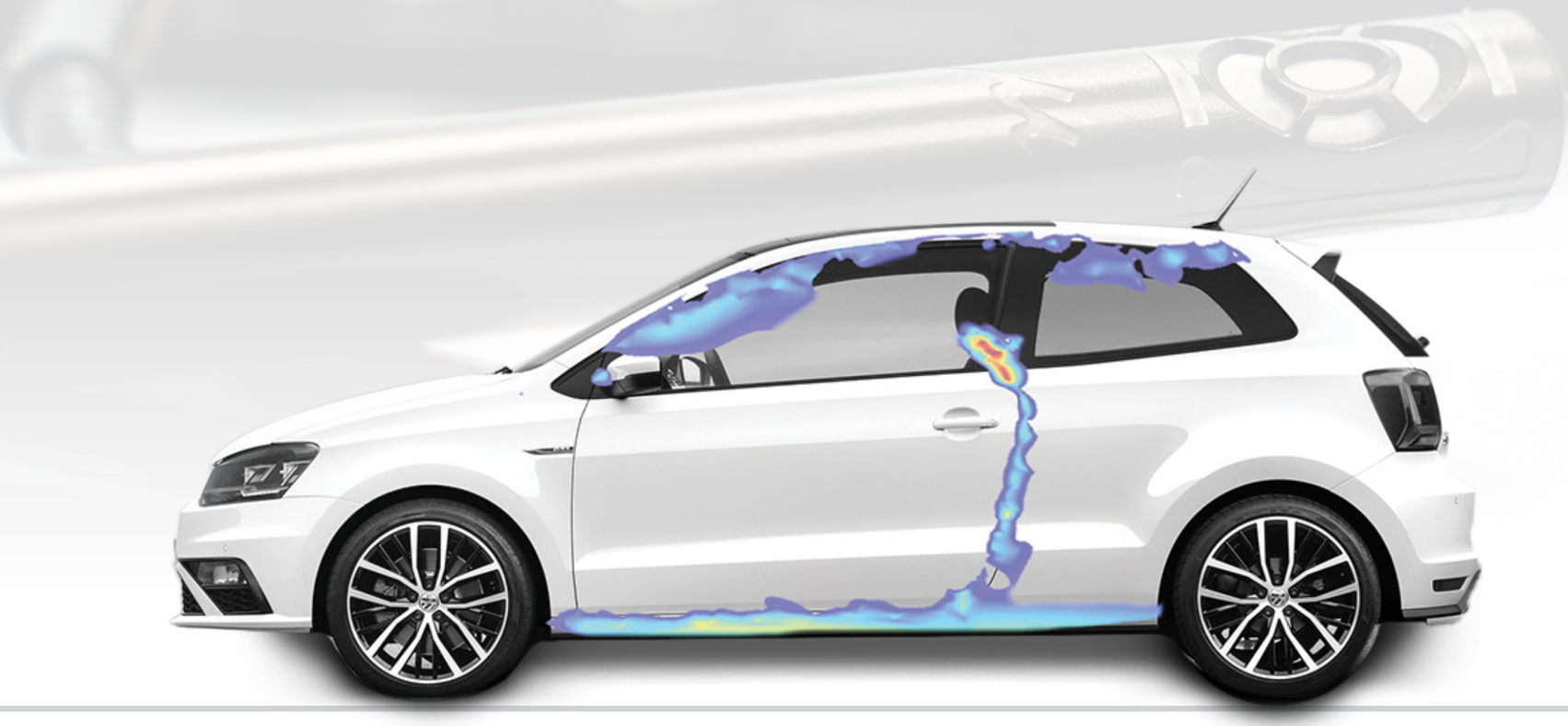
SCAN&PAINT 2D

Fast & easy high resolution sound mapping



MICROFLOWN TECHNOLOGIES

Product leaflet

Scan&Paint 2D

OVER A DECADE IN IMPROVING THE ACOUSTIC FOOTPRINT OF MANY PRODUCTS

Every once in a while, something revolutionary comes to market, so like in the field of acoustics. Starting in 1998 with our revolutionary particle velocity sensor and later, in 2011, our Scan&Paint solution.

Engineers face acoustic challenges daily, whether soundproofing, troubleshooting, or optimizing, ranging from small to large objects. Having the right engineering tools for sound source localization is crucial to getting the job done.

