

Release 2023 R1 Highlights

Ansys Sound



/ Ansys Sound Overview

Ansys Sound is a set of software tools used to perform:

- Acoustics Analysis
- Sound Quality Studies
- 3D Sound rendering
- Sound Design Projects

The input of Ansys Sound can be NVH CAE Simulation Data as well as measurement testing data.

The outcome of Ansys Sound are:

- Acoustic performance indicators and comparison Test vs Simulation
- Sound Quality criteria
- Real-time Sound Synthesis and 3D Sound Spatialized
- Active Sound for EV and new mobility



The 6 Ansys Sound Modules



Analysis &
Specification



Jury Listening Test



Virtual Reality
3D Sound



Car Sound
Simulator



Active Sound Design

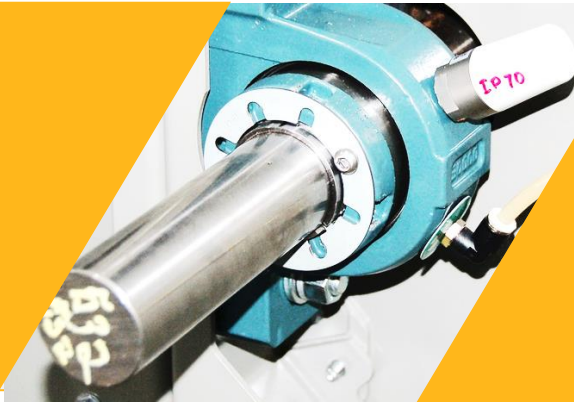


ASD for EV

ANSYS Sound Highlights in 2023 R1 - from vibration toward Sound Design

Vibration data analysis

Displacement ↔ Speed ↔ Acceleration



Vibration analysis needs to deal with

- Displacement
- Speed
- Acceleration (Accelerometer for measurement)

Integration and Differentiation can calculate the signal/spectrum/Spectrogram from one to the others

3D Sound

Multiple channel player



Once 3D sound is computed with trajectories and control parameters scenario, 3D sound player can play the sound on multiple Loudspeaker system. Transaural filter can also recreate 3D sound with only 2 loudspeakers.

Active Sound Design for EV

Granular Synthesis Sound Synthesis



Granular Synthesis Sound Synthesis technique offers infinite ways to generate Interactive Sounds controlled by driving parameter via Can-Bus

NVH Post-Processing

Vibration analysis improvements

User experience improvements

Ansys


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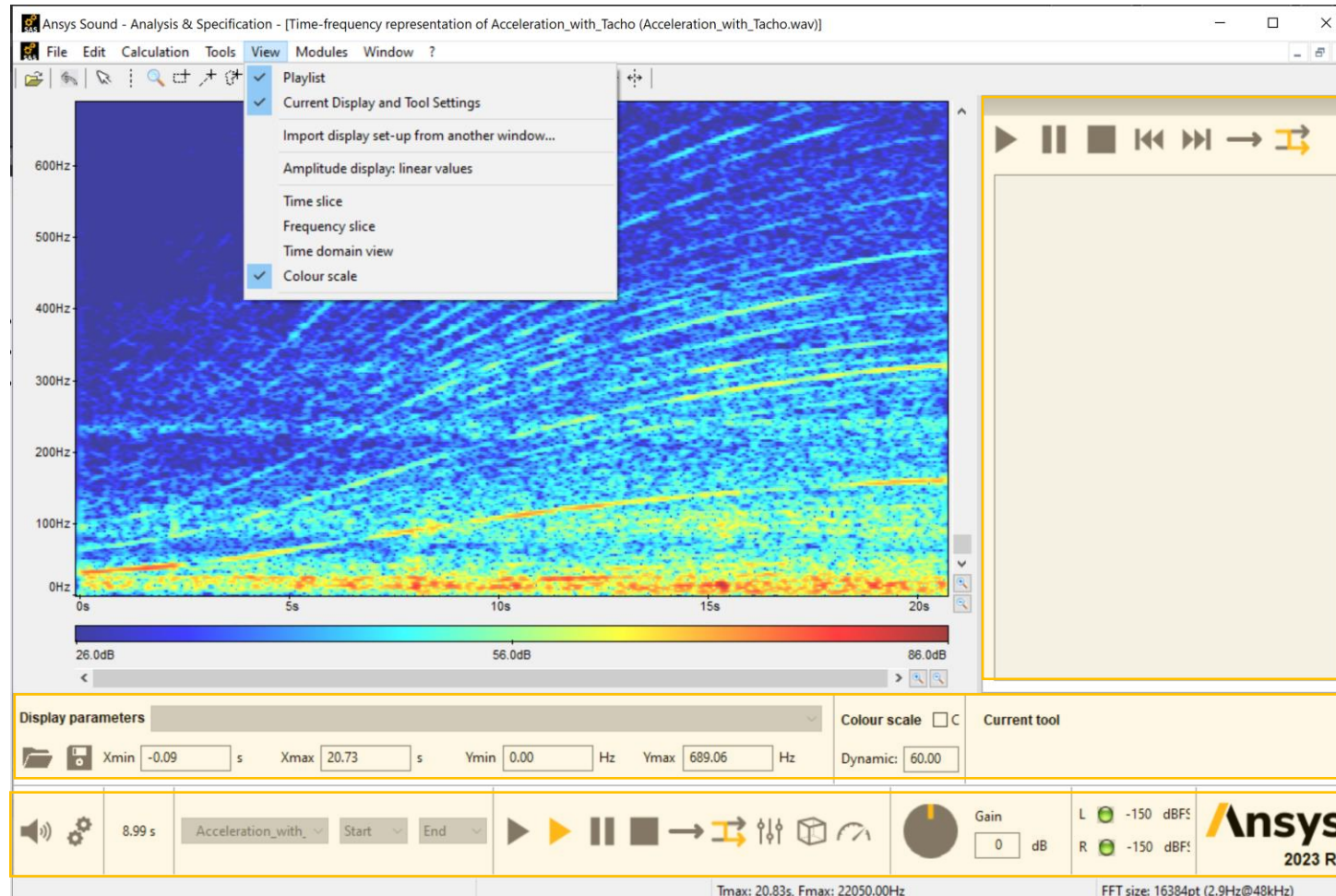

ASD for EV

What's New - in 2023 R1

Feature	Description
New User Interface to avoid too many floating windows	<ul style="list-style-type: none">• Fixed panel for Playback buttons• Show / Hide Panel for Display Settings and Time-Frequency window tools options• Show / Hide Panel for Playlist
Integrate / Derivate data	<ul style="list-style-type: none">• Integrate / Derivate data in Time domain, Spectrums, Spectrogram and RMS level versus time windows → Vibration data: Switch from acceleration to vibration to displacement
Spectrogram FFT size display	<ul style="list-style-type: none">• FFT size is displayed on the main interface• Avoids having to look at the calculation settings to know what FFT size is used in the current display
Spectrogram with linear values	<ul style="list-style-type: none">• Display colormap amplitudes with linear values and not only dB• Useful when analyzing data that is not acoustic data - for instance vibration
New Tutorial videos	<ul style="list-style-type: none">• 4 Tutorial videos on XTRACT module• 1 Tutorial video on Sound Composer Module - Broadband Noise source

