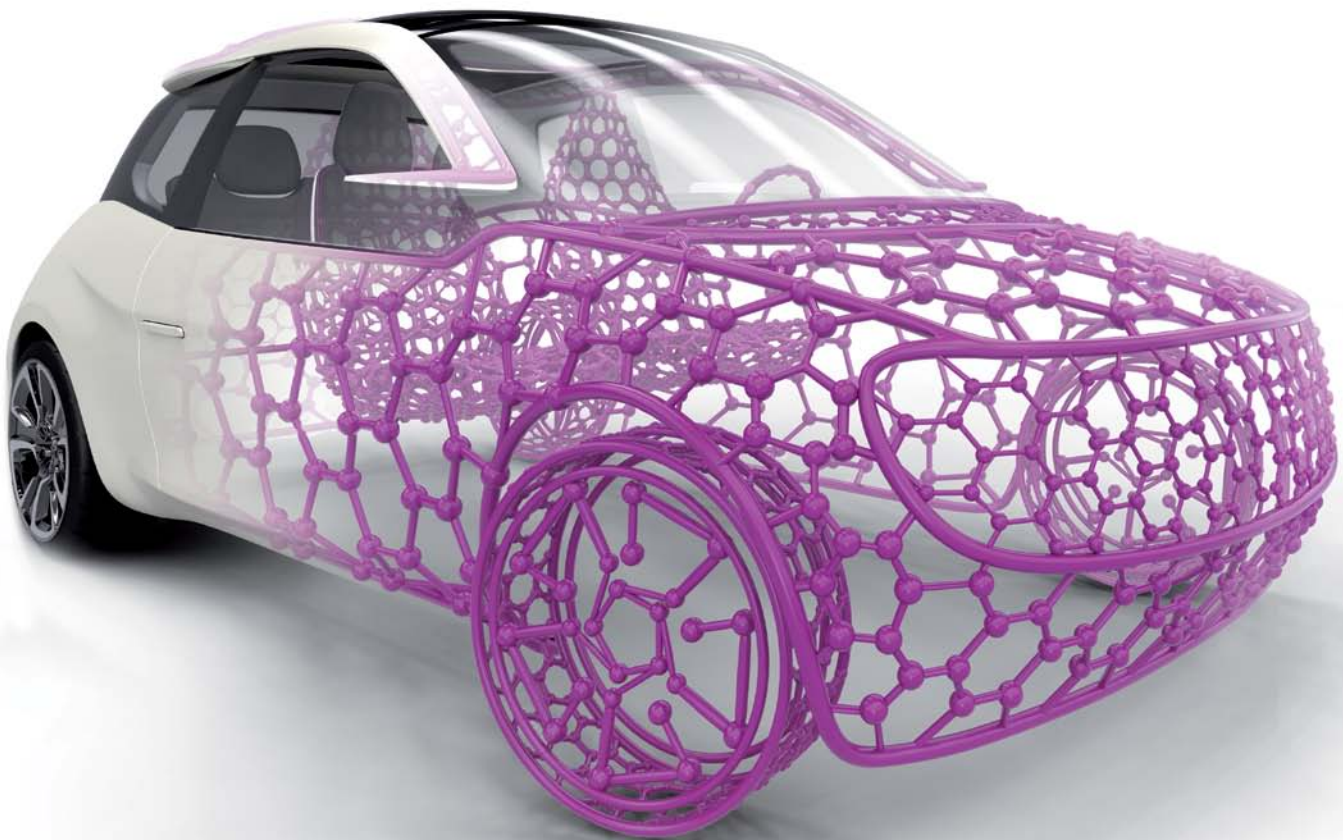


EVONIK FOR AUTOMOTIVE

**INNOVATE MOBILITY -
WE PROVIDE THE CHEMISTRY.**



MEETING THE CHALLENGES OF TODAY AND TOMORROW

Evonik is working on innovative materials and processes, providing solutions for better cost efficiency and more environmentally friendly systems as well as materials that are more resistant to chemical or mechanical stresses.

Our developments focus on four key drivers of innovation: We save weight, we boost efficiency, we create surfaces and we manage light.

The competencies that have fueled success for Evonik and its customers for decades are as varied as the many different applications in the automotive industry.



We save weight.

