

VRXPERIENCE SOUND

Analyze sound perception, design a new target and validate your results

ANSYS VRXPERIENCE Sound is a high-performance tool, which links the physical parameters of a given sound with the auditory perception on the end-user's side. It offers conventional analysis functions, allowing users to study signals in both time domain and frequency domain. VRXPERIENCE Sound also features innovative time-frequency analysis and processing functions for isolating and modifying various sound components to assess their influence on perception.

Analyze, listen and modify

The software's recording and playback capabilities allow users to perform temporal, spectral and time-frequency graphical analysis and induce modifications on the signal. VRXPERIENCE Sound also enables the filtering and comparison of sound signals.

In addition, signals can be separated into several components, based on state-of-the-art algorithms that capture:

- Denoising — the extraction of background noise
- Tonal components detection
- Transient parts extraction
- Mixing of all components

It is possible to track and isolate whistling, whine and any other pure or harmonic frequency — as time, level and frequency progress. The efficient denoising algorithm is combined with an automatic noise estimation tool in cases where the noise is not known or recorded separately. Shocks, ticks, clicks, explosions and every kind of impulsive sounds can be isolated using the transient detection component of the sound module.

Explore harmonic content

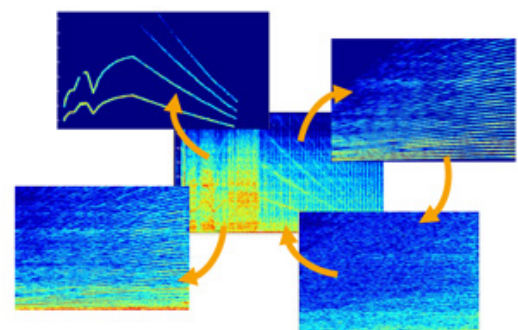
Users can work with sounds and signals exhibiting harmonic content, and employ tools related to orders of rotating machines, such as ANSYS Mechanical.

Detection or association of an rpm profile to a signal and calculation of order analysis is also possible. The order analysis feature is dedicated to the analysis of harmonics and partials coming from sounds of rotating machines. The rpm signal may be derived from a recorded tachometric signal or pulse signal, or extracted and created using the integrated tools within VRXPERIENCE Sound for harmonics detection in the time-frequency representation. These tools are particularly powerful because it does not require a specific sensor device (like a rev counter) to carry out harmonic order analysis.

With this capability, ANSYS VRXPERIENCE Sound provides the following color map representations of the signal information:

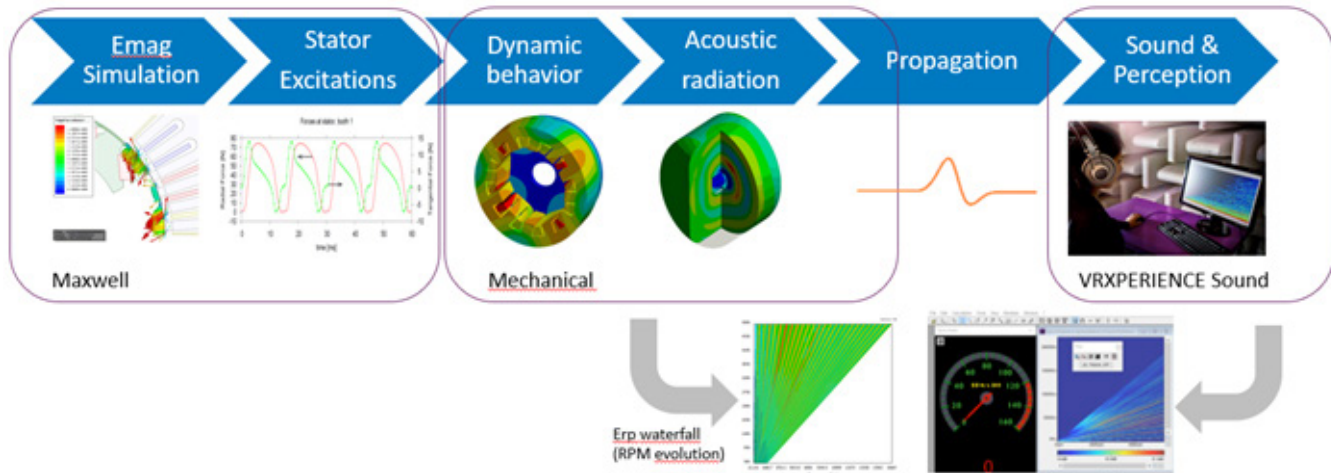
- Time versus Order
- RPM versus Frequency
- RPM versus Order

In addition, this capability includes the creation of sound synthesis datasets (harmonics plus noise) from acoustic recordings for integration into real-time sound software used for driving simulators.



