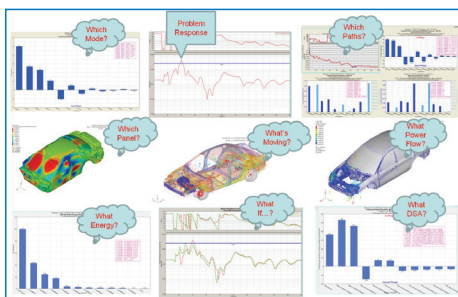
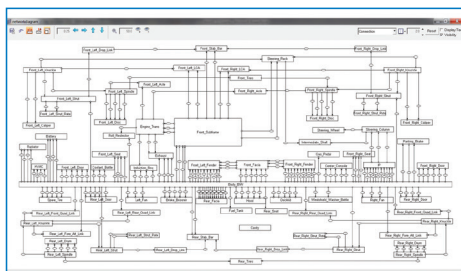


Cavity Mesher



Problem Diagnostics



Assembly Network

Altair Solutions for Structureborne NVH

Practical NVH functionalities that enable engineers to develop better products, faster

HyperWorks has a broad range of NVH functionality for NVH engineers, designed to reduce the simulation cycle time, freeing CAE engineers to focus on optimizing product design and performance. NVH Director (NVHD) is the first commercial software solution that makes full-vehicle NVH simulation possible in the most advanced and streamlined form.

Benefits

CAE that Drives Product Design

- Advanced analytical capabilities designed for effective upfront design support
- High efficiency features, allowing few engineers to support an entire vehicle platform
- Enable multiple discipline modeling and optimization framework
- Leverage mathematical cause-effect relations
- Generate physical root cause understanding
- Facilitate test-CAE correlations
- Identify sensitive parameters thru quick what-if studies
- Reduce testing by running many iterations in CAE
- Improve the value of testing by learning more in simulation

Technologies that Reduce Cycle Time

- New assembly environment enables a high level of automation
- Innovative approaches for component reduction – such as CMS SE and FRF
- AMSES eigensolver and FastFR Fast frequency response solution new
- Halves typical analysis time - response peak search enables diagnostic output in baseline run
- Integrated visualization - results served based on physical relationships
- Leaves more time for effective design optimization

True Full Vehicle Simulation Solution – NVH Director

- Facilitates modeling of all vehicle subsystems
- Trimbody
- Powertrain
- Suspension
- Steering system
- Torque paths etc.
- Directly simulates customer NVH experience
- Clear Identification & Ranking of source-path-receiver
- Helps understand noise/vibration energy transfer paths
- Directly drives physical prototype development

A Complete Set of NVH tools

- Low frequency – modal alignment and contribution analysis
- Mid frequency – transfer path, point mobility, and panel analysis
- Effective isolation
- Mass damper and tuned mass dampers
- Mastic or beads on panels
- Optimization

Capabilities

Modeling

- Batch meshing
- Acoustic cavity meshing
- Coarse display meshing
 - Support plate PLOTELS – PLOTEL3 and PLOTEL4
- Templated lumped parameter models
- Joints modeling using enhanced CBUSH
- NVH local coordinate systems **NVHD**
- Templated loadcase creation **NVHD**
- Door seals and windshield bonding
- Mass trimming
- Subsystem model preparation **NVHD**
 - Add spider
 - Add plotel
 - Repositon/re-orient
 - Assign damping

Assembly

- Representations **NVHD**
 - Multiple representations (FE/Modal/FRF)
 - Seamless switching for usage based on needs of analysis
 - Representation design updates
- Visual display **NVHD**
 - Network view of assembly **new**
 - Switch between full/coarse mesh display
 - Full show/hide/isolate/find unattached capabilities
 - Multiple display modes for tagpoints
- ID management **NVHD**
 - Validate ID range assigned to each subsystem to ensure it is not in conflict
- Event simulation management **NVHD**
 - Manage multiple loadcases to ensure consistency
 - Created and submit analysis jobs
- Job management **NVHD new**
 - Keep track of all previously created jobs

- Quickly compare results from different iterations
- Leverage model and assembly data for post-processing
- Assembly data xml file **NVHD**
- Assembly information can be saved in sub-xml files
 - Allows sub-assemblies be owned by responsible activities
 - Enables quick sub assembly update
 - Complex joint modeling

Loadcase Setup

- Frequency response process managers
 - Normal modes
 - CMS SE generation
 - Unit input frequency response
 - Random frequency response
 - General frequency response

Solution

- Feature rich NVH solver (OptiStruct)
- Response Peak search enables diagnostic output in baseline run
- Advanced Dynamic Reduction Techniques
 - CMS Superelement (free, fixed, and mixed boundary)
 - CDS Superelement (FRF based)
- Support for full featured CBUSH element with mass properties, rigid dofs, and frequency dependent property etc.
- Most complete diagnostic outputs:
 - Modal participation
 - Structure and fluid grid participation
 - Automated, one-step, TPA **new**
 - Energy – all varieties
 - Simplified design sensitivity output **new**
 - Grid point forces
 - Powerflow/Mech. Intensity
 - Equivalent radiated sound power (ERP) **new**

Post-Processing and Diagnostics

- Innovative approach for serving results based on physical relationships
- A full set of integrated post-processing utilities
 - Modal/Panel participation
 - Grid participation
 - Energy distribution new
 - Transfer path analysis
 - Design sensitivity new analysis
 - Oder analysis
- Response study – investigate effects of varying modal, grid participation, transfer function, force, etc
- Integrated diagnostics utility makes problem diagnostics very easy to use **NVHD**

Optimization

- Identify top sensitive design variables thru post processing and sensitivity analysis
- Use reduced component representations for non-design areas
- Size, shape, topology, topography optimizations
- Exterior field response optimization using response transfer function

NVH Director solution offering **new**

- To ensure customers' successful implementation, the advanced features in NVH Director are packaged with services
- Training:
 - Instructor-led class
 - Tailored course and workshop
 - On-site expert help and mentoring
- Customization
 - General requests, such as job submission or automated reporting
 - Special requests
- Project engagement
 - Engage Altair ProductDesign NVH experts to execute a customer project



Altair Engineering, Inc.
1820 E. Big Beaver Rd. Troy, MI 48063-2031 USA
Phone: +1.248.614.2400 • Fax: +1.248.614.2411
www.altair.com • info@altair.com

For more information about NVH Director and other Enterprise Solution Offerings, contact us at info@altair.com

Altair's Enterprise Software and Solutions division helps companies to solve business and engineering problems at the desktop, team and enterprise levels. We work closely with our clients to increase organizational efficiency and decision-making by building solutions that are tailored to their unique environment and processes. These solutions include: cloud-based simulation and high-performance technical computing, CAE workflow automation, and specialized data analytics applications.