ACTRAN Acoustics

The most efficient solution for predicting acoustic radiation.

KEY FEATURES

> Standard and convected acoustics

> Extraction of acoustic modes

> Handling of heterogeneities such as complex flows or temperature gradients

> Account for dissipation mechanisms such as viscothermal losses, acoustic absorption...

> Direct response and modal superposition approaches

> Unique library of stable infinite elements for modeling anechoic boundary conditions

> Pressure, velocity and admittance boundary condition

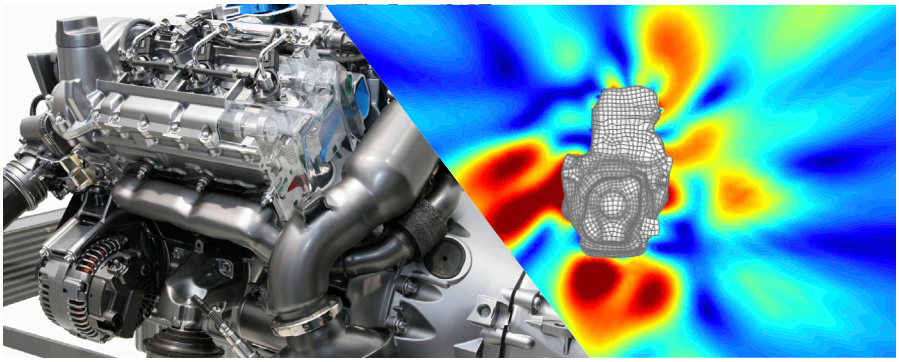
> Plane, spherical and cylindrical wave sources and excitation of ducts by incident plane waves

> Vibration results recovery from most FEA structural analysis solvers for radiation analysis

> Direct and iterative solvers for fast CPU times

> Available platforms: Windows 32 & 64 bits, Linux and most Unix platforms

> Integration in ACTRAN VI



Product overview

Rich and powerful acoustic features for your simulation needs

ACTRAN Acoustics is the foundation module of the ACTRAN family and is both a standalone tool and a prerequisite for advanced modules like ACTRAN VibroAcoustics, ACTRAN AeroAcoustics or ACTRAN TM.

ACTRAN Acoustics contains a wide set of acoustic modeling features making it the CAE tool of choice for the simulation of a large variety of problems, from the simplest component to the most elaborate system. The ACTRAN Acoustics product relies on Free Field Technologies' exclusive powerful, robust, fast and reliable acoustic finite and infinite element library.

Sound fields in cavities are easily analyzed with ACTRAN Acoustics which offers both modal and physical approaches. Absorbing walls may be modeled in detail using impedance conditions or porous material models.

ACTRAN Acoustics is also uniquely suited for sound radiation analysis, where it brings unprecedented efficiency, speed and productivity to your analysis process. ACTRAN Acoustics features seamless interfaces with most FEA structural analysis codes like NASTRAN, ABAQUS™ or ANSYS™.

ACTRAN Acoustics also offers powerful features for analyzing sound propagation in ducts and may be used for designing e.g. intake and exhaust lines or air distribution systems in buildings, aircrafts and cars.

Among the many advanced features available in ACTRAN Acoustics are the handling of a mean flow field (convected acoustic propagation) and temperature gradient effects. Specific elements are also available to handle visco-thermal effects that are important when sound waves propagates in narrow ducts or thin cavities (eg: hearing aids, solar array panels, etc.).

Target applications

> Sound radiation by vibrating structures: powertrain, engine components (oilpan, intake manifold and air filter, valve cover, etc.), compressors, electrical motors, loudspeakers and more.

> Intake and exhaust noise, including complex mufflers and silencers.

> Air conditioning units and distribution systems (calculation of transfer matrices coefficients).

> Sound absorption inside passenger compartment of cars, trains and aircrafts.

> Sound propagation in complex media with mean flow or temperature gradient.

> Audio devices such as telephones, hearing aids or musical instruments.

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ACTRAN Acoustics

THE ACTRAN SOFTWARE SUITE

ACTRAN is the most complete acoustic, vibro–acoustic and aero–acoustic CAE software suite. Under a common techno–logical umbrella provided by the finite and infinite element method, ACTRAN provides a rich library of elements, material properties, boundary conditions, solution schemes and solvers. ACTRAN is a high performance, high pro–ductivity, high accuracy modeling environment suiting the needs of the most demanding engineers, researchers and teachers and empowering them with the tool they need for solving the most challenging acoustic problems.

FREE FIELD TECHNOLOGIES

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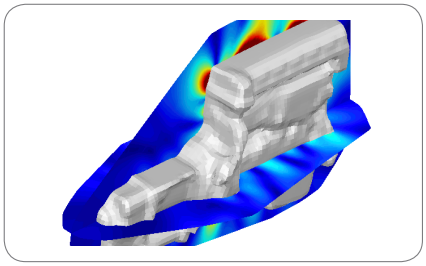
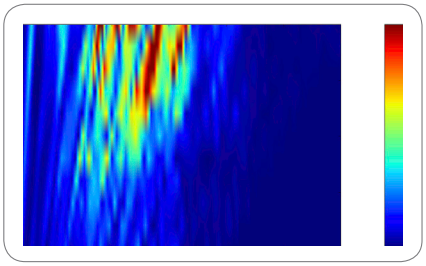
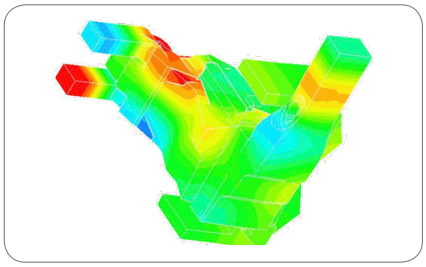


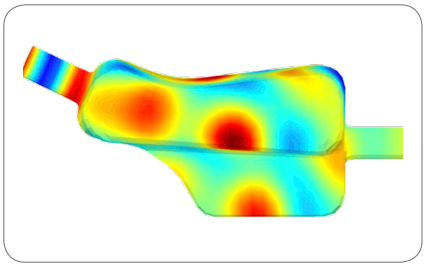
Sound radiation by a powertrain.



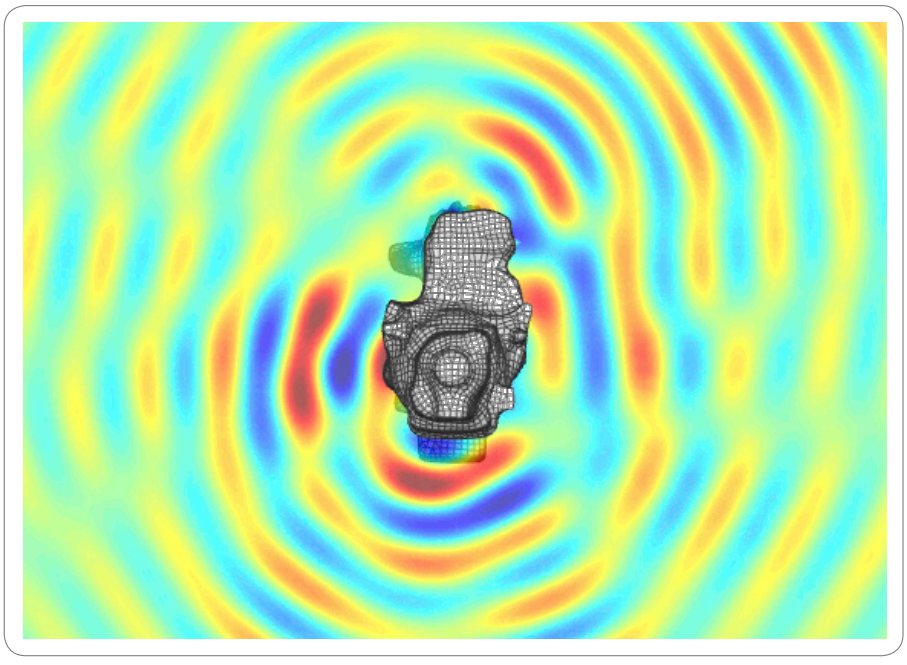
Waterfall diagram of the sound pressure level as a function of frequency and regime.