Evonik develops high-performance lightweight materials to replace metal or rubber parts. By combining different polymer materials weight is reduced and efficiency soars. Our solutions give customers the power to design commercially optimized vehicles with a perfect blend of multi-material systems.



We boost efficiency.

Evonik provides innovative technologies to reduce energy consumption and CO₂ emissions while boosting efficiency with advanced lubrication of engines and drive trains, low friction parts, and reduced rolling resistance of tires.



We create surfaces.

Evonik provides innovative raw materials to protect and valorize surfaces. Whether the target is a high gloss or a matte surface, enhanced scratch resistance, or decorative pillar cover or panel, we offer products that improve design and extend the lifespan of car components.



We manage light.

Evonik develops materials that enable advanced lighting technologies for the ultimate in performance and safety, as well as ensuring passenger comfort and classic design.

INNOVATIVE SOLUTIONS THROUGHOUT THE ENTIRE VEHICLE

Our strong competitive position is based on advanced technology expertise, an innovative spirit and close cooperation with our customers. By focusing on dynamic trends and developments, resource efficiency and sustainable transportation we stand behind OEMs in their quest to meet the key demands of the automotive industry.

Evonik provides a wide product portfolio for applications: from exterior panels made of composites and lightweight polymers, to coatings and adhesives used throughout the car, and for over parts under the hood or tubing systems, as well as interior applications like seats, trim parts and ambient lighting – we have solutions to benefit virtually any vehicle component.

Innovate mobility – we provide the chemistry.

Exterior and body applications



1 Metal bonding

Hybrid parts of metal and plastic bonded with copolyamide VESTAMELT® Hylink are lighter in weight, but absorb a greater amount of force than allmetal structural parts of the same thickness.

Adhesive and sealant solutions for Body-in-White applications use POLYVEST® liquid polybutadienes as a polymeric binder or additive in anti-flutter, seam or sport weld sealers, structural adhesives or liquid applied sound dampening. They are applied manually or robotically along car assembly lines.

2 Structural composite parts

Reduce body panel weight by up to 70 percent with a ROHACELL® structural foam carbon fiber reinforced sandwich component. Free up space in door cavities with side impact bars made of complex profiles produced with efficient PulPress technology and ROHACELL® structural foam cores.

VESTANAT® products for polyurethane composite parts are the recommended choice in structural applications based on liquid infusion systems and prepreg technology.

VESTAMIN® products for epoxy matrix systems are used in high pressure injection (HP-RTM), wet compression molding and pultrusion processes.

NANOPOX® is used on body panels to provide a Class A surface that can be painted immediately after demolding, thus saving costs. In other applications, like driveshafts, it provides significantly improved fatigue performance that translates into extended service life.

DICYANEX® and Amicure® micronized dicyandiamides offer performance advantages when combined with Curezol®, Imicure® and Ancamine® imidazole and amine-based latent accelerators for automotive 1K adhesives and pre-pregs.

3 Exterior coatings and corrosion protection

VESTANAT® EP-M products ensure outstanding scratch resistance of class A surfaces.

VESTAGON® provides a class A surface on A/B pillars and for powder coated wheel rims it protects against dirt accumulation while assuring high impact resistance.

High durability, brilliant gloss, UV and weather stability are key characteristics of binders made from VISIOMER® methacrylates for coatings.

AEROSIL® fumed silica is used throughout all coating layers to control rheology and thixotropy.

Other effects, such as improvement of scratch or corrosion resistance, can be achieved with AEROSIL® or its dispersion, AERODISP®.

Dynasytan® is a binder in the formulation of corrosion protection coatings for small parts like screws and nuts.

4 Headlamps and rear lights

ACRYLITE® and ACRYMID® molding compounds are specifically designed for lenses in LED headlamps. ACRYLITE® provides the highest possible transparency and most negligible drop in light transmission, even after years in service. ACRYMID® is a high heat resistant special molding compound with excellent optical properties. ACRYLITE® is an ideal solution for display lighting. It provides excellent light guiding properties, clear signal colors that remain stable for decades, and high UV and weather resistance.

POLYVEST® HT, a hydroxyl-terminated polybutadiene, is a flexible and hydrophobic binder that contributes to high quality two-part PU adhesives for headlights.

DYNACOLL® polyesters are preferred polymeric binders for one-component PU adhesives with their ability to broad adhesion performance and initial strength.

