

## Enjoyable Data Management – An Oxymoron?

J. Seybold

Altair Engineering GmbH

One of the grand challenges of today is to provide simulation data and process management (SDM or SDPM), which can easily be integrated in the current IT infrastructure and can directly be accessed from the CAE tools.

Many SDM implementations have shown that there are different key success factors for the simulation data management:

- All stakeholders the CAE users, management, and IT need to benefit from such a solution. Especially the acceptance from the CAE users working in the CAE tools in different departments is difficult to obtain and costly to implement, because they need a direct integration in their daily CAE tools. For this reason Altair provides HyperWorks Enterprise as part of the HyperWorks CAE tools to make SDPM enjoyable and natural.
- Development cost and implementation time needs to be reasonable low, so that the requirements for customers, the CAE tools and the CAE Best Practices are still the same.
- Integration into the IT infrastructure need to be easy and depending if the customer has a centralized or decentralize hardware and systems. This is challenging if the computing hardware and the workload management system are decentralized and the SDM system should be centralized, because then all results need to be moved over the network to the central location. For this reason, HyperWorks Enterprise enables decentralization of simulation and test data.

Because of these requirements to SDPM, Altair HyperWorks introduces a novel set of comprehensive Enterprise software modules, tightly integrated with the HyperWorks platform, making the CAE and test data management a natural and enjoyable experience. Altair HyperWorks Enterprise offers both the out-of-the-box on desktop level and a modern and web-based interface to access it across the entire enterprise.

HyperWorks Enterprise provides four independent but integrated modules to explore, capture, compute, and collaborate.

- The Data Manager explores your personal and team CAE data, interfaces with CAD/PDM systems, and manages the entire CAE and test lifecycle.
- A comprehensive process automation framework for CAE loadcase automation, process guidance, and process integration is provided by the Process Manager. It captures the best practices and automates the most tedious phases of the product development process and integrates enterprise workflow with desktop CAE processes.
- Get the most out of your HPC resources with the Compute Manager which allows simple, easy to use interface for submitting and monitoring CAE jobs.
- Establish a collaborative environment by exposing CAE and Test results in a secure and highly collaborative environment to the Enterprise by the Results Manager.

We present in the last chapter Customer Success Stories for HyperWorks Enterprise to show the benefits of the customers.

Dr.-Ing. Jochen Seybold  
Director Enterprise Solutions Technologies

Altair Engineering GmbH  
Calwer Straße 7  
71034 Böblingen, Germany

phone: +49(0)7031 6208-125  
mobile: +49(0)171 3782289  
fax: +49(0)7031 6208-99  
email: seybold@altair.de

# Enjoyable Data Management – An Oxymoron?

---

**Altair Engineering, Inc.**

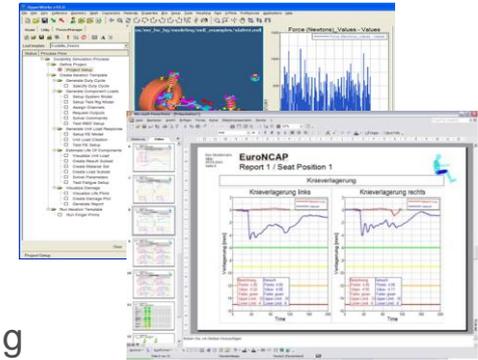
**9. LS-DYNA Update Forum 2010, October 12<sup>th</sup> 2010**

**Simulation Data Management SDM Session**

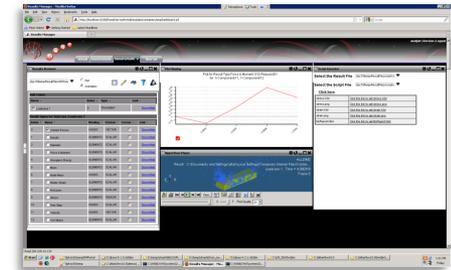
# Balancing Needs vs. Costs for all Stakeholders

## CAE users need to work in their CAE tools

- Usually data management is boring and unknown to CAE users
- HyperWorks includes Data Management to **explore** and **organize** data and to **connect** to PLM Systems
- Integrate both the Desktop and Enterprise for process automation
- Complete solution from preprocessing to solving and post processing
- Utilize already existing process automations in HyperWorks