Acoustic modes of an air conditioning module.



Pressure distribution in an exhaust muffler, where temperature gradients and mean flow are taken into account.



Presure field generated by the vibration of a powertrain.

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PRODUCTS

ACTRAN VibroAcoustics

The most advanced tool for vibro-acoustic simulation

KEY FEATURES

> All ACTRAN Acoustics features (see dedicated flyer)

> Poro–elastic element library based on the Biot theory for mo–deling bulk reacting materials

> Full element library for modeling visco–elastic structures (solids, shells, beams)

> Piezo–electric element libraries for modeling active structures

> Visco–thermal elements for modeling thin air layers or thin tubes

> Composite elements library for modeling complex multilayered composite structure

> Advanced random vibro–acous–tic features including diffuse sound field, turbulent boundary layer and rain–on–the–roof excitation models

> Solution using physical or modal coordinates

> Full support of non–congruent meshes

> Direct, iterative and parallel solvers for very fast CPU times

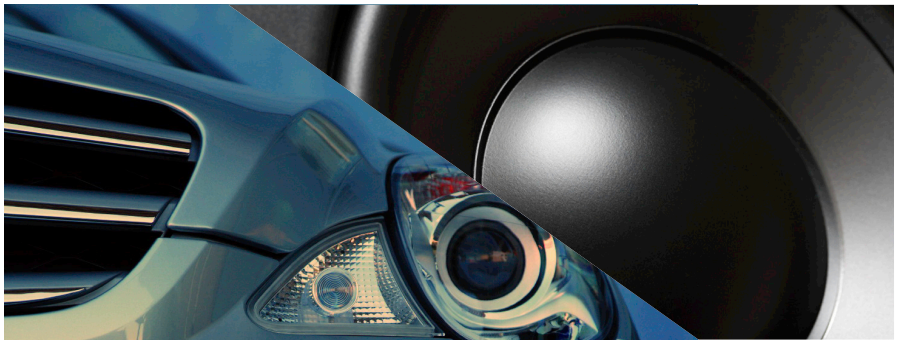
> Unique fast FRF synthesis solver

> Computation of stress levels

> Output of global and per material energy quantities

> Compatible with other ACTRAN modules for aero–vibro–acous–tic simulations

> Integration in ACTRAN VI



Product overview

A complete, robust, reliable, productive and high performing vibro-acoustic CAE module

ACTRAN VibroAcoustics is the most complete vibro-acoustic simulation software currently available on the market.

Built on top of ACTRAN Acoustics and relying on Free Field Technologies' powerful finite and infinite element library, ACTRAN VibroAcoustics provides a rich library of elements, materials, boundary conditions, solution schemes and solvers and is used by the most demanding engineers, researchers and teachers to solve challenging vibro-acoustics design problems.

To build the structural model in ACTRAN you can rely on its rich material library. Indeed, ACTRAN features not only conventional materials for acoustic or visco-elastic media but also more specific models for porous or incompressible media, composite materials or active components (including piezo-electric ceramics). All material types can be combined in a single model to achieve the most realistic results.

A modal basis may also be imported from most structural FEA codes and be used as a representation of the structural model.

Your vibro-acoustic model may be submitted to the most realistic working conditions by combining acoustic, dynamic and kinematic boundary conditions, as well as more physical excitations like diffuse sound field and turbulent boundary layer.

ACTRAN AeroAcoustics and VibroAcoustics can be combined: modeling complex aero-vibro-acoustics problems has now become reality!

The available solution schemes include coupled or uncoupled models in physical and modal coordinates, in frequency or time domain. The very efficient linear equation solvers and the parallel processing capabilities make ACTRAN the solution of choice for solving industrial-size problems in design optimization processes.

Target applications

> **Automotive**: noise related problems from powertrains, intakes, exhausts, passenger compartment, trim, seats, hoses, tires, windows and windshields, audio, HVAC.

> **Aerospace**: sound transmission through cockpit and fuselage, noise propagation in air distribution system, response to TBL excitation, random dynamic response of rocket payload at take-off.

> **Consumer goods**: telephones, headsets, loudspeakers, hearing aid devices, disk drives, washing machines, refrigerators, cameras.

> **Defense**: underwater acoustics, sonars.

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ACTRAN VibroAcoustics

THE ACTRAN SOFTWARE SUITE

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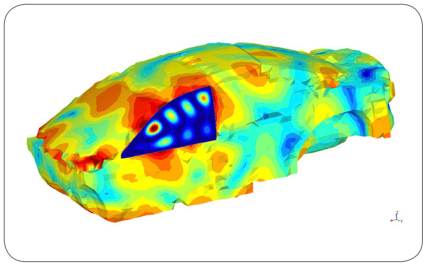
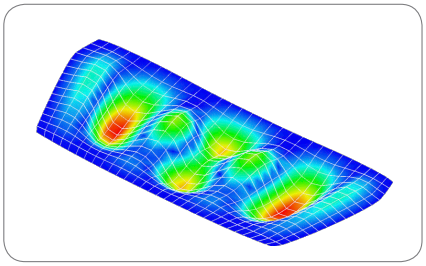
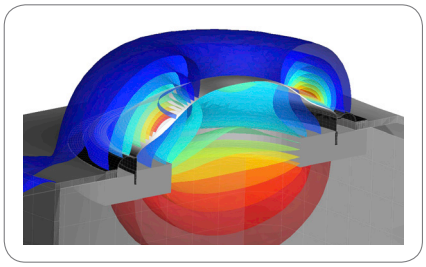


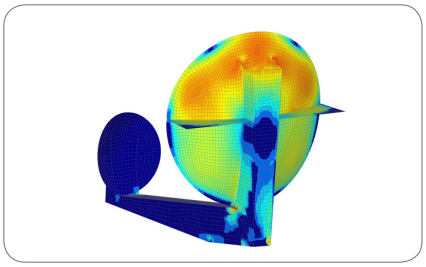
Vibro-acoustic model based on a modal approach and coupling a sidewindow and the inner acoustic cavity of the vehicle.