New User Interface

- Fixed panel for Playback buttons
- Show / Hide Panel for Display Settings and Spectrogram window tools options
- Show / Hide Panel for Playlist



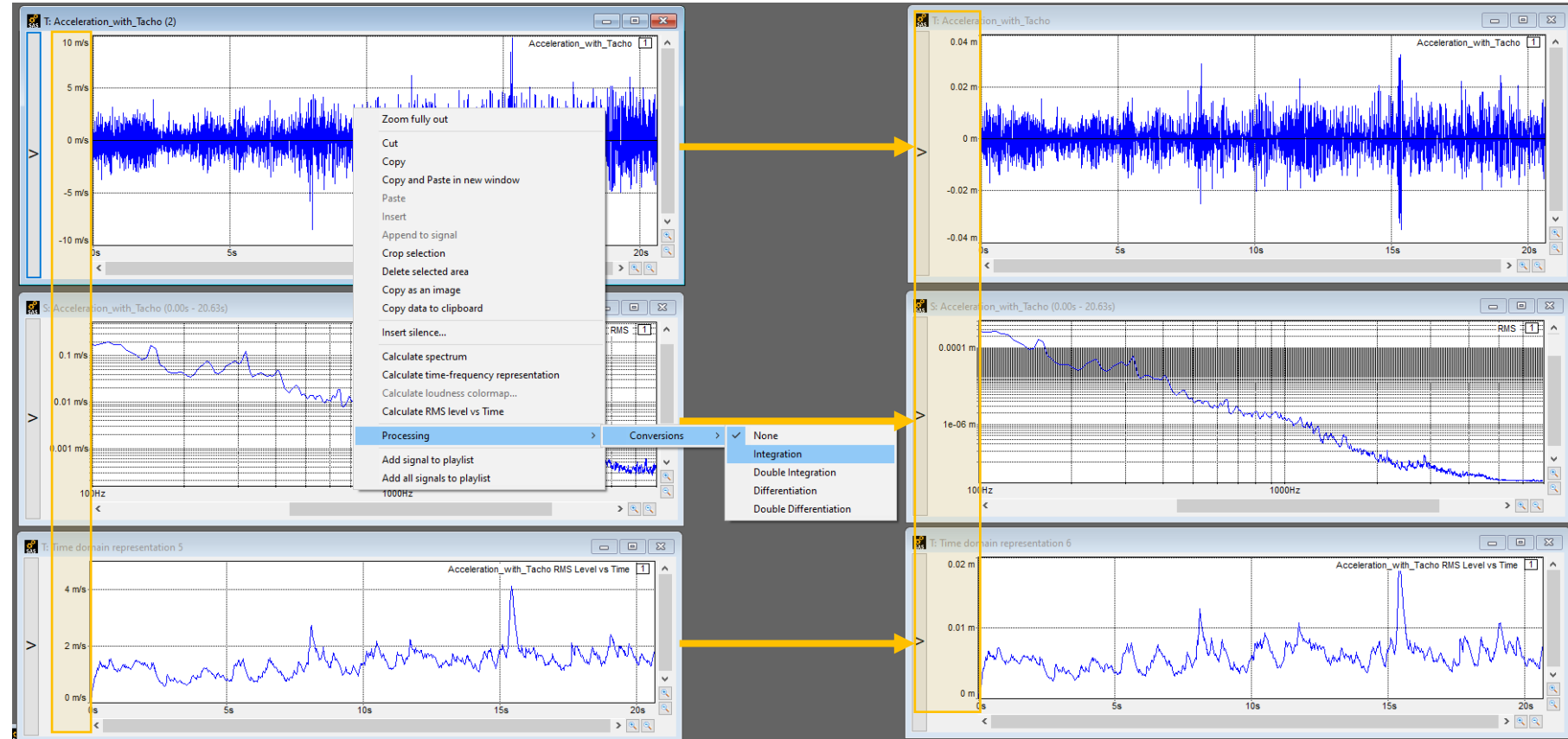
← Playlist (show / hide)

← Settings (show / hide)

← Playback (fixed)

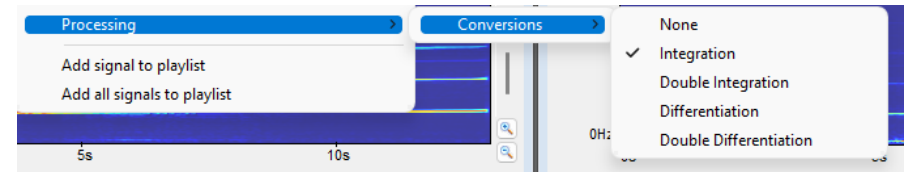
Integrate / Derivate data

- It is possible to Integrate / Derivate the data on several window types:
 - Time domain
 - Spectrums
 - Spectrograms
 - RMS level versus time
- For instance, for vibration data, it enables the Switch from acceleration to vibration to displacement

