

## Product portfolio

Engine Bay · Interior Floor · Underbody  
Sustainable Champions · New Mobility  
Measurement Systems · Simulation Tools



**Autoneum** is the global market and technology leader in acoustic and thermal management for vehicles and partner for automobile manufacturers around the world.

The Company develops and produces components that enhance a quiet and comfortable driving experience with a low environmental impact at the same time.

# Product portfolio



## Engine Bay

Engine encapsulations, engine and battery covers, hoodliners, outer dashes

**4 – 9**



## Interior Floor

Tufted and needlepunch carpets, inner dashes, floor insulators, floor mats

**10 – 17**



## Underbody

Underbody systems, wheelhouse outer liners, battery boxes, heatshields and tunnel insulators

**18 – 23**



## Sustainable Champions

Best-in-class products and technologies with a superior sustainability performance

**24 – 25**



## New Mobility

Products for new types of mobility

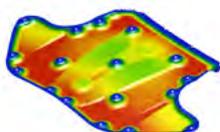
**26 – 29**



## Measurement Systems

Specialized systems to measure NVH performance of component and material properties

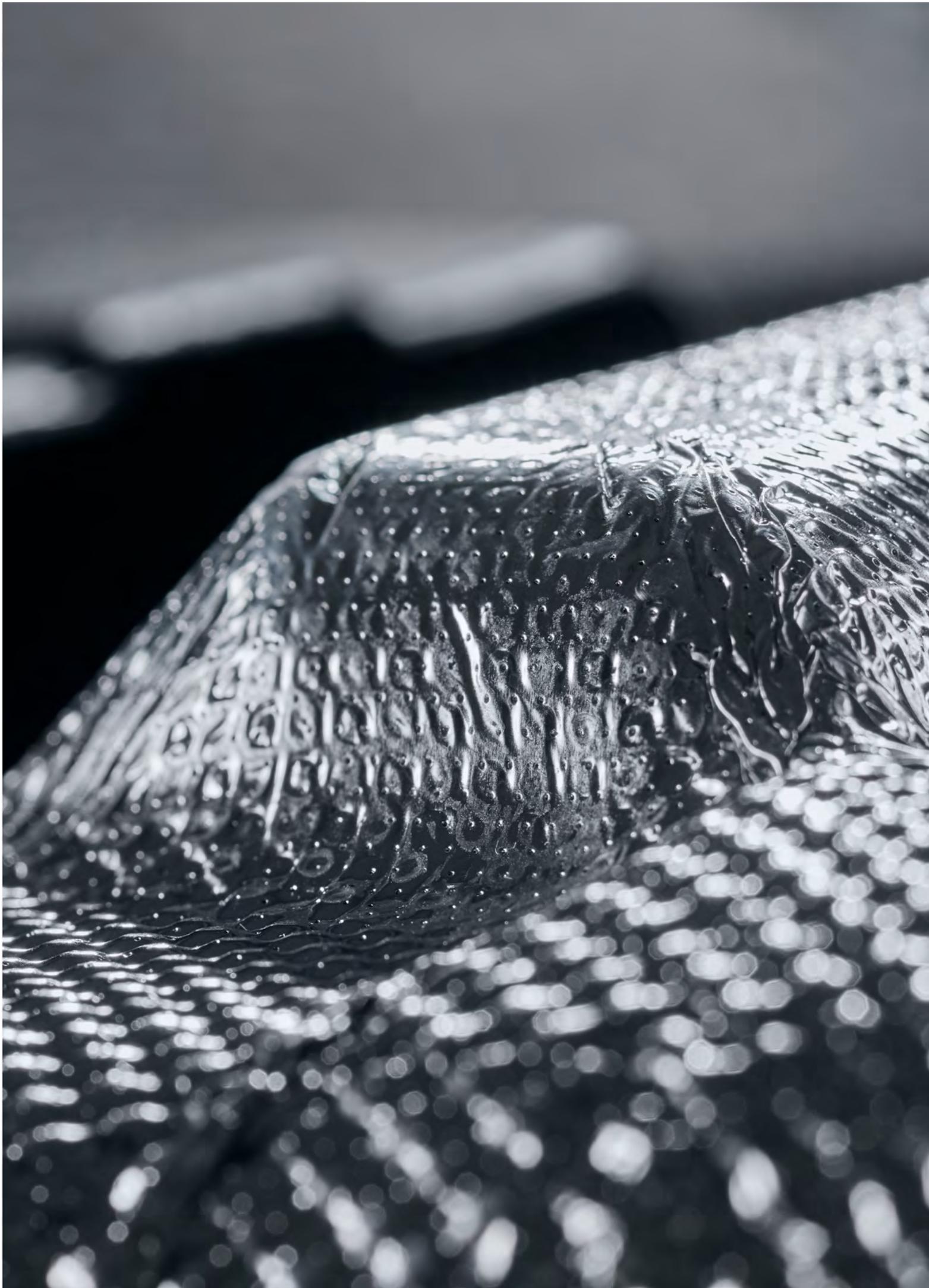
**30 – 35**



## Simulation Tools

Innovative software to optimize NVH performance

**36 – 43**

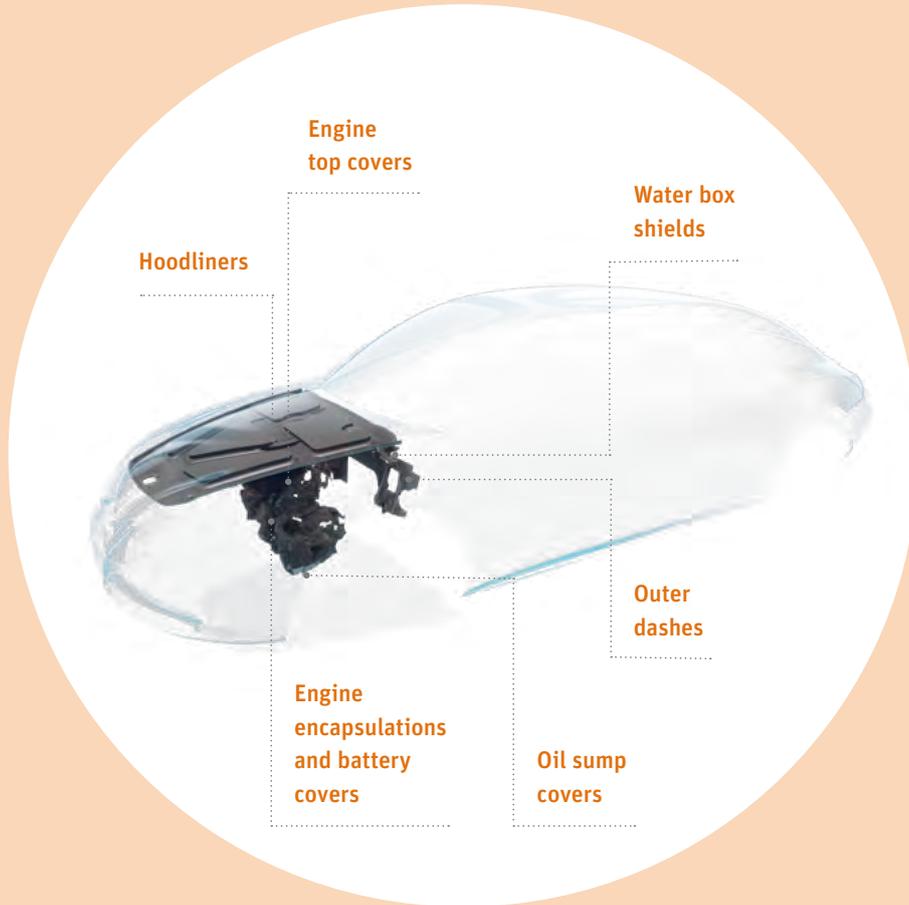


# Engine Bay

Engine bay is the vehicle area where most of the noise and heat sources are concentrated. With innovative lightweight and multi-functional components, Autoneum helps automobile manufacturers to address new regulations for pass-by noise and CO<sub>2</sub> emissions.



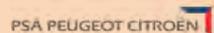
For further information, please contact:  
**Autoneum | Global Product Management Engine Bay**  
[engine-bay@autoneum.com](mailto:engine-bay@autoneum.com)



These products include a variety of features and benefits



Autoneum supplies engine bay components to these customers



# Theta-FiberCell

## Key technology for engine encapsulations



Innovative engine encapsulations enhance the efficiency and sustainability of vehicles: The heat storage in the engine bay achieved with the encapsulations reduces fuel consumption at the next cold start, which in turn leads to lower vehicle emissions.

Theta-FiberCell, the key technology for engine encapsulations combines the benefits of the fiber carrier Theta-Fiber and foam absorber Theta-Cell and is based on Autoneum's long-standing experience. It takes into account customer-specific product requirements such as optimum noise protection and integrated thermal insulation. For instance, Theta-FiberCell is barely flammable and can withstand temperatures of up to 200°C.

As well as the acoustic absorption of interior (by up to 4 decibel) and exterior (by up to 8 decibel) noise, the fiber-foam solution enables heat to be stored for long periods after the vehicle has been parked. After being switched off for 12 hours, the temperature of an engine with Theta-FiberCell encapsulation is up to six degrees higher than one without this special insulation.