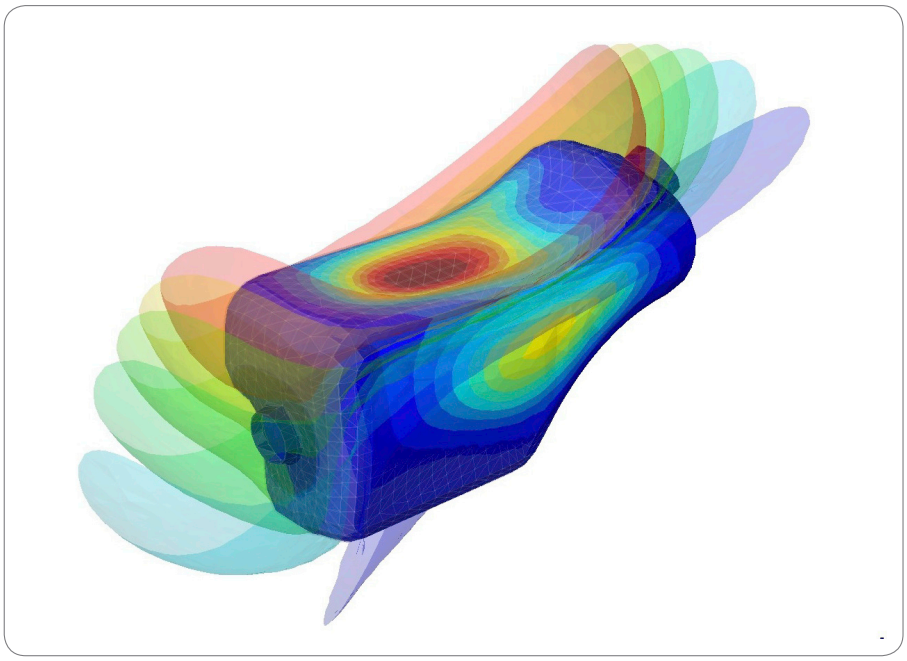
Vibration levels of a multi-layered windshield, involving two layers of glass and one layer of visco-elastic PVB material.



Sound generated by a loudspeaker.



Stress level on a antenna model loaded by a diffuse field. A modal approach has been used.



This muffler model includes an inner and outer acoustic model coupled by a flexible structure.

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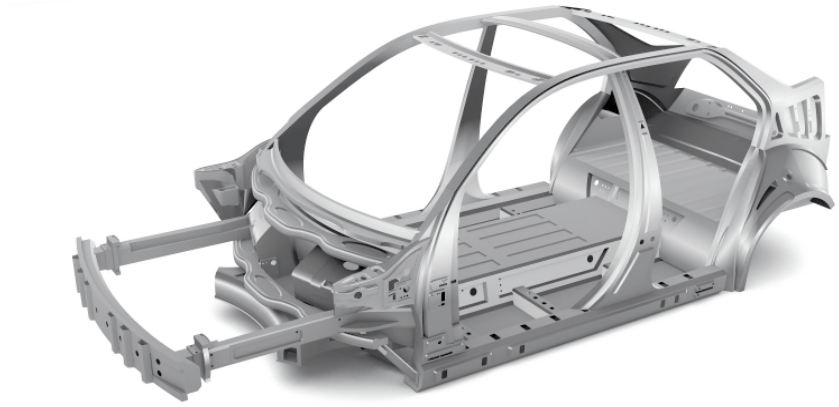
PRODUCTS

ACTRAN for NASTRAN

Advanced vibro-acoustic analysis combining ACTRAN and NASTRAN



KEY FEATURES

> Analysis of fully trimmed models combining NASTRAN body–in–white models with ACTRAN trim models.

> Import of NASTRAN super–ele–ments into ACTRAN.

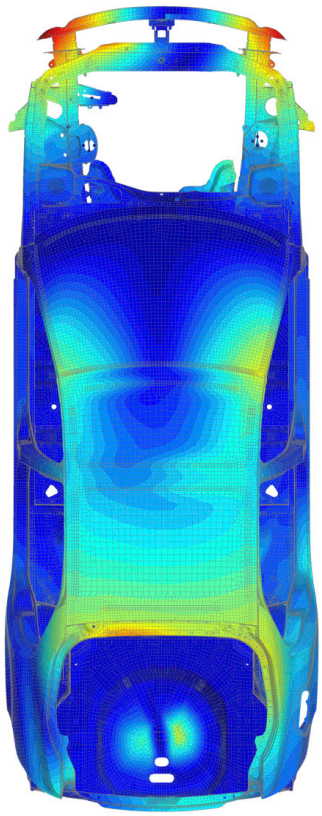
> Export of ACTRAN components to NASTRAN using DMIG data blocks.

> Support of most NASTRAN brands (MSC, MD, NX, NEi)

Target applications

> Acoustic transmission through components in real-life mounting conditions

> Trimmed body modeling using a combination of ACTRAN detailed models in physical coordinates and a NASTRAN body-in-white modal model



Product overview

Combine the strength of ACTRAN and NASTRAN for advanced vibro-acoustic modeling

ACTRAN is a powerful tool for modeling and analyzing complex vibro-acoustic systems and specifically trim components. Such components are usually made of materials with high damping and strong acoustic absorption characteristics; as such they have a significant influence on the overall vibro-acoustic behavior of the structure.

Accounting for high damping very often relies on the use of physical coordinates, hence ACTRAN models are usually available in physical coordinates.

NASTRAN is the reference tool for vibro-acoustic analysis of lightly damped structures and cavities. It features efficient modal analysis solution sequences, making it suitable for handling large models like automotive vehicle body-in-white or an aircraft fuselage. NASTRAN models are usually available in modal coordinates.

ACTRAN for NASTRAN provides CAE engineers advanced features for mixing the best of both worlds: ACTRAN physical model and NASTRAN modal model. Three types of combined models may be created:

1 ACTRAN for NASTRAN is able to merge a set of ACTRAN models of individual trim components with a NASTRAN body-in-white model in order to create a fully trimmed body vibro-acoustic model.

2 An ACTRAN model may be set in its real-life working environment by connecting it to an existing NASTRAN model (e.g. a detailed ACTRAN model of a layered windshield may be connected to a NASTRAN model of the vehicle body).

3 A NASTRAN model may be enriched by including a reduced ACTRAN model of a specific component. The ACTRAN component is defined as a DMIG data block in the NASTRAN deck.

ACTRAN for NASTRAN makes the vibro-acoustic analysis of fully trimmed bodies possible. To model the problem with both efficiency and accuracy, Free Field Technologies develops the innovative hybrid methods of ACTRAN for NASTRAN. With these hybrid methods, the strength of modal and physical approaches are combined and their weaknesses circumvented.

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ACTRAN for NASTRAN

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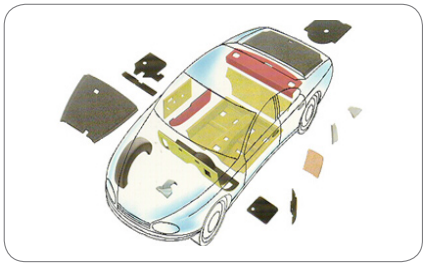
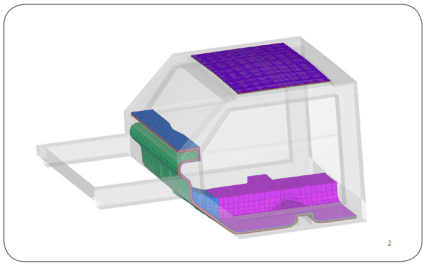
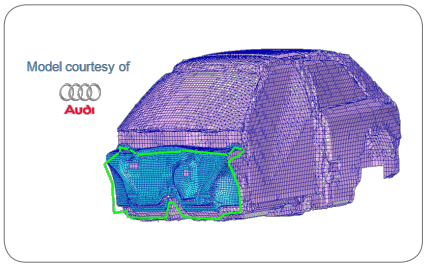


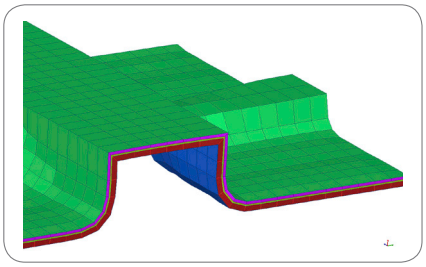
The use of acoustic trim is ubiquitous in cars. ACTRAN for NASTRAN provides an efficient tool for modeling the NVH impact of trim components in a car.