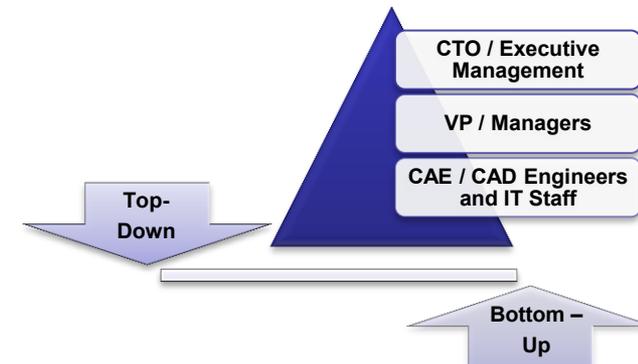


## Managers need decision support and want to see the current status of a development and need a collaboration platform for review meetings



## IT Balances between

- Compliant to the IT standards
- Dynamic, Open, Flexible, Modular for multi domain usage
- Connection to Enterprise Systems like PLM Systems
- Service Oriented Architecture
- Support decentralization
- Low costs and out-of-the box
- SDK Toolkit



# Explore, Organize and Connect in HyperWorks

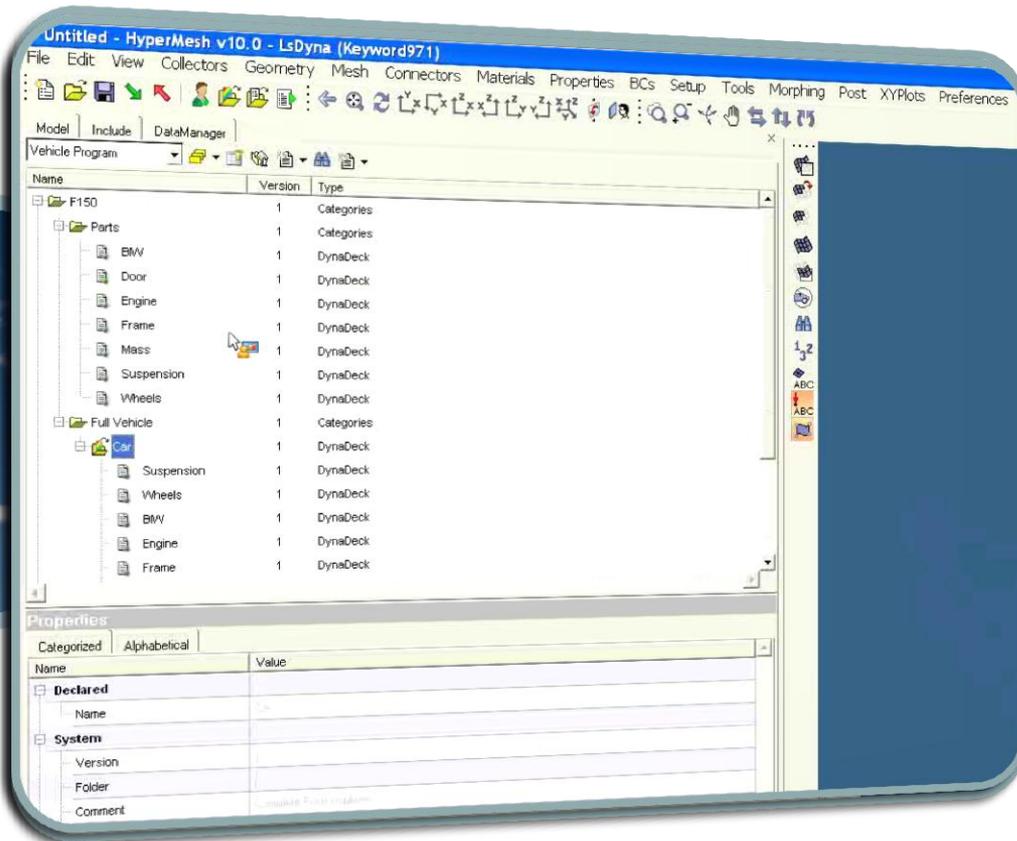
Index the CAE files on your local/shared Hard Drive