5 High gloss body parts

ACRYLITE® Hi-Gloss provides exterior body parts with high-gloss (Class A) surfaces without the need for painting or coating.

6 Door sealants

Door sealing materials are crosslinked with TAC or TAICROS® to improve compression properties.

7 Windows

VESTINOL® additives for multipurpose adhesives keep windows firmly anchored, even in the event of an accident. Half of all welding spots in automobiles can be replaced with cost-effective adhesives.

Dynasytan® SIVOCLEAR uses state-of-the-art silane technology to ensure a clear view, even in strong downpours. The coating allows liquids to simply roll off.

ACRYLITE® for glazing applications provides freedom of design, the ability to integrate a variety of functions, and a 40 to 50 percent weight reduction as compared to glass.

Under the hood and underbody applications



1 Engine components

For applications near the engine, high temperature polymers are required. VESTAMID® HTplus (PPA), VESTAKEEP® (PEEK) and P84® NT (PI) feature the high temperature stability, mechanical strength and chemical resistance for the concentric slave cylinder, charge air duct, or parts of the vacuum exhauster.

Electronic systems are encapsulated with epoxy resins. ALBIDUR® improves thermo-mechanical performance to meet the demands of high performance engines and harsh environments.

2 Engine compartment parts

Natural-based polyamide VESTAMID® Terra products bridge the gap between high-temperature polyamides and standard polyamides. They contribute significantly to reduced reliance on fossil raw materials and reducing the greenhouse effect.

3 Turbo charger hose

TAICROS® co-agent improves the efficiency of peroxide crosslinking, thermal stability and aging properties of fluoro rubbers for turbo chargers or fuel hoses.

4 Cooling lines

Multilayer cooling line systems with an outer layer of polyamide VESTAMID® are light and easy to shape and mount. Used for cooling of accumulators, they reduce the weight of hybrid cars significantly.

5 Air filters

VESTOPLAST® in air filters ensures efficient processing due to its low viscosity and compatibility with fast processes. Open and set times are very short. It is also possible to foam the granules in a nitrogen environment, which is crucial for pleat stabilization.

6 Lubricants

Engine oils and transmission fluids formulated with DRIVON™ technology reduce fuel consumption and CO₂ emissions while ensuring wear protection and durability for critical powertrain components. The versatile Viscosity Index Improvers (VIIs) bring advanced fluid technology to formulation of high-performance shock absorber and power steering fluids. They provide excellent low-temperature properties and provide optimal viscosity across a wide range of temperatures.

7 Transmission components

Using VESTAKEEP® or P84® NT in place of metal parts help reduce wear and tear, boosting component service life.

8 Transmission oil cooling lines

As a lightweight and space saving alternative to metal tubing or rubber hoses, temperature and chemical resistant VESTAMID® polyamide lines transport the hot transmission oil to the cooler.

9 Cables

Crosslinker TAC improves aging properties of PE heat shrink tubes for cables in the engine cavity.

10 Underseal

PVC-based underseal (UBC) systems containing VESTINOL® plasticizers and special acrylate plastisols protect against chipping and the effects of weather. They harden at low temperatures and adhere well to the underseals of vehicle bodies.

Dynasylan® MTMO adhesion promotor, AEROSIL® 200 HV, AEROSIL® 380 thickening agent, and thixotropic agent are used in PVC and acrylate plastisols.

Nourybond® adhesion promoters for plastisols based on polyamide and blocked isocyanate chemistries offer industry proven rheological and adhesive properties.

11 Fuel lines

Evonik is the world's leading supplier of plastic systems for multilayered fuel lines. The outer layer of these lines is of tried and tested VESTAMID®, while various solutions are incorporated for adhesion, inner layers and the barriers between layers.

12 Wheel suspension, stabilizers, strut bars

Unstringed masses, built as carbon fiber reinforced components that incorporate lightweight ROHACELL® structural foam cores, provide structural strength and improve vehicle efficiency by minimizing weight.

To protect the material of wheel rims and improve durability and cleanability, powder coatings are applied. Fumed oxides like AEROXIDE® or AEROSIL® act as free-flow agents in the powder, assuring proper application and homogeneous appearance of the coating.

High and medium molecular weight DYNAPOL® polyesters are used for primers and top coats on high tech aluminum wheel rims.

