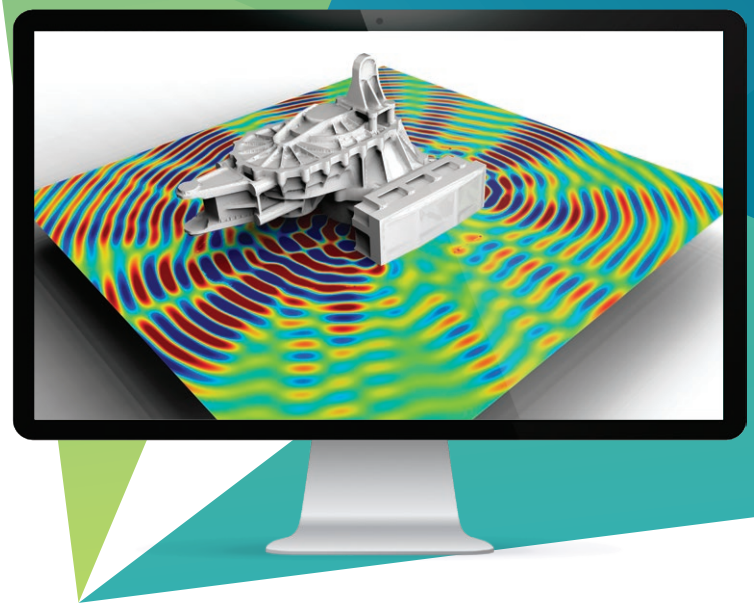
HEXAGON

NVH Simulation

End-to-end NVH simulation, from ePowertrain to full vehicle across the whole frequency spectrum



High-accuracy noise, vibration and harshness (NVH) analysis is crucial for meeting NVH targets and shortening the development and verification cycle. Balancing powertrain performance with quietness of the cabin interior, masking tire and wind noise to provide a superior ride quality are just a few examples of the challenges that eMobility brings.

The wide frequency spectrum where the vehicle must showcase excellent NVH performance requires engineers to adopt a variety of solutions and materials, each designed for a specific frequency range and noise source.

Hexagon's end-to-end solution for NVH features industry-standard tools that allow engineers to optimise the structural behaviour (vibrations), encapsulate noise sources (acoustic materials) and reduce the emission levels of the powertrain (gears and bearings).

Benefits

- **Accuracy and speed**
  State-of-the-art solvers like ACMS and MUMPS, combined with solver optimisation and HPC-readiness, can provide superior accuracy with low turnaround times for all problem sizes.
- **From low to high frequencies**
  Explore the whole frequency range efficiently with classic FE methods for the low frequencies and Virtual SEA for the high frequencies, with minimal effort for subsystem creation.
- **Component to system**
  Evaluate NVH performance both at the component and system level, reducing surprises that come from integration of the component to the system.
- **Vertical applications**
  End-to-end solutions to specific applications with domain expertise built-in, such as electric motor noise, damping pad positioning and pass-by noise, reducing friction between different departments and allowing engineers to do fast what-if analyses with minimal expertise.
- **Openness and partner ecosystem**
  All tools can import and export files from various 3rd party tools, allowing the solution to fit easily within existing processes. A vibrant ecosystem of partners exists to cover topics such as simulators, testing, materials, electromagnetic motor simulation, cloud simulation and more.
- **Customisation and Automation**
  Powerful APIs based on Python enable easy customisation and automation via workflows, wizards and scripts.

Optimal NVH designs for lighter and more comfortable vehicles with end-to-end NVH simulation with MSC Nastran, Actran, Adams, Romax and Cradle

Electric Powertrain NVH

- Predict complete ePowertrain NVH behavior for the complete frequency range
- Predict gear and electric machine noise and vibration from the early stages of design
- Enable electric motor engineers to accurately evaluate NVH performance
- Design and optimise covers to control radiated noise

Interior comfort in the entire frequency spectrum

- Accurately represent body response, including acoustic treatments to structure-borne and airborne excitations up to 1kHz
- Capture high-frequency performance starting from FE model with Virtual SEA
- Optimise the acoustic and damping treatment performance
- Assess leak effects on interior noise