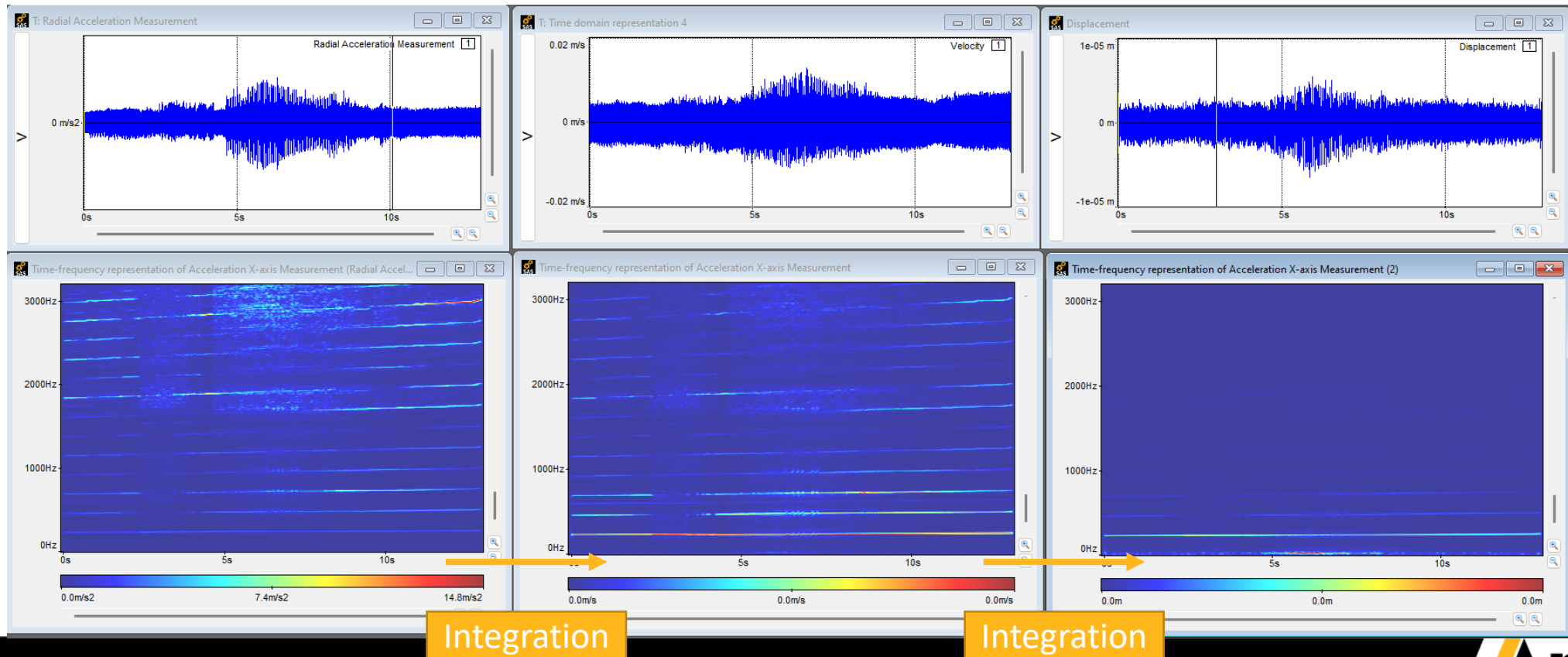


Conversion of quantities

Acceleration > Velocity > Displacement

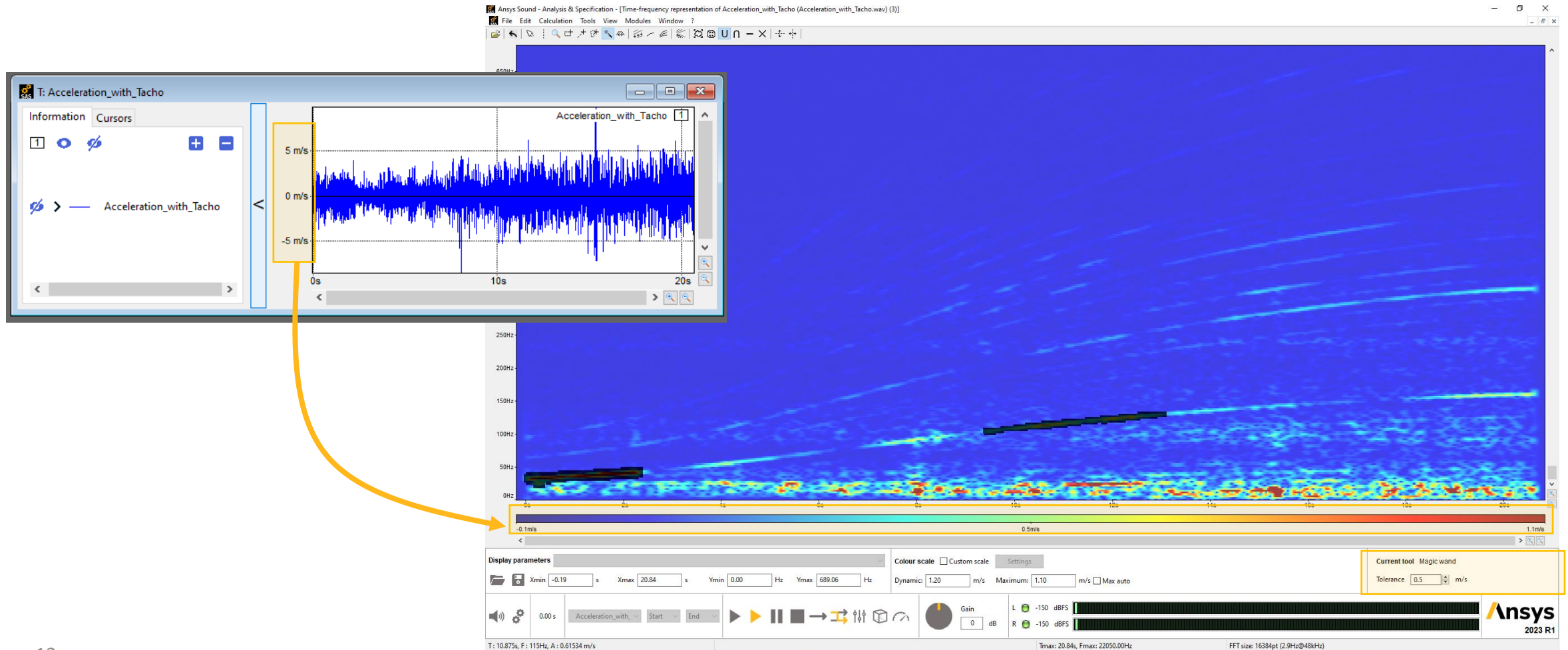


- It is now possible to use Integration and differentiation tools in SAS to convert, display and analyze (time, spectrum, spectrogram) vibration signals