### BENEFITS

Lightweight fiber-foam solution

High acoustic absorption

Resistant to engine vibration

**200° C**

Heat insulation and temperature stability up to 200° C

# Theta-Fiber

Multifunctional non-woven technology



## BENEFITS

robust and  
multifunctional

High  
temperature stability

The engine bay compartment is a major source of heat and noise in any vehicle. Therefore, it has to be acoustically and thermally isolated in order to increase passengers' comfort. For that, Autoneum offers Theta-Fiber, a robust and multifunctional non-woven material.

Theta-Fiber stands out against conventional non-woven components above all thanks to its high temperature resistance: While traditional thermoplastic materials are able to withstand temperatures of up to 150°C, noise and thermal insulation parts based on Theta-Fiber can also be applied at temperatures of up to 200°C.

Compared to traditional heavy engine covers made of solid plastic, Theta-Fiber engine covers achieve weight savings of up to 60%, reduce the interior and exterior noise of vehicles and insulate heat generated by the engine.

# Theta-Cell

Durable and lightweight foam absorber



Theta-Cell is an innovative polyurethane foam material developed by Autoneum. It is used for different applications such as lightweight and multifunctional hoodliners, outer dashes, tunnel insulators and battery covers. Compared with conventional acoustic absorbers, Theta-Cell components can be used to achieve weight reductions of up to 60% as well as high thermal insulation.

Products based on Theta-Cell are able to withstand temperatures of up to 180°C at peak; they meet customer requirements and legal provisions with regard to the non-flammability of components for the engine bay. They are also oil and water-repellent and help to reduce the interior and exterior noise of vehicles.

## BENEFITS

Low weight

**Premium**  
acoustic absorption

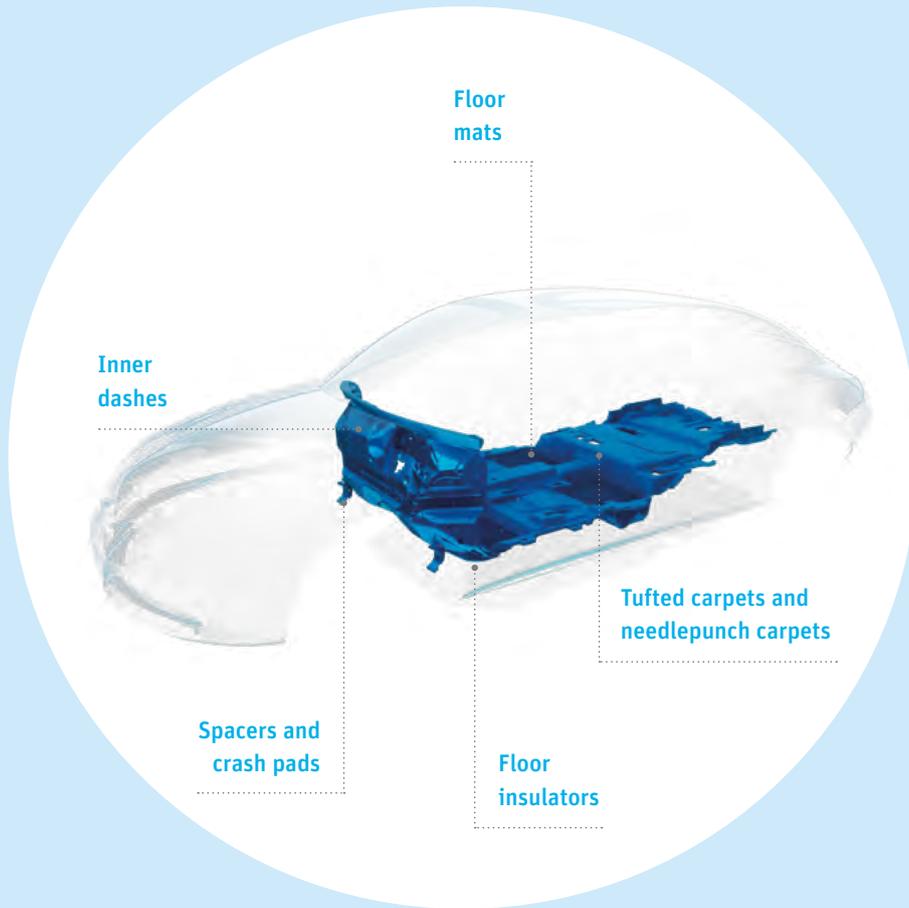


# Interior Floor

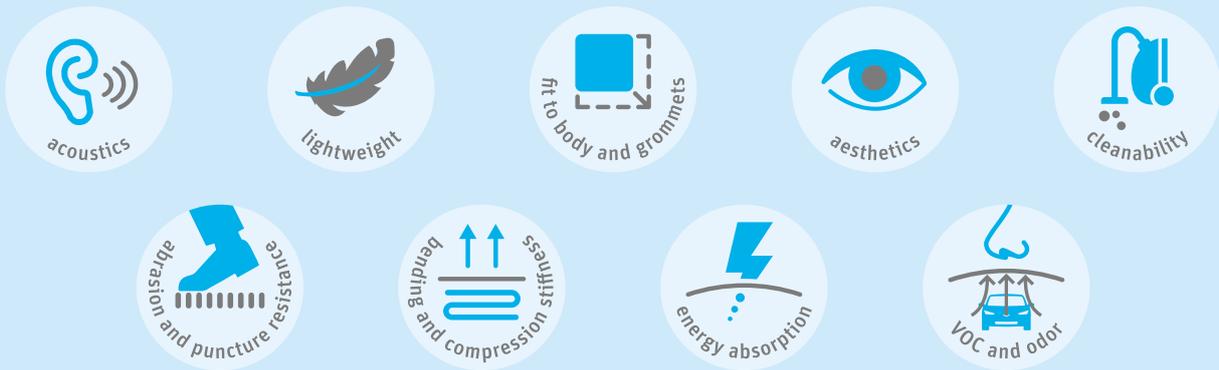
Autoneum's interior floor products makes the vehicle lighter, more comfortable and environmentally-friendly – while providing optimum acoustics performance at the same time. In addition, these multi-functional components also meet the increased requirements for comfortable vehicle interiors thanks to their outstanding cleanability, low odor and high durability.



For further information, please contact:  
**Autoneum | Global Product Management Interior Floor**  
[interior-floor@autoneum.com](mailto:interior-floor@autoneum.com)



These products include a variety of features and benefits



Autoneum supplies interior floor components to these customers



# Di-Light

Better durability and perceived quality



Needlepunch carpets have until now been seen as cost effective textile surfaces but prone to flattening and wear over lifetime. With Di-Light, Autoneum now offers a more durable non-woven carpet thanks to its great abrasion resistance and resilience. The technology additionally allows an attractive esthetics even in highly shaped carpet areas due to its uniform surface appearance. The needlepunch carpet absorbs noise entering the passenger compartment from the road or engine bay, thereby contributing to enhanced driving comfort.

The enhanced resistance/weight ratio and the homogeneous look and feel of the carpet are based on newly developed fibers. Depending on the product variant, they consist of up to 97% of recycled PET which is reflected in the carpet's excellent environmental performance.

