As the mobility industry accelerates into an era defined by electrification, autonomy, and sustainability, the materials that shape tomorrow's vehicles are undergoing their own transformation. The **SPE Plastics in Electric & Autonomous Vehicles (EAV) Conference 2025** served as a premier platform for showcasing the innovations driving this shift—where plastics, coatings, and engineered materials are enabling smarter, lighter, and more efficient vehicles.

Hosted in Troy, Michigan, the event gathered top engineers, material scientists, OEMs, and Tier 1 suppliers from around the globe to present groundbreaking advancements in everything from optical polymers for head-up displays to sustainable coatings, functional surfaces, and lighting systems. These articles collectively capture the essence of the conference, distilling technical presentations into digestible summaries that highlight the materials, methods, and applications reshaping electric and autonomous vehicle design.

Through detailed insights from industry leaders like **Henkel, Röhm, Dow, SABIC, BASF, Trinseo, Kingfa, Envalior, Mankiewicz**, and others, this collection explores how polymers and coating technologies are helping the auto industry meet evolving challenges—from integrating digital UX to supporting circular design goals. Whether it's smart surfaces that light up on demand or recycled PMMA used in full-width center lamps, each innovation reflects a broader commitment to performance, sustainability, and user-focused design.

For more details, visit the official event site or view the conference program.

The following articles provide an overview into these technologies and the future-forward companies leading the way—direct from the conference floor of **SPE EAV 2025**

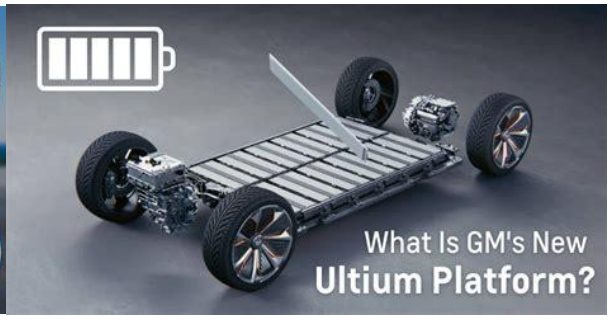
Launching of the All-New Electric Chevrolet Equinox
Presenter: Matt Purdy, Executive Chief Engineer for Electric SUVs, General Motors

As GM accelerates toward an all-electric future, Matt Purdy in this technical briefing outlines the engineering and platform innovations behind the 2024 Chevrolet Equinox EV—GM's latest mass-market entry into the electric SUV segment. Built on the scalable **Ultium platform**, the Equinox EV integrates a high-energy-density lithium-ion battery pack architecture with single- and dual-motor drivetrain configurations, targeting a competitive EPA-estimated range of up to **319 miles** on a full charge.

The Ultium platform's modular structure enables flexible battery and drive unit configurations across GM's EV portfolio, which streamlines manufacturing while lowering cost-per-unit. The Equinox EV's platform supports **DC fast charging capability**, with estimates of up to **70 miles of range added in just 10 minutes**, depending on charging infrastructure.

Purdy highlights key system features, including the available **17.7-inch infotainment touchscreen**, **Super Cruise™ hands-free driver assistance** on compatible highways, and OTA (over-the-air) software update capabilities. The vehicle's interior benefits from a **flat floor enabled by battery packaging under the floorplan**, enhancing occupant space and cargo flexibility without compromising structural rigidity.

This model is positioned as a **strategic linchpin in GM's EV transition strategy**, offering technical advancements in powertrain integration, digital vehicle architecture, and sustainable production—all within a consumer-friendly price point to drive EV adoption at scale.



2024 Chevrolet Equinox EV, via CarEdge. Accessed April 23, 2025. *Ultium Platform Schematic – General Motors*, via Bing Images. Source page: Mike Anderson Merrillville Blog. Accessed April 23, 2025. *Chevrolet, "2024 Equinox EV Capability,"* via Chevrolet Canada. Image URL: https://www.chevrolet.ca/content/dam/chevrolet/na/canada/english/index/hybrid-and-electric/equinox-ev/capability/2023-equinox-ev-capability-03-xs.jpg. Accessed April 23, 2025.

