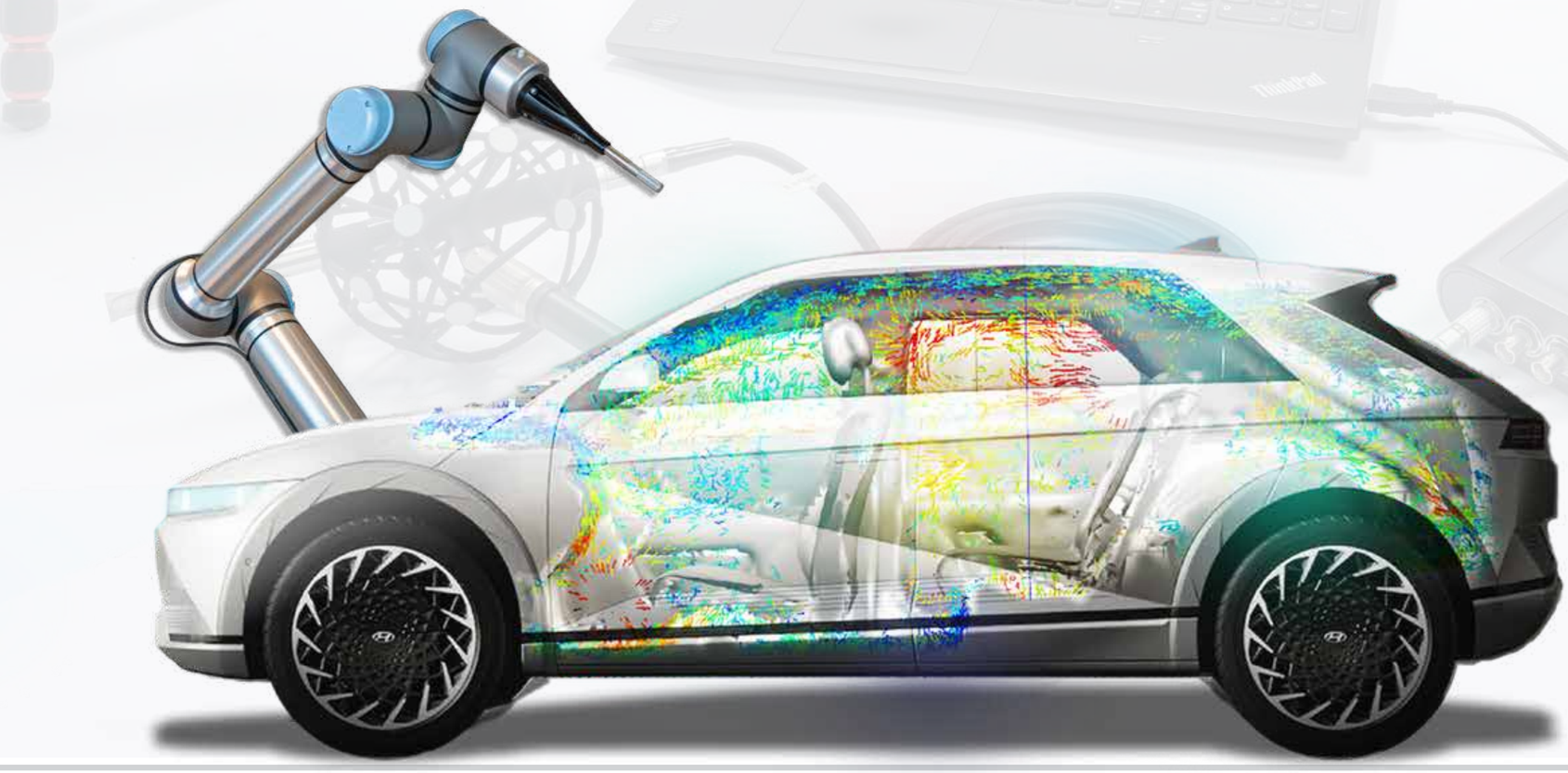
SCAN&PAINT 3D

3D sound visualisation in a matter of minutes



MICROFLOWN TECHNOLOGIES

Product leaflet

Scan&Paint 3D

CUTTING EDGE SOLUTION FOR SOUND VISUALISATION AND 3D SOUND INTENSITY

A unique tool for acoustic troubleshooting, sound source localization and noise ranking, allowing you to visualize what you hear. It makes complex problems simple and easy to understand. Localize your sound sources and visualize the sound propagation in full 3D. Scan&Paint 3D offers you 3D sound vectors displayed on a 3D model.