## BENEFITS

Homogeneous  
look and feel

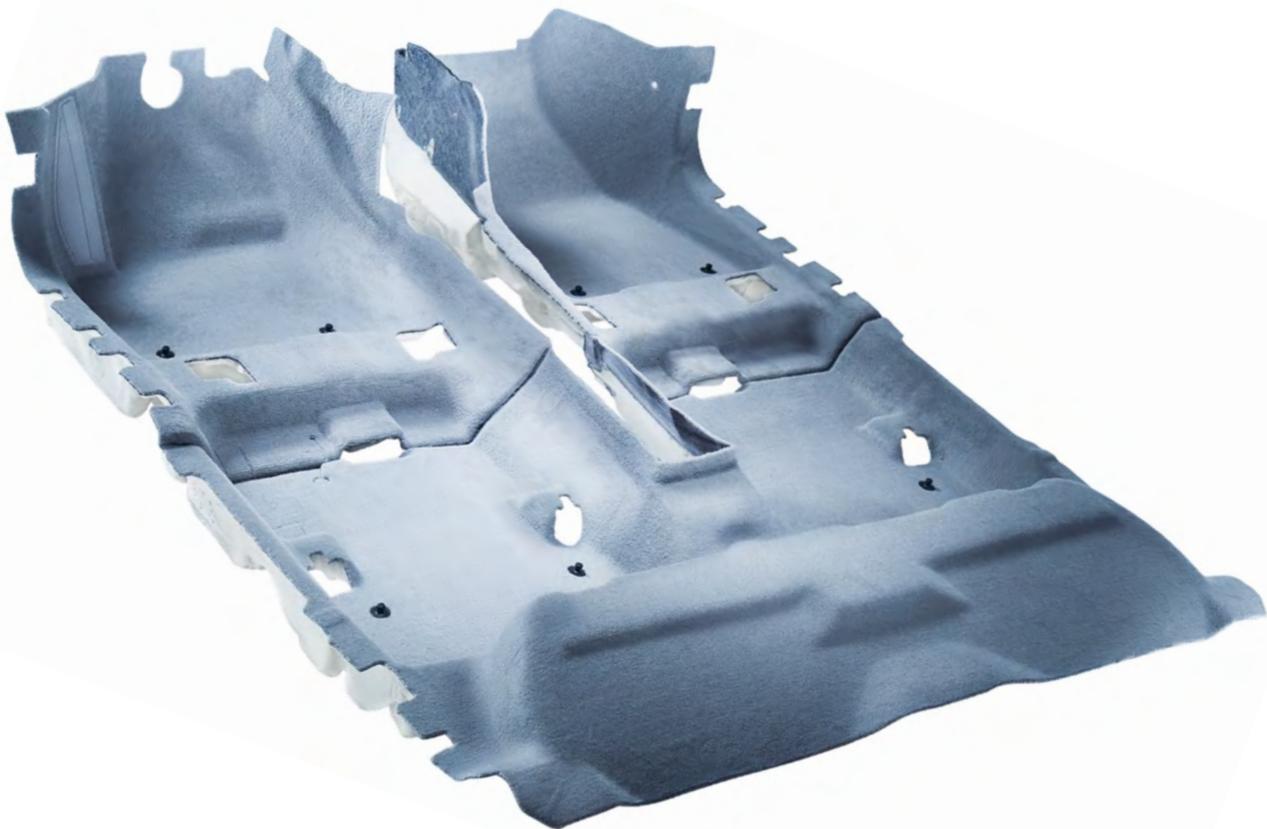
Highly resilient and  
wear-resistant

97%

Made from up to  
97% recycled PET

# Clean-Tuft

Easy to clean and more premium



## BENEFITS

Easy to clean  
from dirt

High stain  
resistance

Premium  
aesthetics

This technology for tufted carpets has a number of advantages compared to the needlepunch carpets mainly used in the compact and medium class. Thus, also drivers of these vehicle classes benefit from the quality standard and the look and warmth feeling of premium carpeting.

Clean-Tuft offers a clearly improved cleanability compared to needlepunch floor coverings: In particular, small particles such as grass, sand or animal hairs can be removed more easily and thoroughly because of the vertical orientation of the carpet filaments and the characteristics of the polymer used. Carpet systems based on Clean-Tuft also feature high stain-resistance thanks to its hydrophobic property.

# Hybrid-Acoustics

Unique combination of absorption and insulation



Hybrid-Acoustics provides automobile manufacturers with a versatile acoustic solution for inner dashes, floor insulators and wheelhouse inner liners. This hybrid technology for vehicle interiors offers a unique performance-to-weight ratio: Hybrid-Acoustics is up to 50% lighter than conventional solutions, thus the lightest hybrid technology on the market. Furthermore, it consists largely of recycled materials, which reduces CO<sub>2</sub> emissions during the production process.

Thanks to the dynamic stiffness-controlled layer (DSL), the acoustic properties of Hybrid-Acoustics parts can be locally tuned to maximize absorption or insulation performance. As a result, Autoneum's Hybrid-Acoustics parts can be designed to tackle any acoustic challenges in vehicles. Statistical energy analysis (SEA) simulations that take the available packaging space into account, the acoustic loads and the part's environment are used to find the most optimum material configuration before a physical prototype of the car is available.

## BENEFITS

Insulates and absorbs noise simultaneously

Lightweight

Customized  
acoustic tuning

# Prime-Light

Extremely light and high design freedom



## BENEFITS

Lightweight

Improved design  
capability

High  
recycled content

Prime-Light is the latest advancement of Autoneum's successful Ultra-Light technology. Components based on this innovative technology can be formed into a wide variety of different shapes and sizes. This way they adjust optimally to the individual body-in-white shapes and take account of increasingly complex production processes in vehicle construction.

Prime-Light also convinces with a light weight while maintaining the same level of acoustic protection. Thanks to a 30% weight reduction compared with previous models, Prime-Light-based inner dashes and floor insulators save more than two kilos of a vehicle's weight in average. Prime-Light-based components consist of thermoplastic cotton felt blends in which the share of recycled materials amounts to up to 50% depending on the application-specific composition.

# Injection Fiber Process (IFP-R2)

## Technology for optimal acoustic performance



Autoneum is setting new standards in felt technology: The fully-automated IFP-R2 production systems are based on the Rotating Injection Fiber process which is an innovative, patented manufacturing process from Autoneum used for manufacturing tailor-made felt blanks for inner dashes and floor insulators in vehicles. These blanks with locally adjusted area weight are then molded into the shape required for the final product.

The advanced process leads to better acoustics, lower weight and the possibility to locally increase the compressional stiffness of carpet systems for improved quality perception. Autoneum also achieves a higher environmental performance of the production process, as up to 70% of recycled fibers are possible, fewer fiber scrap is generated which can additionally be immediately recycled by the line.

### BENEFITS

Optimized part weight and acoustics

Increased compression hardness

Up to

**70%**

recycled fibers

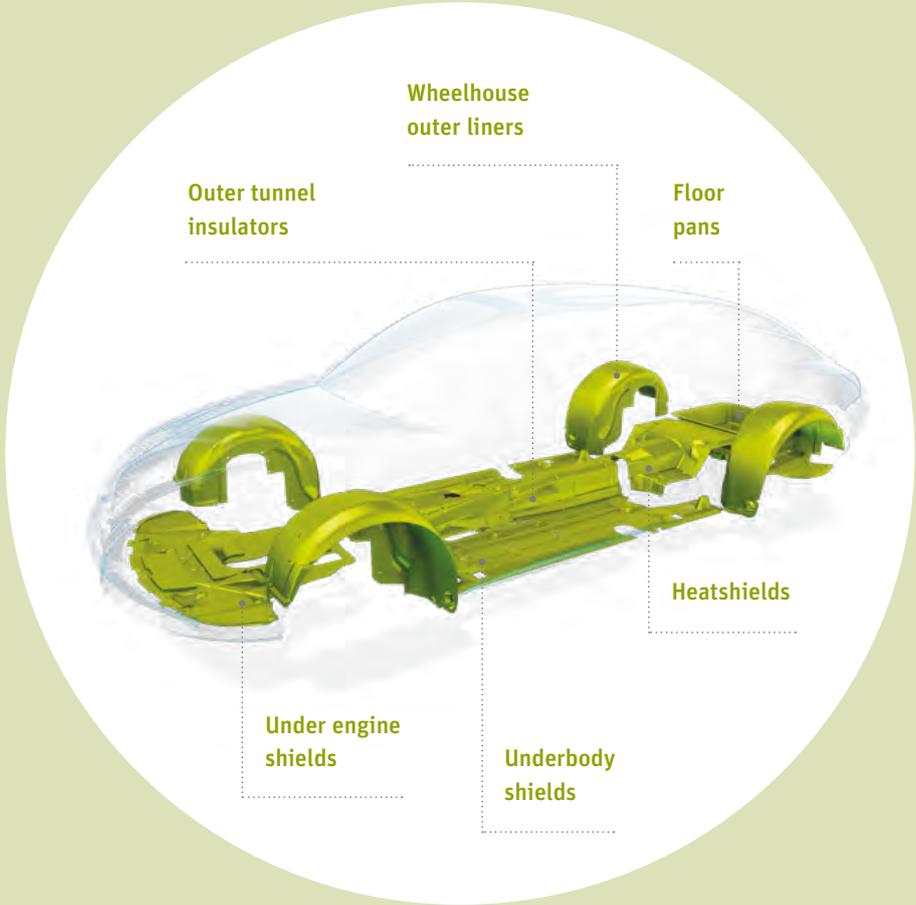


# Underbody

Textile-based and correspondingly lightweight underbody systems of Autoneum absorb noise and therefore simultaneously reduce the interior and exterior noise of cars. They also enhance the aerodynamics of a vehicle. This leads to lower fuel consumption and reduced vehicle emissions.



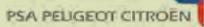
For further information, please contact:  
**Autoneum | Global Product Management Underbody**  
[underbody@autoneum.com](mailto:underbody@autoneum.com)



These products include a variety of features and benefits



Autoneum supplies underbody components to these customers



# Ultra-Silent

## The lightest textile underbody system



With underbody systems made of Ultra-Silent, Autoneum offers the most lightweight textile underfloor systems for vehicles: They are up to 50% lighter compared with equivalent plastic components. Underbody systems made of Ultra-Silent also convince with a high degree of impact resistance and optimum stone chip protection. The PET based, glass-free mono-material is resistant against water and heat and fully recyclable.

At the same time, Ultra-Silent absorbs sound and in doing so reduces the vehicle noise by up to 2 decibels. In addition, underfloor systems made of Ultra-Silent enhance the aerodynamics of vehicles by reducing their air resistance. This contributes to lower fuel consumption and thereby reduces CO<sub>2</sub> emissions. The sophisticated engineering behind Ultra-Silent helps reduce mass, the number of fixation points, part numbers, overall complexity and costs. This makes Ultra-Silent a convincing value offer for OEMs.