Spectrogram with linear values

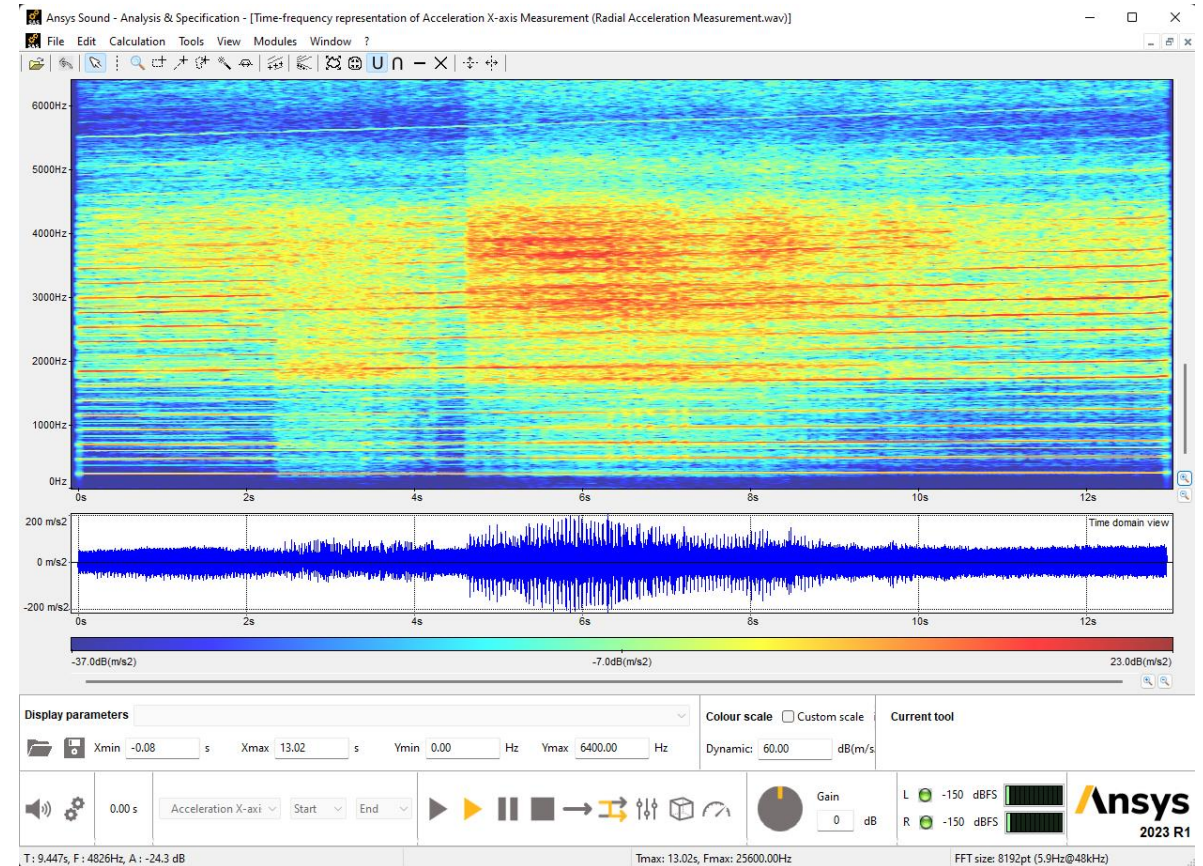
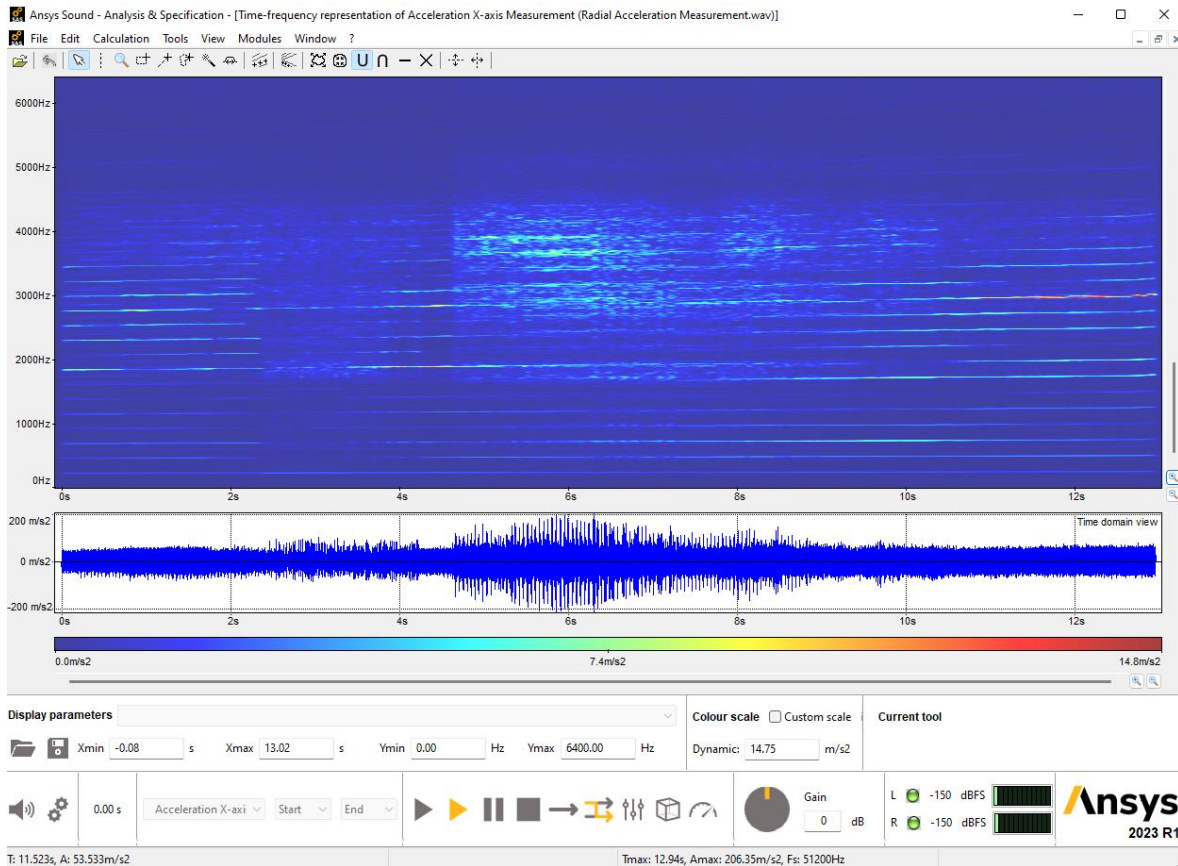
- By default, the color scale is displayed with linear values (and not dB) if the unit of the signal is not Pa
- The parameters of the signal modification tools are also with linear unit
- It is useful when analyzing data that is not acoustic data - for instance vibration



Linear colormap of amplitudes (spectrogram display)

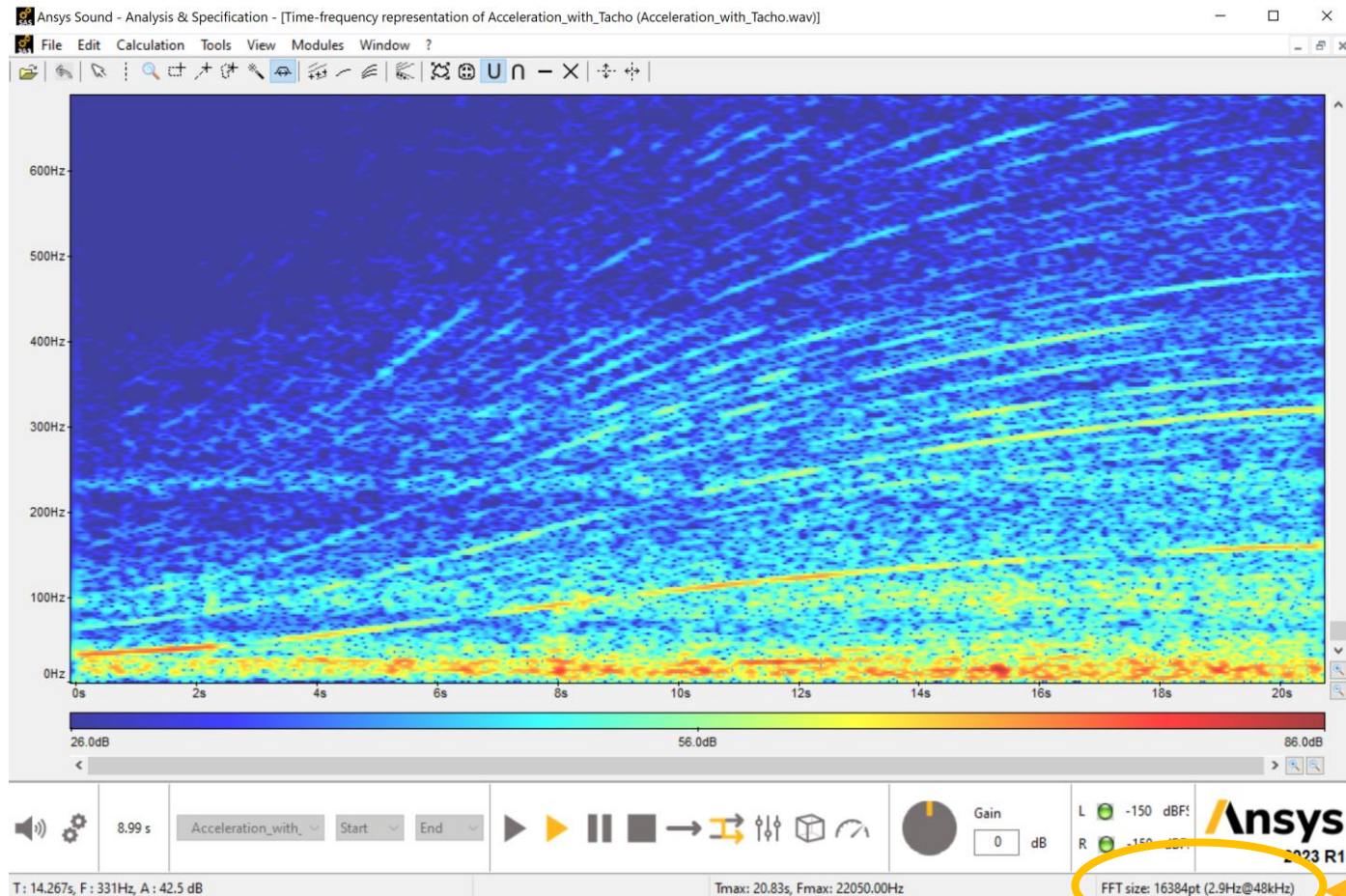
Enhancement of vibration analysis tools

- Linear (left) and logarithmic (right) display of amplitudes are now available in SAS



