

# ACOUSTIC SYSTEMS QUIETER RIDES START WITH SIKA

LIGHTER | STRONGER | SAFER | QUIETER | GREENER

BUILDING TRUST





# YOU NEED TO FIND WAYS TO MAKE YOUR NEXT VEHICLE LIGHTER, STRONGER, SAFER, QUIETER OR GREENER.

## **SO WHERE DO YOU START?**

Start with a trusted partner that can deliver global innovation on a localized scale, wherever and whenever it's needed. Start with a commitment to continuous improvement, and the knowledge that it takes years to become an overnight success. Start with a collaborative approach that can bring together great minds without knocking heads. Start with pioneering innovation that clears a path for the vehicles of the future, no matter what form they take.

## **START WITH SIKA.**

With a full suite of bonding, damping, sealing and reinforcing solutions, Sika is a key strategic partner for both OEMs and component suppliers. By collaborating on advanced acoustic systems in an early project stage, we help our customers to enhance global projects with high performance as well as EHS-friendly products fitting your specific requirements.

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# CAVITY SEALING

Expand your NVH Options with SikaBaffle® and SikaSeal®

**SIKABAFFLE® AND SIKASEAL® SOLUTIONS** use lightweight, pre-shaped molded, extruded, die-cut parts and bulk pumpables within the primary body structure to effectively block common noise transmission paths.

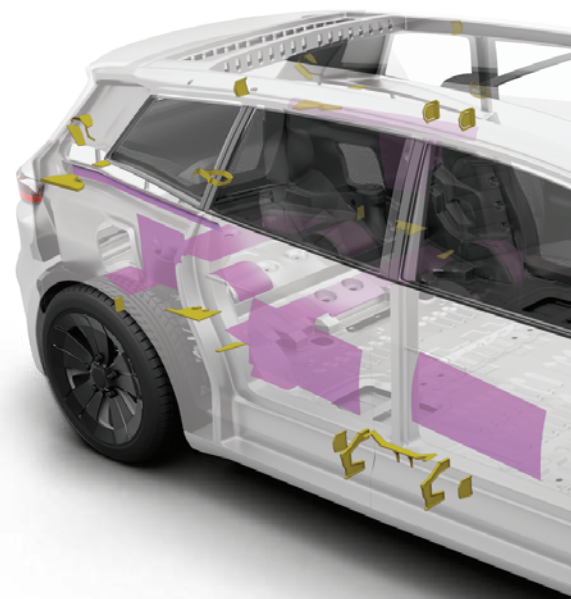
SikaBaffle® and SikaSeal® product families include thermoplastic and elastomeric-based formulations. They are designed to be heat activated and expanded inside vehicle body cavities.

## BENEFITS

- 100% sealing, preventing noise, water and moisture entering the vehicle
- Applicable in the body shop with a wide curing temperature range
- Effectively resistant to multi-bake curing
- Design solutions for both acoustics and water sealing concepts
- Full range of design options through injection molding, extrusions and bulk pumpables

## THE RIGHT MATERIALS AT THE RIGHT PLACE

SikaBaffle® and SikaSeal® represent a full range of products designed to improve vehicle acoustic performance by effectively sealing the car body and reducing noise transmission. Materials can be processed as injection molded parts to seal complex cavity shapes; alternatively simple designed extruded parts can be applied. Our new bulk pumpable baffle solution is applicable in the Body Shop and is ideal for automated application in areas requiring narrow cavity filling.



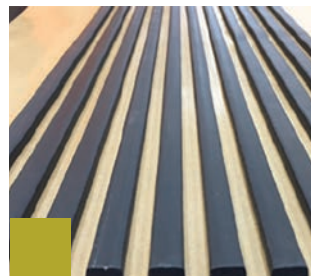
## PRODUCT KEY

- Sealing
- Damping



## ENGINEERED INJECTION MOLDED PARTS

Solutions that are applicable to protect any body cavity section from noise propagation and elements intrusion. Watertight for lower-body areas, acoustic concepts for upper-body dry areas.



## EXTRUSION TECHNOLOGY

Foam only applications targeting small- to medium-sized cavities. Adding versatility, adaptability and design flexibility.



