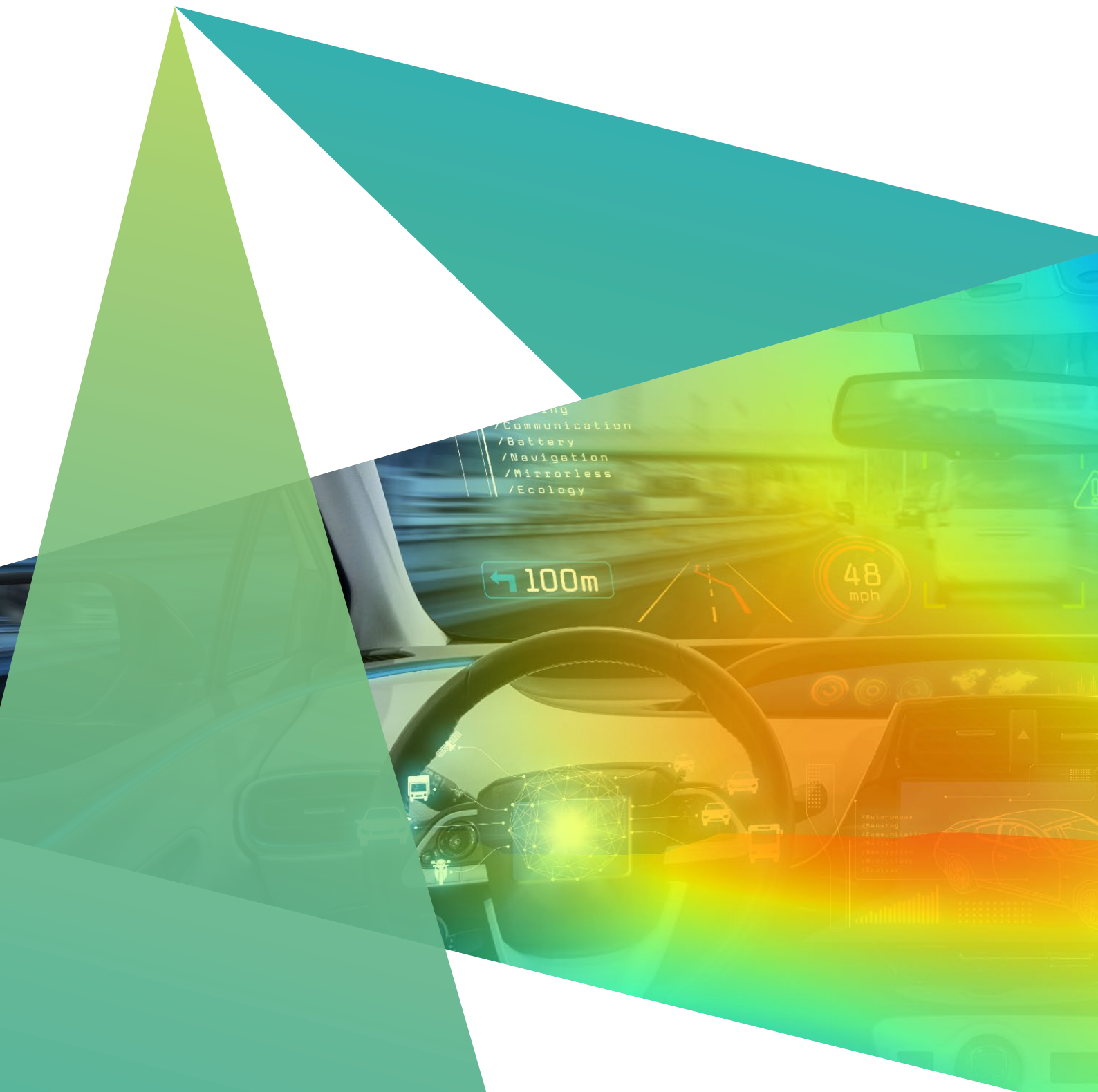# Actran Vibro Acoustics

Ideal tool for vibro-acoustic simulation

Product overview

A complete, robust and highly performant vibro-acoustic CAE module

Actran VibroAcoustics provides a rich library of structure materials, elements, loads, boundary conditions, solution schemes, solvers and interfaces with leading FEA solvers.