Here is where Microflown Scan&Paint2D fell right into place. Supplying engineers with a powerful yet straightforward solution, allowing them to create broadband sound maps overlaid on a picture of the device under test in minutes with an unmatched spatial resolution. Over the years, this improved the acoustic footprint of many products we use daily, making the world more silent and pleasant.

However, at Microflown, we never settle and keep developing our products and solutions, embracing new possibilities to continuously improve our Scan&Paint 2D system.

The success and cooperation with our customers drive us to improve our successful Scan&Paint 2D system further!

All you need to know in one look

SCAN&PAINT 2D SYSTEM AT A GLANCE

Scan&Paint 2D is a quick and robust measuring system for generating sound maps of stationary sound fields. The method is very simple; the surface is scanned with one PU probe while a camera is positioned toward the surface for scanning. The recorded video and audio data are automatically synchronized by the software and the position of the probe can be extracted in real time using IR technology.

The measurements are directly ready for further processing and analyzing. The system is a superb engineering tool for troubleshooting, soundproofing, or benchmarking all kinds of objects on the spot. It only takes a few minutes to complete an entire measurement campaign. Scanning results are translated into acoustic imaging by superimposed sound variations on a photograph of the measured object, allowing to localize the sound origin for either low, mid, or high frequencies. A reference sensor can be added to preserve the relative phase of the measured particle velocity distribution. This feature enables the user to plot and study the dynamic behavior of samples (Operational deflection shapes).

Key features

- Broadband Solution: 20Hz - 14kHz
- Fast Method: short setup, measurement and processing time
- High resolution mapping of:
  - Particle velocity
  - Sound intensity
  - Sound pressure
- Applicable in (real) operating environments e.g. reverberant environments;
- Sound Power calculation
- Reference sensor option for phase correlation and ODS mapping
- Intuitive tool for troubleshooing and benchmarking
- Easy to operate
- Portable single sensor solution

A system that changed the field of acoustic forever

MAKING THE WORLD A MORE SILENT PLACE

Since 2011 at its origin in the Netherlands, Scan&Paint 2D quickly made a name worldwide. Microflown Technologies put themselves on the map, providing a solution that could do on-the-spot acoustic measurements in minutes. Over the years, this improved the acoustic footprint of many products we use daily, making the world more silent and pleasant.

The solution's versatility is shown in its use case portfolio, ranging from objects the size of a PCB to an airplane, from companies specializing in home appliances to big OEMs in the automotive industry. In addition, it helped acoustic engineers worldwide in noise control, troubleshooting, and overall producing better quality products.

With its broad adoption, engineers shared much of their findings and expertise with the scientific community. All over the world, Scan&Paint 2D took part in research papers on the topic providing additional insights into the field of acoustics. This shared experience creates a permanent source of inspiration, resulting in a continuously innovative product that adapts to the user's needs by integrating the latest cutting-edge technology.

See the full publication list here!

Curious about the impact of Scan&Paint2D?

CLICK HERE

Designed for the users

10+ YEARS OF EXPERIENCE IN 1 PACKAGE

The success and cooperation with our customers drive us to improve our successful Scan&Paint 2D system further! Supplying engineers with a powerful yet straightforward solution, allowing them to create broadband sound maps overlaid on a picture of the device under test in minutes with an unmatched spatial resolution.

1 Fast & easy to setup

Scan&Paint 2D fits as complete system in a single, easy to travel with and robust peli-case. The straightforward setup procedure only takes a few minutes. Connect the probe, connect the camera and Voyager, and you are good to go!

2 Record with portable, compact equipment

Want to do a fast measurement? No problem! Swipe our PU Gen2 probe over the surface and let the IR technology do its work. The Intel Real-Sense camera in combination with dual IR LEDs on the probe enable real time position tracking.

3 Short processing and instant results

Directly after capturing to choose your analyze settings, process your data and chat your sound field with a highs spatial resolutions sound map overlaid on an image the device under test.

4 Easy to understand & explain

Scan&Paint 2D is well-known for its beautiful and easy-to-under-stand results. It simplifies complex acoustic challenges you might face when troubleshooting or optimizing your products. Easy to understand by the experts but also easy to explain to the other relevant people.