## BULK PUMPABLE TECHNOLOGY

One-component bulk sealants for narrow cavities. Design flexibility supporting full automation concepts.

# VIBRATION DAMPING

Optimized Panel Damping with SikaDamp®



**SIKADAMP®** solutions comprise a broad family of sound deadeners based on elastomers or bitumen, which can also be coupled with a constraining layer. Designed for best-in-class weight-to-performance ratios, while still providing industry-leading damping performance, SikaDamp® can be applied at any point during vehicle assembly or be installed at the stamping location.

## BENEFITS

- Full range of solutions that allow effective structure-borne noise reduction of car body elements
- Improved targeted acoustics without compromising weight
- Hybrid versions available for damping performance and panel stiffening in one product
- Ultra lightweight products
- Automated application processes add value and performance

## HIGHLY TARGETED, HIGHLY EFFECTIVE

SikaDamp® is versatile in application as a magnetic, self-adhesive, melt-adhesive or peel-and-stick product in standard and custom shapes. Placement and shape of parts can be highly tuned through laser-vibrometer analysis of the entire body panel system, which allows for targeted, cost-efficient use, while achieving maximum damping effect.



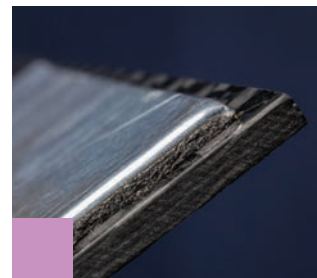
### MONOLAYER DAMPING

Highly versatile for flat, curved, crimped, vertical and overhead use. Can be applied throughout the body production process.



### CONSTRAINED LAYER DAMPING

Best-in-class acoustic performance, highly effective on doors and panels. Hybrid versions combine acoustic damping and panel stiffening in a single product.