Unmatched solution for 3D sound intensity

SCAN&PAINT 3D AT A GLANCE

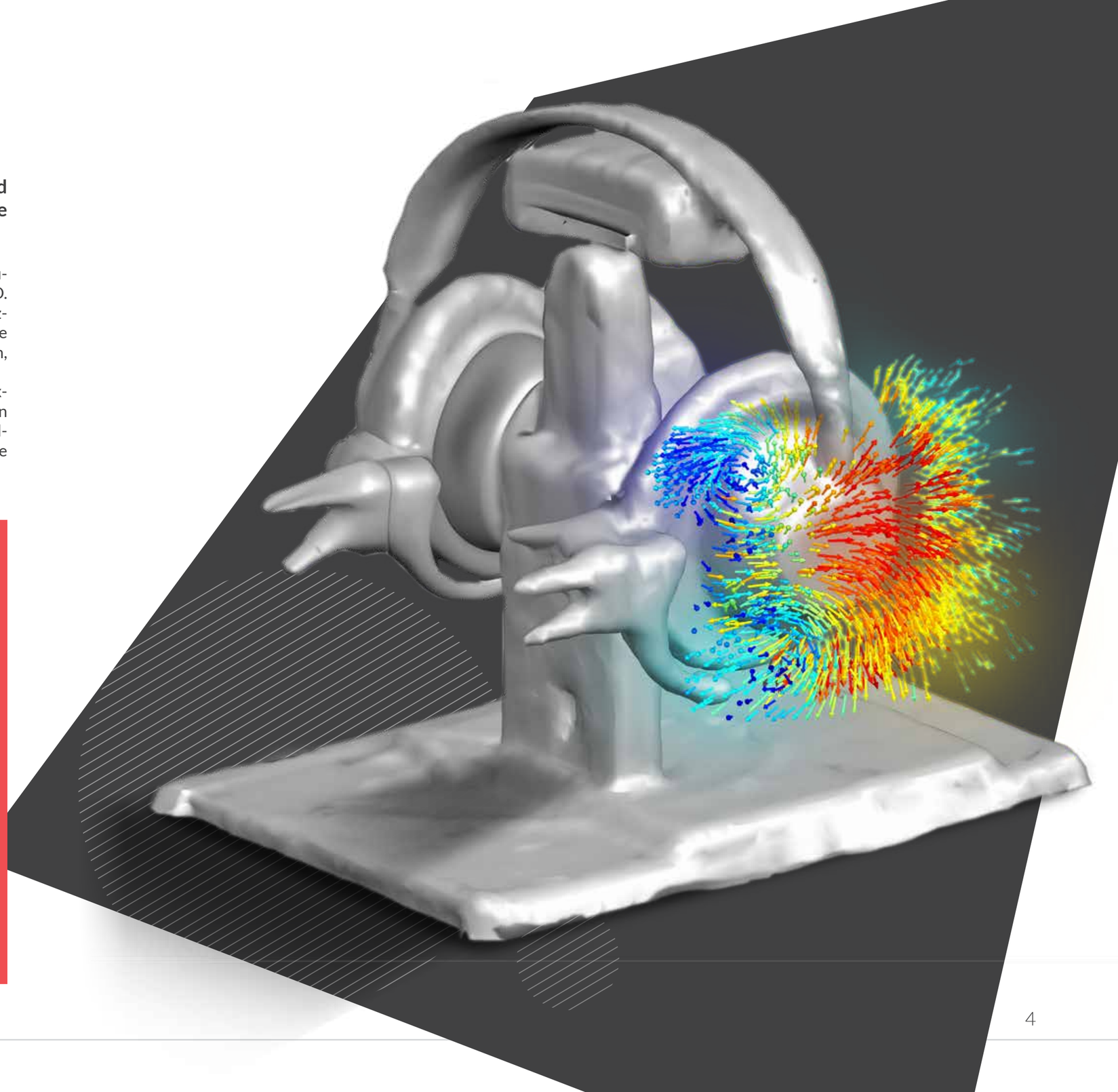
Sound source localization is an important topic in the working field of sound & vibration, from the product development stage to the end of line quality control.

In a matter of minutes the complete sound field, as 3D sound intensity or particle velocity, is displayed on a 3D model over a broad frequency range and with an unparalleled dynamic range. The tiny 3D sensor makes it possible to obtain results with a very high spatial resolution, down to 3mm, enabling measurements even on very small objects.

Localize your sound sources and visualize the sound propagation in full 3D. Use one data set for for localizing dominant sources and accurate broadband sound power calculation, for the overall level or per segment.
The comprehensive and advanced export option enables a bridge between simulation and measured results, allowing flexibility on the use of the data.

Key features

- 3D visualization of sound pressure, particle velocity and sound intensity (incl. active and reactive fields)
- Broadband Solution | 20Hz - 10kHz
- Unmatched spatial representation down to 1 mm
- Results created in a matter of minutes
- Applicable in challenging environments
- Calculation of sound power and panel ranking
- Multiple 2D plane visualization
- Advanced colormap display (3D wrapping)
- Compatible with manual and robotic scanning
- Animated vector fields and colormaps
- Extensive data export option (incl. *.csv, *.mat, ParaView and ACTRAN)



Portable yet powerful

Cutting edge sensor technology

3D SOUND INTENSITY PROBE

The state of the art sensor used in the system is the three dimensional 1⁄2 inch USP regular probe. The sensor consists of three orthogonally placed Microflown acoustic particle velocity sensors and a sound pressure microphone.

The Microflown USP probe is the first sensor that has the unique capability of allowing the direct measurement of all acoustic quantities: sound pressure and tri-axial particle velocity. The sound intensity can be calculated by taking the time averaged cross spectrum of particle velocity and sound pressure. 3D Sound intensity vectors can be obtained without any frequency limitations covering a range of 20Hz to 10kHz. The small sensor size allows measurements to be taken with an unmatched spatial resolution.