FFT
ASUS
PVL (re 5e-08 m/s) [dB]
120
100
80
60
40

A new family member, the PU Gen2

A VERSATILE SOUND INTENSITY PROBE

We keep evolving our Scan&Paint 2D, also at the core level of the system, our sensor technology. For that reason, we are proud to introduce the PU Gen2 probe. This latest addition to our probe family has been designed with Scan&Paint 2D on top of our minds. Thanks to its rugged design it is ready to take on challenges in the field. This new generation probe incorporates a sound pressure sensor with higher dynamic range, is compatibility with a sound calibrator for field calibration, ensuring the best performance and quality of your data. To make it match up perfectly with Scan&Paint 2D, we've incorporated two IR LEDs that allow real time position tracking when using the IR camera technology.

Thorough research enabled us to drive up the frequency, covering a range of 20 Hz to 14 kHz, enabling to take on new acoustic challenges. Sound intensity becomes as straightforward as it can be, simple by taking the time-averaged cross-spectrum of the two measurable quantities, the particle velocity and sound pressure. By this, the PU Gen 2 can obtain sound intensity broad band and is not affected by the p/I index.

NEXT LEVEL PROBE POSITION TRACKING

The PU Gen 2 comes with two integrated IR LEDs. Combined with a special camera with dual IR lenses, this allows us to track the position in real time when moving the probe. Naturally, this feature comes in handy when measuring with our Scan&Paint 2D. Creating high-resolution sound maps with unmatched dynamic ranges in the total bandwidth of 20Hz up to 14kHz has never been more straightforward and fast to get to the results.

ROBUST

Measurement conditions are not always perfect, that why we kept that in or mind when designing the PU Gen2 probe. The sensors are mechanically protected with a robust housing which includes an embedded metal mesh. The unique design helps you evaluate and troubleshoot all kind of noise problems while coping with the most demanding measuring conditions.

FIELD CALLIBRATION

We know the repeatability of your measurements matters and that you want to be sure that your equipment does what you expect. That's why our Gen2 probe is designed to be compatible with our Class 1 Microflown Sound Calibrator for field calibration. This calibration step is typically performed before and/or after measurements to maximize the accuracy of your data. Both sensors included in the PU probe can be calibrated against a known level and frequency, for example, at a level of 94dB and frequency of 1kHz. Field calibration of sound intensity probes has never been easier.

Introducing Intel RealSense camera

A CAMERA THAT MAKES SENSE!

The new standard for camera technology is the Intel RealSense camera. This cutting edge camera combines standard RGB lenses with IR and depth technology. Besides the prior described real time tracking, the new camera also captures depth information, which is valuable to extract the dimension of your test object, making sound power calculations more convenient than ever.

DEPTH IMAGE

It is no longer to manually measure the dimensions of the scanned object and insert a pixel to image reference e.g. needed to calculate sound power. The new camera enables to directly capture a depth image providing all the needed information.

IR CAPTURE

The PU Gen2 probe pairs perfectly with the camera, you can directly capture and process an IR re-cording, making real-time probe position tracking possible. This feature saves you valuable time where you can process with a single click. Getting you faster and more straightforward to your sound maps

RGB RECORDING

The included camera comes with dual recording capabilities. Next to IR recording, the camera captures an RGB image that can be used for post-processing and for generation of an image of the device under test to overlay the results on.

Hardware overview

ALL IN ONE BOX SOLUTION

Scan&Paint 2D is easy to carry all in one box solution. With the entire Peli case weighing under x KG, you can take it to any location. The solution is functional after only minutes of taking it out of the box due to its plug-and-play nature and easy setup.