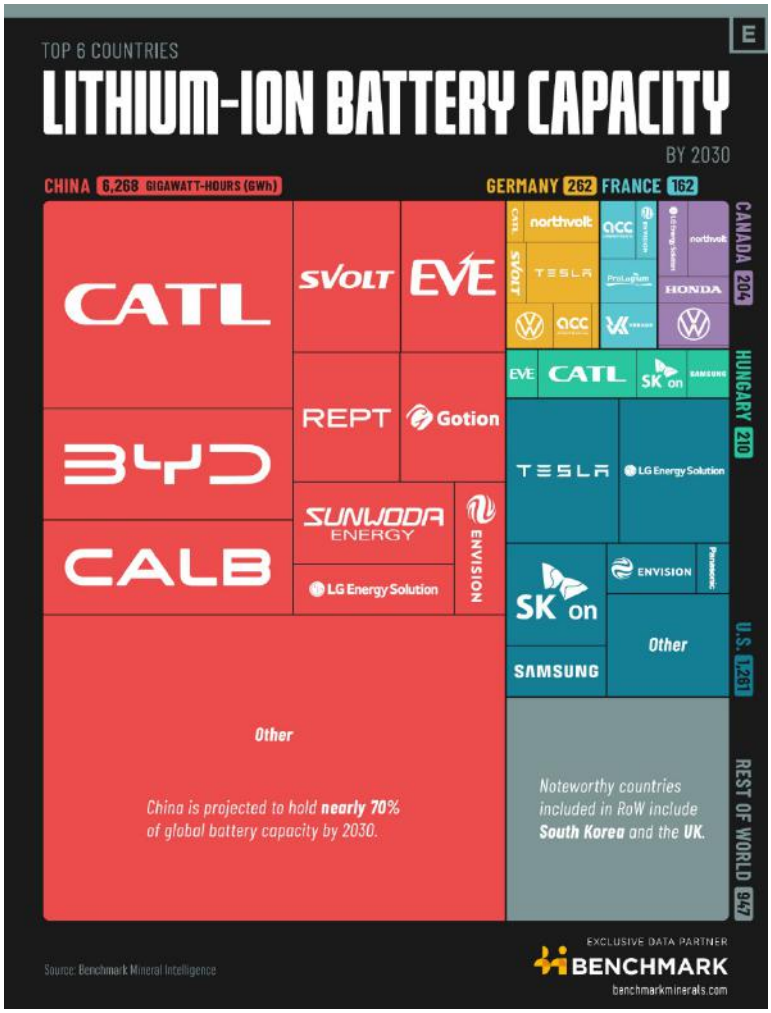
Battery Royale – The Global Battery Supply Chain Battle
Presenter: Brian Engle, Director at Amphenol, President of NAATBatt, SAE Fellow

In this strategic presentation, Brian Engle examines the evolving landscape of the global battery supply chain, framing it as a high-stakes "royale" between nations and corporations vying for dominance in energy storage. As electrification accelerates across transportation, grid, and industrial sectors, control over battery technology, materials, and manufacturing capacity is becoming a critical pillar of economic competitiveness and national security.

Engle highlights the race to localize battery manufacturing, spurred by initiatives like the U.S. Inflation Reduction Act, which incentivizes domestic supply chains and reduces dependency on foreign sources—especially in light of geopolitical pressures and raw material constraints. The presentation explores the growth of lithium-ion gigafactories, while also pointing to emerging chemistries like sodium-ion and solid-state batteries that promise safer, more cost-efficient, and energy-dense solutions.

With battery pack prices dropping below $115/kWh and cell-level costs reaching $50/kWh, Engle notes that competitiveness is now driven by innovation, integration, and supply resilience. Recycling, circularity, and workforce development are positioned as essential next steps to support the industry's sustainable growth.

Ultimately, the "Battery Royale" is not merely about scale, but about creating a robust, adaptive, and environmentally responsible global battery ecosystem.



Engle, B. (2025, February). *Battery Royale – The Global Battery Supply Chain Battle*. NAATBatt Annual Conference. Retrieved from https://nac.naatbatt.org/wp-content/uploads/2025/02/E-2_-Brian-Engle_NAATBatt-CTO-Presentation.pdf

Smart Surfaces for Automotive Interiors – Benchmark and Future

Presented by Driving Vision News (DVN) experts Felipe Melhado and Paul-Henri Matha, this session explores how **automotive interiors are evolving from analog controls to fully integrated "smart surfaces"**—blending electronics, lighting, haptics, and sustainability into a seamless design experience.

Smart surfaces replace traditional switches with touch-sensitive, hidden-until-lit, and haptically responsive materials like PVC, polycarbonate, and even leather. These systems

integrate sensors, LED lighting, and even heating elements directly into functional areas such as dashboards, doors, and headliners—turning every interior surface into an interactive component. Technologies from companies like Yanfeng, Covestro, and Antolin demonstrate functional, elegant surfaces with embedded UX, lighting, and tactile feedback.