Filter and search for specific CAE metadata

Connect and get direct access to PDM Data store from HyperWorks Desktop

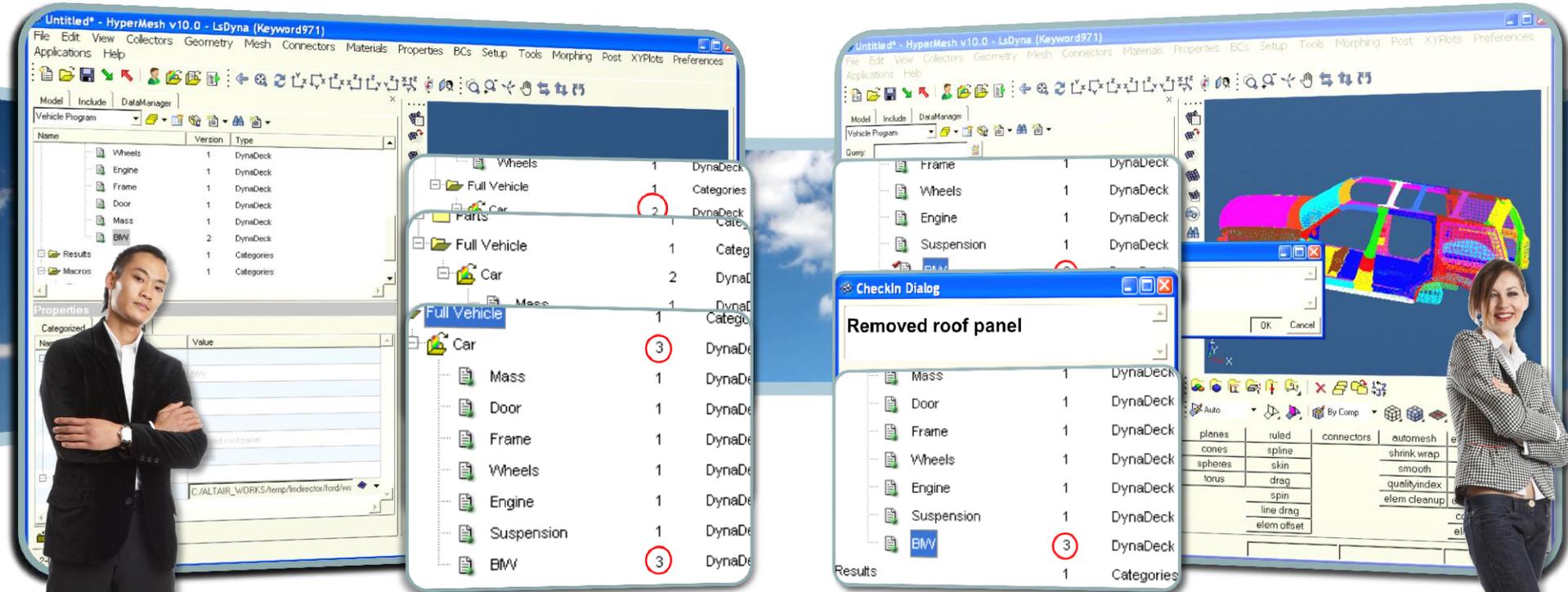
A local or shared CAE database to organize your data, track versions, manage variants

Data Manager to explore them in a user-friendly browser



# Collaboration between Persons or Teams

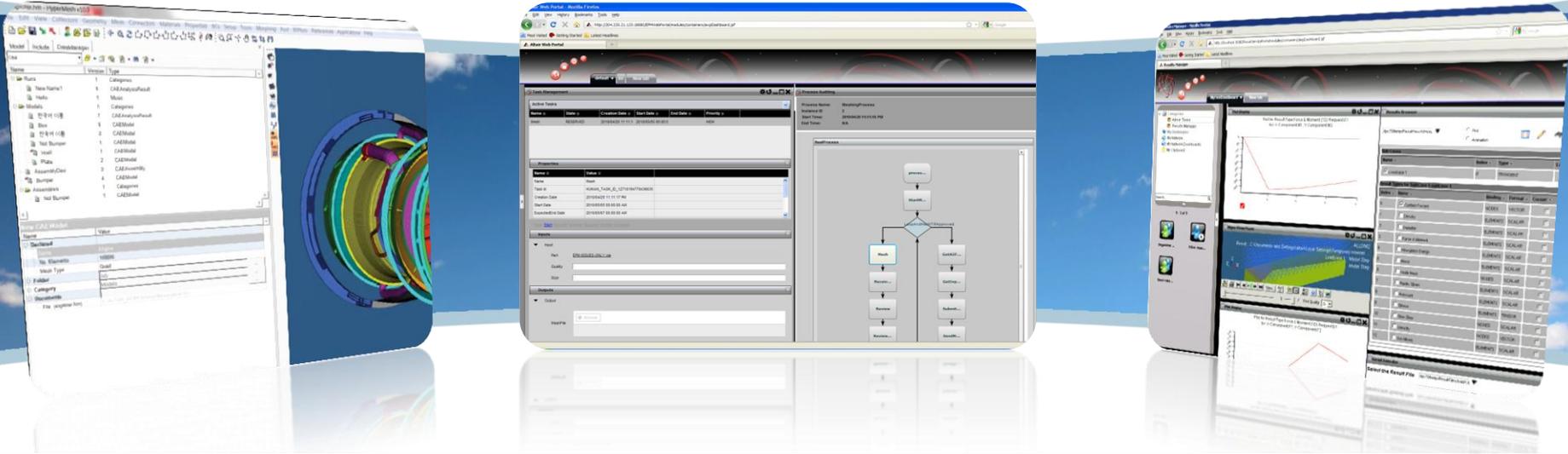
## Jason starts working on his Vehicle FE model pulling the information from the HyperWorks Data Manager