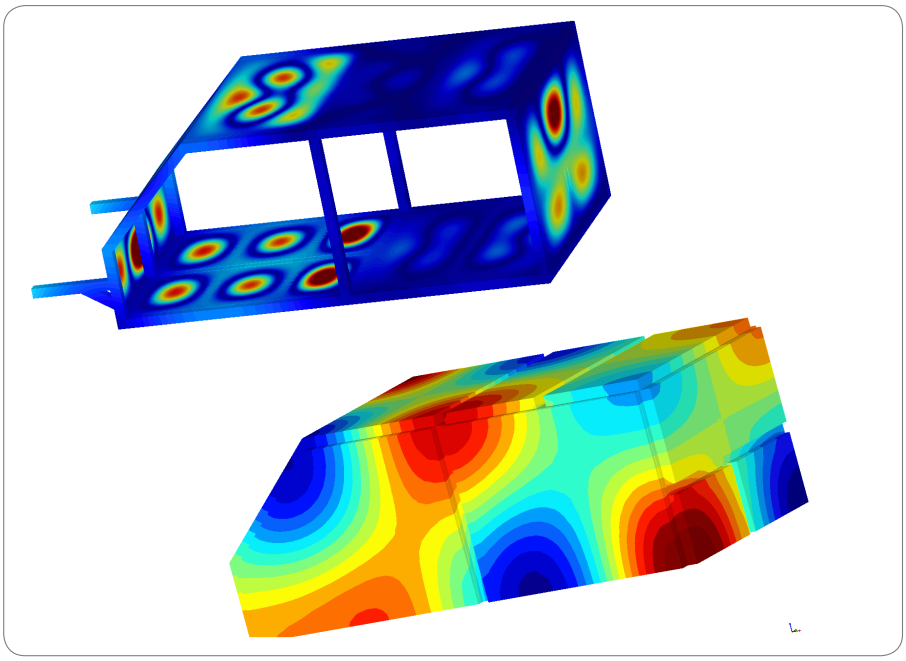
Truck cabin coupled to three trim components.



Import of NASTRAN superlements into ACTRAN.



ACTRAN multilayered trim component.



Structure and cavity maps for a coupled cavity-trim-structure model.

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ACTRAN TM

The leading solution for turbomachinery noise prediction

KEY FEATURES

> All ACTRAN Acoustics features (see dedicated flyer)

> Acoustic propagation and radiation on top of a non–uniform mean flow

> Accurate modeling of liners in–cluding the effects of the flow (Myers–Eversman formulation)

> Infinite elements for unbounded domains

> Excitation defined by incident acoustic duct modes

> Harmonic analysis

> 2D, axisymmetric and 3D analysis

> Complete finite element library (tria, quad, tet, hex, prism, pyra, all in linear and quadratic forms)

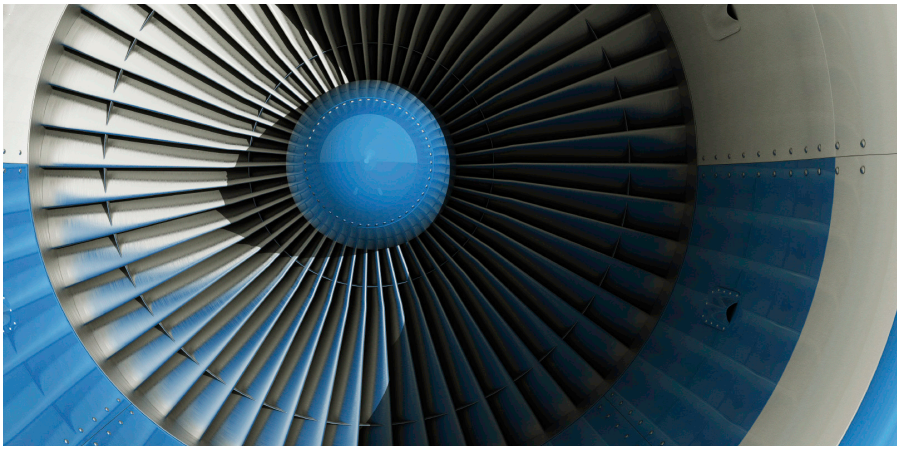
> Direct and iterative solvers for improved efficiency

> Available platforms: Windows 32 & 64 bits, Linux and most Unix platforms

> Streamlined interface with leading CFD tools, including Fluent™, STAR–CD™ and Powerflow™ for importing mean flow

> Identification of the incident duct modes amplitudes from CFD simulations using a triple plane pressure matching technique

> Integration in Actran VI



Product overview

A powerful acoustic CAE tool for turbomachinery noise prediction

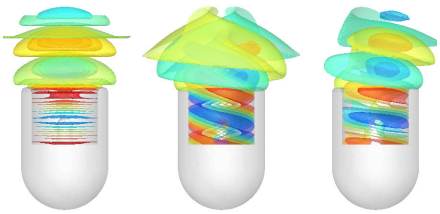
ACTRAN TM is the reference CAE tool for analyzing the sound radiated by turbo machines and for optimizing the related acoustic treatments. ACTRAN TM is used extensively by many leading aerospace companies that rely on the tools' accuracy, ease-of-use and performance for reaching their strategic acoustic design goals.

ACTRAN TM contains all advanced modeling features required for turbo machinery noise analysis. To capture the important convection and refraction effects, the sound waves propagate on top of a non-uniform background mean flow which can be calculated by ACTRAN or imported from a CFD simulation. The influence of the mean flow on the performance of acoustic liners is accounted for thanks to the Myers boundary condition. The acoustic source is defined in terms of incident duct modes of arbitrary order and their amplitude can be defined in a variety of ways (e.g. normalized amplitude, intensity, equal distribution of energy on all propagating modes) or derived from pressure fluctuations calculated on a set of planes by one of the supported CFD tools. Both 3D and axisymmetric models can be defined.

One of the challenges of acoustic CAE is to handle large models associated to high wave number and to large geometrical size and complexity. ACTRAN TM meets this challenge thanks to its efficient solver technology that includes advanced parallel processing.

ACTRAN TM is used not only for optimal aircraft engine nacelle liner design but also on inlet and outlet liners for helicopter turbines, environmental control systems (ECS) or auxiliary power unit (APU). ACTRAN TM is also used for non aerospace applications like computer cooling system noise and more.

ACTRAN TM can be complemented by ACTRAN DGM to solve problems involving complex shear layers and flow gradients occurring at the engine exhaust.



Target applications

> Aircraft engine noise, including nacelle design
> Ducted cooling systems (electronic devices)
> Blower systems (air conditioning modules)
> Helicopter turbine noise

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ACTRAN TM

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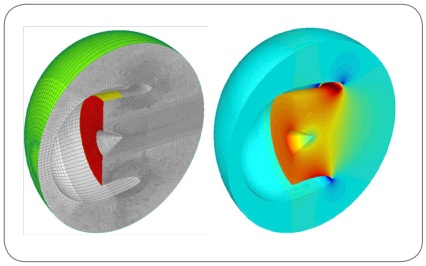
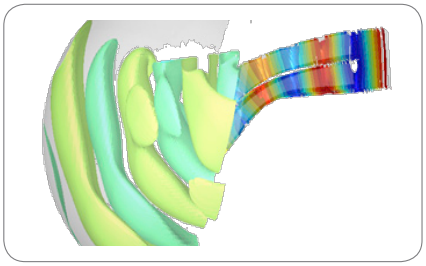
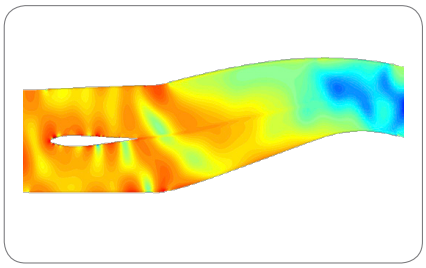


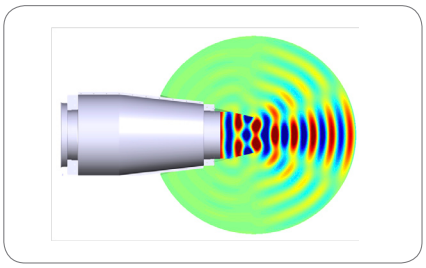
Mesh of a half nacelle model (left) and the associated computed flow magnitude (right). Model courtesy of Airbus™.