In electric cars, undercovers made of Ultra-Silent are installed underneath the battery casing, providing the battery cells with the best possible protection against extreme ambient conditions

### BENEFITS

Lightest textile underbody technology

Benchmark fixation point strength and stone-chipping performance

**100% PET**

completely recyclable and safe handling

# Alpha-Liner

Optimum tire noise reduction



## BENEFITS

Enhanced acoustic absorption

Anti-icing

Stone impact protection

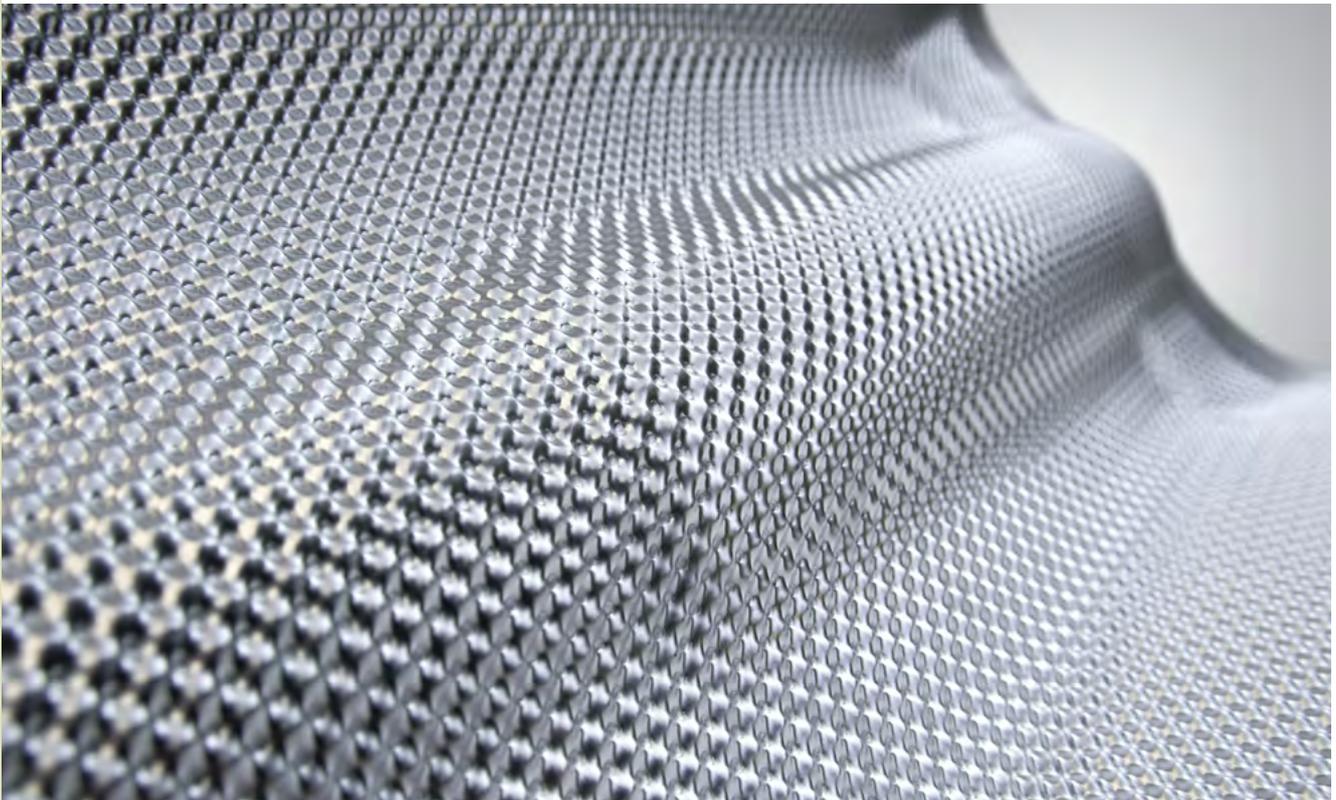
100%

acoustically tunable

The newly-developed Alpha-Liner is a lightweight textile wheelhouse outer liner featuring a thin coated surface on the tire side. Thanks to this innovative technology, the porosity of the textile material is tuned to maximize the sound absorption, what contributes to the reduction of tire noise and accordingly improves pass-by level as well as passenger comfort. This advantage is key for car manufacturers, especially in light of increasingly tightening exterior noise regulations worldwide. Sound-reducing components are also essential for electric vehicles because tires have to be insulated here even more: Due to the lack of the engine noise, they are more audible for passengers. The coating can be adapted to the specific requirements of every vehicle, thereby protecting the textile carrier in areas strongly impacted by water and stone chipping for instance. The plasticized surface is also easier to clean than standard textile wheelhouse outer liners with less ice accumulation on the component. The manufacturing process of Alpha-Liner is solvent-free and eco-friendly. Applied only where it is most effective, the coating allows the recyclability of the production trim waste.

# RIMIC

## Heat protection and noise absorption



Heatshields are used in vehicles primarily to provide protection against the heat that arises in the engine bay and the exhaust system. In order to shelter this radiant warmth, these shields are heat-resistant up to 500°C. Acoustic heatshields based on Autoneum's RIMIC technology additionally reduce the noise emission of the vehicle thanks to their integrated acoustic function. The noise reduction is achieved by means of a special perforation developed by Autoneum. It converts the airborne sound into thermal energy and absorbs it. Using in-house production processes, these perforations are applied specifically only at predefined areas to ensure optimal heat protection and durability. The acoustic performance of heatshields is controlled by the number and density of openings per shield. RIMIC can be used as a single layer, with glass fiber mats or in combination with the Theta-Cell acoustic absorption technology in order to facilitate the absorption of high-frequency sounds of between 2 – 6 kHz.

### BENEFITS

Maximized tunable acoustic performance

High durability thanks to optimized design of perforation area

High heat protection



## Ultra-Silent



100% recycled PET



60% lighter than  
plastic underbodies

# Sustainable Champions

Autoneum's sustainable champions display an excellent sustainability performance throughout the product life cycle. They are made partially or entirely, of recycled materials, which have a significantly low environmental footprint. Moreover, the production waste can be reclaimed during the manufacturing process and reused again. Being lightweight, Autoneum's sustainable champions also reduce vehicle weight and therefore fuel consumption and CO<sub>2</sub> emissions.



