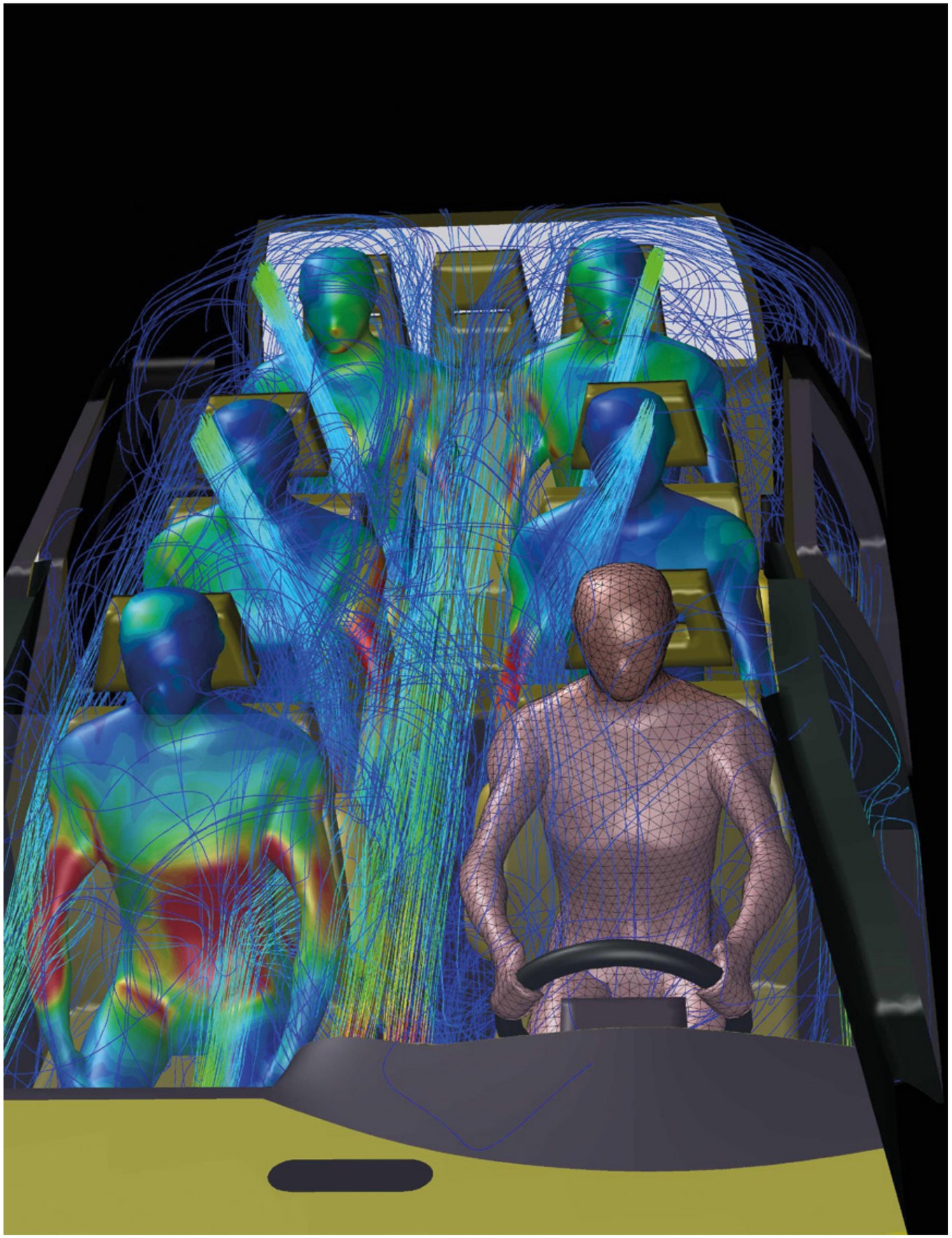
autoneum

Product portfolio

Interior · Exterior
New Mobility · Autoneum Pure.
Measurement Systems · Simulation Tools



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 in order 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

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 in order 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