Beyond aesthetics, these innovations offer cost and weight reduction while meeting automotive standards for reliability, longevity (up to 50,000 hours), and environmental durability. The trend aligns with CASE (Connected, Autonomous, Shared, Electrified) mobility, pushing vehicle interiors toward **a "smartphone-on-wheels" paradigm**—where function and form merge for a cleaner, more intuitive user experience.

Continental AG, *ShyTech Display*, via Continental Official Website. Accessed April 23, 2025.

Translucent Materials for Interactive and Sustainable Vehicle Interiors

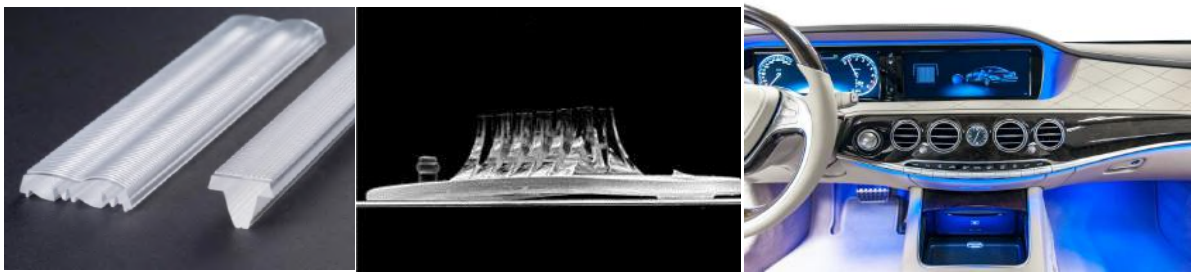
In this forward-looking presentation, Dow Chemical's MobilityScience™ team explores how translucent materials are redefining the design and function of automotive interiors. As vehicles become more interactive, electrified, and user-centric, Dow introduces a portfolio of polyolefin elastomers (POEs) and silicone-based solutions that combine optical clarity, durability, and design flexibility for integrated lighting and touch-based controls.

The presentation highlights innovations in both **soft and rigid translucent thermoplastic olefins (TPOs)**. Soft translucent TPOs are used in slush-molded skins and bi-laminates for premium feel and seamless backlighting, while rigid translucent TPO compounds enhance **light transmittance** without compromising impact strength or heat resistance. These

materials allow designers to create “hidden-until-lit” controls and smoothly integrated lighting across complex surfaces.

In addition, Dow’s **moldable optical silicones (SILASTIC™)** enable precision light control in interior components like lenses, diffusers, and backlit panels. These materials support next-generation Human-Machine Interfaces (HMI) with tunable transparency, thermal stability, and excellent durability—perfect for dynamic, multi-sensory interiors.

Dow frames these materials not only as enablers of elegant UX but as sustainable solutions, engineered to meet circularity goals, reduce weight, and integrate with future-ready EV architectures.



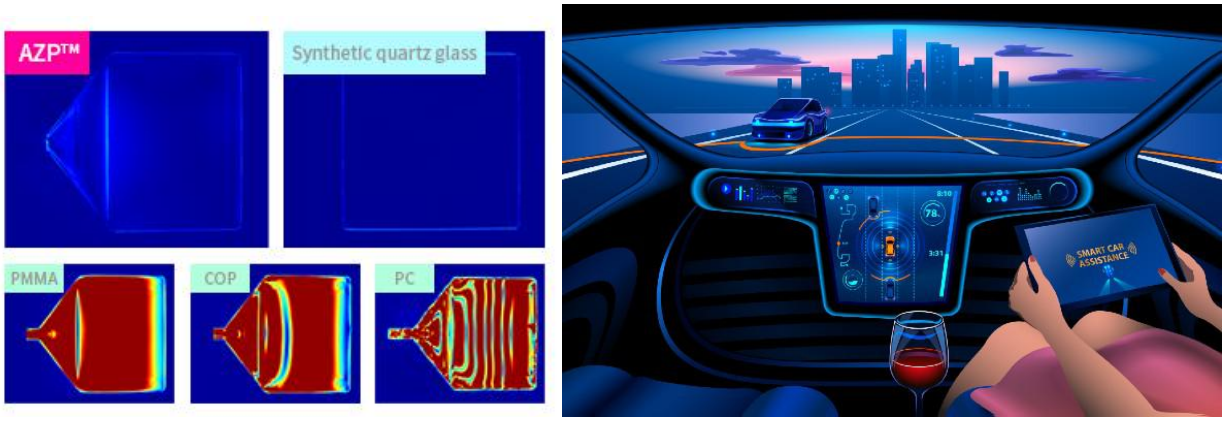
Starke, T., & Allen, M. (2025, January). *Translucent Materials for Interactive and Sustainable Vehicle Interiors*. Dow Chemical. Retrieved from https://mobex.io/download/17947