Furthermore the sensors are not highly affected by the environment and allow sound intensity measurements in situations with a high sound pressure over sound intensity ratio (p/I index).

Real time position and orientation tracking

The sensor's position and orientation are automatically tracked in 3D. When used in manual scanning, this is done through an optical tracking system that monitors a defined measurement space using an infrared stereo camera. The camera periodically illuminates the scene with invisible IR light, reflected by retro-reflective markers on the sensor sphere to determine its exact position and orientation.

The tracking camera can be repositioned easily between measurements, allowing full coverage of complex objects such as vehicle interiors. When integrated with a robotic scanner, position and orientation data are instead provided directly by the robot, ensuring an even higher 3D precision without the need for optical tracking.

Enabling acoustic measurements in hazardous areas

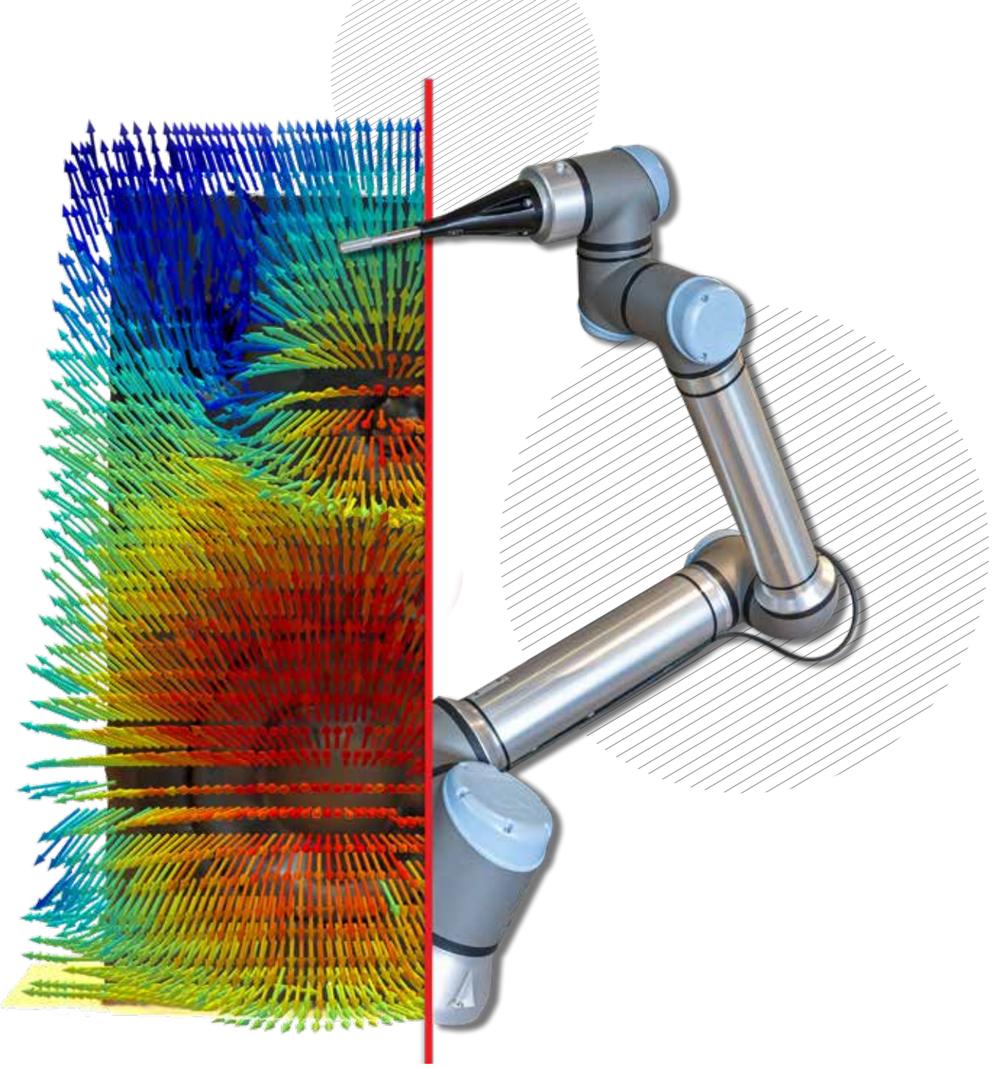
ROBOTIC ACOUSTIC SCANNER

Extending the versatility of Scan&Paint 3D, the Robotic Integration unlocks fully automated sound field visualization, ideal wherever manual scanning is difficult, unsafe, or repetitive. By seamlessly combining the USP probe with collaborative robots such as the Universal Robot (UR), engineers gain a powerful tool for high-precision, repeatable measurements in virtually any environment.

A dedicated probe adapter ensures fixed positioning and orientation, while spacer tools maintain controlled probe distance, even on curved or complex surfaces. This guarantees consistent data, removes operator variability, and allows long test campaigns without human intervention.

Beyond safety and repeatability, robotic integration also enhances efficiency. Measurements that once demanded extended operator time can now be performed automatically, overnight, or in parallel with other tasks. With the robot executing precise scanning paths, engineers are free to focus on data interpretation, simulation, and design improvements.