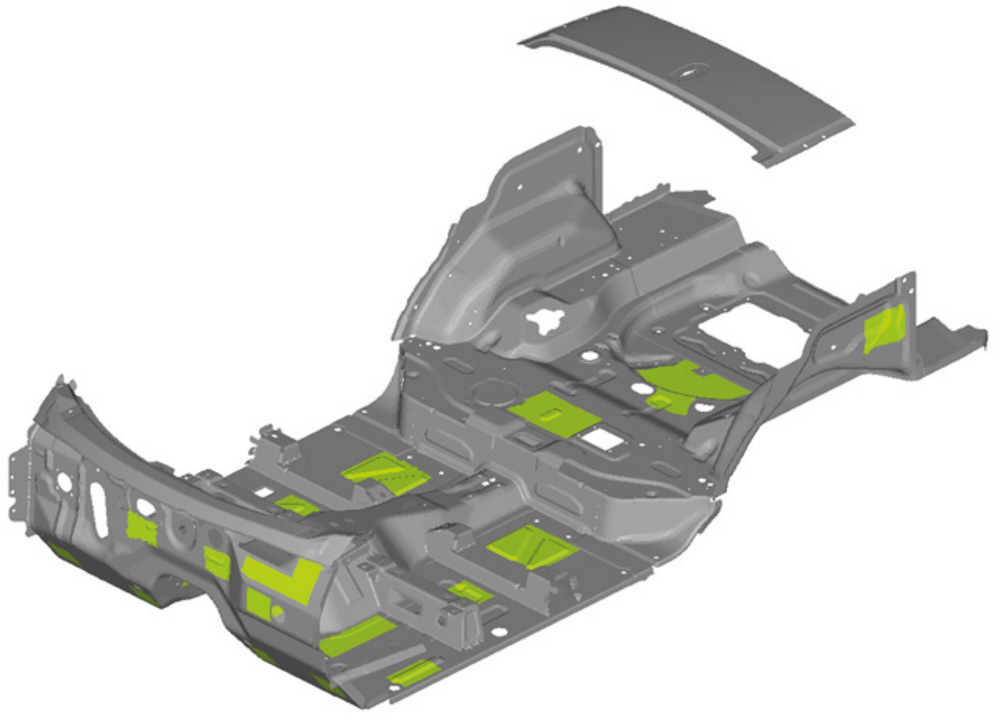
Reduction of damping package weight by 20 % in floor area.
Same or better performance as original (same panel vibration).

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 automobile manufacturers 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

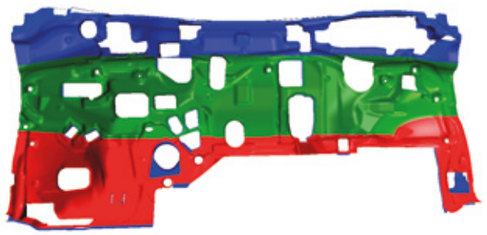
High-performance software programs are used for the analysis, optimization and validation of the isolation and insulation properties of components for the vehicle interior floor, including carpet systems, inner dashes and floor insulators. The aim is to achieve the perfect balance between acoustic performance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

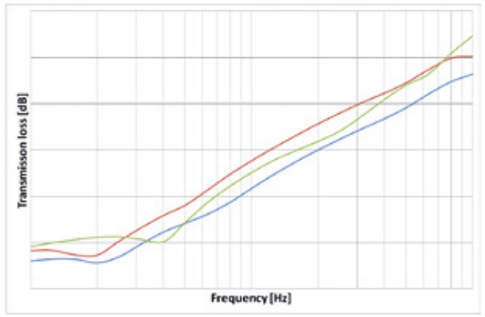
VisualSISAB

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, lightweight 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

