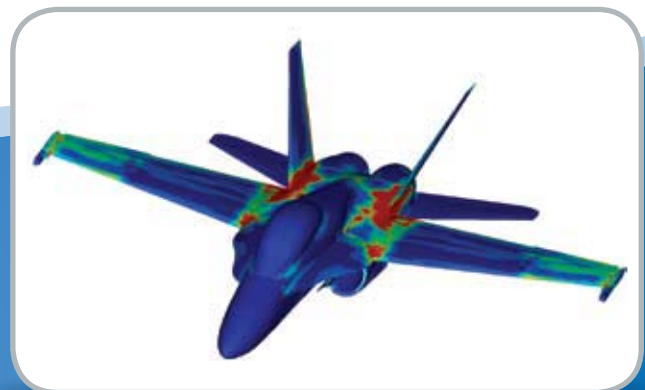
Dynamic mechanical systems simulation using rigid and flexible bodies is made possible through the integration with MotionSolve. The solutions include:

- Kinematics analysis
- Dynamics analysis
- Static analysis
- Quasi-static analysis
- Linearized solution

All typical types of constraints such as joints, gears, couplers, user-defined constraints, and high-pair joints can be defined and analyzed. High-pair joints include point-to-curve, point-to-surface, curve-to-curve, curve-to-surface, and surface-to-surface constraints as well as contact. They can connect rigid bodies, flexible bodies, or rigid and flexible bodies.



Correlated Material Law and Rupture Model Library



Stress Analysis



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