Manage Alternatives - Save Branch - Load Version - Metadata Traceability

# Novel **Enterprise** CAE in its Natural, Enjoyable Form

A collection of software modules tightly, seamlessly integrated with HyperWorks



## Data Manager

Personal and Enterprise CAE Data Management



## Process Manager

Capture and Automate CAE and Test Processes



## Compute Manager

Run, Monitor & Manage Your CAE Jobs



## Results Manager

Expose to the Enterprise Performance Results & Alternatives



## The right Functionality for the Right Purpose

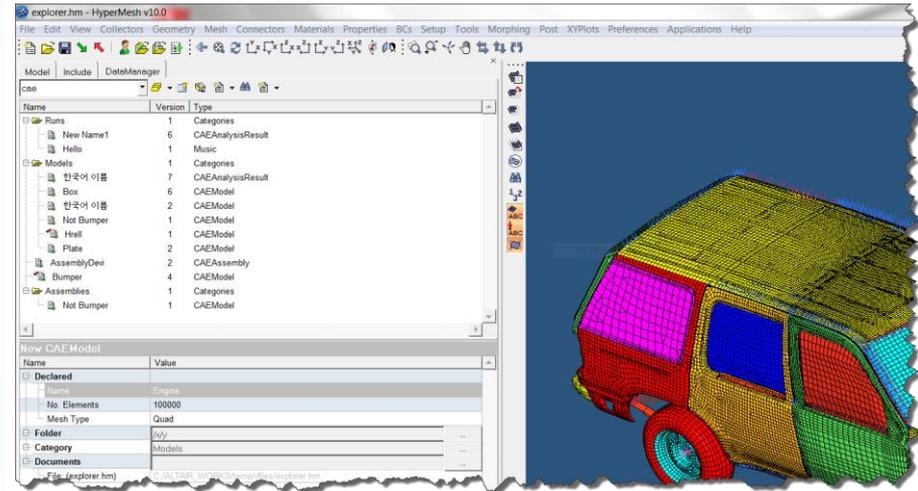
Bottom-up approach to satisfy the typical enterprise needs at different organizational level, providing the HyperWorks users a natural experience without forcing or confining them.



# A Natural and Enjoyable Enterprise User Experience

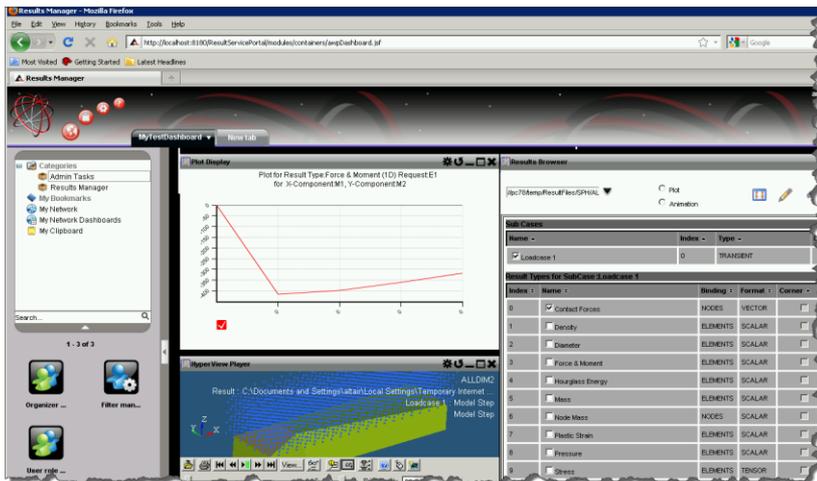
## Personal/Team Level

Tightly integrated into the HW panels  
Naturally bring enterprise capabilities  
into HyperWorks Desktop