Whether in confined interiors, hazardous environments, or routine prototype testing, Robotic Integration ensures safe, accurate, and fully automated acoustic scanning. It provides engineers with reliable datasets that strengthen benchmarking, accelerate product development cycles, and open new possibilities for measuring previously inaccessible areas.



Robotic scanner highlights

- Automated & repeatable measurements
- Safe in confined or hazardous environments
- Extended reach into complex geometries
- Continuous or unmanned test campaign

Hardware overview

A TOOL FOR EVERYONE

When dealing with acoustic measurements, not one of them is often the same. For example, the environment or use case can be very different, varying from large to compact objects, spacious to cramped rooms.Having the proper hardware at hand is vital in many cases. To ensure that you have the right tool for the job, we created a base package that you can upgrade to fit your needs.

SYSTEM SPECIFICATION

Sensor	
USP Regular Probe:	20Hz - 10kHz | Particle velocity | Sound pressure | Sound intensity Error margin: Class 1 | Noise floor (20 Hz - 2 kHz): 21 dB(A) SPL, 32 dB(A) PVL Noise floor (20 Hz - 2 kHz): 27 dB(A) SPL, 48 dB(A) PVL | Maximum level: 130 dB
DAQ + Power source	
MFPA-4 + Scout V2:	Resolution: 24bit | No. inputs: 4 | Input ranges: ±1 V, ±10 V | Max. sample frequency: 52 kHz
	or
Voyager:	Resolution: 24bit | No. inputs: 6 | Input ranges: ±0.1 V, ±1 V, ±10 V | Max. sample frequency: 48 kHz
Optical tracking camera	
PST Iris:	Tracking distance: 50cm up to 5m | Frame rate: up to 120Hz | Data transfer: 1x USB 2.0
	or
PST Base HD:	Tracking distance: 20cm up to 3m | Frame rate: up to 200Hz | Data transfer: 2x USB 3.0
Other information	
Type of noise:	(Time) stationary conditions
Data Output:	Color sound vectors in 3D for particle velocity and sound intensity, spheres for sound pressure overlaid on a 3D models of the device under test. 2D interpolated color sound maps for one or mulitple planes in any direction.
Analysis options:	Narrow band, octave bands (1/1, 1/3 and 1/12), cuboid sound power, panel ranking

PST Iris

50.5 cm

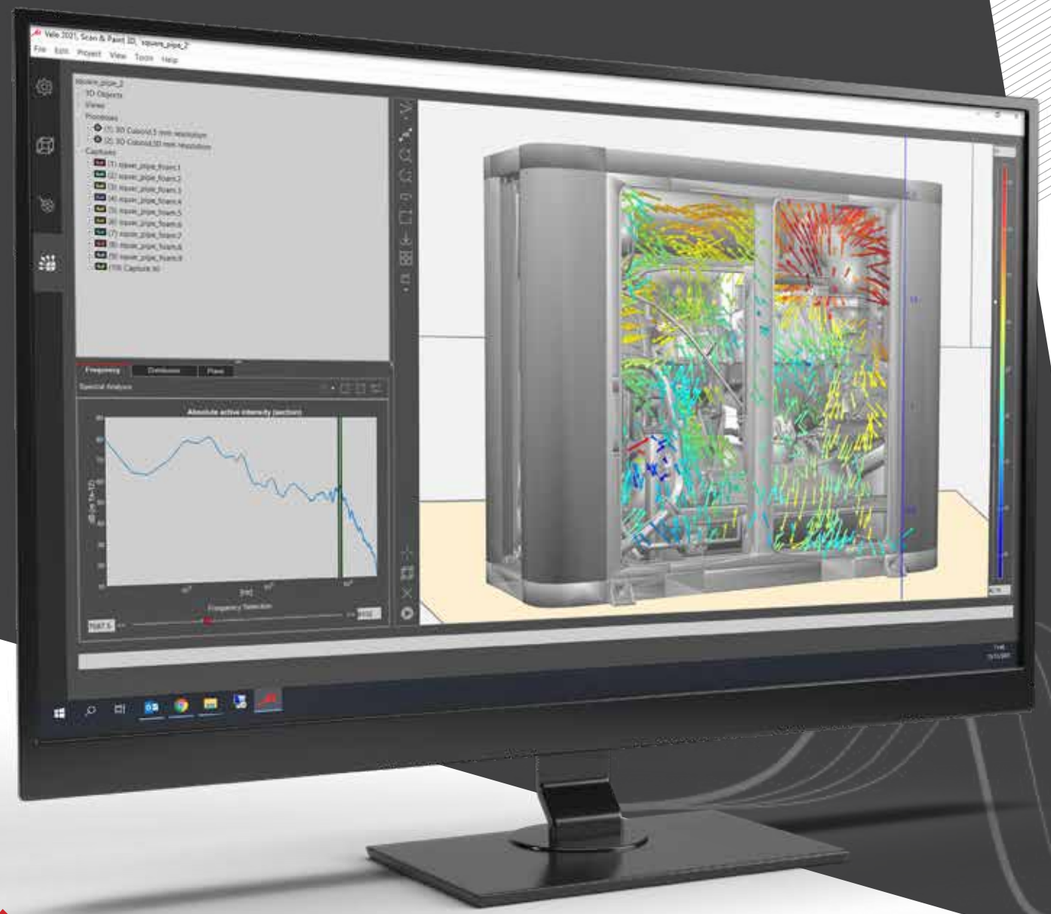
PST Base HD

31 cm

VOYAGER

Intuitive & comprehensive
NEXT LEVEL SOUND VISUALISATION SOFTWARE

What originally started with sensor technology has become one of the world's most unique instruments for sound visualization. Microflown Technologies integrates different hardware products with a powerful and user-friendly software package.