Intel RealSense D415

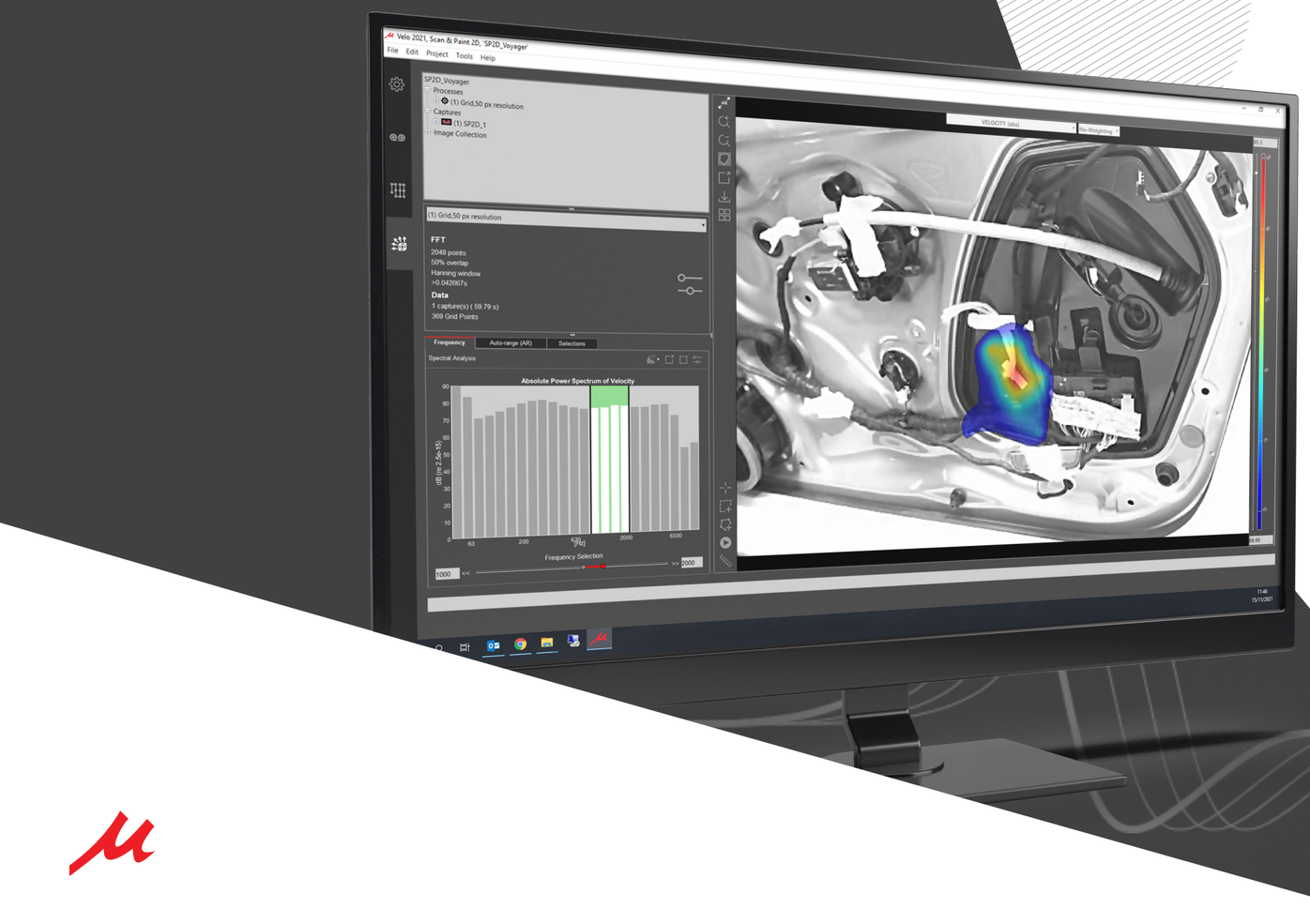
SYSTEM SPECIFICATION

Sensor	
PU Regular Gen2 Probe:	20Hz - 14kHz | Particle Velocity | Sound Pressure 20Hz - 10kHz | Sound Intensity Error margin: Class 1 | Noise floor (20Hz -2kHz): 31 dB(A) SPL, 25 dB(A) PVL Noise floor (20Hz -10kHz): 37 dB(A) SPL, 40 dB(A) PVL | Maximum level: 131 dB SPL, 126 dB PVL
DAQ + Power sourse	
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	
Intel RealSense D415:	Ideal range: 50cm up to 3m | RGB: 1920 × 1080 resolution, 69° × 42° field of view, Frame rate up to 30 fps | Depth technology: Stereoscopic, Frame rate up to 90 fps, 65° × 40° field of view | Infrared sensing
Other information	
Type of noise:	(time) stationary condtions
Measurement result outcome:	Scanning results are translated into acoustic imaging by superimposed sound variations on a photograph of the measured object, allowing to localize the sound origin in either low, mid, or high frequencies. Particle Velocity, Sound Intensity and Sound Pressure can be selected as quantity to visualize and analyze.
Analysis options:	Narrow band, Octave Bands, 1/3 & 1/12 Octave bands, Sound power calculation, Comprehensive export options, multi-view for fast & easy comparisson of results

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 but user-friendly software package.



