Altair® HyperCrash™
Crash and Safety Evaluation

Dummy positioning

Airbag folding

Review of material orientation check in an airbag model

Altair® HyperCrash is a highly tuned pre-processing technology specifically designed to automate the creation of high-fidelity models for crash analysis and safety evaluation. Through a comprehensive and procedure-oriented toolset, Altair® HyperCrash improves and simplifies the complex problems of creating a quality crash model.

Product Highlights:

- Pre-processor for creation of high-fidelity models for vehicle crash analysis and safety evaluation
- Management of highly complex models including submodeling and include files
- Dummy positioning, seatbelt routing, and seat deforming
- Airbag folding, including reference geometry generation
- Mesh quality module, model, and penetration checker

Benefits

- Reduce model assembly and loadcase set-up time from days to hours with advanced model management procedures
- Altair® HyperCrash has built-in solver rules to avoid modeling mistakes during creation of most entities
- Easily manage penetrations, intersections, model assembly contact management, and dummy positioning
- The Altair® HyperCrash database enables organizations to seamlessly support standard and proprietary corporate engineering procedures and data structures
- Altair® HyperCrash enables part replacement at all modeling levels – component, subsystem and complete assembly
- A generic data model simplifies and optimizes model creation and modifications

Capabilities
GUI
Altair® HyperCrash employs a modern graphical user interface (GUI) to provide streamlined processes for building com-plex crash simulation models. Users can visualize, organize, and manage all levels of modeling data and information with a point-and-click access to the tree-style model browser.

In addition, Altair® HyperCrash provides a fast intuitive toolset for preparation and set-up of analysis input decks.

Multiple Solver Support
Altair® HyperCrash is a multi-solver pre-processor with comprehensive inter-faces to Altair® Radioss™ and LS-DYNA. A huge library of dummies is supported. The model checker prevents user errors before the export of a model and numerous tailored panels help to set up models for both solvers. Altair® HyperCrash also has an interface to read and edit PAM-CRASH models.
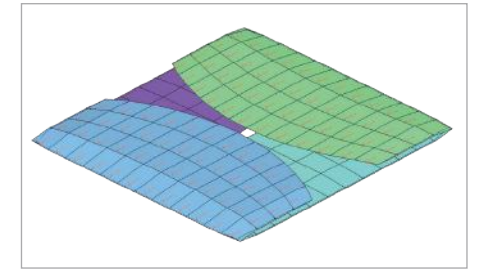
- Comprehensive support for over a thousand keywords
- Complete dummy positioning module
- Conversion between all supported solvers
- Belt systems
- Joints
- Connections
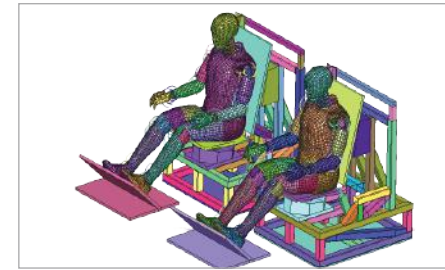
Mesh Editing And Model Connections
Users can modify and edit crash meshes from within Altair® HyperCrash or take advantage of the seamless integration with Altair® HyperMesh™. Dependencies like contacts, loads and boundary conditions will be updated automatically. Altair® HyperCrash also offers many methods and options for editing and tuning a mesh for a crash analysis:
- Adding, duplicating and moving nodes
- Finite element creation (1D, 2D, and 3D)
- Split parts or move elements from part to part
- Renumber selected entities, parts or the complete model
- Clean the model by removing unused entities
- Create, modify and check rigid bodies
  - Full support for connection types (Spotweld, Mastic, Adhesive, and more)
 - User defined connection representations

Safety Tools Module
This module provides a streamlined, user-friendly interface to set up, edit and define all safety-related characteristics for crash simulation and analysis. In addition to the standard set of safety tools, Altair® HyperCrash contains a unique seat-deformer utility that allows the seat foam – on both the lower and back of the seat - to be deformed based on the intersection between the dummy and the seat.

Safety features include:
- Dummy positioning
  - Interactively position dummy (torso, head, limbs)
  - Load and save dummy positions
  - Merge dummy in the model
  - Works with LS-DYNA & FTSS dummies
- Seat belt creation and routing
- Airbag toolset for creation and folding
- Seat deformer: Deform the seat automatically to remove the initial intersections with the dummy.

Mass Balance
The Mass Balance module completely manages the mass and inertia properties of each part as well as the entire crash model. After the masses are set for all parts and components, Altair® HyperCrash automatically balances the total mass of the model according to the mass on the front and rear tires. Altair® HyperCrash can display, check and report the center-of-mass locations for each part, rigid body and the complete model. The mass of each part can automatically be fitted to the mass of the CAD part.

Quality
The Quality module is a configurable and customizable set of utilities for evaluating the quality of a model by performing hundreds of different checks on the part, component and model level. A variety of checks are executed, ranging from simple element checks to part connectivity and modeling errors in the input deck. Users visually review the state of each check represented by status color (red, orange and green).
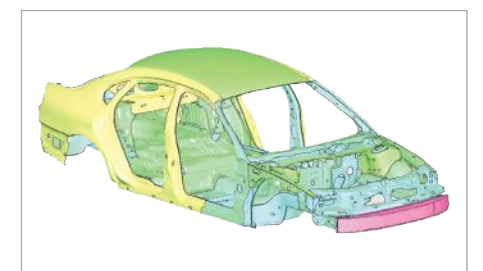
- Model Cleaner
  - Remove unused options
  - Check connectivity for failed welds, unconnected parts and topology of connected parts
  - Automatically remove initial penetrations

- Model Checker
  - Exercises hundreds of unique checks
  - Model robustness for crash-worthiness criteria
  - User-defined criteria checks and filters
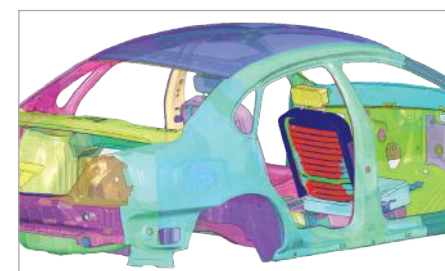
Contact status check based on solver algorithms
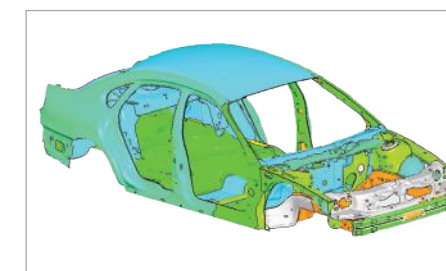
Thickness contour plot

Yield stress contour plot