Offering so much more than a 3D sound map

Scan&Paint 3D Software comes as part of Microflown successful VELO platform. It is one of the first VELO applications to transition to the 64bit version, decreasing file loading time and increasing software and PC performance capabilities.

The Scan&Paint 3D solution prides itself on being user-friendly and a plug & play solution, meaning that the software and hardware work synchronized to facilitate connections, leading to a straightforward setup condition.

Certifying the solution is user-friendly also shows in its ingenuous icon-based GUI design, transcending language barriers and skill levels, making the Scan&Paint 3D software intuitive and quick to learn. In addition, the software guides the user through configuring, importing, measuring, post-processing, and the results.

Don't be misled by its simplicity, the software includes a powerful set of tools under the hood. Users can import different 3D files and make measurements with multiple 3D geometries. Compare multiple analysis configurations within one project by creating different processes with different quantities. On top of this, the software displays data in real-time, making it the perfect tool for troubleshooting.

Direct import of 3D models

All results are visualized on an interactive 3D model. The software can directly import a variety of standard CAD formats and has embedded tools to modify loaded data. Files captured with an iPhone/iPad Pro using a 3D scanner app are also supported. Examples of format types are .obj, .stl, .3DS, .shape and .dae.

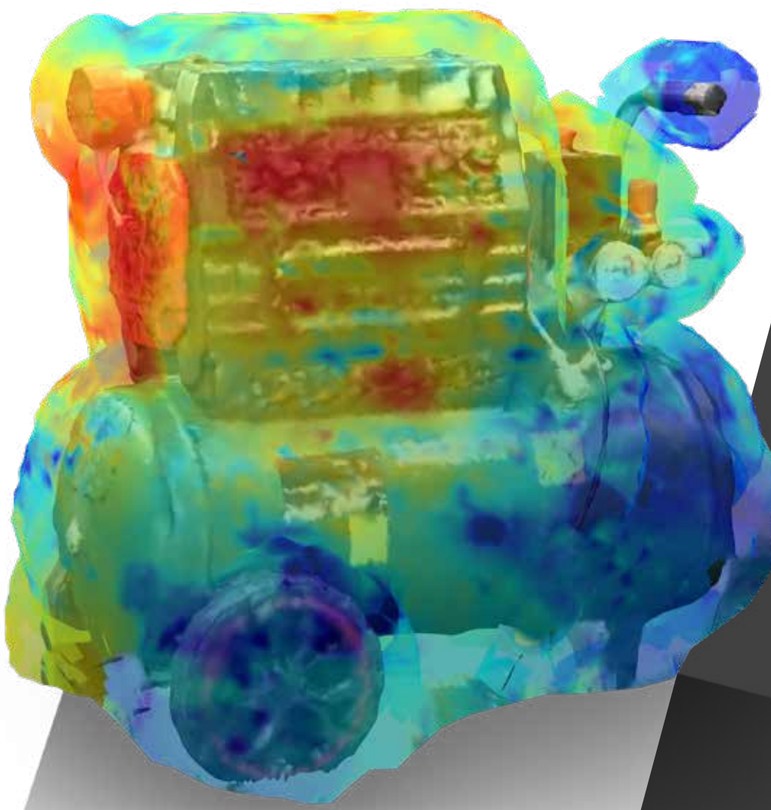
Alternatively, if no model is availably for import, a fast method using a Structure Sensor to obtain a detailed 3D model can be offered. The structure Sensor can be used either with an Ipad or PC and provides a 3D model in a directly compatible file format in a matter of minutes. But the software also allows for the use Apple's LiDAR sensor.

Redefining sound analysis

In the ever-evolving realm of sound and vibration analysis, precision and clarity are paramount. The latest enhancements to Scan & Paint 3D, elevate your sound analysis capabilities to unprecedented heights. Our cutting-edge modules redefine how you perceive, analyze, and communicate sound data. Let's look into the transformative features that are set to revolutionize your approach to sound analysis.

Full 3D wrapped sound mapping

Accurate visual representations of measurements are now at users' fingertips with the introduction of full 3D-wrapped sound maps. Performing 3D sound localization and identifying noise issues becomes an effortless task, thanks to this feature's ability to provide an intuitive and detailed overview of sound distribution at a user-defined distance range. An enveloping layer is automatically calculated at a custom-define distance from the object's surface, visualizing just the right data of interest.



Versatile sound visualization results

Take 3D sound localization to new heights by visualizing data in multiple formats—whether it's exporting text, Excel files, images, or stunning customizable videos. Now, with the ability to export directly to GLB format, you can seamlessly open your results in PowerPoint and other 3D software, facilitating enhanced presentations and collaboration.

Showcase your expertise like never before with dynamic video exports, or dive deeper into your data with animated vector fields and colormaps in Scan & Paint 3D. This empowers you to communicate your findings and insights more effectively, ensuring impactful results and seamless teamwork.