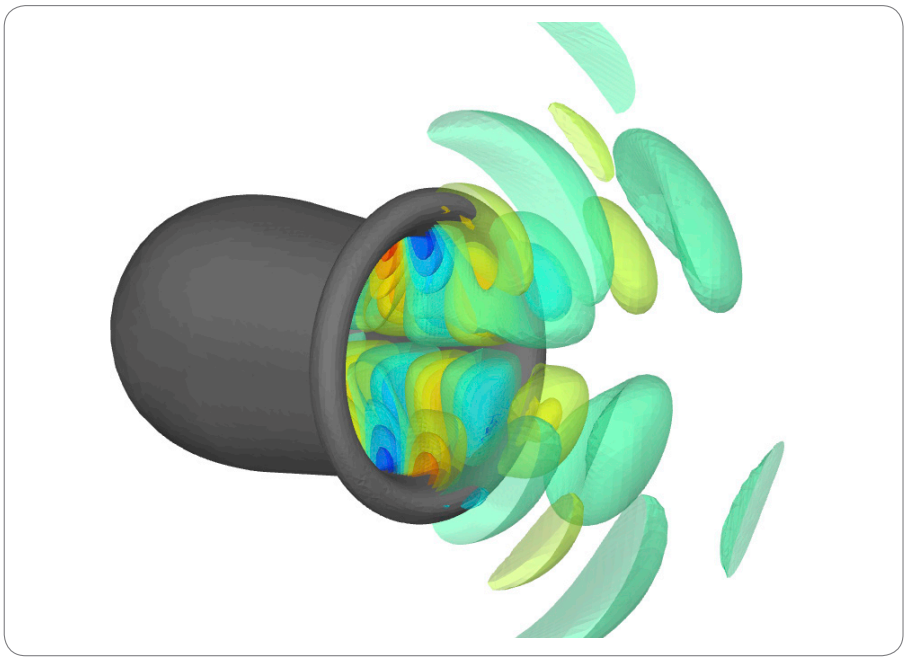
Sound propagation through an APU unit - Model courtesy of Airbus™.



Influence of a splitter within a duct - Model courtesy of Airbus™.



Visualization of the sound directivity generated by a turbine - Model courtesy of Airbus™.



Nacelle duct mode propagation - Model courtesy of Alenia Aermacchi™.

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ACTRAN DGM

The ideal complement to ACTRAN TM for aircraft engine exhaust

KEY FEATURES

> Module based on Linearized Euler Equations (LEE) : ability to solve problems with strong shear layers, temperature gradients or non–homentropic flows

> Resolution based on a Discontinuous Galerkin Method

> 2D, axisymmetric and 3D analysis

> Unstructured mesh with adapta–tive high order elements (ranging from 1 to 16) : the mesh can be used for several frequencies

> Automatic and efficient detection of the harmonic regime

> Far–Field radiation based on a Ffowcs–Williams and Hawkings Formulation

> Very low RAM consumption

> Domain parallelism with auto–matic partitioning leading to high scalability both in computational time and RAM

> Various boundary conditions available : duct modal basis, absorbing buffer zone (to simu–late the far field) and admittance (supplemented with Myers' term if grazing flow)

> Coupling with standard CFD codes

> Integration in ACTRAN VI

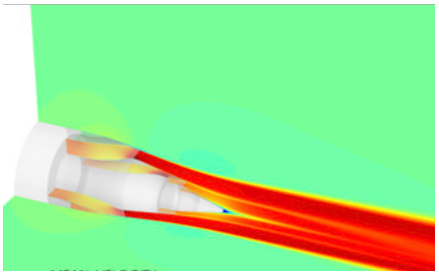
Product overview

Modeling noise propagation in complex flows using linearized Euler equations and discontinuous Galerkin methods

ACTRAN DGM solves the linearized Euler equations using discontinuous finite elements and is used for predicting the noise propagation in complex physical conditions. It is particularly well suited to solving aero-acoustic problems at the exhaust of a double flux aero-engine, including effects such as propagation through strong shear layers, high temperature gradients and non-homentropic mean flows. ACTRAN DGM can address 2D, 2.5D (axisymmetric with azimuthal order) or 3D problems. It includes all required boundary conditions: decomposition of the engine excitation in duct modes, non-reflective boundary conditions with absorbing buffer zones; liners are modeled using a time-domain translation of the Myers BC (Extended Helmholtz Resonator Model).

The straightforward mesh generation is one of the key advantages of ACTRAN DGM. As an unstructured mesh method, it is not submitted to the standard constraints of a Finite Difference mesh. As the order of the elements is automatically adapted, the mesh can be "non-homogeneous" (i.e. using very small and large elements in the same model) without any performance degradation. In addition, the same mesh can be reused for frequencies of ratio 1 to 4 (i.e. a mesh that was designed to run at a frequency of 1000Hz can be used for frequencies ranging from 500Hz to 2000Hz).

Thanks to the implementation of a discontinuous spatial scheme for solving the Linearized Euler Equations, the performance is highly scalable in parallel. This scalability of the RAM consumption and computational time makes the solution of very large problems (in terms of kR) possible.



Target applications

> Exhaust of turbomachines

> Inlet of large turbomachines

> All acoustic propagation problems with non-homogeneous mean flow conditions

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ACTRAN DGM

THE ACTRAN SOFTWARE SUITE

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FREE FIELD TECHNOLOGIES

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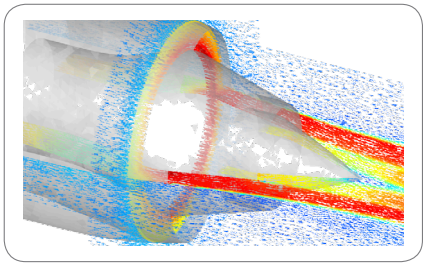
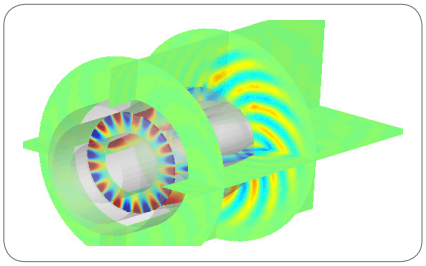
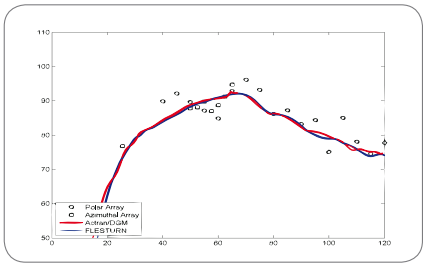


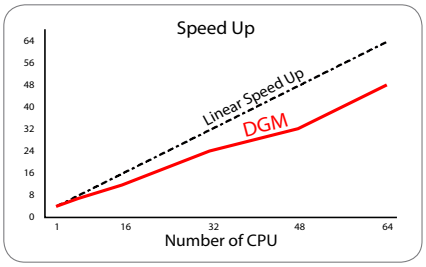
ACTRAN DGM handles complex flows on real life geometries.