Spectrogram FFT size display

- The FFT size is displayed on the main interface
- It avoids having to look at the calculation settings to know what FFT size is used in the current display



FFT size

Tutorial videos included with SAS installation

- The tutorial videos are available here:

<C:\Program Files\ANSYS Inc\v231\Acoustics\PublicDocuments\Acoustics\SAS\Video tutorials>

Topic	Feature	Length
1_Time domain	1.1_Customize display setup	03:44
	1.2_Calibrate a signal	03:36
	1.3_Resample and modify sampling frequency	03:46
2_Frequency domain	2.1_Customize display setup	05:26
	2.2_Cursor management - Reference curve	04:33
	2.3_Frequency filtering	03:31
3_Time-frequency domain	3.1_Customize display setup	05:44
	3.2_Sound modification & listening	05:00
	3.3_RPM detection and harmonics selection	04:17
	3.4_Order analysis - level vs RPM	06:00
4_Sound playback	4.1_Sound playback basics	04:42
	4.2_Sound playback settings	02:40
	4.3_Mix Table	01:59
5_Psychoacoustics	5.1_Psychoacoustic indicators	15:47
	5.2_Plot indicators versus custom units	04:13
6_Sound composer : Test and simulation data coupling	6.1_Harmonic source	05:11
	6.2_Time domain source	02:00
	6.3_Spectrum source	04:05
	6.4_Broadband noise source	05:14
	6.5_Gain adjustment & Mix table	02:28
	6.6_Sound display	03:21
7_Data import from test and simulation	7.1_Generate signal from waterfall	03:53
	7.2_Generate signal from spectrum	06:21
	7.3_Generate a longer sound	04:06
8_XTRACT	8.1_Module overview	04:43
	8.2_Noise extraction	04:03
	8.3_Tonal extraction	04:47
	8.4_Transient extraction	04:02

Electric and hybrid vehicles

New sound design method

UX improvements using projects

Ansys

The 6 Ansys Sound modules



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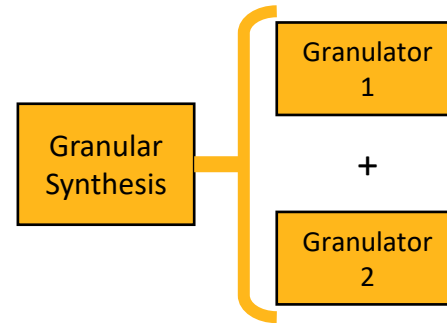
Active Sound Design



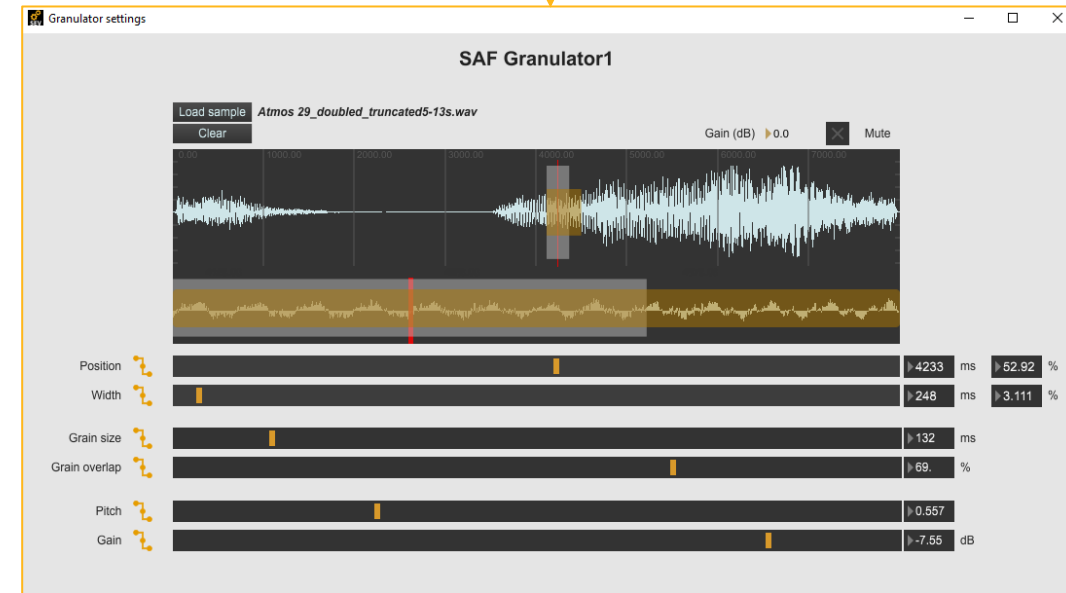
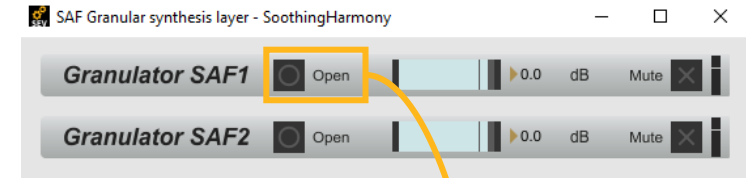
ASD for EV

Feature	Description
Save & Load Project	The entire ASDforEV configuration (4 presets, audio configuration, scenario) can now be stored and resumed as projects
Granular synthesis	SAF & AVAS sound functions now include an additional Granular Synthesis layer
Preprocessing formulas included into presets	Preprocessing formulas are now saved along with preset files, making it possible to have distinct formulas for different presets
Reusable individual preprocessing formulas	Each preprocessing formula can be saved and loaded again onto a different control parameter so that it is no longer necessary to redefine the formula and mapper data entirely for each parameter
Additional gain & pitch mappers for loopers	SAF & AVAS loopers now offer the possibility to use up to 4 (additive) gain mappers, and 2 (multiplicative) pitch mappers