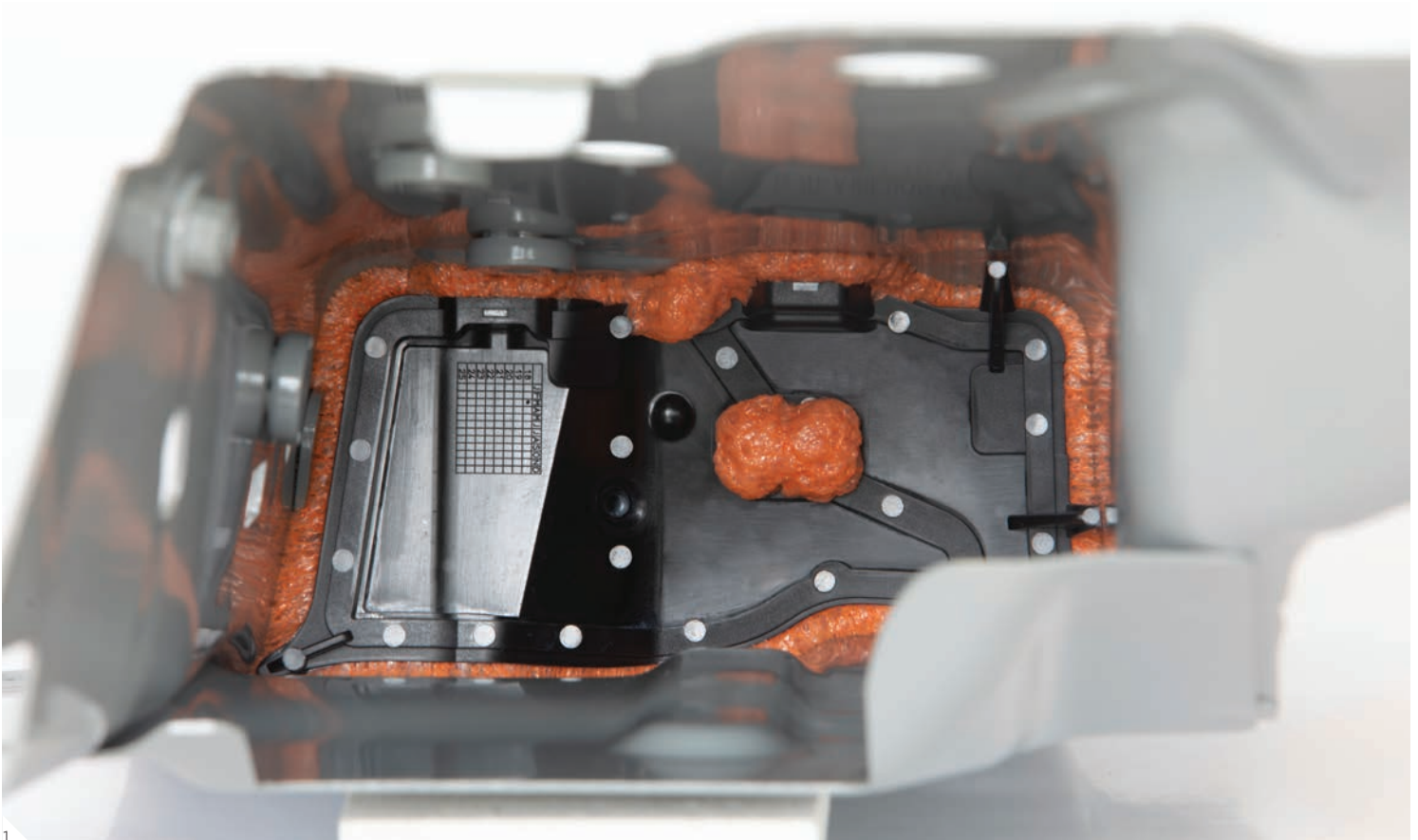


### ULTRA LIGHTWEIGHT DAMPING

Constrained layer expandable material system which achieves up to 80% weight savings with exceptional acoustic performance possible.

# CAVITY SEALING

The right Materials with the right Design at the right Place



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- 1 SikaBaffle® part in a body cavity
- 2 SikaBaffle® extruded, non-expanded
- 3 SikaSeal® pumpable Baffle expanded

## APPLICATIONS

Typical applications for SikaBaffle® and SikaSeal® products include pillars, roof sections, cowl and rocker areas. These products enable complete sealing of vehicle body cavities; with watertight solutions for the lower body and acoustic solutions for dry upper body areas.

# PRODUCT SPECIFICATIONS

## Cavity Sealing

**SIKABAFFLE® AND SIKASEAL®** products can be processed as highly engineered 3D parts which optimize material usage and enhance performance at the best cost-to-volume ratio. Extrusion and bulk pumpable technology can be used as an alternative targeting applications on narrow-sized cavities; simply designed parts can be added readily even during late stages of development.

### SIKABAFFLE® AND SIKASEAL® PORTFOLIO

Product		SikaBaffle®-400 series	SikaSeal®-700 series	SikaBaffle®-200 tape series	SikaSeal®-800 bulk series	SikaBaffle®-27x repair series
Applications		Acoustic, water sealing, fuel resistant	Water sealing	Acoustic, water sealing	Acoustic, water resistant	Repair
Technology		Thermoplastic	Thermoplastic	Rubber	1C Rubber	2C PU
Curing temperature (in °C)		140 to 210 °C	160 to 200 °C	160 to 205 °C	155-205 °C	ambient temp.
Adhesion	Steel	+	+	+	+	+
	Aluminum	+	+	+	+	+
	Plastics	+	+	+	+	+
Expansion Rate (% volume)		250 to 2000 %	>1600 %	600 to 1200 %	>500 %	>2000 %
Design options		Injection molded or extruded	Injection molded or extruded	Extruded	Bulk pumpable	Aerosol can

### SIKAMID®

Sikamid® is the proprietary material used to create supporting carriers for sealing and acoustic parts. It is available in a variety of colors formulated to meet the specific mechanical, thermal and processing requirements of each application.



### REPAIR SOLUTIONS

SikaBaffle® Repair can be used for manual application in vehicle production as well as for repair and service solutions. SikaBaffle® Repair is available as a ready-to-use, 2C polyurethane foam that cures quickly at ambient temperature and reliably seals cavities against noise, air, water and dust.





