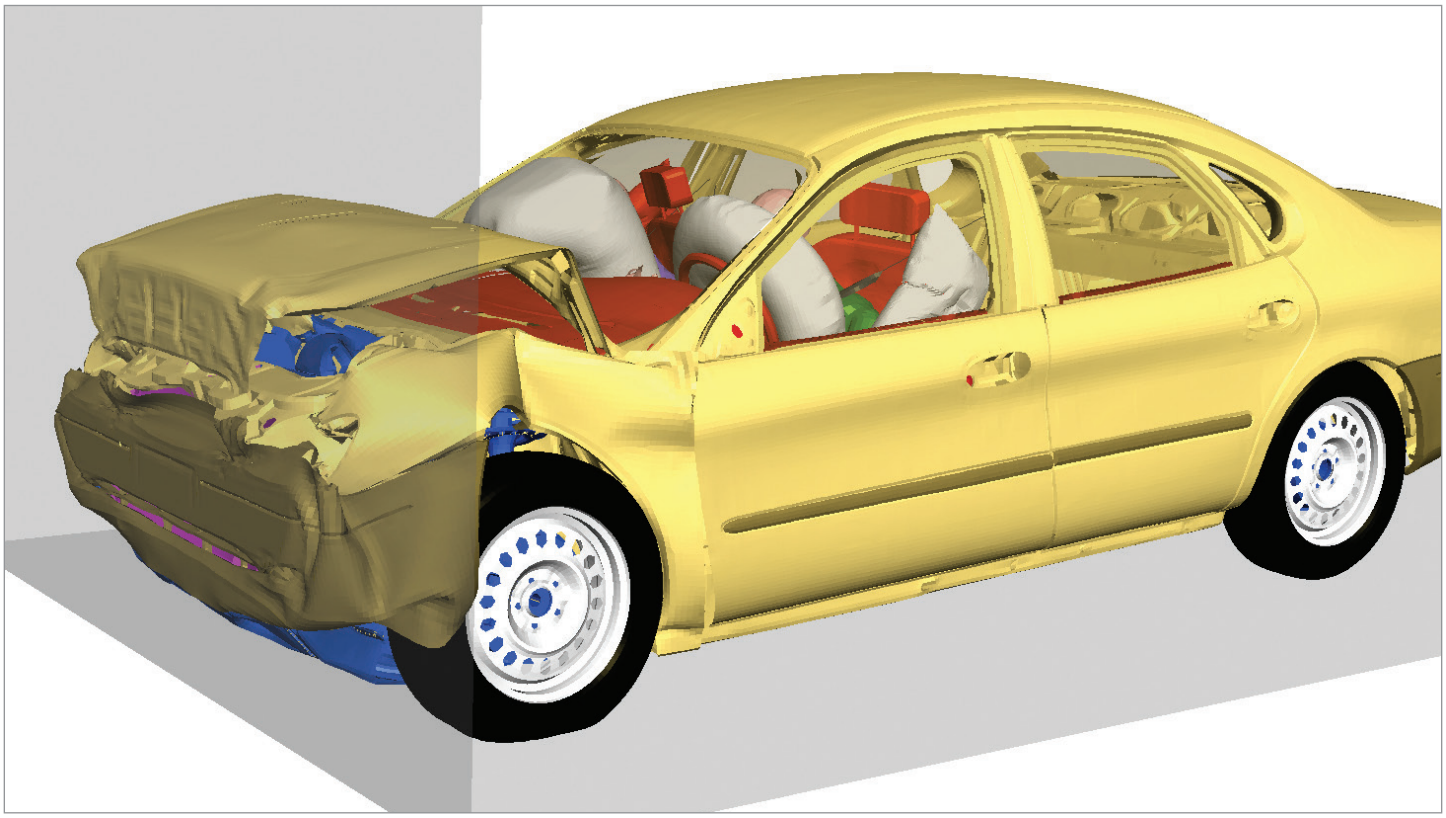
RADIOSS®

Altair | HyperWorks®



Altair RADIOSS is a leading structural analysis solver for non-linear problems under dynamic loadings. It is highly differentiated for scalability, quality, robustness, and consists of features for multi-physics simulation and advanced materials such as composites. RADIOSS is used across many industries worldwide to improve the crashworthiness, safety, and manufacturability of structural designs.

Product Highlights

- Best scalability for large, highly non-linear structural simulations
- Most complete material and rupture libraries
- Unique feature for accurate airbag simulations
- Rich multiphysics capabilities
- Wide offer of FE Safety models, dummies, barriers, and impactors

Learn more:
altairhyperworks.com/radioss

Benefits

Scalability, Quality and Robustness

RADIOSS' advanced multi-processor solution (Hybrid Massively Parallel Processing) has enabled the best scalability in the industry for large, highly non-linear structural simulation. Special provisions in the implementation guarantee full repeatability of results regardless of the number of computer cores, nodes, or threads used in parallel computation. Numerical scattering of results is highly minimized.

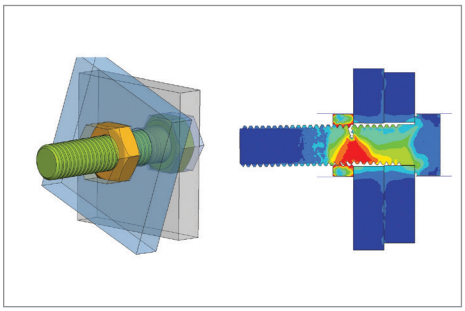
The use of Advanced Mass Scaling (AMS) and intelligent single precision calculation option increases simulation speed by orders of magnitudes while retaining the same accurate results. AMS provides an advanced and competitive solution for quasi-static problems, model with smaller mesh size locally. AMS is also an alternative to implicit non-linear simulation which has convergence problems due to high non-linearity in the contacts, complex material behaviors, or rupture modeling.