Listen to simulation calculation results

Create sound from spectra or waterfall resulting from simulations calculated by ANSYS Mechanical. For example, users can listen to the sound from the noise and vibration simulation of an electric motor dynamic model.

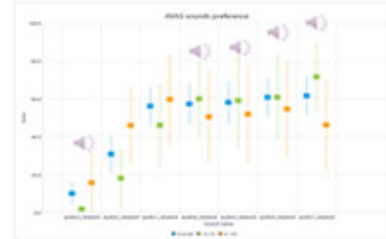


From here, users can evaluate the perceived quality of the sound, identify the weaknesses, and make improvements and decisions to drive enhancements of the corresponding CAD model.

Measure sound perception

With VRXPERIENCE Sound, users may create, run and analyze listening tests to measure and understand how the sounds are perceived. The software enables preference ranking, sound comparisons and selection of sounds with expert or end-user panels.

Users will gain insight into how the end-product is perceived and positioned through the sound delivered. VRXPERIENCE Sound helps validate that a sound has reached its target and is appropriate for the intended situation.



Characterize sound quality

VRXPERIENCE Sound suggests many psychoacoustics criteria (e.g., induced discomfort or unpleasantness), which are often required for an initial qualification of sound quality. Advanced measurements of these metrics can subsequently be recorded during listening tests. Loudness calculations are based on the ISO standard 532B for stationary and slowly evolving sounds. Joint research involving teams from ANSYS and the CNRS LMA research laboratory are used for quantifying impulsive sounds' loudness. The psychoacoustic feature of VRXPERIENCE Sound can perform the equalization of a set of signals to reach a specified common indicator (loudness equalization, for example).

Experience high-accuracy spatial sound

VRXPERIENCE Sound improves the realism and immersion of a sound, by creating soundscapes in virtual reality platforms and driving simulators. For every sound source, 3D sound techniques are available: head-tracked binaural, transaural, ambisonic and vector base amplitude panning (VBAP), etc. To maximize the realism of the sound, the loudspeaker setup can match the customer's facilities. Additionally, an on-site calibration and equalization can be performed to achieve optimal realism in the simulation. When the output signal is sent to a pair of speakers, the listener has the sensation of being immersed in the real-world sound scene, while experiencing a high-quality reproduction of the original soundscape in timbre and spatial position. With this feature, a basic laptop running VRXPERIENCE Sound — with a soundcard and two small speakers — becomes a full, 3D-playback station.



Accurate and immersive sound for driving simulator

The software includes an interactive sound generator for driving simulators. All sound sources are managed and accurately modeled and configurable. These include powertrain, aerodynamic noise, rolling noise, screeching tires, traffic, starter, etc. This feature offers an advanced real-time audio synthesis tool for the generation of car-related sounds. VRXPERIENCE Sound is designed to be integrated into driving simulators and virtual reality platforms. Its sound database is open, so customized car sounds can be created and integrated into the software.

The VRXPERIENCE Sound synthesis technique consists of generating sound sources according to real-time events within a given scenario. When the driving conditions are changing, the synthesis algorithms match the new conditions and each sound source evolves accordingly. Innovative techniques are also used to provide a 3D audio simulation of a sound delivered via headphones or loud speakers. The loud speaker setup can match the customer's facilities and on-site calibration and equalization can be performed to achieve optimal realism.

Engine sound design

ANSYS VRXPERIENCE Sound includes a solution for engine sound enhancement (ESE) in a vehicle. It offers a comprehensive process for measurement, sound design and testing of vehicles (EV, ICE, HEV), as well as the mass production of car stereo systems.

	PRO	PREMIUM	ENTERPRISE
Analyze, listen and modify	●	●	●
Explore harmonic	●	●	●
Listen to simulation calculation results	●	●	●
Measure sound perception		●	●
Characterize sound quality		●	●
Simulate high-accuracy spatial sound		●	●
Experience accurate and immersive sound with driving simulator		●	●
Simulate engine design sound			●

ANSYS VRXPERIENCE Product Line

- VRXPERIENCE Driving Simulator powered by SCANer™
- VRXPERIENCE Sensors
- VRXPERIENCE Headlamp
- VRXPERIENCE HMI
- VRXPERIENCE MRO
- VRXPERIENCE Perceived Quality
- VRXPERIENCE Sound



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