## Prime-Light



Made of 40%  
bio-recycled cotton fibers



Fully recyclable

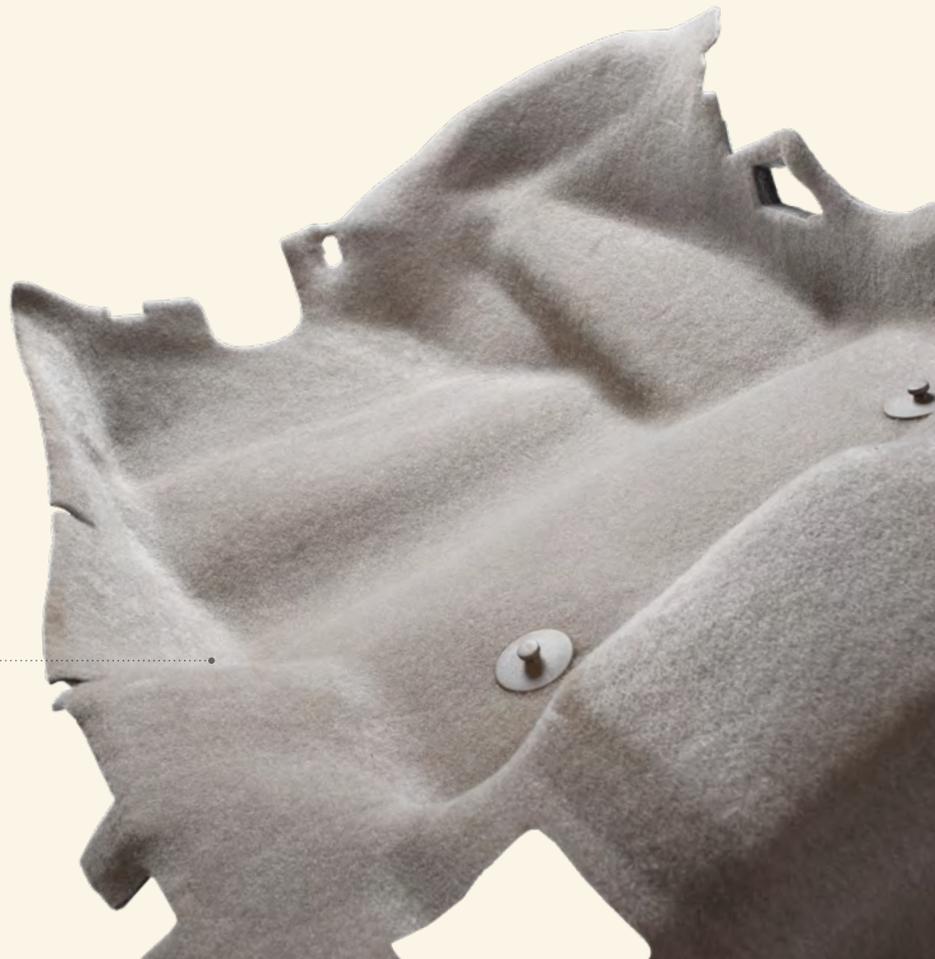
## Di-Light



Up to 97%  
recycled PET



20% lighter than standard  
needlepunch carpets





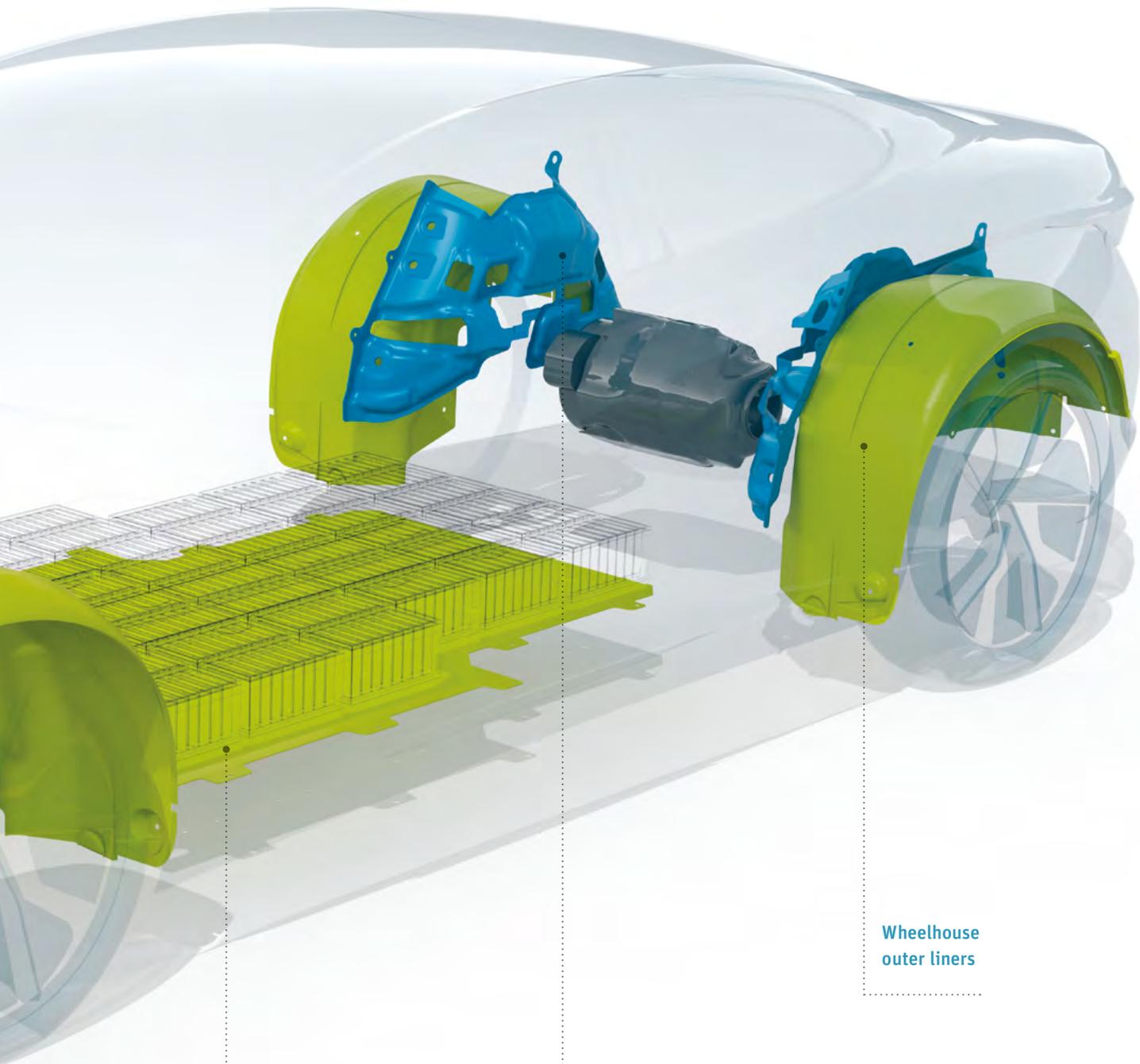
E-motor  
encapsulations

Textile trunk  
components

# New Mobility

## Innovative and future-oriented portfolio

Major industry trends such as electromobility, autonomous driving and car sharing are raising the requirements on future vehicles. There is a growing demand for components designed to make vehicles significantly lighter, quieter and environmentally-friendly while enhancing driving comfort. As innovation leader in acoustic and thermal management, Autoneum is manufacturing products and technologies that meet the requirements of modern mobility.



Wheelhouse  
outer liners

Wheelhouse  
inner liners

Under battery  
covers

# Optimized product portfolio for e-mobility

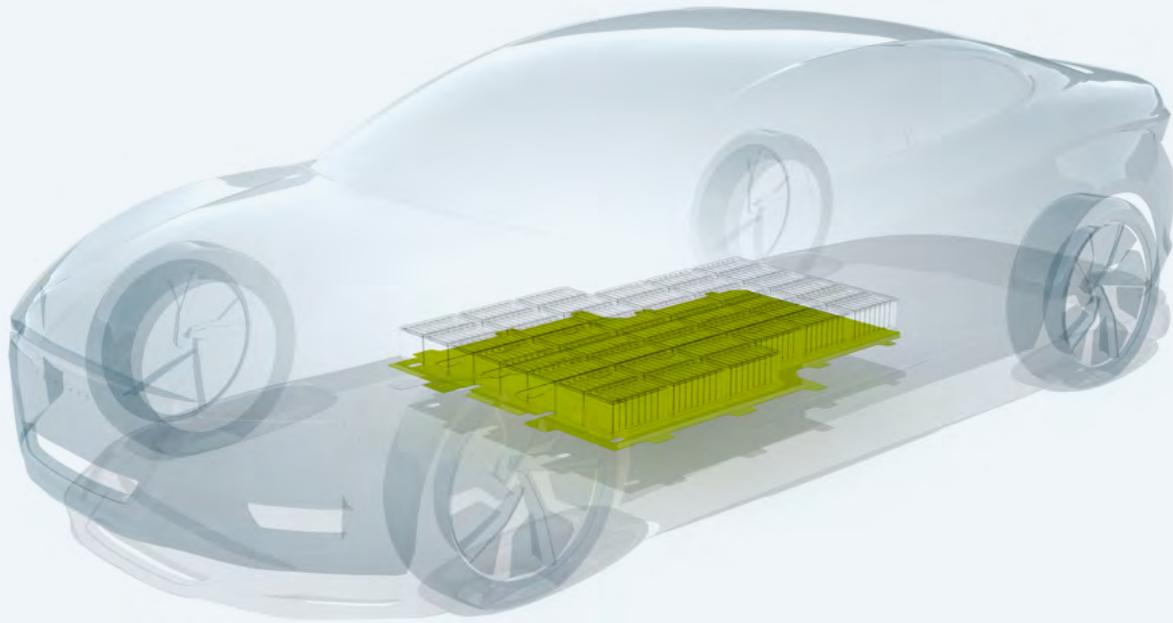


Electromobility

Autonomous driving

Shared mobility

Topics	Missing heat sources	Road noise	Interior and trunk aesthetics	
	Reducing vehicle weight	Sustainable technologies	Comfort in autonomous vehicles	
	Aerodynamics	Powertrain noise	Shared use	
Opportunities	Acoustic components with thermal properties	Textile exterior treatment	Material innovations	
	Lightweight construction expertise and product portfolio	Recycled fibers	New noise insulation requirements	
	Expanding underbody business	Tailored acoustic solutions, diagnostics and simulations	Cleanability and durability	
Components				
	Carpet systems	Inner dashes	Wheelhouse outer liners	Underbody systems



## Battery undercovers based on Ultra-Silent

Optimum noise and heat  
protection for electric vehicles

Battery undercovers made of Ultra-Silent act as insulators helping to lower sound that enters the passenger cabin, for instance caused by tires, and also pass-by noise. At the same time, the textile battery undercovers also convince thanks to their low weight: They are up to 50% lighter than corresponding components made of plastic and thus ensure a greater driving range.

Undercovers made of Ultra-Silent are installed underneath the battery casing, providing the battery cells with the best possible protection against significant cooling or heating and ensuring a constant temperature with a correspondingly optimized battery capacity. As a result, the components help to improve battery performance. They are also resistant to water, stone chipping and vibrations and thus help to protect the battery casing.

### BENEFITS

Ensuring constant  
battery temperature

Up to 1 db noise  
reduction

**100%**  
based on PET fibers



# Measurement Systems

Autoneum has been the leading supplier of specialized measurement tools in automotive acoustics for 50 years. The innovative systems can be used to assess and compare noise-reducing components in next to no time. This facilitates the compilation of sound packages for vehicle manufacturers while at the same time ensuring that the customer receives a product that is optimally tailored to his needs. Autoneum's measurement systems have become globally recognized industry standards that are successfully used by vehicle manufacturers, suppliers and research institutes alike.



For further information, please contact:

**Autoneum | Measurement Systems**  
[ms-sales@autoneum.com](mailto:ms-sales@autoneum.com)

## AFR

The AFR (Airflow Resistance Measurement) system was designed to measure the airflow resistance of porous materials in an easy way without compromising measurement quality. The results comply with ISO standard 9053-1:2018.



