

NVH & INTERIOR ACOUSTICS ANALYSIS

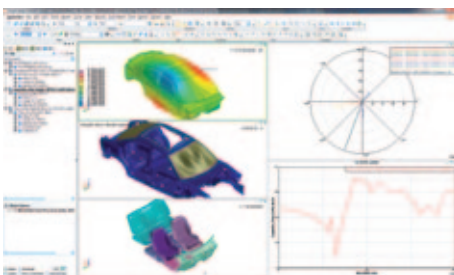
FOR AUTOMOTIVE

KEY BENEFITS

- A dedicated integrated solution for durability, NVH and interior acoustics,
- A single core data model to run all performance tests and for multi-domain optimization,
- Unique coupling of nonlinear Finite Elements and multi-body analysis,
- Increased performance by making optimal use of advanced numerical methods and hardware,
- Improved accuracy as manufacturing and assembly effects are taken into account,
- Full vehicle simulation.



Eigen frequency car suspension.



Dedicated environment for NVH & interior acoustics.

For automotive OEMs and suppliers, Virtual Performance Solution provides a dedicated simulation framework for noise, vibration and harshness (NVH), strength, durability and interior acoustics simulation. Combining implicit and explicit technologies, independent or chained, a single core model is used for a broad range of load cases to address both standard and high end engineering challenges.

ESI's solution for NVH & interior acoustics includes an intuitive and open user environment: Visual-Environment, which also supports third party solvers.

Users can address NVH problems, ranging from driving point responses, transfer functions of car bodies, torsional vibrations in the crankshaft, to break squeal and interior acoustics.

IMPLICIT NVH & INTERIOR ACOUSTICS

LINEAR PERTURBATION RESPONSE OF MECHANICAL SYSTEMS

ESI's offering for implicit NVH simulation includes Eigen mode analysis, harmonic and transient response, as well as acoustics analysis.

Implicit NVH simulation delivers significant advantages over conventional methods with a true single core data model, reducing the effort to generate NVH models out of existing crash models (explicit): large models are calculated in DMP (distributed memory parallel) mode, allowing to keep the model in core, and dramatically reducing time spent on input/output. Virtual Performance Solution also enables multi-domain optimization by chaining implicit and explicit results in a single core model.

Automotive engineers can predict effects on the structure from manufacturing (forming history) all through to testing (dynamic behavior).

Acoustics analysis can be performed as well by predicting the response of vibro-acoustics interior problems where porous elastic materials such as foams play a role. The interior acoustics module features an automatic algorithm to couple air and structure, represented in a modal way.

Porous elastic materials which consist of multiple layers of foam and septum, are mapped on the structure either glued or sliding. Typical outputs like sound pressure levels or panel participation factors, and nodal responses on the structure such as displacements, velocities and accelerations, as well as energies in parts allow the user to make design changes on the structure and on the acoustic trim.

In addition, Virtual Performance Solution can model the acoustic trim entirely with poro-elastic materials, generating realistic responses. The trim is coupled automatically to the structure and the fluid.

EXPLICIT NVH

MOTION AND DYNAMICS OF MECHANICAL SYSTEMS

Virtual Performance Solution can also evaluate the motion and dynamics of mechanical systems, with optional nonlinearities such as contacts and material nonlinearity.

By integrating multi-body dynamics and Finite Elements, engineers can evaluate the product real life performance at every stage of the design process. In addition, Virtual Performance Solution addresses detailed dynamic durability and strength problems with fully flexible nonlinear parts and analytical 3D contacts. Thus stresses and kinematics are simulated with realistic physics, for example within bearings and spur gears.

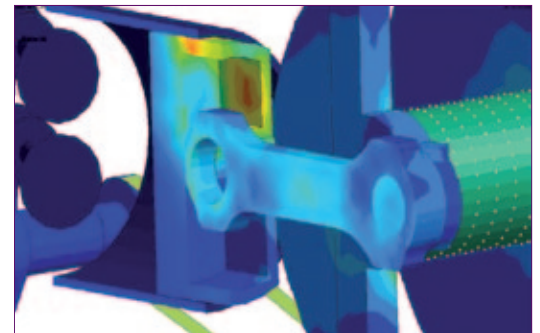
Users can chain different load cases and use the results as loading conditions for further analysis. Manufacturing results, such as residual stresses or hardening effects from heat treatment in prior production processes can be included as initial conditions for the simulation of dynamic stresses.

All solvers within Virtual Performance Solution share the same core data model, reducing model generation time and increasing quality and productivity. They are also all supported by Visual-Environment, a common dedicated user environment.

Parallelization capabilities of Virtual Performance Solution ensure short iteration cycles on real life models and keep the abstraction level to a minimum. This leads to highly accurate results.



Motorcycle motor dynamics performance.



Focus on the motorcycle crankshaft, track rod and piston.

For more information, visit: www.esi-group.com/virtual-performance-solution

ABOUT ESI GROUP

ESI is a pioneer and world-leading provider in virtual prototyping that takes into account the physics of materials. ESI has developed an extensive suite of coherent, industry-oriented applications to realistically simulate a product's behavior during testing, to fine-tune manufacturing processes in accordance with desired product performance, and to evaluate the environment's impact on performance. ESI's solutions fit into a single collaborative and open environment for End-to-End Virtual Prototyping, thus eliminating the need for physical prototypes during product development. The company employs over 750 high-level specialists worldwide covering more than 30 countries. ESI Group is listed in compartment C of NYSE Euronext Paris. For further information, visit www.esi-group.com.



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