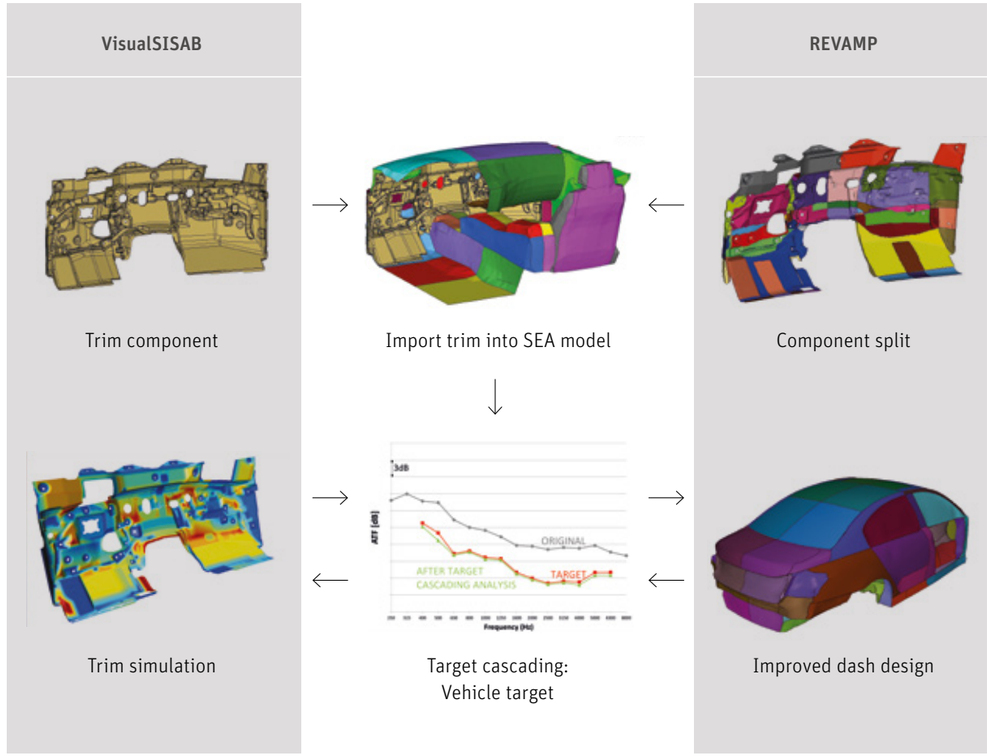
Area split to simulate transmission loss of dashes

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 for the next vehicle generation

At global research and development centers, Autoneum carries out material testing on components as well as in vehicles and uses unique simulation software to design innovative packages that are tailored to customer needs.

Autoneum provides full engineering services for thermal performance, safety and storage from concept selection and material choice to part design and optimization by using computer aided engineering (CAE) software. Thanks to these solutions, the Company's experts can analyze better design options faster and earlier in the vehicle development process.

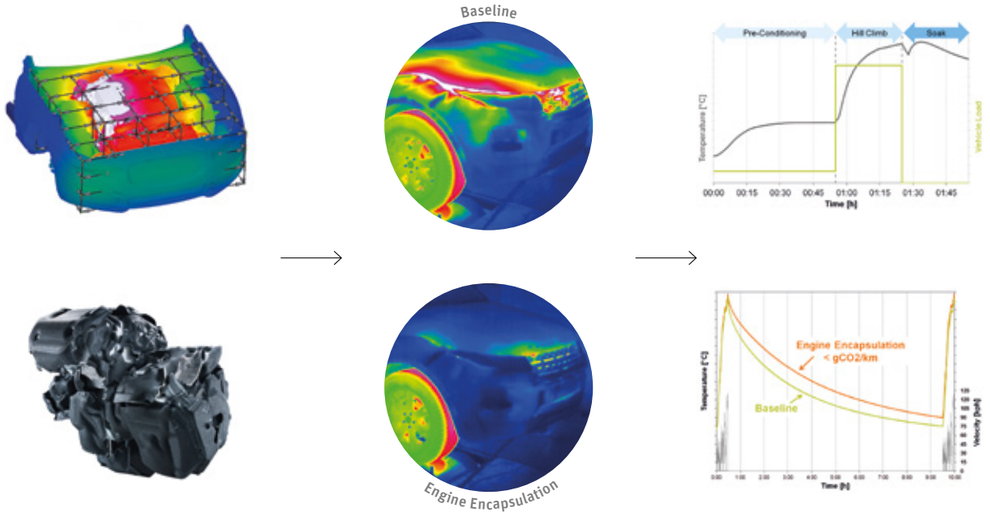
Case study: E-motor and engine encapsulation pre-development workflow

Based on a smart and accelerated combination of Star-CCM+ and TAITherm, the cooldown duration and efficiency of engine encapsulations is evaluated in shorter time.