### BENEFITS

- Extremely robust, stable, durable construction
- Easy and intuitive operation
- Measurement of thin materials (fabrics or non-wovens)

<b>Dimensions</b>	<b>600 x 600 x 1240 mm (L x W x H)</b>
Sample diameter	100 mm
Airflow Source	Vacuum pump or compressed air
Standards	ISO standard 9053-1:2018
Output	Airflow resistance, airflow resistivity

## Alpha Cabin

The Alpha Cabin is the leading system to measure the acoustic absorption properties of materials and components that contribute to noise reduction in vehicles. The system is particularly suitable for validation and quality assurance of the measured data. A recognized standard by OEMs, the system is used in over 20 countries worldwide.



### BENEFITS

- Results enable specifications for the absorption properties of NVH products
- Fast and repeatable measurement processes
- Significantly smaller than normal reverberation rooms

<b>Dimensions</b>	<b>3220 x 2370 x 2030 mm (L x W x H)</b>
Volume	6.44 m <sup>3</sup>
Sample surface area	1.2 m <sup>2</sup> (standard sample), 0.6 – 2.4 m <sup>2</sup>
Frequency range	400 – 10000 Hz
Standards	Based on ISO 354:2003
Output	Absorption coefficient, equivalent absorption area

## APAMAT II

APAMAT II compares and classifies the complex range of soundproofing solutions currently used in the automotive industry. For instance, the system evaluates the effectiveness of NVH materials in terms of noise control, noise damping and noise insulation in just one system. Optionally, the system is compatible with the airborne excitation only, allowing the installation of loudspeakers in the excitation chamber.



### BENEFITS

- Measurement of acoustic efficiency by reproducing material performance in the car
- Combination of structure-borne and airborne excitation
- Quick and easy measurement

<b>Dimensions</b>	<b>1740 x 1180 x 1865 mm (L x W x H)</b>
Sample size	840 x 840 mm
Frequency range	100 – 10000 Hz
Output	Overall acoustic efficiency



<b>Dimensions</b>	<b>920 x 920 x 1490 mm (L x W x H)</b>
Frequency range	100 – 800 Hz
Sample size	643 x 544 mm
Output	Structure-borne insertion loss

## ARTIS3

The innovative ARTIS3 system features an optimized experimental set-up for the performance assessment of structure-borne noise of acoustic packages. The dedicated software for testing, archiving and analysis makes it easy for the user to find the best solution in terms of performance, weight or cost.

### BENEFITS

- Robust evaluation of the acoustic effectiveness of a passive treatment versus structure-borne noise
- Immediate and easy measurement process
- Easy to transport thanks to comparatively small size



<b>Dimensions</b>	<b>440 x 180 x 305 mm (L x W x H)</b>
Bell overall dimensions	145 mm
Range of airflow resistances	200 – 4000 Ns/m <sup>3</sup>
Recommended sample thickness	less than 20 mm
Output	Airflow resistance

## CARE+

The control of airflow resistance in the production of materials and components is a growing requirement in the automotive industry. CARE+ (Concentric Airflow Resistance Evaluator) is an apparatus designed to measure the airflow resistance of materials and parts.

### BENEFITS

- Non-destructive air flow resistance measurements
- Quality control adequate to manufacturing environment
- Easy to transport



<b>Dimensions</b>	<b>1500 x 950 x 1800 mm (L x W x H)</b>
Dimensions of standard sample	180 x 620 mm
Suction head speed	7 m/min
Output	Cleanability index, dirt repellency index

## Carpet Cleanability Analyzer

Autoneum developed the Carpet Cleanability Analyzer measuring system to conceptualize carpet systems during predevelopment of new vehicle models. The underlying process enables the cleanability and dirt resistance of different carpet surfaces to be analyzed and compared. It can be supplied together with standardized soiling particles and tools for sample soiling preparation.

### BENEFITS

- Works with all carpet surfaces (tufted and non-woven)
- Repeatability of the results ensured
- Quantitative assessment of carpet cleanability

## ELWIS

ELWIS (Evaluation of Light Weight Impedance System) offers a full, reliable and rapid characterization of the physical parameters of the porous materials (Biot-Allard parameters). The system consists of the ELWIS-A and ELWIS-S devices which can be used independently from each other although both applications are needed for a complete material modeling.



### BENEFITS

- Rapid, easy and reliable data evaluation
- Adaptable to a wide range of materials and parts
- Easy-to-operate

<b>Dimensions</b>	<b>850 x 2210 x 1240 mm (L x W x H)</b>
Sample size	ELWIS-A: 60 mm diameter additional option: 29 mm diameter ELWIS-S: 100 mm diameter
Frequency range	ELWIS-A: 200 – 3400 Hz additional option: 1000 – 6300 Hz ELWIS-S: 50 – 800 Hz
Standards	Fulfills ASTM (E-1050) and ISO (10534-1/2) For impedance tube measurements (measurements between 200 and 3400 Hz or up to 6300 Hz with the additional option)
Output	Acoustical and structural Biot-Allard parameters

## Isokell

Isokell offers a flexible method geared specifically to the needs of the automotive industry for measuring airborne noise insulation and the transmission loss of vehicle components. The system is easier to use and less costly than traditional transmission loss suites.



### BENEFITS

- Measurement of flat samples or components
- Fast and easy measurement procedure
- Used in combination with Alpha Cabin, it can also measure absorption

<b>Dimensions</b>	<b>3400 x 2500 x 3750 mm (L x W x H)</b>
Sample apertures	1.0 x 1.2 m (standard flat samples) 1.0 x 1.8 m (dashboards) 1.5 x 2.0 m (larger parts)
Frequency range	125 – 6300 Hz (extendable up to 10 kHz)
Output	Transmission loss, insertion loss

## PORPOS

PORPOS measures the porosity (ratio of air to overall volume) of felts and foams on the basis of the so-called air-based method. Via a process of alternately compressing and decompressing air, the porosity of the sample under analysis can be derived from the resulting pressure changes.

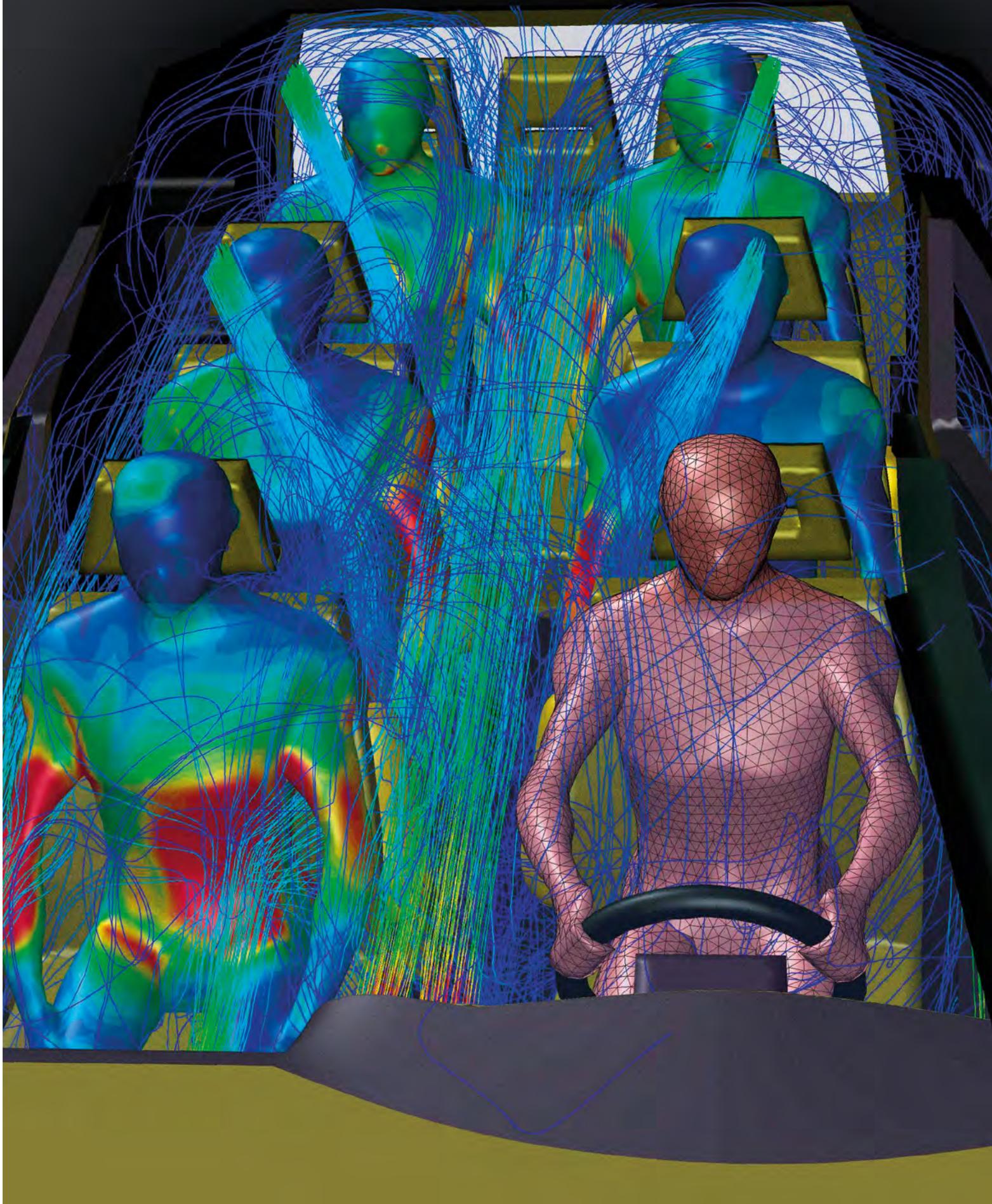
### BENEFITS

- Fast and easy measurement procedure
- Automatic evaluation of the measurement results
- Suitable for a wide range of porous materials such as felts and foams



<b>Dimensions</b>	<b>600 x 600 x 1240 mm (L x W x H)</b>
Sample holder length	50 mm
Sample diameter	40 mm
Output	Porosity





# Simulation Tools

Autoneum provides a full range of simulation tools based on our long-standing expertise in vehicle acoustics and thermal management. These tools predict and optimize NVH in the concept phase to provide our customers with cost-effective solutions and reduced lead times. Thanks to our broad range of measurement systems, the data for this process can be evaluated thoroughly.



