

NVH Director

A True Full Vehicle Simulation Solution that Enables Engineers to Develop Better Products, Faster



NVH Director is a fully integrated, user-friendly, and customizable solution for optimizing product design and performance. This is achieved by automating complex NVH modeling tasks while reducing solution and problem diagnosis times.

Benefits

True Full Vehicle Simulation Solution

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

Technologies that Reduce Cycle Time

- New assembly environment
- Innovative approaches for component reduction – such as CMS SE and FRF
- Interface with AMLS and FastFRS to reduce solution time
- 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

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

CAE that Drives Product Design

- 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

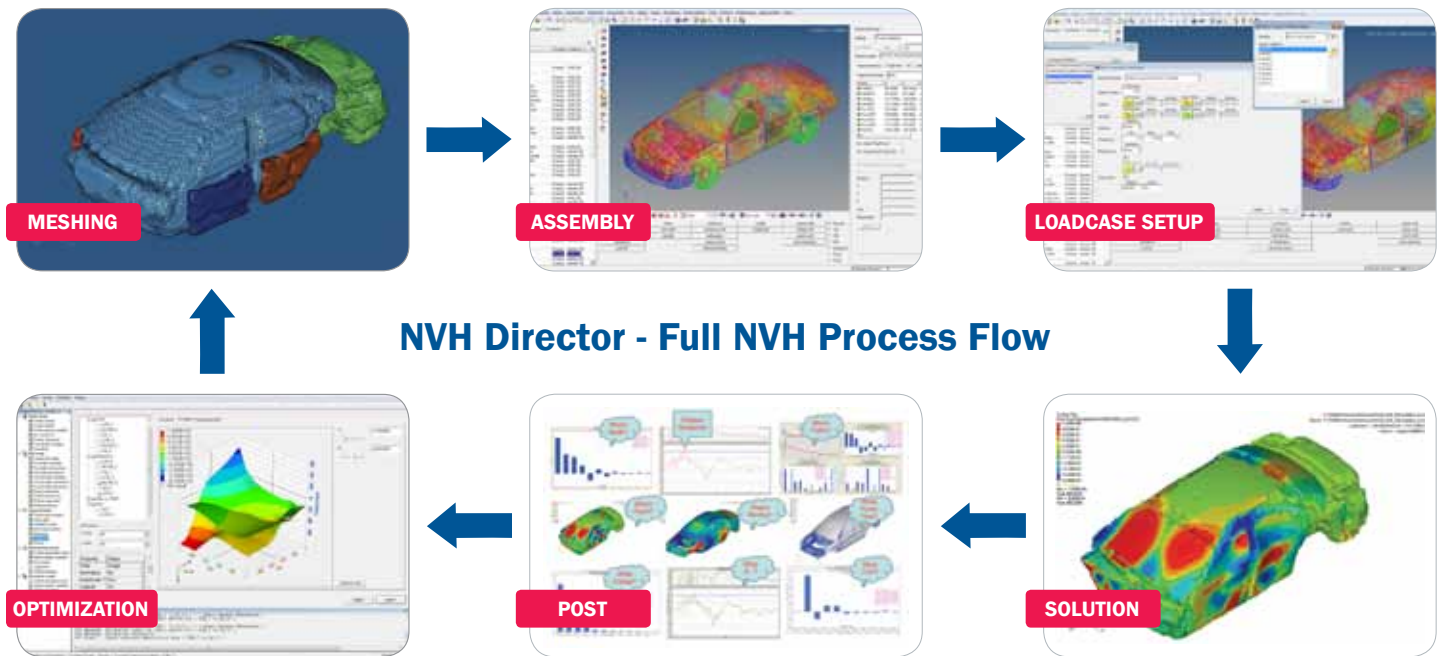
Capabilities

Latest Technologies for Superior User Experience

- Browser technology
 - Data views, context menu, show/hide, interactivity with 3-d window
- Connector technology
 - Multiple property sets, checking thru realization
- Data manager technology
 - Link to PLM system for geometry and non-geometry CAD data
 - Assembly definition xml database
- Process manager
 - Guided loadcase setup
- Object oriented assembly environment
 - Modularized model management

Modeling

- Batch meshing
- Acoustic cavity meshing
- Coarse display meshing
 - Support plate PLOTTEL3 and PLOTTEL4
- Templated lumped parameter models
- Joints modeling using enhanced CBUSH
- NVH local coordinate systems
- Templated loadcase creation



- Door seals and windshield bonding
- Mass trimming
- Subsystem model preparation
 - Add spider
 - Add plotel
 - Re-position/re-orient
 - Assign damping

Assembly

- Representations
 - Multiple representations (FE/Modal/FRF)
 - Seamless switching for usage based on needs of analysis
 - Representation design updates
- Visual display
 - Switch between full/coarse mesh display
 - Full show/hide/isolate/find unattached capabilities
 - Multiple display modes for tagpoints
- ID management
 - Validate ID range assigned to each subsystem to ensure it is not in conflict
- Event simulation management
 - Loadcase and Analysis object management
 - Job submission and job history object management
- Leverage model and assembly data for post-processing

- Assembly data xml file
 - 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
- Enable multiple discipline modeling and optimization framework

Solution

- Feature rich NVH solver (Radioss)
- AMSES (Automatic Multilevel Substructuring Eigen Solver)
- 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, etc.
- Most complete diagnostic outputs:
 - Modal participation
 - Structure and fluid grid participation
 - Energy – all varieties
 - Grid point forces
 - Powerflow/Mech. intensity

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
 - Transfer path analysis
 - Order analysis
- Response study – investigate effects of varying modal, grid participation, transfer function, force, etc

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



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