13 Tires

"Green tires", with Silica/Silane technology using ULTRASIL®, Si 69 and Si 363, show significantly lower rolling resistance, resulting in a reduction in fuel consumption of up to 8% and thus lower CO₂ emissions. They have better grip, particularly in wet conditions, which significantly shortens braking distance. Further improvements are possible with POLYVEST® ST, a range of silane-modified liquid polybutadienes. By improving the compatibility of silica with the rubber matrix, POLYVEST® ST reduces rolling resistance while maintaining high levels of the abrasion resistance and wet grip performance.

Adding only a small amount of VESTENAMER® transoctenamer rubber eases the mixing and processing of various tire compounds significantly. It improves the dispersion of difficult polymer blends by reducing the viscosity of the compound and acts as a compatibilizer between incompatible rubber types.

1,3-butadiene is a key monomer in the production of synthetic rubber, like SBR and PBR. 1,2-butadiene is used to terminate the polymer chain to avoid gel formation/thermal processing in the production process of PBR and sSBR.

Interior applications



1 Decorative panels

ACRYLITE® offers freedom of design and a high-gloss and robust surface for the newest looks in panels and interior components.

Molding with transparent polyamide TROGAMID® decorates surfaces and protects against cosmetics damage.

2 Interior coating of trims and covers

VESTANAT® EP-MF grades provide high performance, scratch resistant coating for plastic/wood interior components.

VESTANAT® IPDI provides a high quality surface texture and light stable instrument panels.

Hybridur® NMP free 1K hybrid polyurethane-acrylic aqueous dispersions provide soft-touch and stain-resistant coatings for plastic and interior components.

ACEMATT® silica-based matting agents for matted surfaces are universally applicable, easy to process and highly effective.

DYNAPOL® polyester based primers and top coats offer excellent scratch resistance, flexibility and hardness to coil coated steel or aluminum construction work sheets. DYNAPOL® polyesters are used for pre-coated metal trim strips. High and matte gloss clear coat finishes offer excellent adhesion, high abrasion and chemical resistance as well as superior weathering resistance.

3 Foam pads

On average, passenger cars contain up to 30 kg of polyurethane foam, found in seats, headrests, armrests, carpet backings, sound deadening mats, steering wheels, roof linings and instrument panels. Evonik offers the broadest product portfolio of catalysts and surfactants for all types of foamed and non-foamed polyurethane materials by uniting marketleading brands like TEGOSTAB®, Dabco®, Polycat®, KOSMOS®, ORTEGOL®, GORAPUR® and Versalink® to offer the most comprehensive choice for product differentiation.

4 Bonding metal, plastic and composites

VISIOMER® methacrylate monomers provide strong adhesion strength to two-component structural adhesives for bonding a wide range of substrates like metal, plastic and composite materials.

ALBIPOX® makes structural adhesives tough.

DYNACOLL® polyesters and polyacrylates in PU hot melt adhesives for lamination of door panels and headliners exhibit fast setting behavior at moderate application temperatures thereby shortening the processing time. In addition, these PU reactive hot melts show high adhesion performance with different materials enabling the use of a broad variety of substrates.

VESTOPLAST® as a raw material in hot melts for interior lamination exhibits excellent thermal stability under load at temperatures above 120 °C.

VESTOPLAST® based heavy coating compounds are used in pre-shaped carpeting to ensure excellent dimensional stability after the pressing step.

VESTOPLAST® based hot melts provide strong adhesion to different felts, board materials and insulating compounds. They provide high temperature stability and are recyclable.

Reactive polyurethane hotmelts using DYNACOLL® polyesters as raw materials are the preferred option for manufacturing molded parts due to their high temperature resistance.

Pre-coated dashboard instrument panels with DYNAPOL® polyester based finishes can be formulated in a wide range of surface effects.

5 Interior lights

ACRYLITE® molding compounds are suitable for a variety of lighting applications in automotive interiors, for example, ambient and contour lighting.

6 Seat structure and cover

DEGALAN® for PVC finishes prevents surface tackiness of artificial leather.

VESTAMELT® copolyamide hotmelt adhesives are best suited to attach seat heaters.

Hybrid components made of steel or aluminum combined with VESTAPE®, an endless glassfiber reinforced unidirectional tape, that are bonded with the VESTAMELT® Hylink copolyamide based adhesive system, can minimize the proportion of steel in cars and improve lightweight design systems.

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