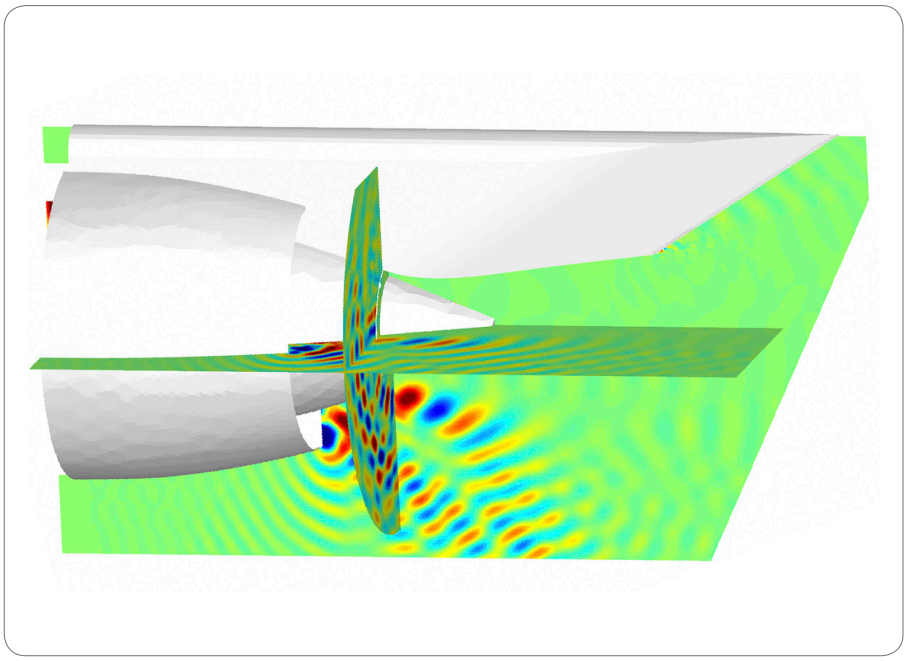
Acoustic mode propagation from the exhaust of an airplane jet engine.



Comparison of measurement data and ACTRAN DGM simulations results (TURNEX EC project).



The ACTRAN DGM parallel solver is highly scalable.



Complex propagation of a high order duct mode through the exhaust of an aircraft jet engine - Model courtesy of Airbus™.

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PRODUCTS

ACTRAN AeroAcoustics

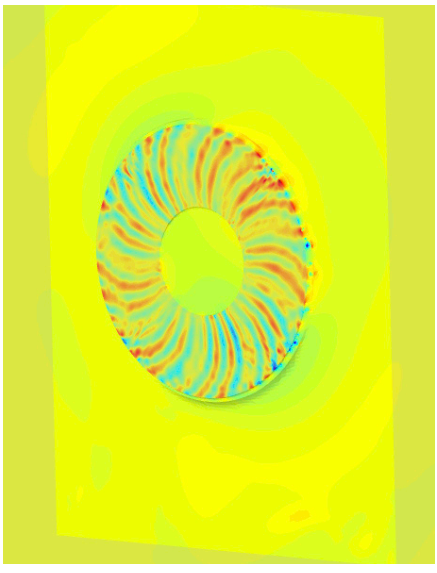
Complex flows noise simulation tool

KEY FEATURES

- **All ACTRAN Acoustics features (see dedicated flyer)**
- Two–step aero–acoustic ap–proach: transient CFD followed by acoustic radiation
- Direct interface to most leading CFD codes using native CFD file formats
- Direct and iterative solvers for fast CPU times
- Available platforms: Windows 32 & 64 bits, Linux and most Unix platforms
- Compatible with other ACTRAN modules for aero–vibro–acous–tic simulations
- Integration in ACTRAN VI

Target applications

- Air conditioning modules (HVAC).
- Side mirror noise.
- Airframe noise (landing gear, trailing edge).
- Air distribution systems.



Pressure level generated by an axial fan - Model courtesy of Trane™.

Product overview

Predicting the noise generated by complex flows

ACTRAN AeroAcoustics is a finite element based acoustic solver for predicting the noise generated by turbulent flows. ACTRAN AeroAcoustics recovers aerodynamic noise sources from flow simulations performed with commercial CFD codes such as Fluent™, Star-CD™, StarCCM+™ or Powerflow™.

The complete simulation procedure involves three steps:

1. An unsteady flow simulation is performed by the CFD code. At each time step, the CFD solution (velocity, density and pressure fields) is stored in its own native format or in the Ensight™ format.
2. ACTRAN AeroAcoustics computes the aero-acoustic noise sources from the CFD results produced in step 1. This involves translating results from the time to the frequency domain and interpolating them from the CFD to the acoustic mesh. Maps of the aero-acoustic sources produced at this stage are in themselves useful results which can be used to identify the most effective sources.
3. The radiated acoustic field radiated is then computed. This produces a wide set of relevant results: acoustic pressure, velocity or intensity maps, frequency response functions of various local (pressure) or global (power) quantities.

This multi-step strategy offers several advantages: (1) Each part of the work can be done independently by different engineers, departments or even companies with different responsibilities or skills. (2) A single CFD simulation can feed different acoustic simulations (e.g. with different acoustic treatments). (3) The acoustic mesh does not need to be refined where the aerodynamic structures are small (for instance in the boundary layers).

ACTRAN AeroAcoustics offers high performance solvers and parallel processing features and is fully integrated in ACTRAN VI.

ACTRAN AeroAcoustics can be combined with ACTRAN VibroAcoustics in order to address aero-vibro-acoustic challenges.

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ACTRAN AeroAcoustics

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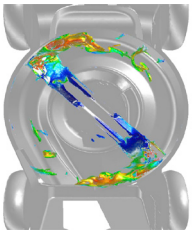
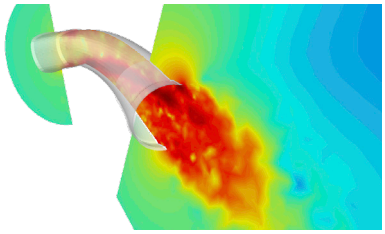
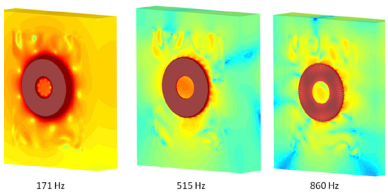


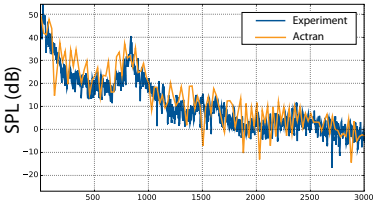
Aeroacoustic source term - Model courtesy of John Deere™.