For further information, please contact:  
**Autoneum Products and Systems Simulation**  
[simulation@autoneum.com](mailto:simulation@autoneum.com)

# Optimizing the vehicle body structure and acoustic trim

Autoneum has developed a complete tool portfolio for state-of-the-art computer-aided engineering (CAE) for vibroacoustics, focusing on body vibration and acoustic trim performance. Our tools predict and optimize NVH in the concept phase to provide our customers with cost effective solutions and reduced lead times.

## GOLD

GOLD is a unique simulation tool for the simultaneous improvement of a damping package and vehicle body panel shape. It exploits the Finite Elements (FE) analysis performed with NASTRAN (Superelement Technique for full body optimization) and uses an Autoneum modeling-technique to simulate the application of damping material on vehicle body panels. GOLD automatically updates the FE model with possible shape modifications as set by the user: beadings, ribs and soapfilms.

### BENEFITS

- Handles high number of design variables
- Customized shape modification

11 design variables for the position and the thickness of damping patches.



27 design variables for the shape modifications on the panels: 20 beadings, 7 soap films.



Full vehicle simulation: 7 uncorrelated loading conditions



## Example

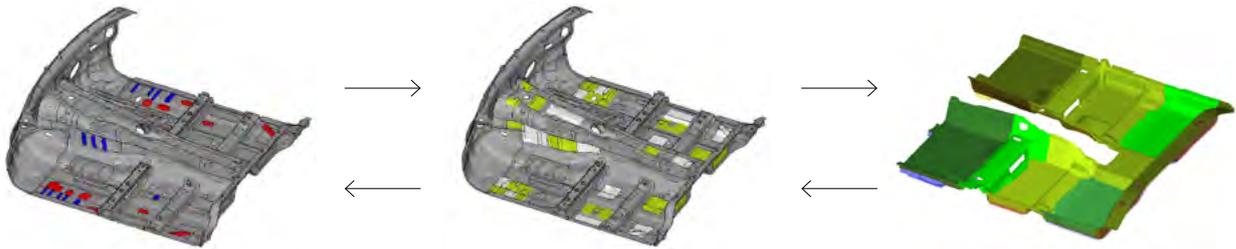
Reduction of damping package weight by 20% in floor area.  
Same or better performance as original (same panel vibration).

## TREASURI2

TREASURI2 allows the Finite Elements (FE) simulation of acoustic trim components containing porous materials. TREASURI2 can set-up, solve and post-process vehicle FE models that include trim parts with porous materials. It is applied to predict noise levels in the passenger compartment (full vehicle acoustics) mainly for structure-borne noise in the low- and mid-frequency range. TREASURI2 can also be used to evaluate in situ insertion loss of full components like floor components.

### BENEFITS

- Simulates structure-borne noise in the low- and mid-frequency range
- Fully integrated in NASTRAN, a standard for the automotive industry

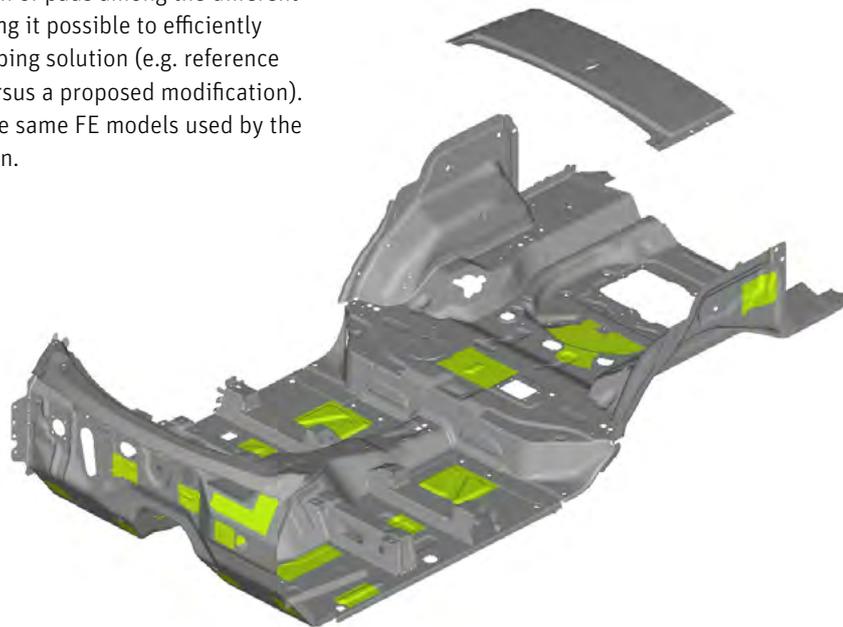


## SILVER

SILVER is a simulation tool which predicts the shape and ideal location of dampers based on a single vibration Finite Elements (FE) simulation performed with NASTRAN. SILVER rationalizes and simplifies the design process of a damping package by optimizing the overall weight and the distribution of pads among the different areas of the vehicle, making it possible to efficiently evaluate a particular damping solution (e.g. reference damping configuration versus a proposed modification). It is applied directly on the same FE models used by the OEMs for NVH optimization.

### BENEFITS

- Rationalized and simplified design process
- Provides ranking of damping package parts



### Example

Refinement of baseline damping package with 15% weight reduction

# Enhancing the acoustic performance of vehicle parts

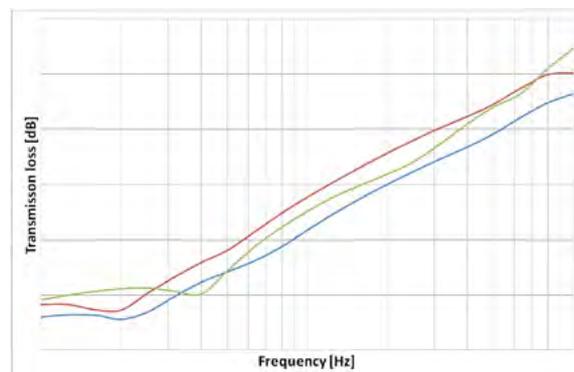
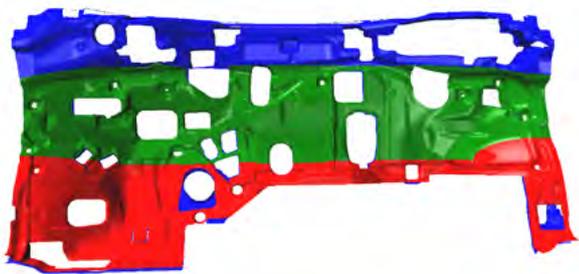
High-performance software programs are used for the analysis, optimization and validation of the isolation and insulation properties of components for the vehicle interior floor, including carpet systems, inner dashes and floor insulators. The aim is to achieve the perfect balance between acoustic performance and product weight.

## VisualSISAB

VisualSISAB calculates the absorption and insulation of sound package components with complex geometries and a wide range of different materials. It exploits the transfer matrix technique to represent the wave propagation through layers of porous materials, hard layers, foils or spacers. VisualSISAB enables material compositions and thicknesses of press-molded components already to be reviewed with respect to NVH requirements and adjusted if necessary during the CAD stage by means of computer-controlled simulations. This is a prerequisite for the development and manufacture of effective, light-weight and cost-efficient noise protection components.