## COMFORT - THE EAR PLAYS A CENTRAL PART

Some people can tell the make of a car from the slamming of the door alone. In the development process of new vehicles, vehicle sound design is gaining importance in terms of shaping its character, comfort optimization and value perception.

Customers' requirements are specifically geared towards eliminating or reducing low-frequency background noise, in order to increase acoustic comfort during driving. At the same time, the added value for our customers is in the cost effectiveness of the materials used and their weight-reducing effect.



# PRODUCT SPECIFICATIONS

## Vibration Damping

**SIKADAMP®** products - from the first idea through simulation and prototyping - are developed and manufactured tailored to seal body structure and reduce structure-borne sound.

### SIKADAMP® ACOUSTIC PORTFOLIO



Product	SikaDamp®-100 series	SikaDamp®-200 series	SikaDamp®-300 series	SikaDamp®-600 series	SikaDamp®-700 Ultralight series
<b>Technology</b>	Bitumen non magnetic	Bitumen magnetic	Bitumen-free product line	Butyl	Expandable bitumen
<b>Bottom Layer</b>	Self-adhesive or Meltsheet	Self-adhesive or Meltsheet	Self-adhesive or meltsheet	Self-adhesive	Self-adhesive or Meltsheet
<b>Place of Application</b>	Body, Paint, Trim shop	Body, Paint, Trim shop	Body, Paint, Trim shop	Body, Paint, Trim shop	Paint, Trim shop
<b>Steel</b>	+	+	+	+	+
<b>Aluminum</b>	+	-	+	+	+
<b>Plastics</b>	(+)	(+)	(+)	+	+
<b>Function</b>	Acoustic, Hybrid acoustic/stiffening	Acoustic, Hybrid acoustic/stiffening	Acoustic, Hybrid acoustic/stiffening	Acoustic, sheet metal hole sealing	Lightweight acoustic
<b>Surface weight</b>	2-5 kg/m <sup>2</sup>	3-8 kg/m <sup>2</sup>	2-8 kg/m <sup>2</sup>	2-4 kg/m <sup>2</sup>	1-3 kg/m <sup>2</sup>
<b>Loss Factor</b>	0,10-0,35	0,10-0,35	0,10-0,35	0,15-0,45	0,15-0,35
<b>Design options</b>	Die-cut, automated application	Die-cut, automated application	Die-cut, automated application	Die-cut, automated application	Die-cut, automated application

### SIKADAMP® AUTOPAD

Butyl-based system especially designed for automated application of sealing elements for sheet metal holes, also providing corrosion protection, water tightness and targeted noise damping function.



### SIKADAMP® HYBRID

Advanced material system that adds stiffness and improves the structural noise performance of the treated components such as door panels. It combines the high acoustic performance of SikaDamp® with the panel stiffening effect of SikaReinforcer®.

# OPTIMIZING COMFORT AND FUNCTIONALITY

**THE FULL RANGE** of Sika's Acoustic Systems provide more flexible and efficient solutions that can be optimized and tuned throughout the development process to accommodate the NVH impact of design decisions.

## QUIETER RIDES WITH SIKA'S ACOUSTIC SOLUTIONS

### SIKABAFFLE® ACOUSTIC

Acoustic designs which combine the advantages of materials with designs to enhance acoustic performance for airborne noise, tailored to specific body locations while also being able to be used in any location of the vehicle.

### SIKADAMP® HIGH DAMPING PERFORMANCE

Butyl or bitumen based HDP products specially formulated and coupled with a constrained layer designed to achieve highest damping effect to reduce structure borne noise.



### AUTOMATED APPLICATION

SikaDamp® products can be optimized and robotically applied. An automated system which combines the benefits of damping pads performance and LASD application.

SikaSeal® pumpable baffle is the ideal solution to seal long narrow cavities when highly automated application is required. This bulk solution can be applied in the body shop using standard application conditions and equipment.