Sound power calculations & ranking

Besides unparalleled 3D sound visualization, users gain the ability to define customizable planes, allowing efficient quantification and ranking of essential sound sources. This invaluable functionality provides deep insights, enabling users to pinpoint and prioritize areas for improvement and optimization with ease.

SCAN&PAINT 3D SOFTWARE LICENSES	LITE	STANDARD	PRO
Data recording	✓	✓	✓
3D Tracker (incl. live tracking)	✓	✓	✓
Support 3D objects texture mapping	✓	✓	✓
Sound pressure, 3D Particle velocity, 3D sound intensity Mapping	✓	✓	✓
Troubleshooting Tools (3D section selection, playback, spectra...)	✓	✓	✓
Multi-view tools for result analysis and comparison	✓	✓	✓
Colormaps based on planar sections	✓	✓	✓
Range selection tab (histogram-based dynamic range filtering)	✓	✓	✓
Dedicated playback tools (incl. filtering, tracking exclusion, impulse detection)		✓	✓
Advanced colormap display (3D wrapping and spherical sections)		✓	✓
Overall sound power estimation (cuboid-based)		✓	✓
Multi-panel grouping, comparison and sound power ranking		✓	✓
Full export options (incl. *.csv, *.mat, ParaView and ACTRAN)			✓
Advanced troubleshooting, section time export, cross-processor			✓
Reference sensor-based displays			✓
Coherent intensity			✓
Compatibility with Universal Robot scanner			✓
Animated vector fields and colormaps			✓

List of included items

HARDWARE OPTIONS

Everything you need, in one rugged, ready-to-go case. The All-in-One Box Solution includes a full suite of professional-grade tools for advanced inspection and analysis.

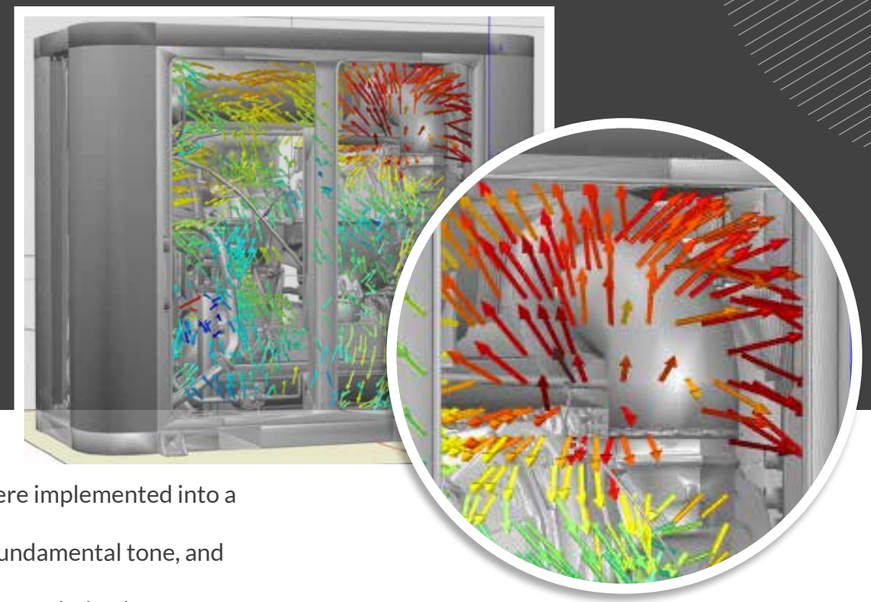
Scan&Paint 3D | VOYAGER configuration
Voyager DAQ
- Lanyard
- Sony WH-1000XM4 Headphones
- Tripod Adapter (1/4 to 3/8)
- Firmware Reset Ejector Pin
USP Regular
- Metal Probe Case
- Calibration Report
PST Iris camera (BASE or HD)
CAMLINK tripod
Cables:
- 5 m LEMO 7pin male to male cable
- 3 m high-speed data USB-A to USB-C cable
- 2 m USB-A to Micro-B cable
Remote handle + Reciever
Tracking Sphere + Pointer
Pelicase 1650 + inlay
Sentinel HL Max | USB dongle
32 GB USB stick (Calibration report/manuals/software)
Manfrotto PIXI Mini Tripod Black

Scan&Paint 3D | Scout + MFPA configuration
Scout V2
MFPA-2
Scout/MFPA Stand
USP Regular
- Metal Probe Case
- Calibration Report
PST Iris camera (BASE or HD)
CAMLINK tripod
Cables:
- 5 m LEMO 7pin male to male cable
- 3 m high-speed data USB-A to USB-B cable
- 20 cm BNC cables (x4)
Remote handle + Reciever
Tracking Sphere + Pointer
Pelicase 1650 + inlay
Sentinel HL Max | USB dongle
32GB USB stick (Calibration report/manuals/software)
Manfrotto PIXI Mini Tripod Black

Reducing noise emissions from Lontra's LP2 compressor

LONTRA CASE STUDY

LP2 is the first fully packaged blower manufactured by Lontra using its proven patented BladeCompressor. It operates at up to 1barG, delivering up to 2630 m^3/h of air at 2500rpm. It is a positive displacement machine, which produces 1 discharge per revolution, resulting in low frequencies of emitted noise. This poses some unique acoustic challenges for various aspects of the design, and led Lontra to use the Microflown equipment.