Granular synthesis available in SAF & AVAS



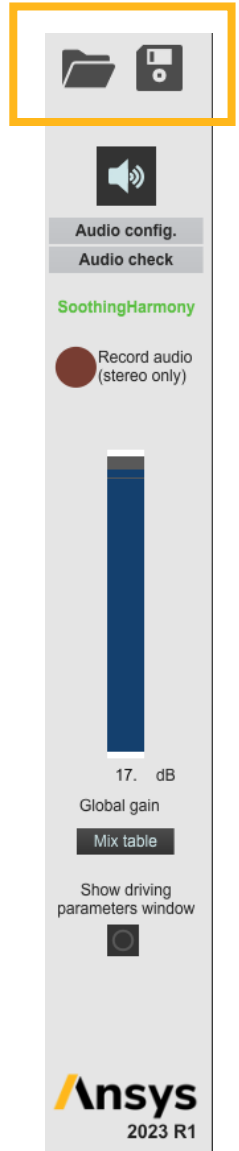
- New sound design method: Granular Synthesis
 - New layer, made of 2 *Granulators*, both in SAF & AVAS
 - *Grains* (short windowed sample excerpts) are successively selected and played with overlap
 - Very intuitive synthesis method, to rapidly sketch and tune rich active sounds from a single sound sample
 - Two granulators in parallel push sound richness possibilities even further



Projects

Save, resume and share your work seamlessly

- Projects allow you to **save** and **load** an entire configuration of the software in order to **reuse** it later or **share** it with colleagues who also use Ansys Sound ASDforEV
- The project comprises:
 - The 4 currently loaded **presets** along with their preprocessing formulas
 - The current **audio output configuration**
 - The currently loaded **driving scenario**
 - The **preset selection preprocessing formula** (which is independent of presets)



Preprocessing formulas included into presets

- Preprocessing formulas are stored along with preset files and data
- Preprocessing formulas can also be directly accessed from the parameters they control

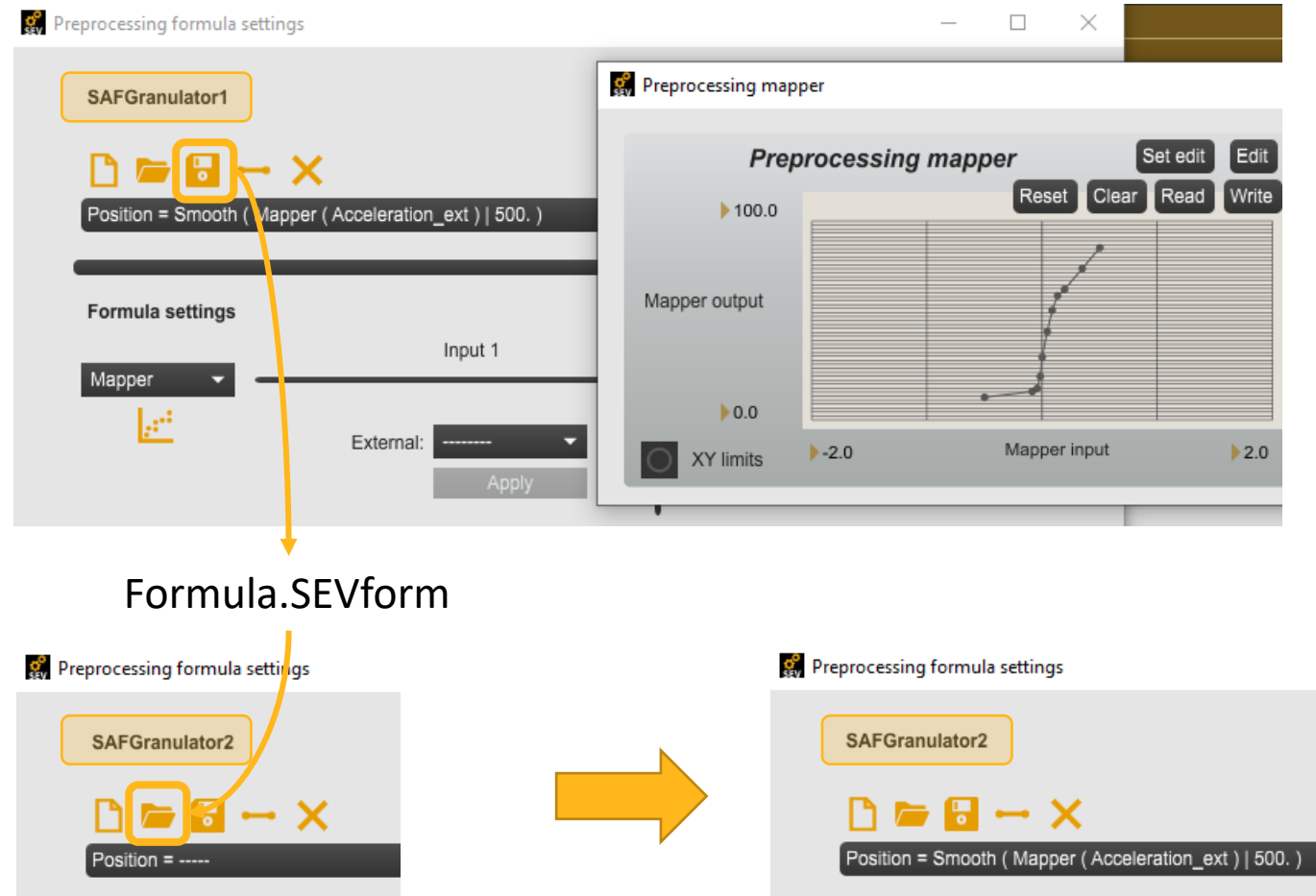
The screenshot displays the Ansys software interface for configuring a 'Turn indicators' preset. The main window shows a car diagram with a highlighted turn indicator. The 'Turn indicators' panel includes a 'Speed-to-Gain mapper' graph with the following data points:

Speed (kph)	Gain (dB)
0	6.0
350	-70.0

The 'Turn indicators' panel also shows the formula settings for 'SpatializationAngle = Mapper (Angle_ext)'. The 'Mapper' dropdown is set to 'Input 1', and the 'External' dropdown is set to '-----'. The 'Apply' button is visible.