## Enterprise Level

Web-based widgets to access to enterprise  
data everywhere, anytime  
The most natural, yet powerful data  
browsing

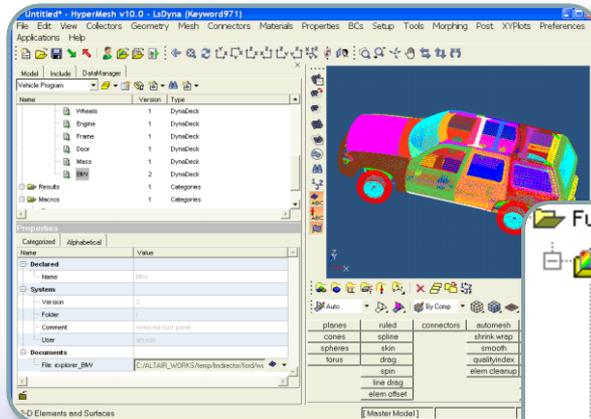


# HyperWorks Data Manager: Desktop

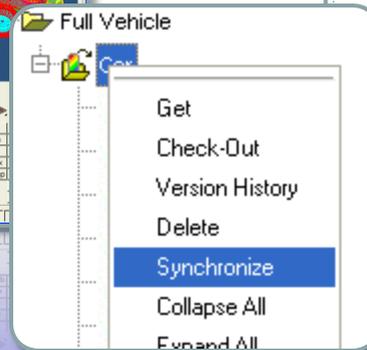


## Your Personal HyperWorks Data Manager

- Seamlessly integrated with HyperWorks Desktop
- Allows individual engineers to manage their projects easily
- Enables increased organization consistency



Wheels	1	DynaDeck
Full Vehicle	1	Categories
Car	2	DynaDeck
Mass	1	DynaDeck
Door	1	DynaDeck
Frame	1	DynaDeck
Wheels	1	DynaDeck
Engine	1	DynaDeck
Suspension	1	DynaDeck
BMW	2	DynaDeck
Results	1	Categories



BMW	2	DynaDeck
Results	1	Categories

# HyperWorks Data Manager: Enterprise



## Manage CAE Enterprise Information

- SOA architecture
- Connects engineering teams for data sharing
- Enables access to both private and public data sources
- Enhanced security level
- Allows for rapid dissemination of information through the extended enterprise

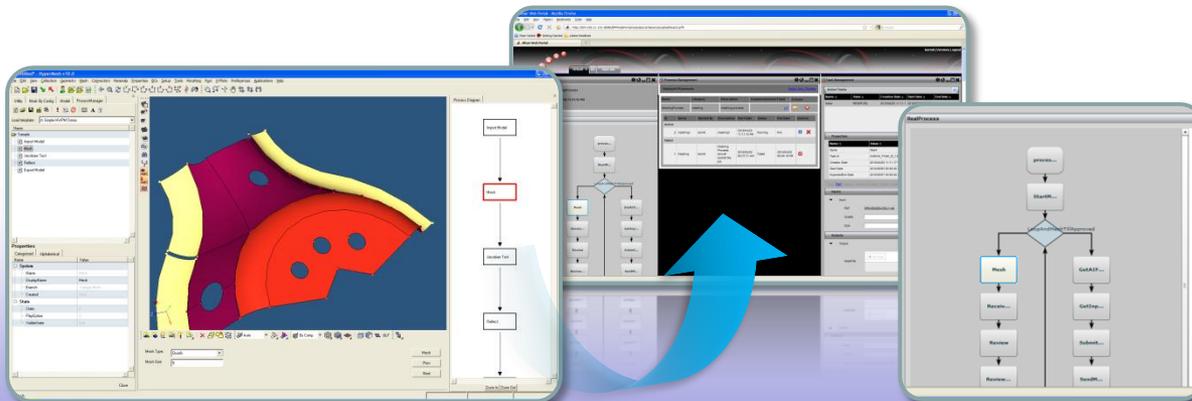


# HyperWorks Process Manager



## Capture CAE and Test Processes

- **Create, Edit & Review** processes in a graphical environment
- **Automate** desktop and enterprise processes by connecting with data, compute and results management services
- **Create standards-based process templates**
- **Integrate** desktop with enterprise workflows and 3rd party apps
- **Publish** processes and tasks for enterprise wide access