Goals

Lontra has a culture of innovation, encouraging thorough engineering evaluation to design better products. Lontra wanted a rigorous approach to identify and precisely target key noise sources in the new blower, to efficiently achieve a quiet product.

Why use Scan&Paint 3D?

Scan&Paint 3D allowed Lontra to identify sources within the enclosure, prioritise and precisely target them with minimal modifications and cost. The key benefit from Lontra's perspective is the ability to accurately resolve frequencies below 50Hz, which is critical due to the low running speeds of the LP2. The Their equipment can also calculate sound power even when used in relatively small test cells, which is important to avoid costly facilities.

Method

A pre-production LP2 unit was scanned using Microflown Scan & Paint 3D to locate where sound was emitted from the enclosure (scanning the outside), and to then identify the sources responsible for those emissions inside the enclosure (scanning the interior of the opened enclosure). Due to the size of the LP2 package, the outside of the enclosure required around 16 individual trajectories, by repositioning the 3D camera. All the trajectories were analysed together in the Velo software, giving a single processed dataset.

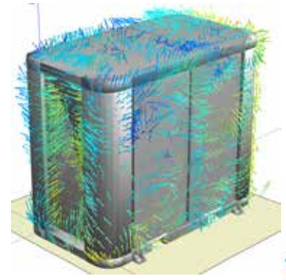
The results were used to inform design changes, which were implemented into a subsequent enclosure:

- Redesigned inlet silencer to better attenuate the fundamental tone, and hence reduce excitation of the rear panel
- Softer anti-vibration mounts to reduce vibration transmission between front and rear panels
- Stiffening of front and rear panels
- Improved outlet pipe cover
- Better quality control for enclosure panel assembly

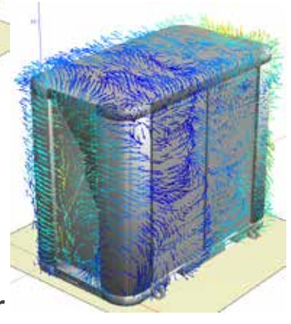
Using just a single set of acoustic scans, Lontra was able to reduce the A-weighted sound power of the enclosure by over 3dB by identifying a key vibration transmission path inside the enclosure. Furthermore, this improvement was achieved with minimal cost additions to the enclosure, and little previous acoustic data or experience of the Microflown Velo software, which is a great first result for Lontra.

It is also clear that there are still improvements to be made, and that by using Microflown equipment we will be able identify, prioritise, and address them in a more efficient and cost-effective manner.

Want to read the full case-study
curious about full mesurements and results?



Before

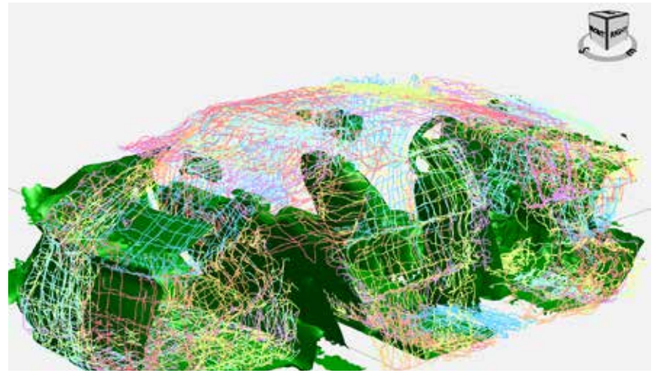


After

Acoustic performance enhancement of a Hyundai electric vehicle interior

HYUNDAI CASE STUDY

The vibro-acoustic properties of a car cabin play a key role in the perception of vehicle quality. One of the main NVH goals of most car manufacturers is to enhance acoustic performance while meeting demanding weight and cost targets. Traditional applied experimental techniques have strong limitations, especially testing a complete vehicle is mostly unfeasible, requiring an independent evaluation of each subsystem.



Goals

Apply a novel methodology to enhance acoustic performance while meeting demanding weight and cost targets.

- Complete vehicle 3D scanning and broadband, high spatial resolution sound field mapping
- Noise ranking of vehicles sections, so called panel contributions
- Design and improve the acoustic package of a commercial electric vehicle

Outcome

The visualization of sound intensity in a 3D space enables to get an intuitive and comprehensive understanding of sound radiation mechanisms as well as the interaction between problematic elements. By 3D scanning, it was already possible to identify two critical bands with very different behavior. The trunk has the highest acoustic emission for lower frequencies, whereas the C pillar, B pillar, and rear passenger windows seem to dominate the medium frequency range.

Secondly, a ranking of the main sections of the car interior was presented, showing that the combination of reciprocally measured acoustic transfer functions with 3D sound intensity measurements can reveal the main problematic areas for multiple operational conditions and/or frequency bands. This information was used to apply an effective acoustic treatment in order to reduce the noise perceived by the vehicle's passengers.