Enhancing Head-Up Display Performance with Ultra-Low Birefringent Polymer AZP™

As augmented reality (AR) and autonomous driving technologies push the boundaries of in-car displays, a clear, distortion-free view is becoming more essential than ever. This presentation introduces **AZP™**, a next-generation optical polymer designed to dramatically improve Head-Up Display (HUD) performance by eliminating image distortions caused by birefringence—a common problem in standard plastics.

AZP™ is a transparent thermoplastic with almost zero birefringence, making it ideal for optical components in HUD systems, such as projection lenses and diffuser layers. Its ability to maintain polarization helps eliminate rainbow effects and uneven brightness, especially at wide viewing angles—key for AR-HUD systems. It also supports submicron-level pattern molding for light direction control, further enhancing display clarity and efficiency.

With growing demands for immersive, high-contrast HUDs in autonomous vehicles, AZP™ aligns perfectly with the shift toward smarter, more user-centric in-cabin experiences. It’s a future-ready material solution enabling more vibrant, efficient, and reliable visual interfaces.



Asahi Kasei Corporation, *AZP™ Optical Resin in Automotive HUD Applications*, via Asahi Kasei Mobility. Accessed April 23, 2025.

Evolution of Interiors with Functional Integration – Covestro's Vision for Future Mobility

Imagine car interiors where wood, marble, or even leather surfaces light up with gesture controls, sensors, or displays—seamlessly embedded beneath the surface. Covestro is transforming this vision into reality by integrating advanced lighting, electronics, and touch technology directly into traditional materials using engineered plastics like Makrolon®, Bayblend®, and Makroblend®.

This presentation outlines how Covestro's materials enable functional surfaces by embedding LEDs, capacitive touch, antennas, and more, behind or within molded components. A standout example is "clear-until-lit" panels made with edge-lit Makrolon®, offering dynamic backlighting while maintaining a sleek, inactive appearance. Other innovations include backlit real wood veneers and soft-touch coated controls, all molded with precision and durability.

By turning any surface into an interactive interface, Covestro's approach aligns with current trends in smart mobility, sustainable design, and user-centered vehicle experiences. These innovations pave the way for highly functional, aesthetically rich, and digitally integrated automotive interiors.

Covestro AG, Functional material solutions for the car interior, via Covestro Press. Accessed April 23, 2025.

Exterior Lighting – New Possibilities on EAV

This presentation explores how electric and autonomous vehicle (EAV) platforms are unlocking new design freedom for exterior lighting. With traditional engine-related constraints removed, designers can integrate lighting more seamlessly into vehicle exteriors—enabling slim profiles, dynamic functions, and multi-purpose front-end modules.

New lighting technologies are being developed to serve not only as aesthetic features but also as functional components that enhance safety, communication, and brand identity. Advanced thermoplastic materials support complex geometries, hidden-until-lit surfaces, and the integration of sensors within lighting systems. This allows for the creation of full-width illuminated front panels, animated light signatures, and seamlessly embedded daytime running lights, turn signals, and ADAS sensors—all within a single cohesive surface.

The presentation also highlights the use of lightweight, recyclable materials that meet strict optical and thermal requirements, aligning with sustainability goals and circular design principles. As vehicles become increasingly electric and autonomous, lighting is evolving into a critical element of exterior design—delivering performance, communication, and style in one.

SABIC. (2025). Smart panels for automotive applications. Retrieved April 23, 2025, from https://www.sabic.com/en/industries/automotive/polymers/smartpanels

Innovative Solutions in Automotive Lighting

This presentation explores how advanced polymer technologies are enabling new possibilities in automotive lighting design and functionality. As vehicles evolve toward electrification and autonomy, lighting systems are transitioning from purely functional components to integral elements of vehicle aesthetics and brand identity.

The discussion highlights the development of high-performance thermoplastics that offer superior thermal stability, optical clarity, and mechanical strength. These materials facilitate the creation of complex lighting structures, such as slim-profile headlamps, integrated light guides, and illuminated brand signatures, while also supporting energy efficiency and design flexibility.