# Compute Manager **Powered by PBS Catalyst**



## Run, Monitor & Manage Your CAE Jobs

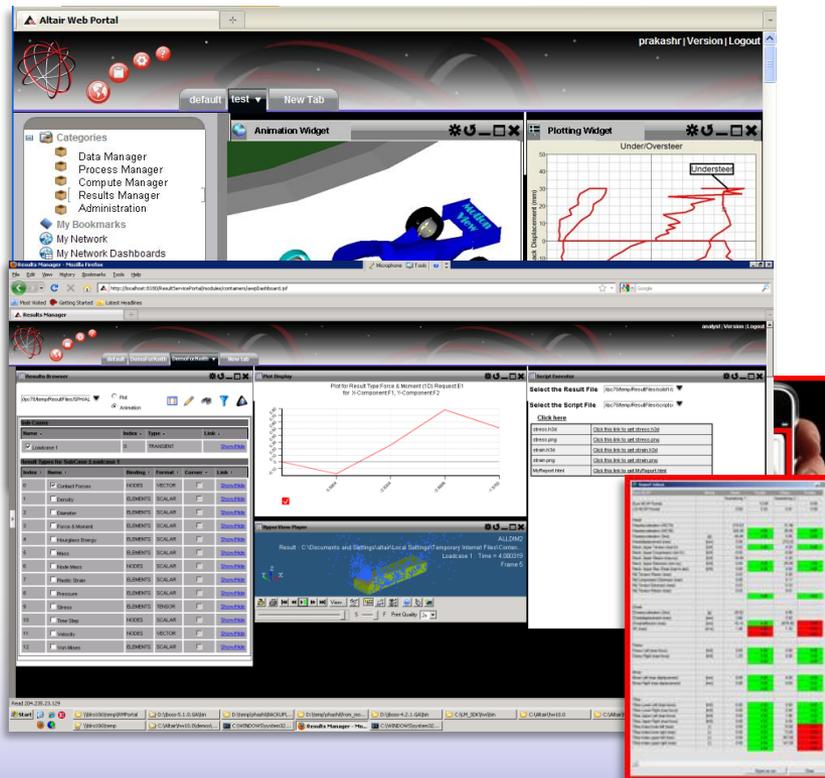
- **Virtualizes compute resources using thick and thin clients**
- **Tight integration to HyperWorks and other CAE solvers via application templates**
- **Seamless data transfer between local/remote machines and cluster**
- **Easily manage and monitor compute resources**



# HyperWorks Results Manager



## Expose to the Enterprise Performance Results & Alternatives



The screenshot displays the Altair Web Portal interface for HyperWorks Results Manager. The top navigation bar includes 'default', 'test', and 'New Tab'. The main content area is divided into several sections: a 'Categories' sidebar with options like 'Data Manager', 'Process Manager', 'Compute Manager', 'Results Manager', and 'Administration'; an 'Animation Widget' showing a 3D model of a car; and a 'Plotting Widget' displaying a line graph titled 'Under/Oversteer'. Below these, there is a 'Results Browser' table listing various results, and a 'Plot Viewer' showing a graph of 'Plot for Result Type: Force & Moment (CD) Request B1 for Component: 1, Component: 2'. A red box highlights a detailed view of a result file, showing a table of data with green and red cells.