To simulate faithfully complex vibro-acoustic phenomena, engineers can either rely on Actran's own structure and acoustic modeling capabilities, or import existing structure models and results from other FEA solvers and combine them with Actran acoustic modeling.

For building vibro-acoustic models exclusively in Actran's environment, engineers can access to Actran's structure materials and elements such as visco-elastic solid, shells, beams, rigid bodies, springs, mass, porous media, composite materials, active components (piezo-electric material), etc. The vibro-acoustic model accounts for the complex structural and acoustic damping mechanisms.

When interfacing Actran with structural FEA solvers, structure eigen modes can be imported into Actran and combined with its acoustic modeling in order to perform vibro-acoustic analysis. Structural damping can be assigned as well either globally or singularly for each eigen mode. A Nastran superelement of structure can also be imported into Actran.

A Nastran structure analysis can be translated into an Actran analysis (using an integrated Nastran to Actran translator) and enriched to a vibro-acoustic analysis in the Actran environment.

Actran vibro-acoustic models can be loaded by excitations representing the most realistic working conditions: combination of acoustic, dynamic and kinematic loads, as well as random excitations (e.g. diffuse sound fi eld, turbulent boundary layer load).
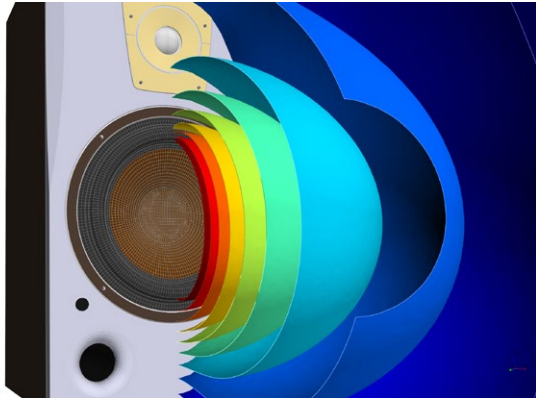
Actran VibroAcoustics and AeroAcoustics can be combined in a single finite element model to simulate complex aero-vibro-acoustics problems (see Actran AeroAcoustics product sheet).

Key features

- All Actran Acoustics features (see dedicated flyer)

- Full element library for modeling structures: solids, shells, beams, springs, rigid bodies, etc.

- Poro-elastic element library based on the Biot theory for modeling bulk reacting materials

- Piezo-electric element libraries for modeling active structures

- Visco-thermal elements for modeling dissipation in thin air layers or thin tubes

- Composite elements library for modeling complex multilayered composite structure

- Advanced random vibro-acoustic features including diffuse sound field, turbulent boundary layer and rain-on-the-roof excitation models

- Solution in physical or modal coordinates, or using hybrid methods

- Full support of non-congruent meshes

- Direct, iterative and parallel solvers for reduced CPU times

- Unique fast FRF Krylov solver

- Computation of stress levels

- Output of global and per material energy quantities

- Compatible with other Actran modules for aero-vibro-acoustic simulations

- Nastran model to Actran model translator

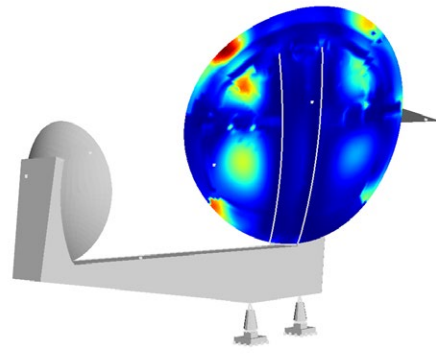- Integration in Actran VI

Target applications

- Automotive: powertrains, intakes, exhausts, passenger compartment, trim, seats, hoses, tires, windows and windshields, audio, HVAC, active noise control

- Aerospace: sound transmission through cockpit and fuselage, noise propagation in air distribution

- System, response to TBL excitation, acoustic fatigue of embarked component at rocket launch

- Consumer goods: telephones, headsets, loudspeakers, hearing aid devices

- Disk drives, washing machines, refrigerators, cameras, etc.