1 Expanded SikaBaffle® in steel cavity    2 Automated application of SikaDamp®

# LIGHTWEIGHTING WITH DESIGN FLEXIBILITY

## LIGHTWEIGHTING WITH DESIGN FLEXIBILITY

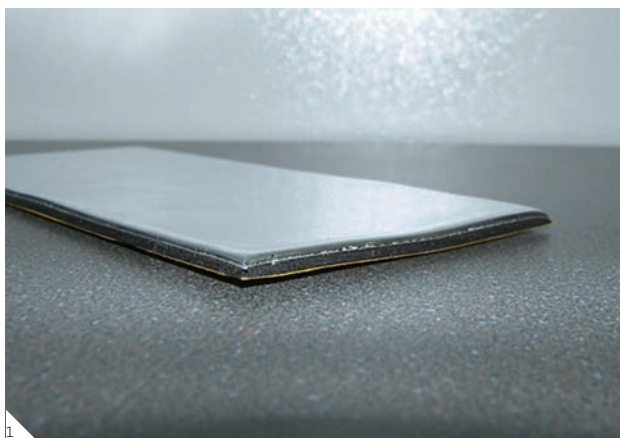
With weight reduction a recognized key driver in the automotive design process, engineers are increasingly creative in their efforts to meet lightweight goals. Cutting the weight, however, can create unanticipated noise issues late in vehicle development. Sika's lightweight solutions provide reduced weight with no performance compromise.

### ULTRA LIGHTWEIGHT DAMPING MATERIALS

Our newest innovation in damping offers up to 80 % weight reduction as compared to similar and competitive products. Targeted damping is a highly effective way in eliminating noise associated with vibration in body panels. SikaDamp®-Ultralight is a constrained layer material which provides highly effective damping. In application, typically area weights of 5 kg/m<sup>2</sup> can be reduced to 1,1 kg/m<sup>2</sup> while achieving higher acoustic performance.

### HIGH-EXPANSION CAVITY SEALING MATERIALS

Our newest SikaBaffle®-400 family is available with a very high-expansion rate, which enables designs that use less material without compromising the sealing and acoustic performance. In some cases material usage can be reduced by >20 % over conventional solutions.



1 SikaDamp®- Ultralight



2

2 SikaBaffle® injected parts

3 Application of 3D printing technology

### THE FUTURE IS NOW - 3D PRINTING AS A DESIGN ADVANTAGE

Applications of additive manufacturing technology at Sika include design validation and creation of functional parts. 3D printed molds can be used to generate parts for validation, prototyping and small series. Additive manufacturing is an effective solution for functional and performance testing, optimized design and rapid prototyping.



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# STATE-OF-THE-ART

In our state-of-the-art acoustic test facilities, Sika engineers and application experts perform virtual and physical testing, analyze the results and propose solutions that deliver optimal weight-to-performance ratios for each application and acoustics treatment package for vehicles.



# ACOUSTIC TESTING

State-of-the-Art Technology Centers

## THE SIKA TECHNOLOGY CENTERS (STC)

have been designed to support the development, validation and optimization of sealing, damping, bonding and reinforcing products and solutions.

A centerpiece of the STCs are the Acoustic Test Centers. Each has a comprehensive range of material testing capabilities, which includes sound absorption, vibration damping and sound transmission loss. Additionally, vehicle subsystems and full vehicles can be evaluated for noise and vibration.

Sika Acoustic Test Centers also include scanning laser vibrometers, psycho-acoustic equipment, and vehicle body leakage testers to assess the effectiveness of the acoustic systems in support of product development and customer programs.

**STC EFFORTS** focus on the latest automotive megatrends in terms of comfort and new challenges with the increasing importance of new energy vehicles.

## FULL VEHICLE NVH TESTING CAPABILITIES

The focal point of the Acoustic Test Centers is the vehicle chassis dynamometer, housed in a hemi-anechoic environment. Full vehicle NVH testing under a controlled environment can be conducted. To demonstrate real-world driving performance, testing can be done either indoors with a variety of simulated road surfaces or on a dedicated test track.

## TARGETED STRUCTURAL NOISE OPTIMIZATION

For structure borne noise Laser Doppler Vibrometer (LDV) studies can be performed to optimize damping package layouts. Reduced weight without compromising acoustics, optimized acoustic performance without unnecessary costs.