Wind Noise and HVAC Noise

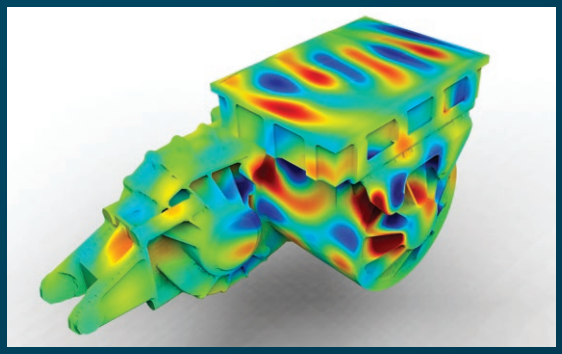
- Accurately evaluate interior and exterior noise due to aeroacoustic sources
- Fast and reliable relative design comparisons
- Assess Transmission through window and seals, and evaluate acoustic treatments with strong vibro-acoustic coupling

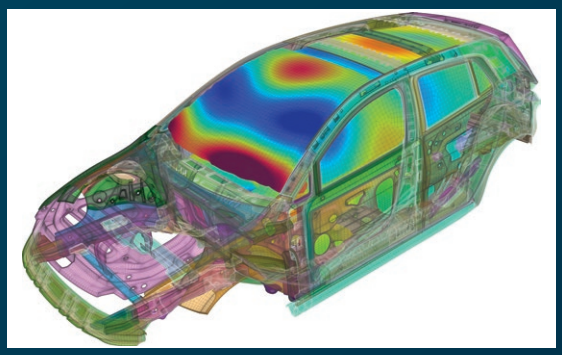
Pass-by noise and pedestrian alert systems

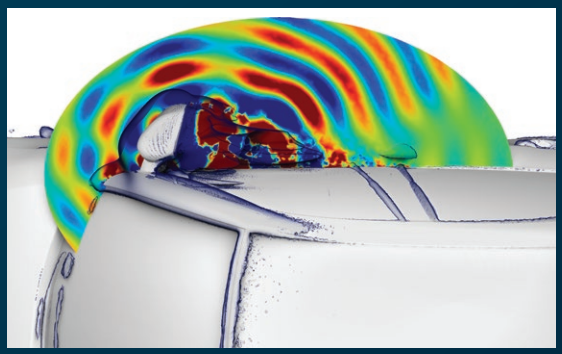
- Fast and accurate exterior acoustic simulations for pass-by noise and AVAS
- Dedicated workflow for streamlined source-transfer function recombination
- Select the right speaker and the right integration for the best performance in pedestrian alert (AVAS) systems

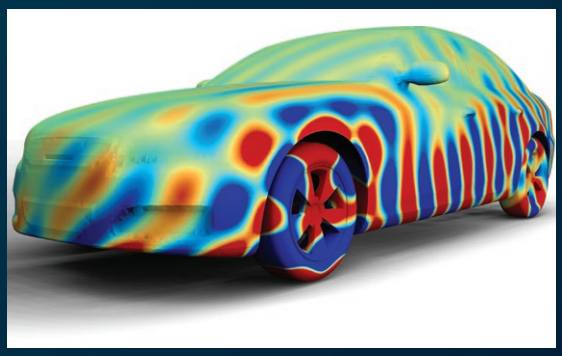
Partner ecosystem

- Take advantage of the complete Hexagon CAE portfolio through MSC**One**
- Save time for your simulations by running them through our cloud partners: Rescale, Azure, AWS
- Leverage our partnerships with leading providers of electric motor simulation and testing, acoustic packages and NVH testing and driving simulators









Hexagon is a global leader in digital reality solutions, combining sensor, software and autonomous technologies. We are putting data to work to boost efficiency, productivity, quality and safety across industrial, manufacturing, infrastructure, public sector, and mobility applications.

Our technologies are shaping production and people-related ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon's Manufacturing Intelligence division provides solutions that use data from design and engineering, production and metrology to make manufacturing smarter.

Learn more about Hexagon (Nasdaq Stockholm: HEXA B) at **hexagon.com** and follow us **@HexagonAB**.