- Shipbuilding: underwater acoustic propagation, sonar, vibro-acoustics of water and hull
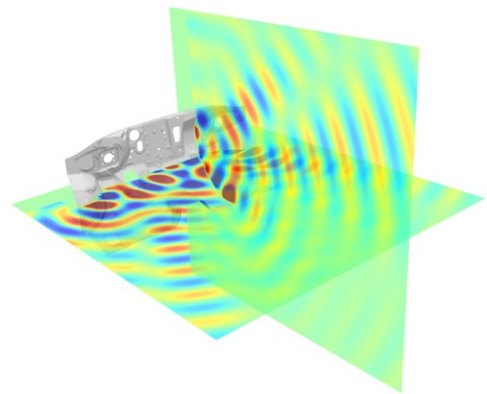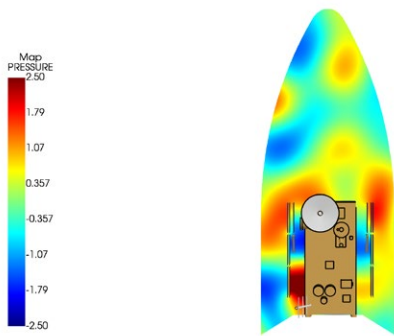
Sound generated by a loudspeaker

Stress level on an antenna model loaded by a diffuse field using a modal approach
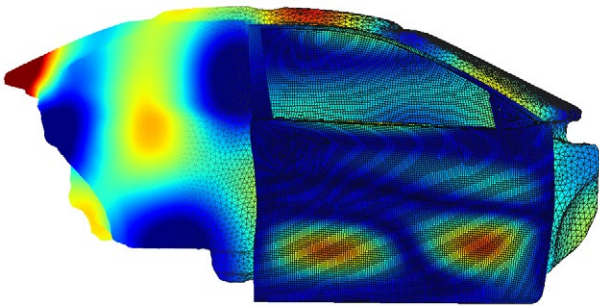
Vibro-acoustic modeling of car side window, sealing and compartment cavity

Vibration levels and acoustic radiation of a car firewall structure

Sound pressure level distribution inside the fairing of a spatial launcher

Actran software suite

Actran is a complete acoustic, vibro-acoustic and aero-acoustic CAE software suite. Empowered by the technologies of finite/infinite element methods (FE/IFE), as well as the Discontinuous Galerkin Method (DGM), Actran provides a rich library of materials, elements, boundary conditions, solution schemes and solvers. Actran is a high accuracy, high performance and high productivity modeling tool suiting the needs of the most demanding engineers, researchers, teachers and students for solving the most challenging acoustic problems.

Free Field Technologies (FFT)

Free Field Technologies is focused on three main areas:

- Developing Actran software for acoustic, aero-acoustic and vibro-acoustic simulation;

- Providing technical services, support, training and delivering acoustic engineering projects;

- Researching innovative technologies and methods for efficient and accurate acoustic analysis.

Free Field Technologies is the technical leader in acoustic CAE and with a wide range of customers around the world active in the Automotive, Aerospace, Shipbuilding, Electronic and Heavy Equipment industries as well as in the Educational and Research sectors. FFT is a wholly owned subsidiary of MSC Software Corporation

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

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

Free Field Technologies (FFT), part of Hexagon's Manufacturing Intelligence division, enables manufacturers to design and optimise products with powerful acoustic, vibro-acoustic and aero-acoustic modelling software and solutions. Learn more at fft.be. Hexagon's Manufacturing Intelligence division provides solutions that utilise 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.