## OLF - A SIKA FIRST TECHNOLOGY

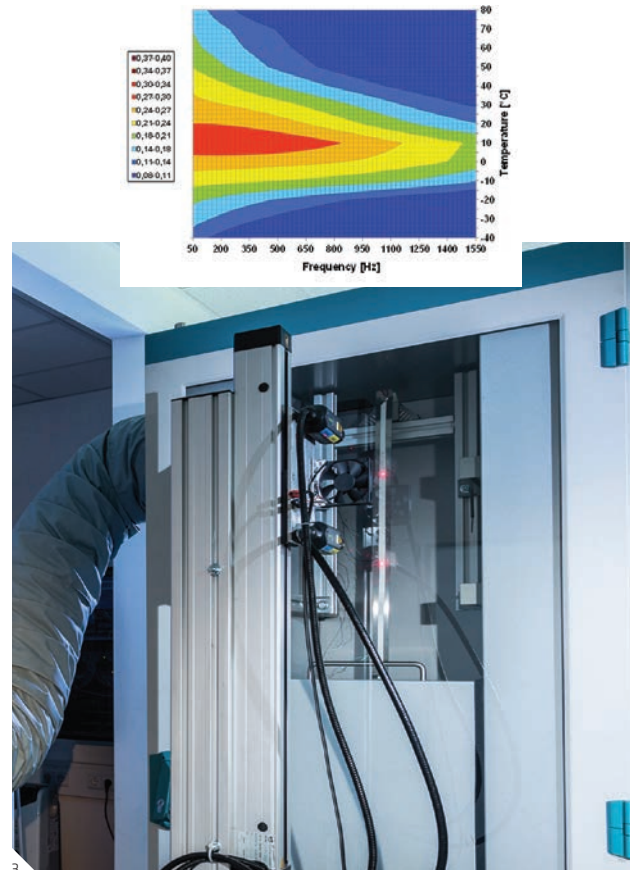
The newly developed OLF (optical determination of loss factor) measuring technique enables the precise measurement of the damping characteristics of single and multiple layer materials at different temperatures and in high-resolution over a broad frequency range.



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1 Acoustic test track

2 Laser vibrometer test equipment

3 OLF testing (optical determination of loss factor)

# INNOVATION, IT STARTS WITH PASSION

**AT SIKA, WE BELIEVE** that a truly innovative company is one that starts with a culture within which a passion for innovation and creativity thrive. An innovative company should also take a customer-focused view; one that anticipates customer needs with a thorough understanding of key market trends.



## **LIGHTER**

We have a full range of products which enable our customers to make their vehicles lighter. For example, we were the first to engineer body shop adhesives (SikaPower®), which enable mixed-material bonding of lighter materials such as aluminum, carbon fiber reinforced plastic, as well as traditional and high strength steels.



## **STRONGER AND SAFER**

We were the pioneer in vehicle exterior parts bonding with our Sikaflex® + Booster and SikaForce® products and our SikaReinforcer products, which not only help stiffen the vehicle for better overall dynamics but also improve crash performance and increase vehicle occupant safety.



## **QUIETER**

We provide solutions that make vehicles quieter; SikaBaffle® seals noise pathways, while SikaDamp® reduces the body panel vibration that contributes to audible noise in the vehicle. Both products are engineered for best-in-class weight-to-performance ratio. Used together, or separately, our industry leading acoustics solutions improve vehicle occupant comfort.



## **GREENER**

We were the first to establish water-based pre-treatments and polyurethane hotmelts with low monomeric isocyanate content and reactive polyolefin hotmelts free of classification to the automotive interior market – a more environmentally friendly approach that easily outperforms the industry's previous generation of products.



