

# The Sound Revolution

Design trends demand a fresh approach to NVH management in vehicles

When a new car rolls off the assembly line, it can make headlines. But even with the pace of transformation accelerating, the truly disruptive work takes place well before a new feature appears on the market.

During the design process, emerging trends sometimes create new issues that spur innovation. For instance, increasingly larger SUV interiors and quieter electric vehicles (EVs) pose separate challenges to noise, vibration and harshness (NVH) management that are leading to advancement in the acoustic materials industry.

With SUVs, larger interior cavities create more opportunity for noise to go into the interior and bounce off the walls. Any noise that makes it through the acoustic insulation and barriers is going to seem magnified to the occupants.

EVs pose their own acoustic conundrum. Engine noises are greatly reduced, but this means that tire, road and other external sounds are more noticeable in the cabins of these quiet vehicles.

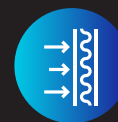
Additionally, there's growing demand for thinner, lighter materials as designs evolve. Cars are becoming sleeker, more spacious and/or more lightweight, and the space for acoustic materials within automotive parts (such as the dash area, doors and wheel arches) is getting smaller.

## Traditional NVH management

There are three ways to combat unwanted sound:



Barrier



Absorber



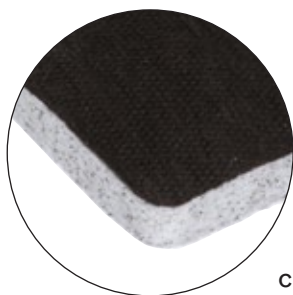
Damping

The traditional solution to address NVH acoustics was one product for each purpose, often layered together. In some areas of the car, NVH management has been sacrificed because there are no sufficiently thin and pliable materials that also offer adequate noise-reduction performance.

A new era for NVH solutions

# Enter 3M™ Flexile Acoustic Material FAB0910

Introduced in 2021, it offers a two-in-one solution — combining barrier and absorption materials in a single, thin, lightweight product (weighing just 900 gsm and measuring 12 mm thick).



The initial response has been positive, as original equipment manufacturers (OEMs) experience the benefits of simpler installation and better overall performance.

In one instance, a major OEM challenged 3M to demonstrate similar or superior performance when compared to the current solution used in their newly launched SUV with third-row seating — at a comparable price and using fewer materials.

The experiment was a success, and the new products weighed roughly a third of the current materials. Focusing on the wheelhouse, where 3M FAB0910 replaced molded foam with an installation that didn't

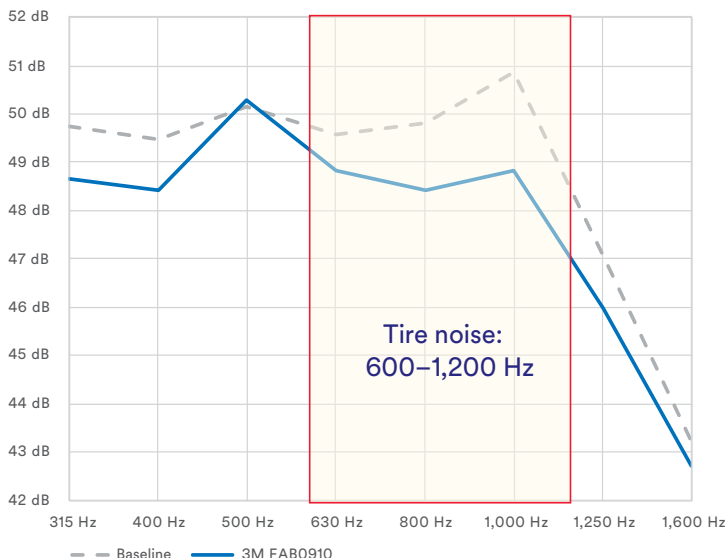
require molding, introduced the opportunity for both cost and time savings.

“We’ve been partnering with one of the largest global OEMs on an area where they don’t have much space and they were struggling to find a material that works well for a particular problematic medium frequency that’s difficult to reduce,” says Taewook Yoo, 3M product development engineer. “The uniqueness about our material is it’s pretty thin compared to existing components, so it worked well with what the customer was looking for.”

## Next generation of 3M FAB

But when it comes to NVH management, one size does not fit all. OEM feedback soon uncovered demand for even thinner, lighter materials for some uses and more robust sound control in others, even if it meant a slightly thicker product.