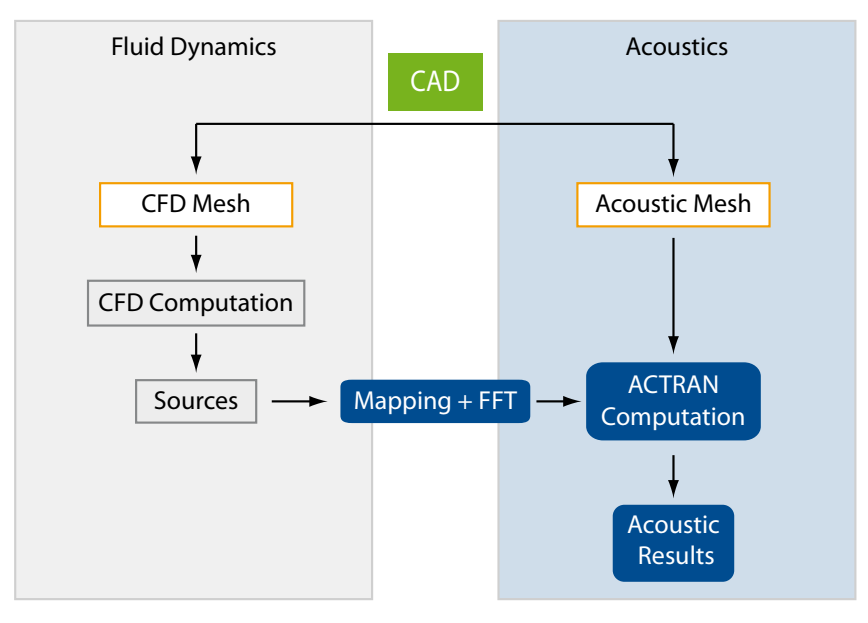
Sound pressure level distribution - Model courtesy of Visteon™.



Pressure levels at different frequencies - Model courtesy of Trane™.



Correlation between ACTRAN AeroAcoustics predictions and measurements - Model & results courtesy of Visteon™.



Computational process overview.

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ACTRAN VI

Dedicated pre & post-processor for the ACTRAN CAE software family

KEY FEATURES

> Support of all ACTRAN features for the creation and editing of ACTRAN analyses

> Support of different mesh formats such as BDF (NASTRAN), OP2 (NASTRAN), UNV, RST (Ansys), CDB (Ansys), NFF & DAT (ACTRAN) and Patran Neutral Format

> Support of different results formats such as OP2, UNV, NFF, RST, HDF and Punch

> Visualization of all ACTRAN specific features

> Visualization of the projection quality for incompatible meshes

> Synchronized viewports for results and analyses comparison

> Analysis templates for semi-automatic model creations

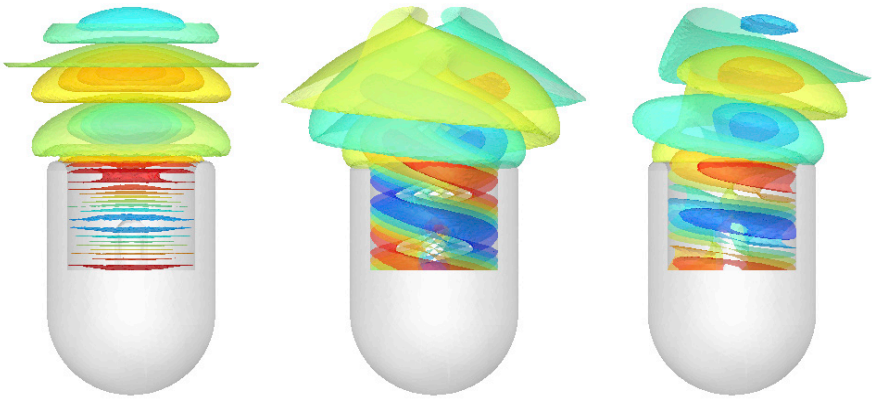
> PLTViewer and WaterfallViewer tool for easy display and handling of frequency response functions

> Contour plots, iso-surfaces, vectors and deformations features responding to the specific requirements of the acoustics community

> Multiple cutplane filters for visualizing results within a mesh

> Animation module dedicated to complex harmonic and transient results

> Video export capabilities



Product overview

ACTRAN's powerful and user-friendly pre- and post-processor

ACTRAN VI is the new graphical user interface specifically designed for pre- and post-processing vibro- and aero-acoustic analyses of all ACTRAN modules.
Including an ACTRAN input file reader to check or modify input files generated by other tools, ACTRAN VI supports several mesh formats (NASTRAN BDF, ANSYS RST and CDB, ACTRAN DAT and NFF, I-DEAS UNV, PATRAN Neutral Format) as input for creating ACTRAN input files.
Its various integrated pre-processing tools ease the creation and editing of ACTRAN models. It is easy to visualize specific ACTRAN model features (such as modal basis, sources or infinite elements coordinate system), to specify the projection parameters between incompatible meshes, to insert additional entities (e.g. control points) or to visualize the specified boundary conditions. Additionally, it is also possible to define analysis templates (with or without mesh) to ease the creation of recurrent analyses.
The post-processing tool supports different results formats, such as OP2, UNV, NFF, RST, HDF and punch files. It contains different visualization modules, such as contour plots (maps), iso-surfaces, vectors or deformations, which can be freely combined and controlled using different filters. Synchronized viewports makes it easy to compare results at different frequencies, phases, times or related to different load case.
An animation module dedicated to complex harmonic results coupled with video export capabilities is also included.
ACTRAN VI includes the PLTViewer and WaterfallViewer modules for easily displaying and handling frequency response functions, in single or multiple loadcases.

Target applications

> Validation, visualization and modification of existing ACTRAN analyses.
> Creation of new ACTRAN analyses.
> Display of all ACTRAN results.

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ACTRAN VI

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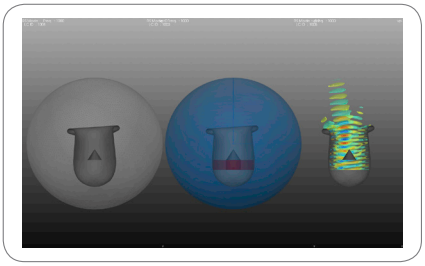
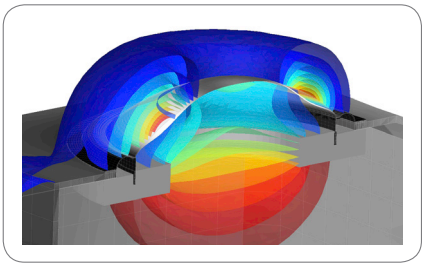
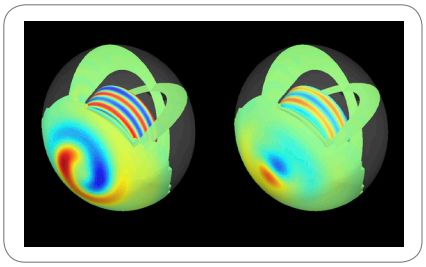


ACTRAN VI workflow : mesh import, model creation, and results postprocessing.

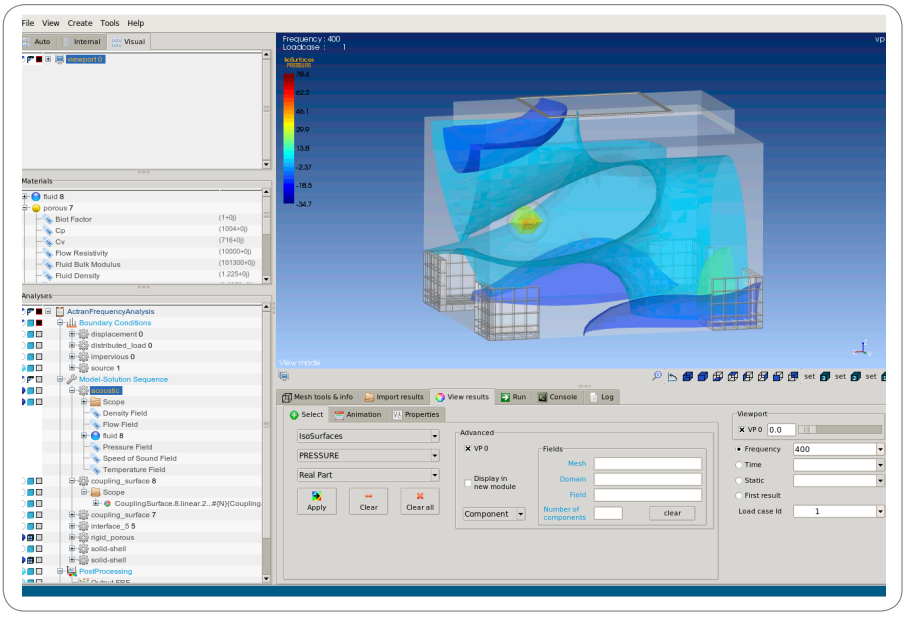
The PLTViewer tool is very useful for plotting FRFs, comparing experimental data to results, etc.