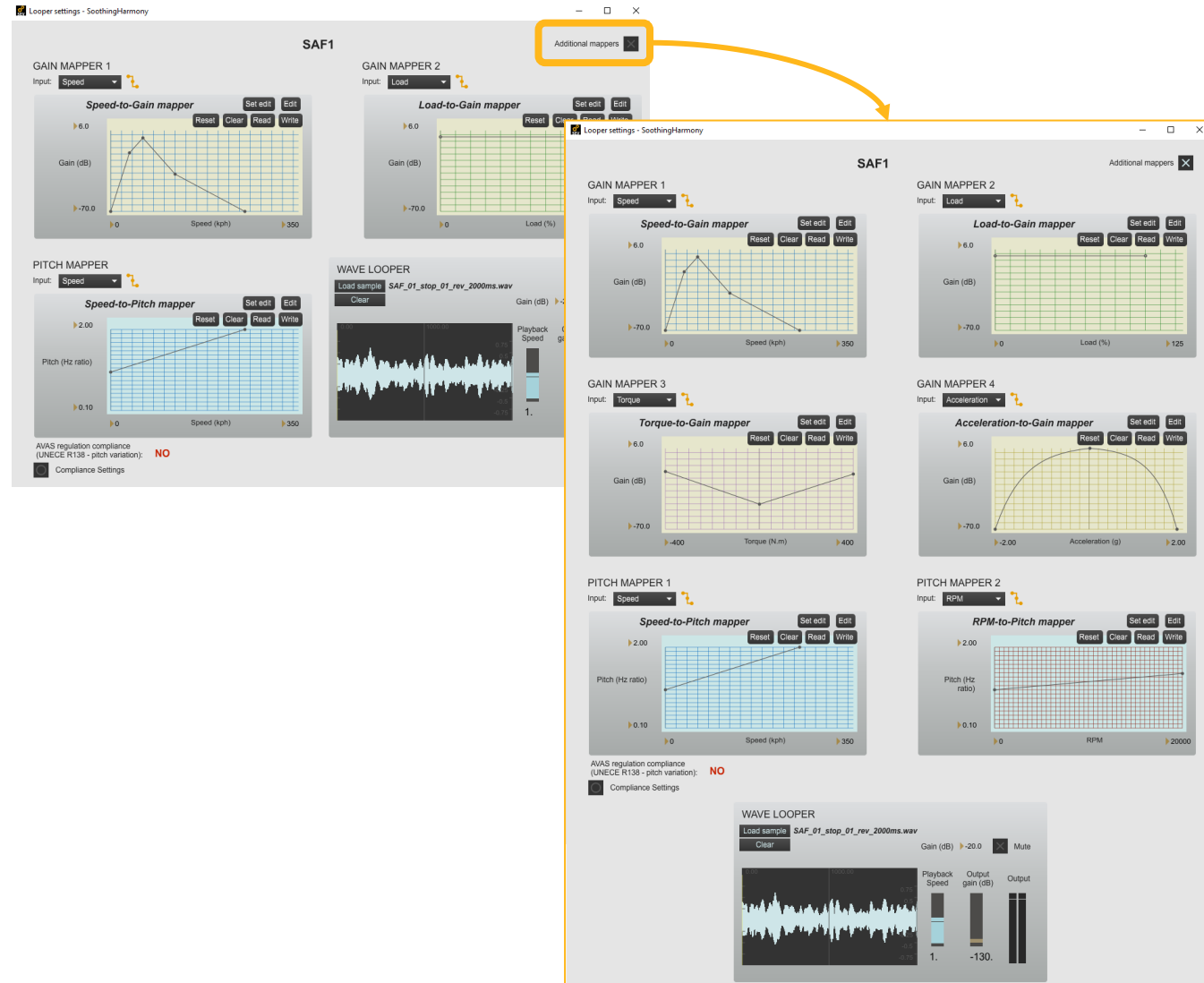
Reusable individual preprocessing formulas

- Preprocessing formulas can be saved and loaded into another formula
- The stored formula contains constant values, external selections, and mapper data
- Additionally external selections can now be changed



Additional gain & pitch mappers for loopers

- In both SAF & AVAS, it is now possible to increase the number of mappers that control a looper's pitch and gain
- By default:
 - 2 additive **gain** mappers
 - 1 **pitch** mapper
- With “Additional mappers” selected:
 - 4 additive **gain** mappers
 - 2 multiplicative **pitch** mappers



Soundscape Creation and Generation

Play any multichannel file seamlessly

Play binaural sounds on speakers

Create soundscapes following predefined scenarios

Ansys

The 6 Ansys Sound modules



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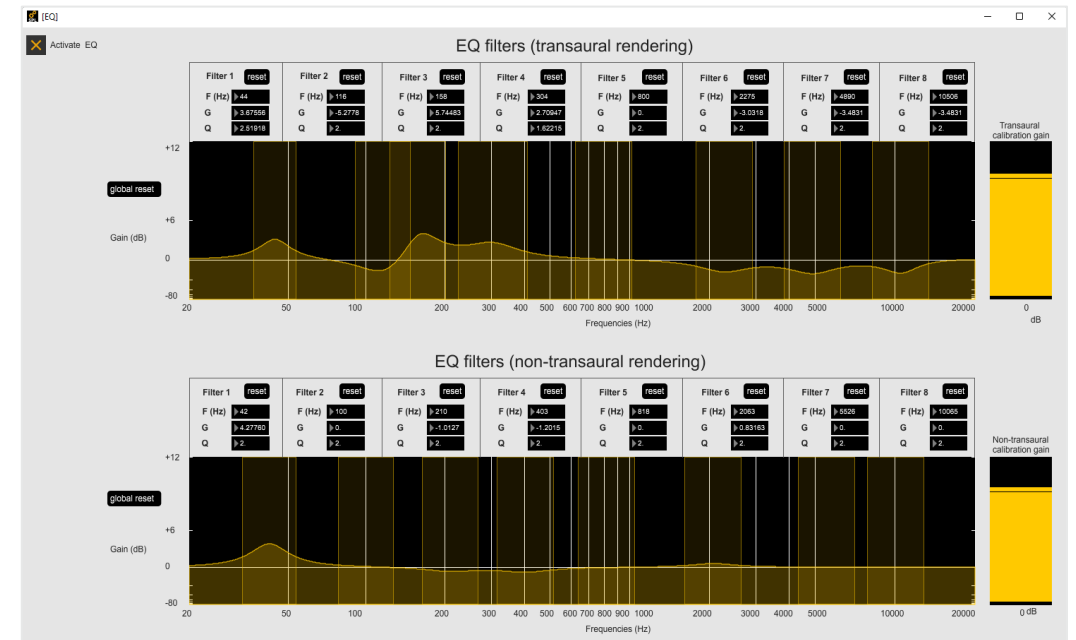
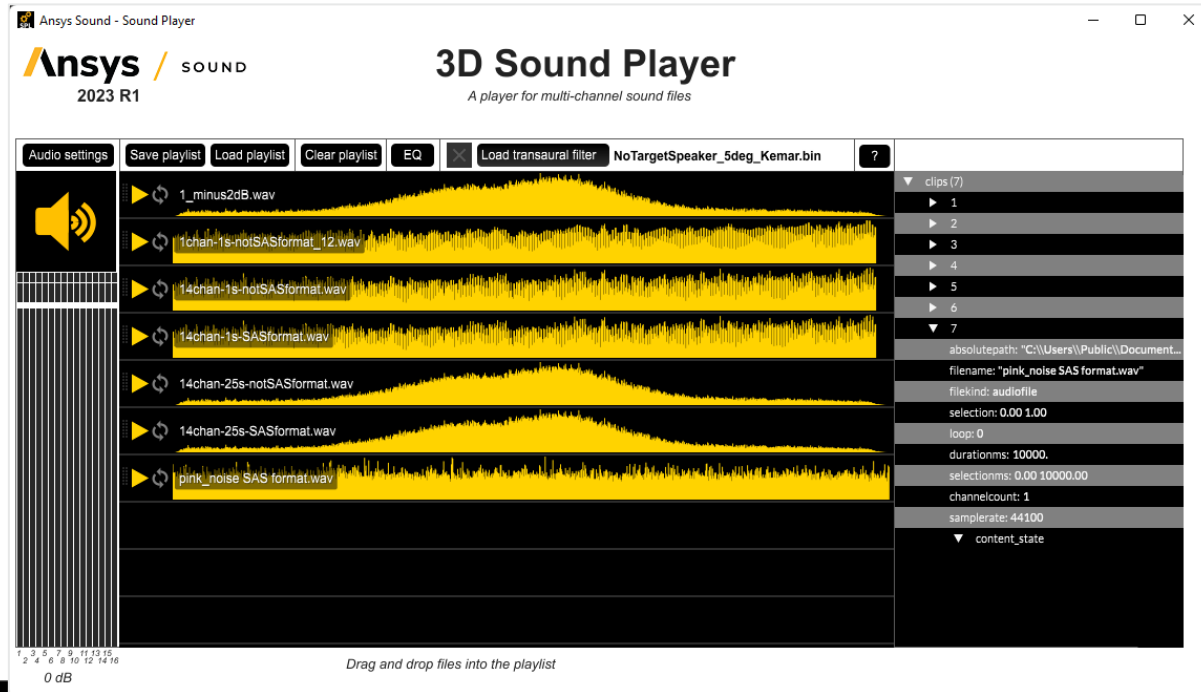