Emphasis is placed on the integration of lighting with other vehicle systems, enabling features like adaptive lighting, communication signals for autonomous driving, and enhanced safety indicators. The use of recyclable and sustainable materials aligns with industry goals for environmental responsibility and regulatory compliance.

Overall, the presentation underscores the role of material innovation in advancing automotive lighting technologies, contributing to both functional performance and the evolving aesthetic demands of modern vehicles.

Envalior. (2025). Innovative materials for automotive exterior lighting. Retrieved April 23, 2025, from https://www.envalior.com/en-us/industry/automotive/exterior/lighting.html

Plexiglas PMMA For Long Light Pipes to Support New Sustainable Design Trends

As the automotive industry pushes toward sleek, illuminated, and sustainable design trends, long light pipes are becoming central to both styling and function in next-generation vehicles. To meet these demands, Trinseo has developed advanced PMMA (polymethyl methacrylate) solutions—marketed under brands like PLEXIGLAS® and ALTUGLAS™—specifically engineered to support optical performance in extended light-guiding applications.

Long light pipes are used to create continuous, eye-catching illumination across wide vehicle surfaces such as front grilles, tail lamps, and full-width rear signatures. These pipes enable design elements like “light blades” and “floating lights,” providing automotive manufacturers with a flexible tool for brand differentiation, lighting animation, and improved visibility. To achieve such visual clarity over extended distances, materials must exhibit high light transmittance, low optical distortion, and long-term UV resistance—qualities that Trinseo’s PMMA excels in.

Aligning with the automotive industry’s sustainability goals, Trinseo introduced the ALTUGLAS™ R-Life series, incorporating recycled PMMA content without compromising mechanical or optical properties. These materials support circular economy objectives by

reducing reliance on virgin fossil-based polymers and enabling design-for-recyclability in future vehicle platforms .

Applications showcased include illuminated body trim, taillight tubes, and ambient interior elements—especially in EVs, where minimalistic styling favors integrated and extended lighting elements over traditional segmented lamps . By using Trinseo's PMMA, designers can produce slender yet powerful light lines, even in complex three-dimensional forms, supported by precision molding and color-tuned diffusion additives.

Trinseo. (2025). ALTUGLAS™ R-Life V825T Acrylic Resin Product Sheet [PDF]. Retrieved April 23, 2025, from https://trinseo.widen.net/s/zppggrrqp5/ffs_altuglas_r_life_v825t_acrylic_resin_v03

Front Decorative Lamps – Emerging Trends in EAV and Application Examples

As the automotive industry embraces electric and autonomous vehicle (EAV) architectures, lighting design is evolving beyond function—into a defining element of brand identity and vehicle character. Front decorative lamps, once purely aesthetic, are now platforms for dynamic interaction, visual communication, and advanced sensor integration. Röhm, through its renowned **PLEXIGLAS®** brand, is at the forefront of this transformation, supplying optical-grade **PMMA (polymethyl methacrylate)** materials for cutting-edge lighting solutions.

Röhm's PMMA materials are prized for their high optical clarity, UV resistance, and dimensional stability. These properties make them ideal for illuminated design elements such as front center lamps, light blades, and signature lighting lines, especially in full-width configurations increasingly favored in EVs. Röhm's recycled-content PMMA solutions also support sustainability targets without compromising performance—aligned with circular design trends in global automotive platforms.

The presentation highlights emerging design strategies using Röhm's PMMA in front decorative lighting, referencing industry standards such as SAE J3098 for non-functional styling lamps and SAE J576 for UV resistance compliance. These standards ensure that even decorative lighting performs reliably under long-term exposure to sunlight, temperature changes, and mechanical stress.

The use of PMMA in center lamps is not new. A notable early example is the 1993 Mercury Sable, which featured a wide, red-acrylic rear center lamp—an iconic element that emphasized design continuity and night-time visibility. Today, this design philosophy continues in a modern form. The Volkswagen ID.3, part of VW's electric ID series, utilizes PLEXIGLAS® Resist AG 100 to create a slim, full-width illuminated front strip. This PMMA compound was selected for its impact resistance, weatherability, and ability to achieve sharp, uniform lighting effects across complex geometries (Röhm, 2025).

PMMA enables lighting designers to produce slim, stylized profiles while integrating light-guiding, backlighting, and hidden-until-lit functions. Its compatibility with laser-welding and decorative film technologies supports seamless transitions between body surfaces and light elements. PMMA also offers excellent aging resistance—crucial for parts exposed to harsh environmental conditions.