## **VALUE-ADDED INNOVATION**

We continuously develop new, cost-effective solutions, which allow our customers to use less material or reduce complexity in their manufacturing process. SikaPower® structural adhesives, for example, allow the reduction of welds in vehicle body sections, while strengthening overall crash durability. Anticipating megatrends we also offer a full range of solutions for assembly of e-mobility components and vehicles

# START WITH SIKA

MORE THAN

**50% OF ALL VEHICLES**

USE SIKA PRODUCTS AND TECHNOLOGIES

**30 MILLION VEHICLES**

PRODUCED ANNUALLY WORLDWIDE CONTAIN SIKA LAMINATION ADHESIVES

**25 MILLION PLUS**

VEHICLES MADE STRONGER AND SAFER EACH YEAR WITH OUR BODY SHOP ADHESIVES

**30% WEIGHT REDUCTION**

IN THE CAR BODY CAN BE ACHIEVED WHEN SIKA® PROPRIETARY HIGH-STRENGTH BONDING SOLUTIONS ARE USED IN CONJUNCTION WITH LIGHTWEIGHT MATERIALS AND THINNER MATERIAL CONSTRUCTION

MORE THAN

**300,000 LITERS**

OF VOCs WERE REDUCED THROUGH THE USE OF SIKA'S PRIMERLESS TO GLASS WATER-BASED PRE-TREATMENT SYSTEMS

MORE THAN

**70 MILLION**

CAR WINDOWS ARE BONDED DURING ASSEMBLY USING SIKAFLEX®

SIKA HAS

**20,000+ EMPLOYEES**

IN OVER

**100 COUNTRIES**

MORE THAN

**700 MILLION**

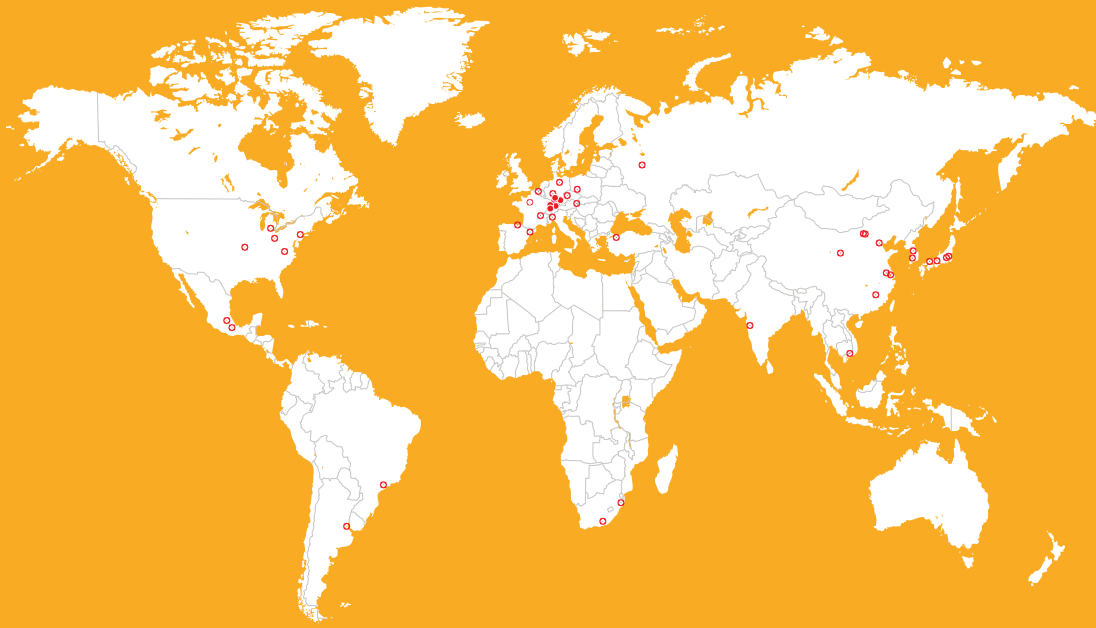
PARTS BASED ON OUR SIKABAFFLE®, SIKADAMP® AND SIKAREINFORCER® TECHNOLOGIES ARE SUPPLIED ANNUALLY TO THE GLOBAL AUTOMOTIVE INDUSTRY

MORE THAN

**30%**

INTERIOR NOISE REDUCTION IN VEHICLES THANKS TO SIKA'S ACOUSTIC SOLUTIONS

# GLOBAL REACH BUT LOCAL PARTNERSHIP



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