Actran TM

The leading solution for turbomachinery noise prediction

Product overview

A powerful acoustic CAE tool for turbomachinery noise prediction

Actran TM is the reference CAE tool for analyzing the sound radiated by turbomachines 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 and their amplitude can be defined in a variety of ways (e.g. normalized amplitude, intensity, equal distribution of energy on all propagating modes). Duct modal amplitudes can be also computed from CFD unsteady results thanks to the iTM utility which enables the translation of CFD pressure fields into duct modes filtering spurious data. Ducts of irregular shapes can be modeled too using numerical duct modes.

Both 3D and axi-symmetric 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 DGM complements Actran TM in order to solve problems involving complex shear layers and temperature gradients occurring at the engine exhaust (see Actran DGM product sheet).

Target applications

- Acoustic transmission through components in real-life mounting conditions
- Aircraft engine noise, including nacelle design
- Ducted cooling systems (electronic devices)
- Blower systems (air conditioning modules)
- Helicopter turbine noise

Key features

- All Actran Acoustics features (see dedicated flyer)
- Acoustic propagation and radiation in a non–uniform mean flow
- Accurate modeling of liners including 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, penta, pyra, all in linear and quadratic forms)
- Direct and iterative solvers for improved efficiency
- Streamlined interface with leading CFD tools, including Fluent™, STAR–CD™ and Powerflow™ for importing mean flow
- Integrated flow solver for calculating background mean flows
- Duct modal amplitudes computed from CFD unsteady results
- Integration in Actran VI

Acoustic modes propagation from engine nacelles

Actran™

Actran TM

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)

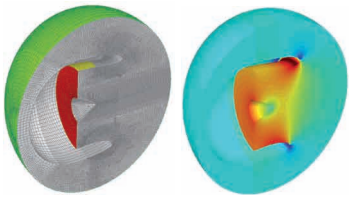
Free Field Technologies is focused on three main areas:

- 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.

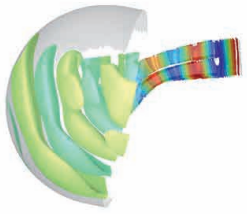
FFT is a wholly owned subsidiary of MSC Software Corporation.

www.fft.be



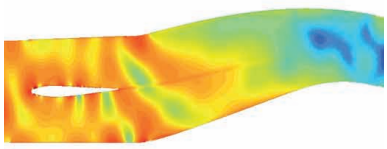
Mesh of a half nacelle model (left) and the associated computed flow magnitude (right)

Model courtesy of Airbus



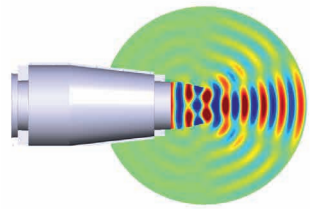
Sound propagation through an APU unit

Model courtesy of Airbus



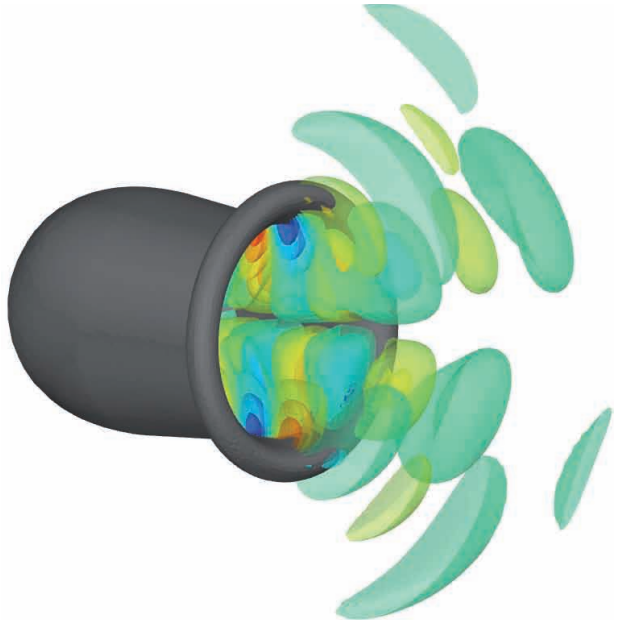
Influence of a splitter within a bypass duct

Model courtesy of Airbus



Visualization of the sound directivity generated by an APU exhaust

Model courtesy of Airbus



Nacelle duct mode propagation

Model courtesy of Alenia Aermacchi

View Actran videos on YouTube

FREE FIELD TECHNOLOGIES (HQ)
a division of MSC Software Belgium SA
Rue Emile Francqui 9
1435 Mont-Saint-Guibert
Belgium
T +32 10 45 12 26
www.fft.be

FFT
MSC Software Company