As EAVs evolve into intelligent, expressive machines, front decorative lighting becomes a vehicle's digital face—communicating status, enhancing aesthetics, and increasing safety. With PMMA materials engineered for clarity, sustainability, and long-term durability, Röhm is helping automakers transform lighting into a strategic design and functional advantage.

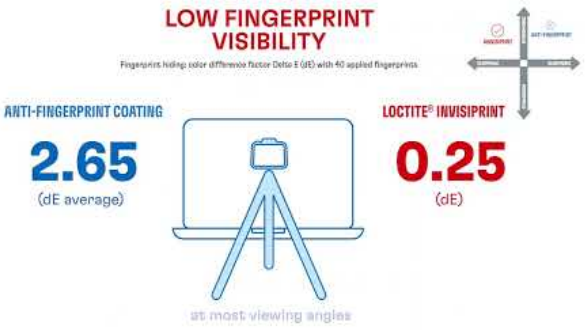
PLEXIGLAS® for Automotive Design: ID.3 from Volkswagen

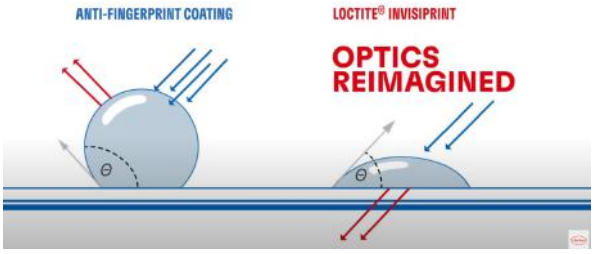
Henkel Innovative Surface Technologies – Fingerprint-Free, Antimicrobial Coatings for Modern Displays

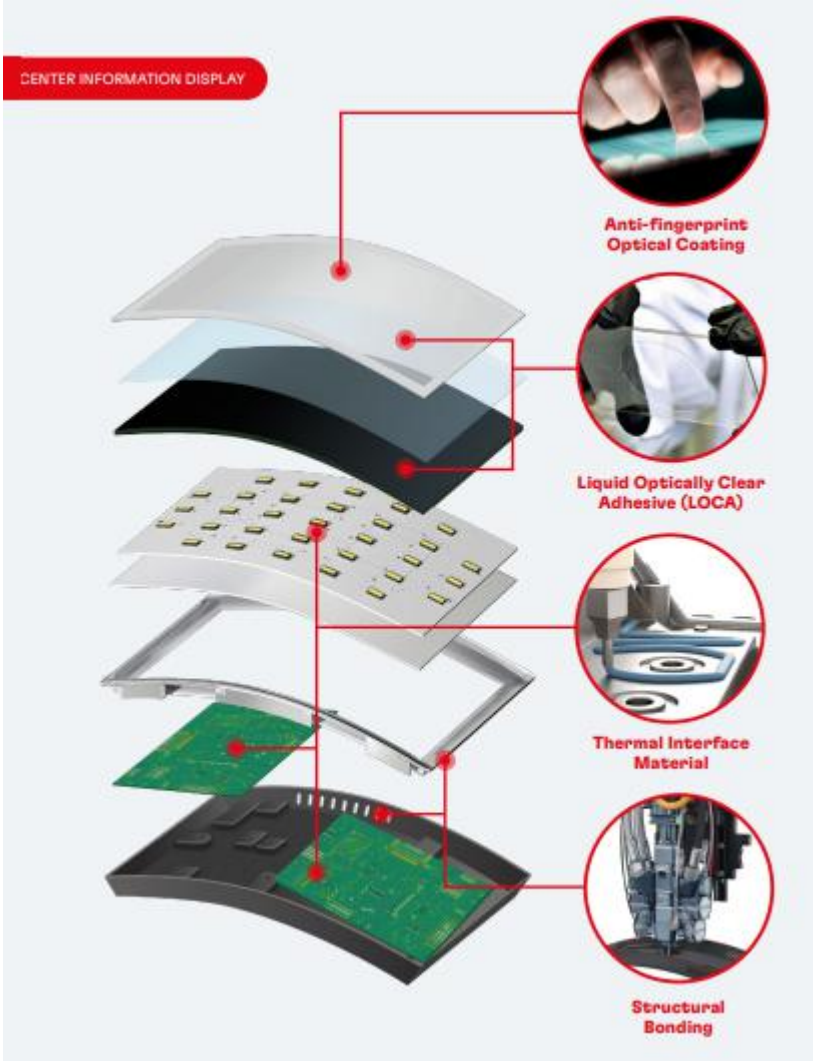
From luxury car dashboards to the latest foldable smartphones, sleek, spotless screens have become a status symbol of modern tech. But nothing ruins that high-end look faster than fingerprint smudges and greasy streaks.