Introduction of a novel technique

- Easy identification of the problematic area in terms of noise emission
- Broadband, high spatial resolution visualization of the sound field to intuitively identity main sources
- Significantly decrease of required time to obtain results compared to traditional techniques
- Ranking of the panels based on their sound pressure contribution to a defined reference position
- Knowledge and information over the perceived noise by the vehicle's passenger for applying proper and effective damping treatment

Want to read the full case-study

curious about full mesurements and results?

Bridging Measurements and Simulations in Acoustic Design

HYBRID ACOUSTIC MODELING

Acoustic design has long relied on two worlds: measurements, which capture the complexity of reality, and simulations, which allow engineers to explore solutions virtually. Each approach has its strengths, but also its limits. Hybrid acoustic modeling combines the best of both — grounding numerical models in measured data from Scan&Paint 3D. The result is a workflow that reduces uncertainty, speeds up development, and gives engineers the confidence to make decisions that work not only in theory, but in practice.

Why full acoustic simulations are so challenging

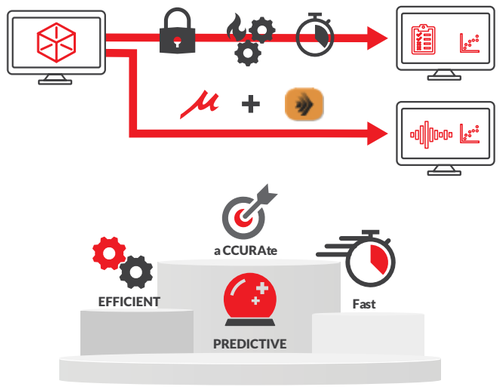
1. Input data
Many components behave like “black boxes.” Suppliers may not disclose full details due to intellectual property restrictions, and in some cases they do not even possess all the parameters needed for an accurate model. Without this foundation, even the most advanced simulations begin with uncertainty.

2. Complexity
Acoustic behavior rarely depends on a single factor. It emerges from the interaction of vibration, airflow, structural coupling, and non-linear effects. Capturing all of this requires large, multi-physics models that are not only difficult to set up, but also extremely demanding to manage.

3. Time
Noise problems often emerge late in the development cycle, during prototype testing or pre-production. At that stage there is little time to rebuild or re-run massive simulation models, leaving engineers with limited options for problem solving.

Why it works

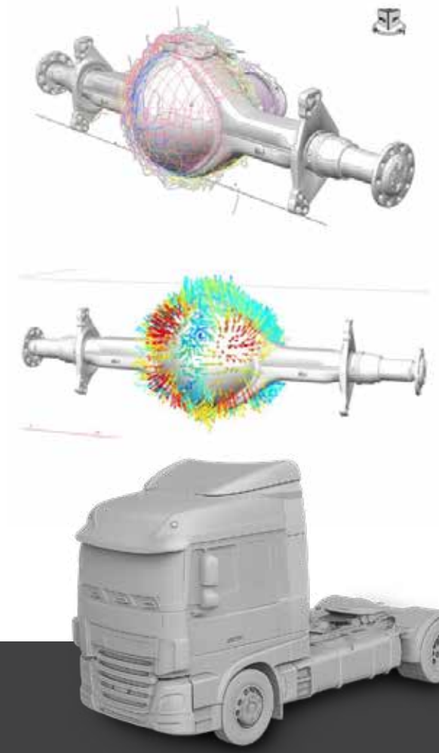
Hybrid Acoustic Modeling clears the three biggest barriers to simulation ,data, complexity, and time , by starting from reality rather than assumptions. With Scan&Paint 3D, real operating conditions such as load, temperature, and boundary effects are directly measured, sound pressure and particle velocity fields define the true acoustic source, and propagation can be simulated with speed and accuracy. The result is a workflow that is practical, predictive, and efficient, giving engineers the confidence to design quieter products with fewer prototypes and less uncertainty.



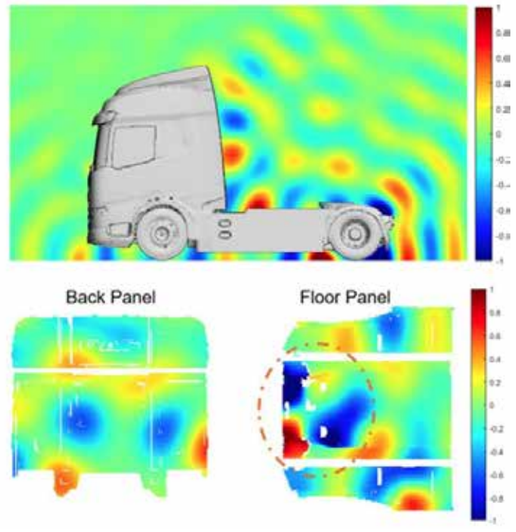
CASE HIGHLIGHT

VELO

MEASUREMENT



SIMULATION



READ PAPER

GOAL

- Merge the strengths of acoustic measurements and advanced simulation into a hybrid methodology
- Investigate and improve the acoustic output of the rear axle under propelling and braking conditions

OUTCOME

- Spatially dense measurements from Scan&Paint 3D were imported into Actran, an advanced finite element (FE) simulation software
- Panel contribution analysis and the surface vibro-acoustic behavior were obtained to implement potential design changes in a fast and efficient way.

REDUCE THE PRESSURE IN YOUR WORK

GO FOR PARTICLE VELOCITY

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