ASD for EV

Feature	Description
Play multichannel files on multiple speakers	The new application 3D Sound Player allows to accurately play multichannel sound files on a multiple speaker's setup for any configuration, making sound comparison as easy as possible.
Transaural playback of binaural sounds on multiple speakers	Binaural sounds can be played on a multiple speakers using transaural technique.
Create a soundscape by controlling individual evolutions of each source	Each source can be assigned a predefined control evolution which controls its behavior.

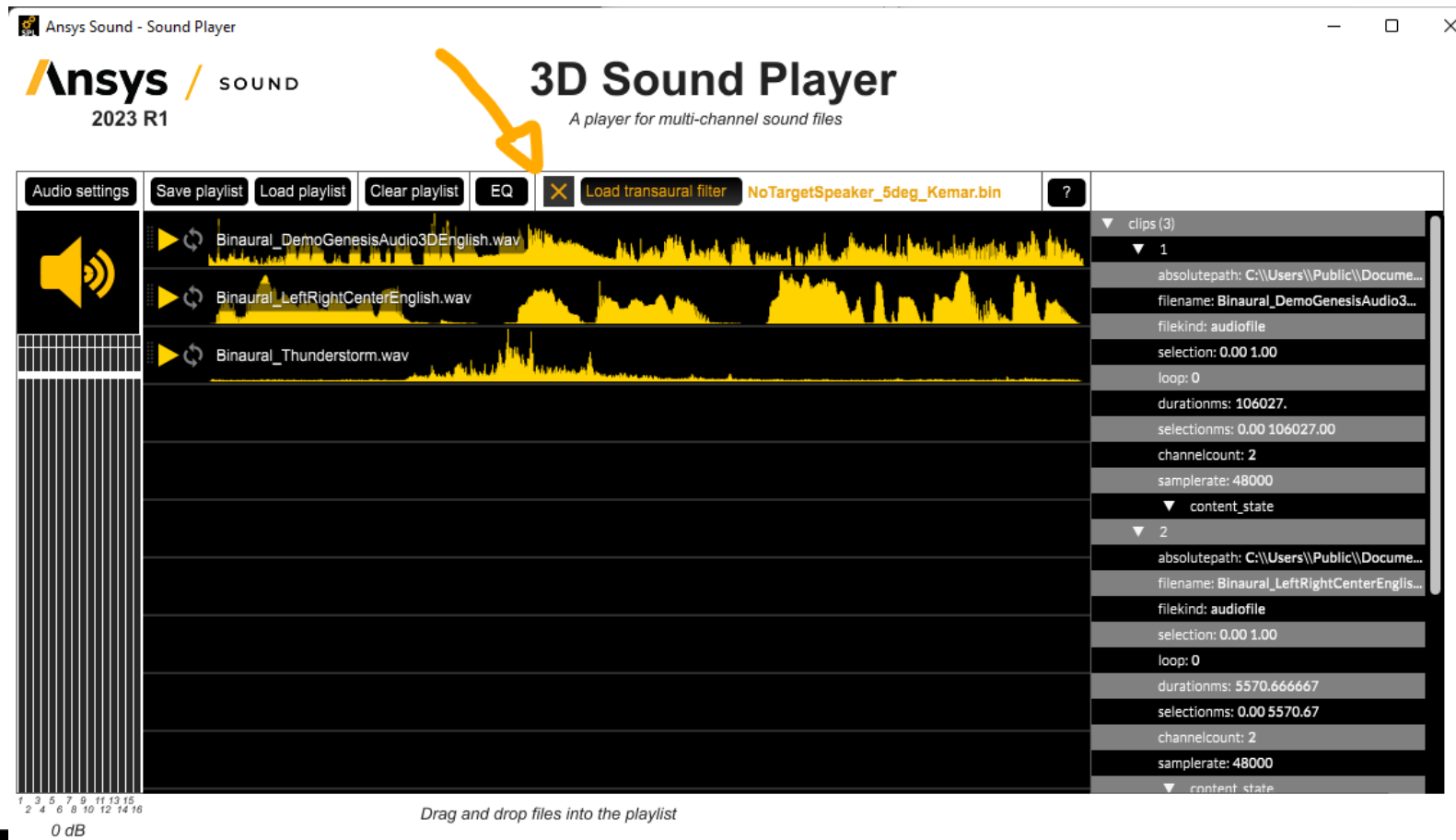
3D Sound Player

- This new application is included in Ansys Sound and allows to:
 - Manage a list of multichannel sounds created with VRS, and play them on any speaker's configuration
 - Equalize the audio output to limit the compensate of the listening room



3D Sound Player: transaural playback

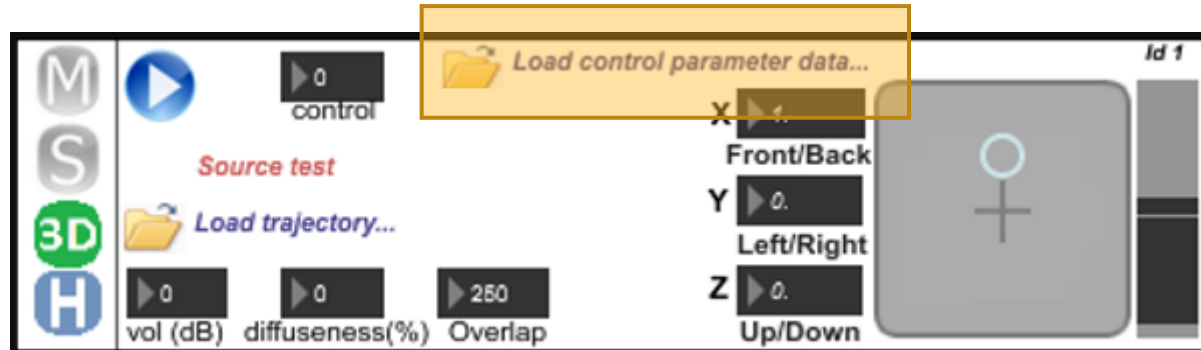
- Play binaural sounds without headphones using 3D Sound Player



Control sources evolution through a predefined scenario

Improved soundscape creation

- In Ansys Sound VRS, it is now easy to set a predefined behavior for each 3D Interpolated Source and save the sound of the corresponding soundscape into a multichannel wav file



The Ansys logo is positioned on the left side of the slide. It features a yellow slanted bar to the left of the word "Ansys" in a bold, black, sans-serif font.

Ansys