Henkel's latest innovation, *Loctite InvisiPrint®*, offers a cutting-edge solution: an ultra-thin, invisible coating that dramatically reduces fingerprint visibility without compromising screen clarity. A premium version, *InvisiPrint® MBED*, also includes embedded antimicrobial protection to help keep surfaces cleaner and more hygienic—a must-have in today's touch-everything world.

Engineered at the molecular level, these coatings can be applied to a wide range of materials via spray or vapor deposition, making them ideal for everything from automotive displays to public kiosks. As screens become smarter, bigger, and more interactive, this technology makes sure they stay pristine and protected—right at the intersection of tech, hygiene, and design.







Henkel AG & Co. KGaA, *Loctite InvisiPrint Demonstration*, via YouTube. Accessed April 23, 2025.

Henkel Adhesive Technologies. (2025). *Henkel solutions for automotive electronics* [PDF]. Retrieved April 23, 2025, from https://4488105.fs1.hubspotusercontent-na1.net/hubfs/4488105/henkel-solutions-for-automotive-electronics-interactive.pdf

Advances in Bio-Renewable Foam for Automotive Interiors

In response to the automotive industry's growing push for sustainability, BASF has developed a new polyurethane foam containing 30% renewable content, aimed at reducing reliance on petroleum-based materials. The team used castor oil—a fast-growing, non-edible plant oil—as the primary bio-based ingredient and overcame common challenges with bio-foams, like poor storage stability and difficult processing. Through targeted experimentation, they created a formulation that performs well on production lines and

holds up in real-world use. The foam also adheres strongly to standard interior surfaces like PVC, making it a promising solution for dashboards and other interior parts. This innovation supports the auto sector's efforts to meet stricter environmental regulations and respond to consumer demand for greener, more responsible products.

Bio-based polyurethane foam used in automotive interior applications. Image courtesy of BASF.

https://automotive-transportation.basf.com

Automotive Interior Design Trends

Mankiewicz Coatings LLC is renowned for its innovative coating solutions tailored for automotive interiors. Their expertise lies in developing high-quality coatings that not only enhance the aesthetic appeal of vehicle interiors but also meet functional requirements such as durability, UV resistance, and tactile comfort.

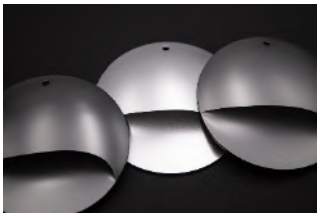
One of the key trends in automotive interior design is the emphasis on sustainable and environmentally friendly materials. Mankiewicz has been proactive in this area, offering coatings that are free from harmful substances and designed to reduce environmental impact. Their commitment to sustainability aligns with the broader industry movement towards eco-conscious manufacturing practices.

In terms of design, Mankiewicz places a strong focus on color trends and surface finishes that resonate with contemporary consumer preferences. Their "Colors of the Year" initiative showcases this commitment, presenting palettes that reflect current societal moods and technological

advancements. For instance, their 2025 selections—"Homecoming," "Balance," and "Pulse"—embody themes of familiarity, sustainability, and dynamic energy, respectively.

Furthermore, Mankiewicz's coatings are engineered to provide a "soft touch" feel, enhancing the tactile experience of vehicle interiors. This feature not only contributes to passenger comfort but also adds a sense of luxury and sophistication to the vehicle's cabin.





Mankiewicz Coatings LLC. (2025). *Automotive interior coatings*. Retrieved April 23, 2025, from https://www.mankiewicz.com/en/markets/automotive/interior

Sustainable Automotive Seating Materials – Design for Recycling

As the auto industry shifts toward circular design and reduced carbon footprints, Dow and Lear have introduced *FlexAir™*, a breakthrough in seat cushion technology. Unlike traditional polyurethane foam, FlexAir™ is made with 100% recyclable polyolefin material that not only reduces CO_2 emissions by up to 50% but also enhances passenger comfort and breathability.

Built for modern needs, FlexAir™ incorporates Dow's bio-circular resins—sourced from materials like used cooking oil—without sacrificing durability or performance. It's validated for automotive use through over 400 tests and engineered to support automated assembly and disassembly, simplifying recycling at the product's end-of-life.