3M rapidly expanded on the innovation of 3M FAB0910 and in mid-2022 unveiled a wider range of 3M™ Flexile Acoustic Material products, designed to suit a range of price points, performance standards and space constraints within specific vehicle parts.



OEM experiment results: Using 3M FAB0910 materials yielded equal or better performance than the OEM's baseline materials (EVA plus foam and absorber).

The 3M™ Flexile Acoustic Material FAB Series provides a range of weights and thicknesses to help engineers balance NVH needs with design specifications and cost requirements.

3M FAB Series			
	Base Weight	Thickness	Scrim color
3M FAB0910	900 gsm	12.0 mm	Black/White
3M FAB1210	1,270 gsm	19.5 mm	
3M FAB0610	670 gsm	10.0 mm	
3M FAB0510	500 gsm	5.5 mm	
3M FAB0310	370 gsm	4.5 mm	



For the most challenging parts of vehicles, such as the wheelhouse — and for the demanding acoustic expectations of high-end cars — there’s yet another option: 3M™ Flexile Acoustic Material FAB/SF Series. This decoupled product family combines the new 3M FAB materials with 3M™ Thinsulate™ Acoustic Insulation SF Series and is excellent for addressing tire and road noise, offering acoustic performance beginning at 200 Hz without compromising acoustic performance at higher frequencies.

### Reducing lead times

One challenge of introducing design changes — which can cause reluctance to break the status quo — is the time and cost associated with creating new metal molds to make the barrier conform to new shapes.

With 3M FAB Series, there’s often no need for molding at all — opening up opportunities to shorten lead times and to reimagine designs without having to factor in the creation of new dies.

“In many cases, an OEM’s NVH needs can change suddenly and they want a quick solution. Sometimes they change the design, so they have to make a new die for molded forms. The metal die is not only expensive but takes time to create. Generally, our materials don’t need to be molded; they’re flexible enough to conform to the curvature of the area without molding. It depends on the part shape, design and application area, but for surfaces without too much of a deep draw, our parts can be a good option.”

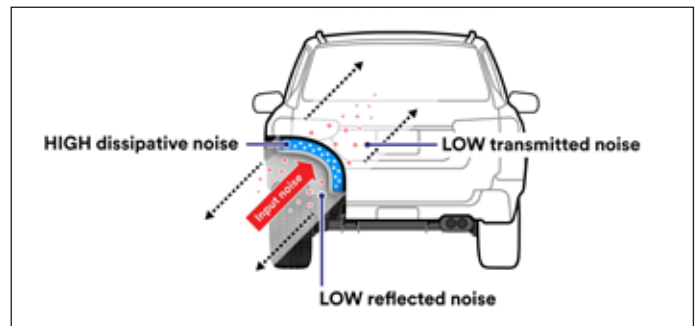
— Hirotosugu Maeda, 3M application engineer

### Real-world performance

With higher-frequency engine noises far less prominent in today’s quieter vehicles, combating lower- and medium-frequency noises is now a top priority. When it comes to sound barriers, the heavier the material, the higher the acoustic performance.

However, standard tests in perfect conditions ignore a reality of real-world NVH applications: the holes required to run cables through acoustic materials. Sound will find the path of least resistance, so holes in the material can cause a measurable decline in the actual performance of a heavier barrier that may enjoy superior performance in lab tests.

With 3M acoustic particle technology, sound is significantly dissipated as it passes through the material, decreasing the actual noise that makes it to the automotive interior. In real-world situations, due to its good acoustic performance, 3M FAB Series can actually perform better than heavier materials where pass-through holes exist.





## Whole-car design

3M FAB and FAB/SF materials not only enable acoustic improvement on design refreshes of running vehicles — where changes would typically be declined to avoid the creation of new dies for molded barriers — but they can contribute to an acoustic revolution when it comes to whole-car design.

“This is the real test of our materials,” says B.S. Prashanth, 3M business development manager. “We can work with the OEM’s NVH, design and purchasing teams to look at every aspect of how to improve acoustics in the vehicle: Can we address areas where NVH wasn’t even a consideration due to small spaces? Can we provide groupings of the products that satisfy the budgets of both higher-end and economical models?”

Prashanth continues: “3M partnership begins in the planning phase, through laboratory and road testing, and continues with supply chain planning that makes sure you have the right products in the right place at the right time. We can be an end-to-end NVH package provider for OEMs.”

[Learn more](#) about 3M Flexile Acoustic Materials.

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