Concept selection and material choice

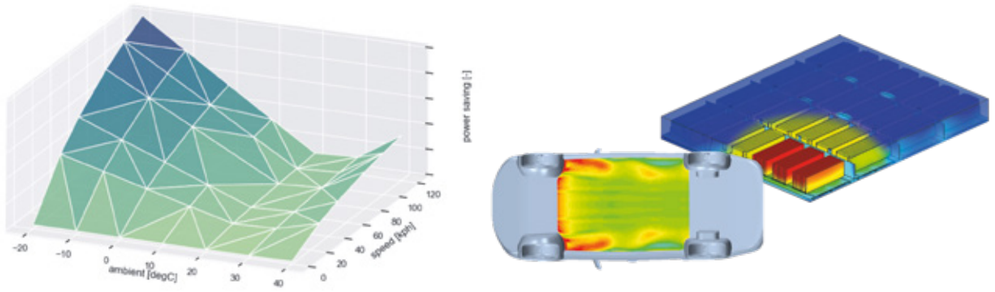
Prototyping and vehicle testing

Thermal safety and emission analysis



Case study: Improving battery performance and protection

With its specialized CAE software developed in-house, Autoneum supports customers in optimizing the thermal management of the battery. This includes the design of the battery structure with coolant circuits among others to calibrate temperature resistance. These simulations thereby help to improve battery performance and correspondingly result in lower energy consumption.

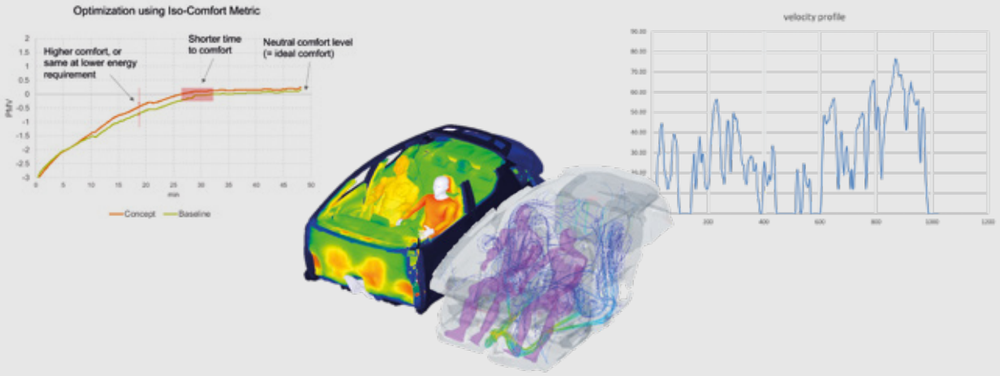


Assessment of interior parts for greater thermal comfort

In order to develop carpet systems, inner dashes and floor insulators that not only provide noise protection, but also optimal thermal comfort inside the passenger cabin, Autoneum offers state-of-the-art simulation tools. These programs factor parameters such as external and internal convection, surface and solar radiation, cabin conduction, heat storage or varying part insulation properties to simulate components that meet the special requirements for thermal management of vehicles. This is also key for electric cars as such components are needed to shield the passenger cabin from cooling or heating, thereby reducing the energy required for temperature regulation. Applying Autoneum's simulation tools in predevelopment thus supports a higher driving range.

Case study: Carpet part simulation and mechanical testing

Combining virtual calculations with the Company's mechanical testing expertise in the predevelopment of carpet systems also enables Autoneum to evaluate the compression performance of the floor system. This is crucial for enhancing part quality.



Autoneum. Mastering sound and heat.