This innovation directly addresses a major industry challenge: the difficulty of recycling seat cushions with in-molded components. FlexAir™ provides a scalable solution for sustainable interiors, proving that comfort and circularity can go hand in hand.

Right: Dow INFINAIR™ 3D Loop Technology, via American Chemistry Council. Accessed April 23, 2025.

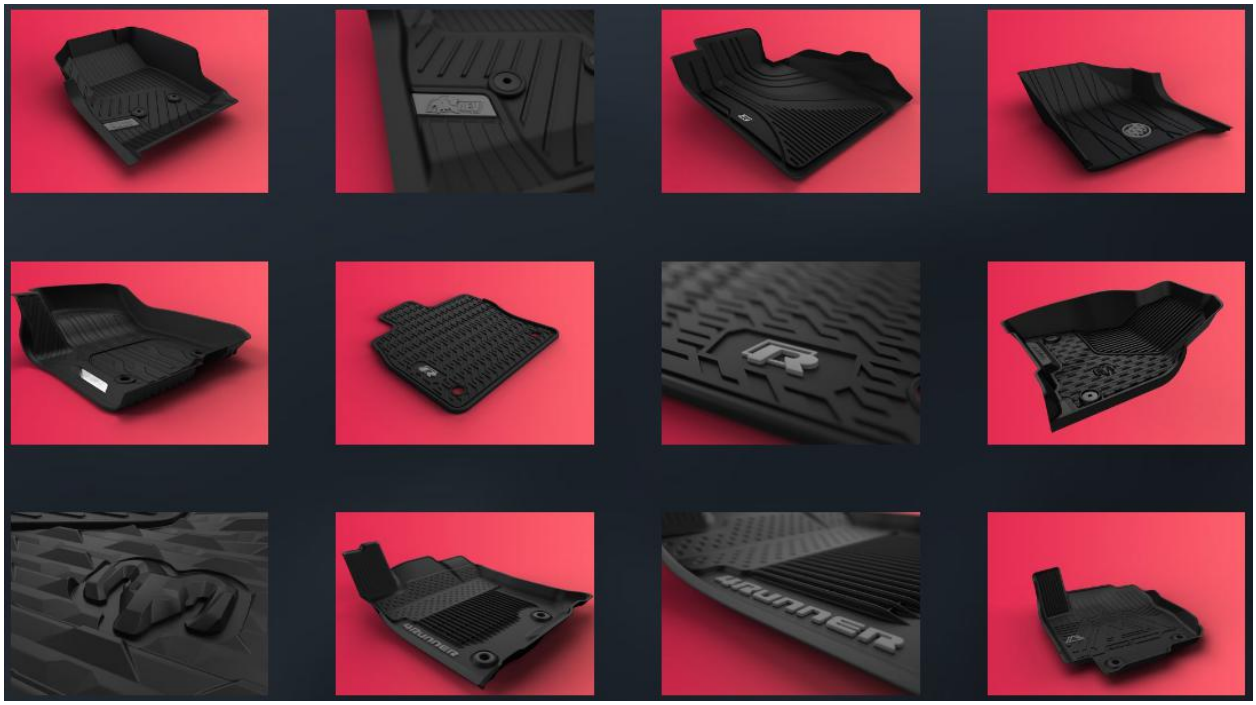
Left: Leather Seats, via Contentstack. Accessed April 23, 2025

Sustainability in Automotive Vehicle Interior Protection Applications

With sustainability now a core driver in automotive design, Thermoflex is leading the charge in eco-conscious vehicle protection products. This presentation highlights the company's *Bionomer™* material family—a set of thermoplastic elastomers (TPEs) engineered to reduce carbon footprints while maintaining the premium quality and durability expected in OEM applications.

Unlike traditional materials, Bionomer™ incorporates renewable inputs such as recycled polypropylene, plant-based oils, and renewable calcium carbonate. The result? Up to a **68% reduction in CO_2 emissions** when used in products like all-weather floor mats and cargo liners, already adopted by major automakers like Volvo, Audi, and Mercedes-Benz. The materials also support advanced features like thin wall molding and digital graining for both sustainability and design flexibility.

As electric vehicle (EV) platforms evolve, Thermoflex's innovations extend into new product areas—such as front trunk trays, charging pad surfaces, and modular organizers—designed with circularity and modularity in mind.



Thermoflex Corporation, All-Weather Floor Mats & Liners, via Thermoflex Official Website. Accessed April 23, 2025.