



# HyperWorks®

A Platform for Innovation™



## Altair® HyperCrash™

Highly-Tuned Modeling Environment  
for Crash Analysis and Safety Evaluation

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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, HyperCrash improves and simplifies complex problems of creating a quality crash model.

## Benefits

- **Reduce Model Assembly and Load Case Set-up Time**

Go from days to hours with advanced model management procedures

- **Input Deck Conversion**

Easy migration between solvers while supporting legacy data

- **Fast, High-Quality Model Creation and Set-up**

Easily manage penetrations, intersections, model assembly contact management and dummy positioning

- **Capture and Re-use Corporate IP**

The HyperCrash database enables organizations to seamlessly support standard and proprietary corporate engineering procedures and data structures

- HyperCrash manages and automates all of the steps required to create crash and safety performance models

- **Database-Driven Part Replacement**

HyperCrash enables part replacement at all modeling levels – component, Sub-system and complete assembly

- **Fast and User-Friendly Model Building Environment**

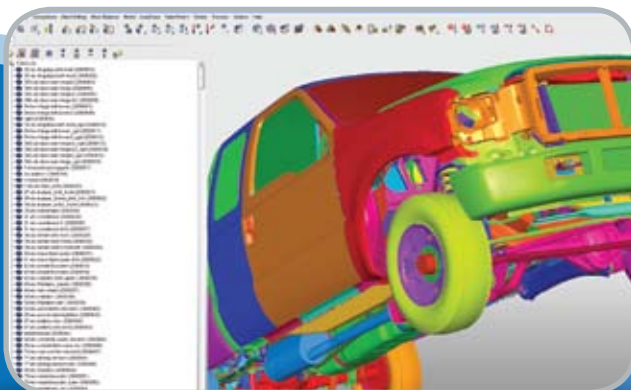
- A generic data model simplifies and optimizes model creation and modifications
- Interactive, hierarchical model and connection tree view streamlines model management

## Capabilities

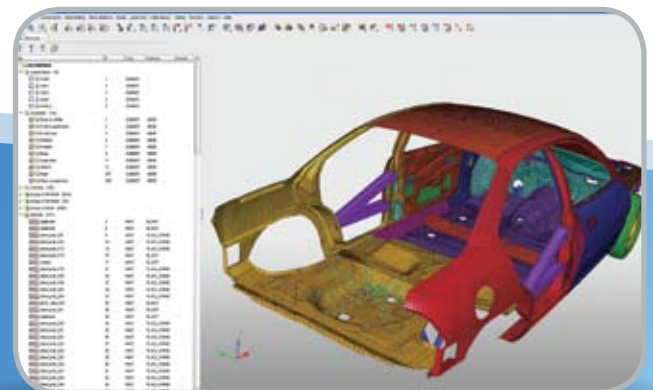
### GUI

HyperCrash employs a modern graphical user interface (GUI) to provide streamlined processes for building complex 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 browser. In addition, HyperCrash provides a fast and intuitive toolset for preparation and set-up of analysis input decks.

- Full access and control over all modeling entities through an intuitive model browser
- User profiles: tuning the interface based on solver and user requirements



Modern Graphical User Interface



Streamlined and Intuitive Model Browsing and Navigation

### Quality

The Quality module evaluates the quality of the 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
- Optimize model per solver

### Mesh Editing

Users can modify and edit crash meshes from within HyperCrash. There are many straightforward methods and options for editing and tuning a mesh for crash analysis. Mesh editing capabilities include but are not limited to:

- Adding, duplicating and moving nodes
- Create elements
  - 1D elements (spring, truss and beam)
  - 2D elements (shell)
  - 3D elements (brick)

- Create, modify and check rigid bodies
- Split parts or move elements from part to part
- Renumber selected entities, parts or the complete model
- Clean the model by removing unused entities

### 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, 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 / save dummy positions
  - Merge dummy in the model
  - Works with LS-DYNA & FTSS dummies
- Seat belts
  - Seat belt creator
  - Seat belt routing
- Airbag toolset
  - Create airbag
  - Folding airbag (Simple, Tuck-type, Double-Tuck, Superimposed Tuck)
- Seat deformer
  - Deform the seat automatically to remove the initial intersections with the dummy.

### Mass Balance

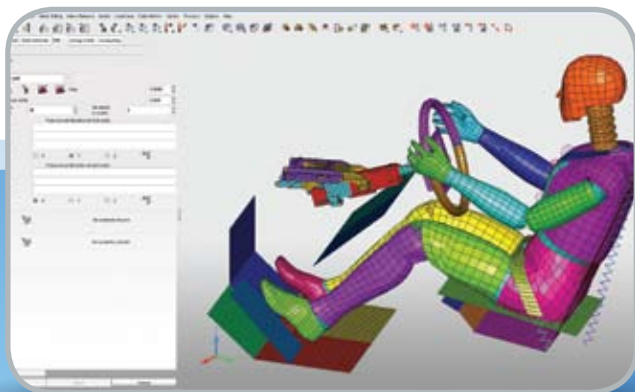
The Mass Balance module completely manages the mass and inertia properties of each part as well as the entire crash model. After the masses are set for all parts and components, HyperCrash automatically balances the total mass of the model according to the mass on the front and rear tires. Also HyperCrash can:

- Display the center-of-mass locations for each part, rigid body and the complete model
- Check and report the mass, inertia and center of mass location of each part, component and rigid body of the model
- Automatically fits the finite element model mass of each part based on the mass of the CAD part
  - Mass will be created if necessary

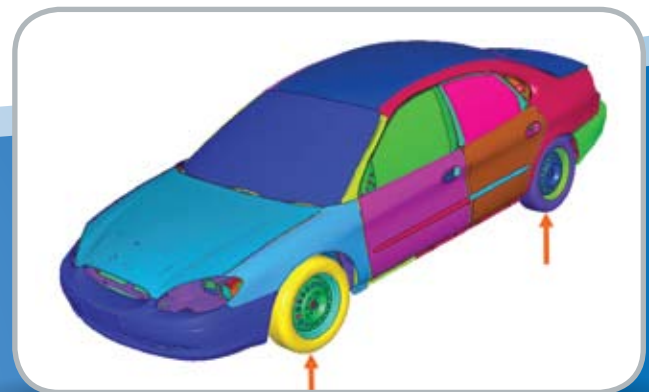
### Multiple Solver Support

HyperCrash includes support for LS-DYNA. This includes a LS-DYNA user profile that contains a series of highly intuitive features and utilities specifically tuned for users of LS-DYNA, such as:

- Complete dummy positioning module
- Belt systems
  - Retractors
  - Pretensioners
  - Slip Rings
- Friction
- Comprehensive support for hundreds of keywords



Comprehensive Library of Easy-To-Use Safety Tools



Advanced Mass-Balancing Module



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