Sound mapping with extensive analysis options

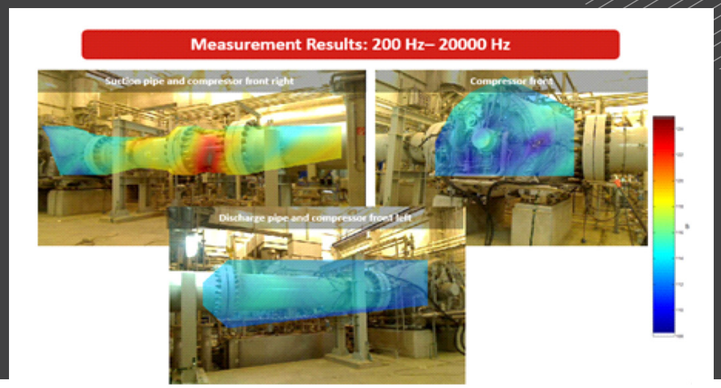
Scan&Paint 2D Software application comes as part of Microflown successful VELO platform. It is one of the first VELO applications to transition to the 64bit version, decreasing file loading time and increasing software and PC performance capabilities.

The Scan&Paint 2D 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 2D software intuitive and quick to learn. In addition, the software guides the user through configuring, importing, measuring, post-processing, and the results.
But don't let this simplicity fool you. The software packs a punch regarding the variety of tools in its arsenal. Users can select many process types in one project, enabling easy comparison of before and after modification results or benchmark competitor products against yours. Select what you want to visualize, particle velocity or sound intensity, narrow band or 1/3 octave bands, calculate sound power and many more.

Troubleshooting & noise mapping of a large gas compressor

ROLLS ROYCE CASE STUDY

In this application the sound field produced by a complex, large infrastructure in a highly reverberant environment with a high ambient noise level (115 dB SPL) is measured. The main part to be measured in this test are the large compressor and the associated process pipework. The main goal was to locate the dominant sound source which is causing abnormal noise levels (115 dB) in the plant. The Scan&Paint 2D system is used to perform the measurements.



Goals

Locate the dominant sound source on a large structure causing abnormal noise levels. Find measures after to reduce the current noise level of 115 dB.

Objectives

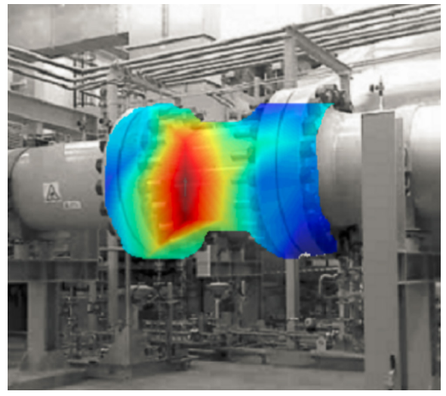
- Rank the sound sources on a large structure
- Locate the dominant sound source causing abnormal noise levels
- Locate this in an acoustic, challenging (reverberant) environment

Sound mapping in reverberant conditions

Due to the size of the measured machinery, it is not possible to capture its whole surface with one camera view. Therefore, the compressor, and the associated process pipe work, will be measured separately. The average scanning time per camera position is only 10 minutes. The results of all three views will be displayed and compared to get detailed inside and ranking of sources. The unique and distinguish features of the microflown probe for particle velocity and sound intensity measurements enable finally a viable solution to measure in such challenging environment. Since most of the radiated acoustic energy is carried in the frequency range between 200 Hz and 20 kHz, the location of the noise sources causing the excessive noise should be revealed while studying this frequency range. The image on the left shows the result of the compressor and process pipes for this frequency range of 200Hz-20kHz. the machinery.

Outcome

A detailed study of the noise distribution along the suction pipe highlights only one dominant source of noise in the middle section of the suction pipe. This part of the pipe contains a strainer which was designed to capture possible debris left inside of the pipe during its installation process. During normal operation of the compressor the strainer would resonate causing the entire pipe to vibrate and produce the excessive noise. After the strainer was removed the noise level in compressor hall was decreased to an acceptable level.