### BENEFITS

- Used for components in the vehicle interior, engine bay and body-in-white
- Fast design modifications and analysis on parts
- Performance result comparison with target curves
- Fast multilayer 3D constructions from CAD data



### Example

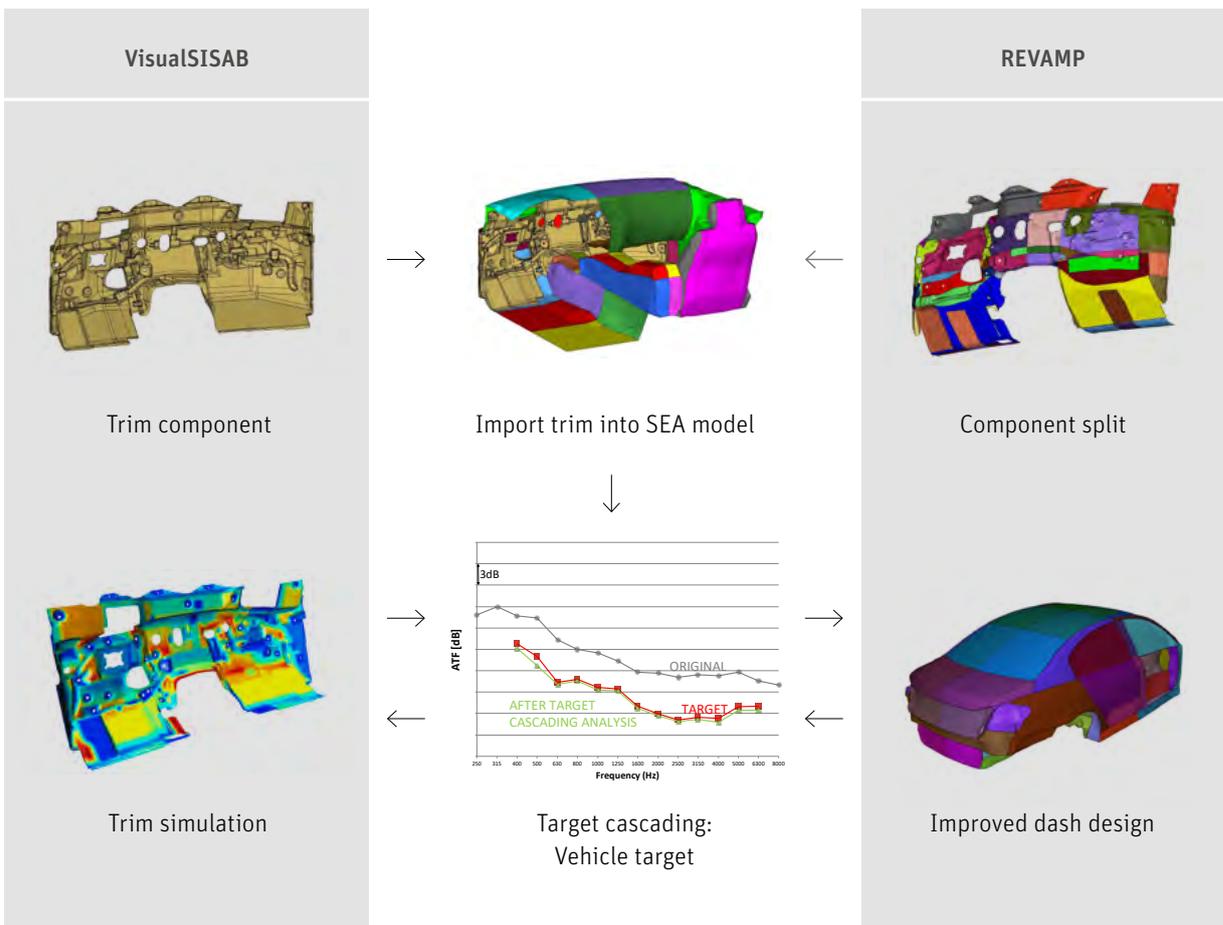
Area split to simulate transmission loss of dashes

# REVAMP

REVAMP can predict the impact of trim parts inside the passenger compartment. It is based on the existing Statistical Energy Analysis (SEA) theory. REVAMP is based on over 20 years' experience in SEA modeling and is specifically designed to carry out typical sound package development and optimization tasks in the mid- and high-frequency range.

## BENEFITS

- Supports the building and analysis of SEA models of vehicles
- Allows determination of dominating acoustic transfer paths
- Cascades vehicle noise level targets down to acoustic component TL and ABS targets
- Compatible with other commercial SEA tools



## Example

Workflow to link parts performance to vehicle targets

# Thermal management solutions for vehicles

Autoneum's range of automotive thermal management solutions includes state-of-the-art thermal testing and calculation processes to develop components for the insulation, shielding and storage of heat.

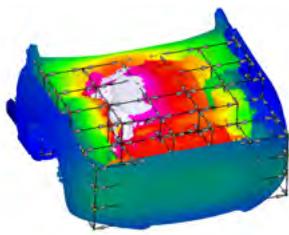
At global research and development centers, Autoneum's thermal management experts carry out material testing on components and in vehicles and use unique simulation software to develop innovative thermal protection packages that are tailored to customer needs.

For example, Autoneum offers Theta-FiberCell, a key technology for innovative engine bay parts like engine encapsulations, engine top covers or hoodliners. Autoneum provides full engineering services for the predevelopment and development stage for thermal safety, heat storage as well as acoustic validation at vehicle level.

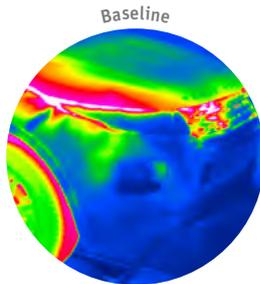


For further information, please contact:  
**Autoneum | Thermal Management**  
[tm-support@autoneum.com](mailto:tm-support@autoneum.com)

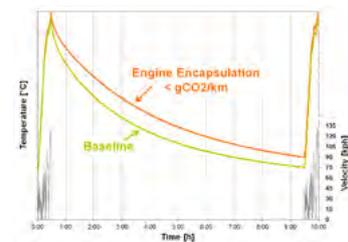
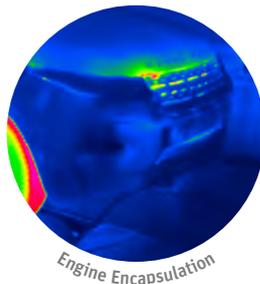
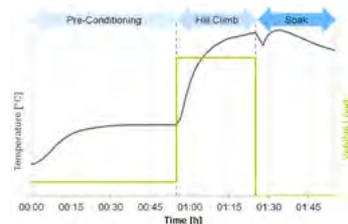
Concept selection and material choice



Prototyping and vehicle testing



Thermal safety and emission analysis



## Example

Engine encapsulation pre-development workflow

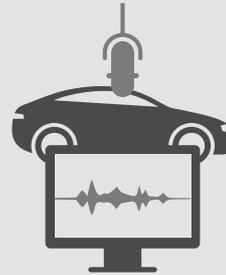
# Autoneum offers a variety of thermal management solutions for its customers



## Part simulation for thermal and acoustic performance

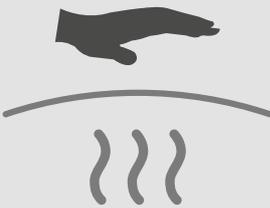
**VisualTherm:** predicting the thermal insulation performance of engine bay parts

**VisualSISAB:** predicting the acoustic absorption and insulation performance



## Autoneum's global vehicle testing facilities

To perform OEM's thermal safety cycles and 24 hours cooldown measurements for engine encapsulation efficiency assessment.



## Engine cooldown methodology

Based on a smart and accelerated combination of Star-CCM+ and TAItherm to virtually evaluate the cooldown duration and efficiency of engine



## Material measurement equipment

To enable the creation of temperature- and density-dependent thermal property databases.

Autoneum

Locations with minority shareholders

Associated companies and investments

Licenseses

## Global presence

### North America

#### Canada

- London, Ontario
- Tillsonburg, Ontario

#### Mexico

- Hermosillo
- Mexico City
- San Luis Potosí
- Silao

#### USA

- Aiken, South Carolina
- Bloomsburg, Pennsylvania
- Jeffersonville, Indiana
- Novi, Michigan
- Oregon, Ohio
- Sunnyvale, California
- Jackson, Tennessee
- Monroe, Ohio
- Somerset, Kentucky
- Tinley Park, Illinois
- Valparaiso, Indiana

### SAMEA

#### Argentina

- Córdoba

#### Brazil

- Gravataí
- São Paulo
- Taubaté

#### South Africa

- Rosslyn
- Durban

#### Turkey

- Bursa

## Europe

### Belgium

- Genk

### Czech Republic

- Bor
- Choceň
- Hnátnice

### France

- Aubergenville
- Blainville
- Lachapelle-aux-Pots
- Moissac
- Ons-en-Bray

### Germany

- Munich
- Rossdorf-Gundernhausen
- Sindelfingen

### Hungary

- Komárom

### Italy

- Santhià

### Poland

- Katowice
- Nowogard

### Portugal

- Setúbal

### Russia

- Ryazan

### Spain

- A Rúa
- Valldoreix

### Sweden

- Gothenburg

### Switzerland

- Sevelen
- Winterthur (HQ)

### United Kingdom

- Halesowen
- Heckmondwike
- Stoke-on-Trent

## Asia

### China

- Changsha
- Chongqing
- Pinghu
- Shanghai
- Shenyang
- Taicang
- Yantai
- Guangzhou
- Tianjin
- Wuhan
- Fuzhou

### India

- Behror
- Chennai

### Indonesia

- Jakarta

### Japan

- Oguchi
- Tokyo

### Malaysia

- Shah Alam

### South Korea

- Seoul

### Thailand

- Laem Chabang
- Chonburi



**Autoneum Management Ltd**

Schlosstalstrasse 43  
8406 Winterthur  
Switzerland

T +41 52 244 82 82  
info@autoneum.com

**[www.autoneum.com](http://www.autoneum.com)**

Text

Autoneum Management Ltd, Winterthur

Design

Büro Variété – Marcel Landolt, Lucerne

Print

Druckmanufaktur, Urdorf

Autoneum. Mastering sound and heat.