Combination of deform, grayscale map and isosurfaces modules.



Multiple viewports can be used for easy comparison of simulation results.



Overview of ACTRAN VI GUI.

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SERVICES

ENGINEERING SERVICES

Get the help you need for your acoustic CAE projects

OUR STRENGTH

> Basic and advanced, standard and custom designed, on–site or off–site, hands–on or theoretical training sessions.

> Hotline support

> On–site assistance

> Short or long, unique or recur–rent consulting projects and engineering services

> CAE Integration services

> High–performance computing consulting including installation, optimization, integration and customization services

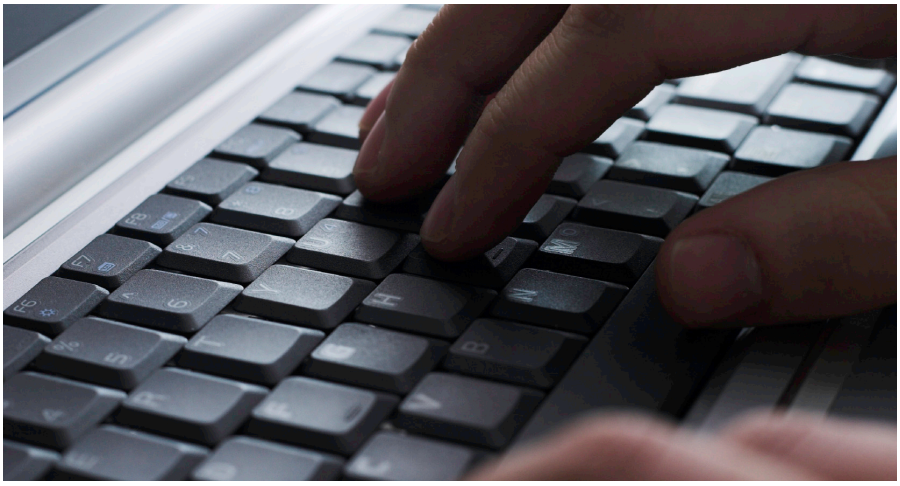
> Acoustic CAE methodology de–velopment and deployment

> Technology transfer services

> Professional team

> High–quality reporting

> High–performance computing resources



Overview

Acoustic CAE services by Free Field Technologies

Free Field Technologies, the developer of the ACTRAN acoustic, vibro-acoustic and aero-acoustic CAE software suite, also provides related technical services to its customers: technical support, training, technology transfer, methodology development, on-site or off-site consulting, custom developments.

Our support team routinely answers dozens of support questions raised from all over the world by our large user community. Answers provide accurate and timely help to professionals whose acoustic design projects cannot wait.

FFT's consulting team in Brussels, Toulouse and Tokyo may also help you reach your acoustic design goals through off-site projects, on-site assistance, methodology development and deployment missions or technology transfer initiatives.

Our team is highly efficient in applying the ACTRAN family of software for solving almost any type of acoustic challenge. This goes through the entire chain of acoustic numerical prediction: starting from the CAD model through the mesh generation up to the thorough post-processing and analysis of the results output by ACTRAN. Our services also rely on other CAE tools such as CFD software packages, structural analysis codes, MATLAB™ or Python scripts and more.

FFT's development group also develops custom ACTRAN solution sequences and request tuning for supporting your special needs.

ACTRAN installation, optimization, integration and customization services are also available.

Project samples

> Vibro-acoustic optimization of a multi-layered windshield

> APU inlet liner optimization

> Aero-acoustic analysis of HVAC systems

> Vibro-acoustic analysis of a satellite antenna under random acoustic loads

> Vibro-aero-acoustic study of side mirror noise transmission through the sidewindow into the passenger compartment

> Optimization and tuning of ACTRAN on a 256 proc. cluster

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ENGINEERING SERVICES

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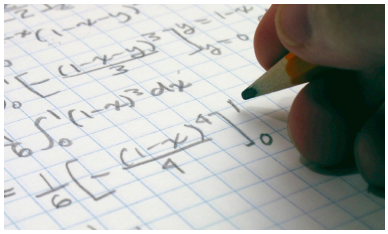
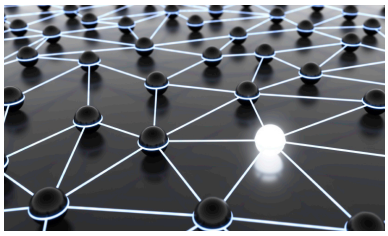


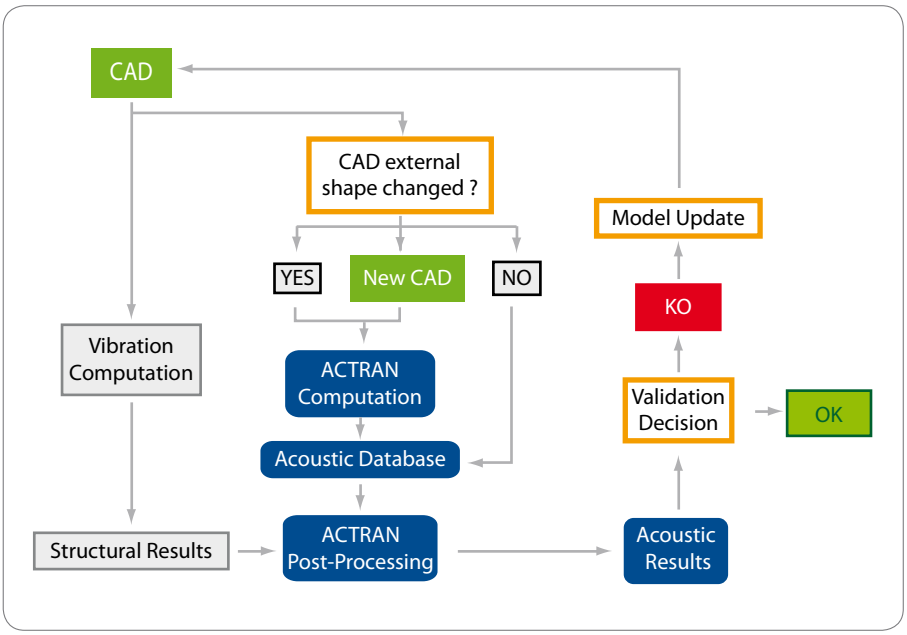
FFT is very active within the scientific community, constantly providing more innovative solutions.

FFT is known for the high quality of its hotline support and on-site assistance.



FFT helps you harness the full power of your high performance computing resources.

Maximize your CAE investments through our technology transfer services.



Example of vibro-acoustic analysis workflow integrating ACTRAN within the overall CAE process.

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