- **Generate results on the server via web portal**
  - XY Plots
  - Animation
  - Tables
- **Graphical diagnosis of running jobs**
- **Publish and share reports**
- **Correlate CAE and test results**
- **Automated complex report generation**
- **Decision support post processing**

# An Affordable Solution for CAE Enterprise

**Based upon Altair's patented units-based licensing system**

“Level” your software license cost maximizing utilization and accessibility throughout the enterprise

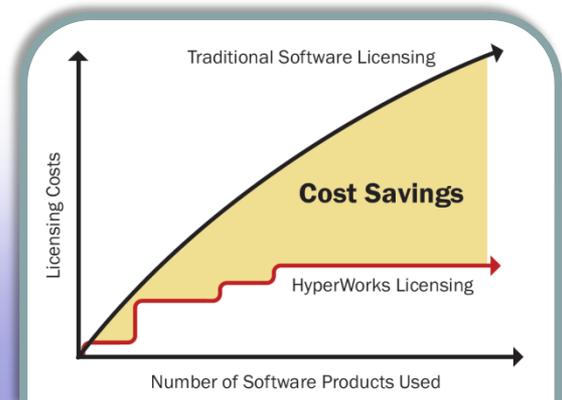
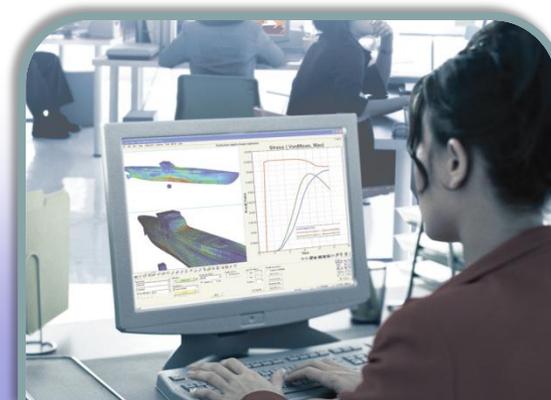
**Don't spend a penny to license the infrastructure, period.**

HyperWorks Enterprise draws ONLY the HWUs you actually use for the desktop services/web widgets for the time you use them

**Lowest “flat-rate” setup/installation cost (for the SOA services)**

A very affordable flat rate to be up and running in days, with no surprises

See CPDA article “Altair Slashes Price of Entry for SDM”



## Altair HyperWorks Enterprise Successes

# CASE STUDY

# HyperWorks Successes: CAD<sup>2</sup>CRASH



## Challenge:

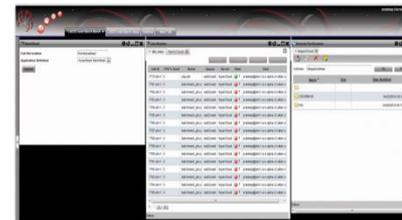
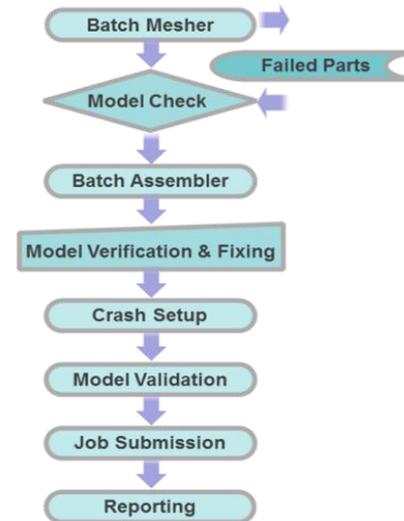
Compressing the time required to mesh, assemble and simulate a full- vehicle crash FE model starting from native CAD data to just 24 hours.

## Solution with HyperWorks:

- **10 h\_** Geometry cleanup, batch meshing, and assembling incl. Compute Manager
- **6 h\_** Preprocessing automation in Process Manager for connection, mesh quality check, and mass balancing
- **6 h\_** Compute Manager to submit and distribute batch meshing, batch assembling and solver for Frontal crash test simulation 65ms
- **2 h\_** Automated Report Generation

## Business Impact:

- Dramatically reduction of the modeling and simulation time of a BIW from weeks to 24 hours.
- Time compression and cost reduction



BIW meshed from CAD data provided by



IP, Powertrain, Front bumper, Seat assemblies, Tires, Suspension components meshed from a NHTSA model morphed to be assembled the model provided by Ford

Over 2000 Parts and 1000 Assemblies

Final Model : ~1M elements

### Loadcase

NCAP Frontal crash  
FTSS 50<sup>th</sup> percentile Hybrid III dummy  
IMM Airbag

### Materials

Ford materials used for the BIW and sub assemblies  
Generic materials for parts that were created by Altair

### Connections

BIW & Closures - spotwelds  
Bolts - rigid spiders



# Altair Innovation Intelligence

**Is Enjoyable Data Management still an Oxymoron?**

**Please visit our booth !**

**Our Mission is to innovate  
and to enable innovation  
for our customers**

**Thank you!**