Want to read the full case-study

curious about full mesurements and results?

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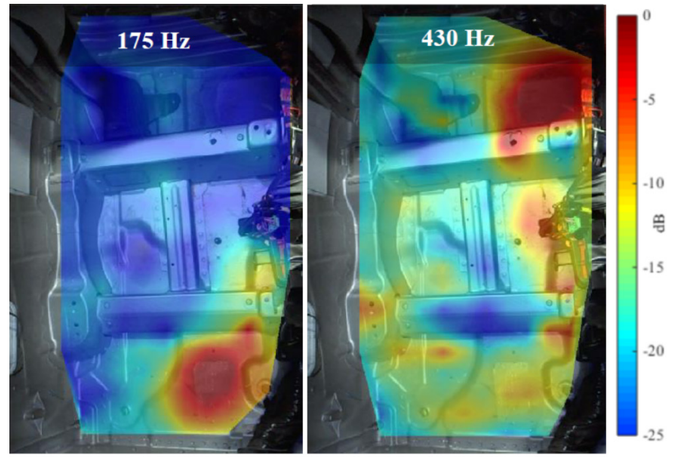
Optimizing the damping treatment of a vehicle body

BENTLEY CASE STUDY

Car manufacturers are constantly seeking methodologies to enhance acoustic performance whilst meeting demanding weight and cost targets. Most soundproofing optimisation strategies are designed via numerical simulations and later adjusted through modal and noise testing. Although traditional approaches are fairly effective, they require a very laborious and time-consuming process. Alternatively, acoustic particle velocity sensors have been proven suitable for performing non-contact vibration measurements.The direct visualisation of this information can be used to find leakage as well as problematic modes across the structure. The main purpose of this study was to design an effective damping treatment of a vehicle by means of scanning particle velocity measurements using Scan&Paint 2D.



Goals & Objectives

Fulfil acoustic targets with minimal weight, cost and number of parts in a damping pack.

- Quickly identify undamped panels/areas
- Ensure existing pads are of suitable size/thickness
- Remove existing pads that are unnecessary
- Demonstrate the effectiveness

Method

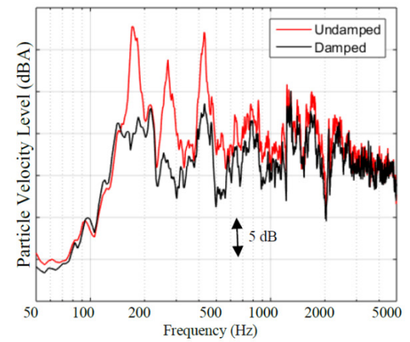
The acoustic signals of the sound field are acquired by manually moving a P-U probe across a measurement plane whilst filming the event with a camera. At post-processing stage, the sensor position is extracted by applying automatic colour detection to each frame of the video. The results are finally combined with a background picture of the measured environment to obtain a visual representation which allows us to “see” the sound pressure, particle velocity or sound intensity spatial distribution.

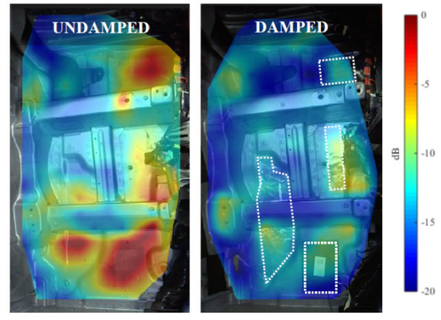
On-road noise validation

The vehicle studied in this paper was tested before and after performing modifications on the damping treatment. Sound pressure measurements were carried out at the front and rear of the cabin for multiple asphalt surfaces. Later on, the vehicle powertrain was again assembled and tested on several roads.

Outcome

A measurement methodology to design the damping treatment of vehicle body is hereby proposed and demonstrated for a full vehicle on the road. The acoustic performance of the modified vehicle is equal or better in all the conditions evaluated. The number of panel treatments was reduced by approximately 15 %, yielding a similar cost reduction for the total pack plus additional saving through overall costs and production time. A second vehicle model to which the proposed methodology was applied achieved a 30 % reduction in the number of panel treatments and even 10 % reduction in the damping package weight.





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