With RADIOSS' multi-domain approach, detailed and accurate analysis can be achieved with a significant elapse time decrease. The model is split into different domains which are computed with their own and adequate time step. Applications such as detailed meshed parts in a global structure, and ditching (fluid and structure in different domains) have big advantages with the RADIOSS multi-domain approach.

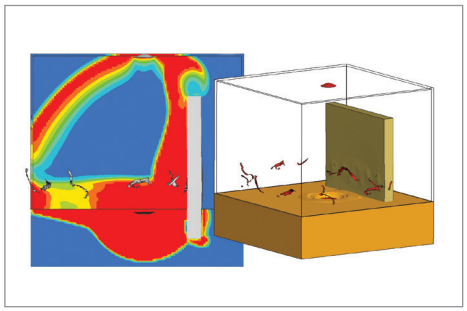
Industry Standard for Crash, Occupant Safety and Impact Analysis

For over 30 years, RADIOSS has established itself as a leader and an industry standard for crash, safety and impact analysis. The number of customers continues to increase at an impressive rate to include over 1000 companies worldwide, with 40% of these customers in the automotive industry.

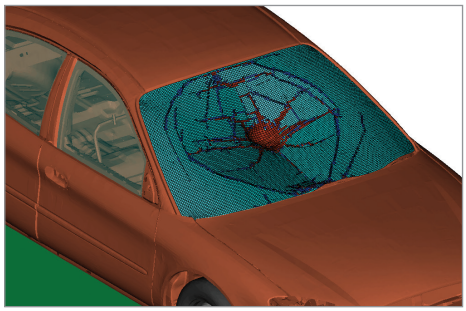
RADIOSS is ranked with a 5-star worthy crash code. Automotive and aerospace companies value the contribution RADIOSS makes in understanding and predicting



Bolt modeling with material failure



FSI application: Steel casing and concrete wall under explosion load (Fluid-structure Interaction)



Extended finite element method (XFEM) for simulation of glass damage

design behavior in complex environments such as automotive and aerospace crash and impact simulations.

RADIOSS has direct access to a large library of finite element dummy, barrier, and impactor models to perform vehicle occupant safety simulation. It provides the most comprehensive and high quality toolset in the industry through partnerships with leading crash and safety testing facilities and model providers.

In addition, Altair's HyperCrash® modeling environment provides outstanding support for automotive crash and safety simulation with RADIOSS.

Most Comprehensive Material and Rupture Libraries

RADIOSS has the most comprehensive material and rupture libraries with more than 300 combinations. A comprehensive collection of linear and non-linear material, failure and rupture models is provided for modeling complex events. Correlated material laws and failure criteria include definitions for concrete, foam, rubber, steel, composites, biomaterials, and more. Multiple failure criteria may be applied to any material. Crack propagation can be followed using an Extended Finite Element Method (XFEM) for multi-layer structures.

Advanced Multiphysics Simulation

Besides Lagrangian Finite Element technology, RADIOSS also uses other technologies such as Euler, Arbitrary Lagrangian Eulerian (ALE), Smoothed-Particle Hydrodynamics (SPH), and the Finite Volume Method (FVM).

With Euler, ALE and SPH formulations, RADIOSS enables Fluid-Structure Interaction (FSI) simulation taking into account multiple fluids. The innovative Finite Volume Method enables full FSI simulation of airbags in full car models with accuracy and speed.

Optimization Ready

Integration with HyperWorks makes RADIOSS a powerful design tool. Aside from modeling and visualization, RADIOSS models are ready for optimization. Advanced design optimization and robustness studies can be performed easily through Altair's OptiStruct® and HyperStudy® products to improve design performance. RADIOSS' high scalability, quality and robustness are essential for successful numerical optimization.

High Performance Computing

With a sophisticated customer base that values performance, reliability, safety, and innovation, the RADIOSS team is committed to supporting the most up-to-date, advanced computing architectures and integrating new technologies to improve performance, scalability, and usability. RADIOSS is leading the industry in understanding many of the state-of-art computing hardware's potential for powering complex simulation software applications and environments.

Features and Capabilities

Analysis Types

- Non-linear explicit dynamic or implicit structural analysis
- Lagrangian, Eulerian, and Arbitrary Euler-Lagrangian (ALE) formulation
- Finite Volume (FVM) based airbag simulation

RADIOSS' application areas include simulations of crash safety, drop and impact, blast and hydrodynamic impact, fluid structural interaction, terminal ballistics, hyper-velocity impact, forming, and composite mapping.

Main features

- 3D shell and solid elements
- Rigid bodies, bar and beam, and advanced springs elements
- Contact interfaces for structural, fluid and fluid structure interaction analysis
- Large material library with different failure models (XFEM), equation of State and thermal behavior
- All kinds of boundary conditions (imposed motion, imposed force and pressure, initial state, ...)
- Specific boundary conditions for fluids (inlet, outlet, silent, ...)
- Finite Volume (FVM) based airbag simulation with reversible flow vent hole
- Sensors, element activation or de-activation

Safety models

- Adult and child models for frontal, side, and rear impact (developed with Humanetics partnership)
- Pedestrian impactors
- Human dummy model
- Frontal, side, and rear barriers (developed with CELLBOND partnership)
- IIHS-RCAR Bumper Barrier