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SPE® AUTOMOTIVE NAMES FINALISTS FOR 51st ANNUAL AUTOMOTIVE INNOVATION AWARDS COMPETITION

TROY, (DETROIT) MICH. – The Automotive Division of the Society of Plastics Engineers (SPE®) today announced the Finalists for its 51st annual ***Automotive Innovation Awards Gala***, the oldest and largest recognition event (established in 1970) in the automotive and plastics industries. Nominations were first subjected to a pre-qualification review and then were presented before a panel of industry experts on September 15-16, 2022; that panel sent forward the most innovative nominations (category finalists) to the Blue Ribbon judging round, which was held September 23, 2022. Category and Grand Award winners selected during the Blue Ribbon judging round will be announced on the evening of November 2, 2022, during the 51st SPE Automotive Innovation Awards Gala. Finalists from this year's competition are listed below in category and submission order.

CATEGORY: Additive Manufacturing

Spoiler Closeout Seal

- **OEM Make & Model:** 2022 General Motors Co. Chevrolet Tahoe, Chevrolet Suburban, Cadillac Escalade, GMC Yukon
- **Tier Supplier/Processor:** HP Inc. & AMT Ltd. / GKN Additive (Forecast 3D)
- **Material Supplier/Toolmaker:** BASF Corp. /GKN Additive (Forecast 3D)
- **Material /Process:** BASF SE Ultrasint TPU01 TPU / HP Multi Jet Fusion 5200 Series
- The powder-bed fusion process was used to source, print, process, and install 60,000 TPU spoiler closeout seals to meet 10 weeks of production as a bridge solution while hard tooling was being produced. Innovative vapor polishing and drying processes cleared a bottleneck, halved production time, were used to finish parts, eliminating the need for post-print dyeing. The seals close out gaps on left and right sides of rear spoiler, improving finish and fuel efficiency.

CATEGORY: Additive Manufacturing

Pedestrian Protection Block

- **OEM Make & Model:** 2022 General Motors Co. Chevrolet Corvette
- **Tier Supplier/Processor:** HP Inc. / Fast Radius, Inc.
- **Material Supplier/Toolmaker:** HP Inc. / Fast Radius, Inc.
- **Material /Process:** HP PA12HR / HP Multi Jet Fusion

- A pedestrian protection performance issue was discovered late in development for a low-volume, RHD variant for the Japanese market. The MJF process was used to print a unique stiffening block that transferred loads from hood to fender and solved the issue, reducing HIC values 19% and meeting internal requirements. The process provides 100% traceability via a unique serial number affixed to each part. No other manufacturing method could have achieved these results given the requirements, time, budget, and design constraints.

CATEGORY: Aftermarket & Limited Edition/Specialty Vehicles

EVSE Charging Accessory

- **OEM Make & Model:** 2023 General Motors Co. GMC Hummer EV
- **Tier Supplier/Processor:** CTEK, Inc.
- **Material Supplier/Toolmaker:** SABIC / NA
- **Material /Process:** Lexan EXL9134, CFR7431 PC, Silicone Copolymer / Injection Molding

- Eliminating the need to paint FR plastics for weatherability, this 1-piece EV charging cover uses 2 grades of a PC/silicone copolymer. The first shot is a high-gloss black and the second is a clear, hard coated lens. Both grades are UL94 V-0 and 5VA approved in thin wall sections and offer excellent low-temperature ductility, weatherability, scratch/mar, and aesthetics. Eliminating paint saved $3/part while reducing the CO2 footprint.

CATEGORY: Aftermarket & Limited Edition/Specialty Vehicles

Carbon Fiber C-Brace

- **OEM Make & Model:** 2022 Ford Motor Co. Ford Bronco Raptor
- **Tier Supplier/Processor:** Montaplast of North America
- **Material Supplier/Toolmaker:** BASF Corp. / Commercial Tool Group
- **Material /Process:** Ultramid B3WC4 HP CF & GR PA6 / Injection Molding

- This customer-visible, Class A C-brace was designed to meet offroad desert durability requirements for convertible versions of the vehicle while boosting torsional stiffness 40% to improve handling and NVH. Weight was reduced 55% vs. aluminum and 85% vs. steel by adopting a sandwich composite approach. Upper and lower shells were injection molded in 35% GR PA6 while a core was injection molded in 20% CF-PA6, then components were bonded with a newly formulated methacrylate adhesive.

CATEGORY: Aftermarket & Limited Edition/Specialty Vehicles

One Piece Snorkel Body

- **OEM Make & Model:** 2023 Ford Motor Co. Ford Bronco Everglades
- **Tier Supplier/Processor:** Mann + Hummel / Steere Enterprises, Inc.
- **Material Supplier/Toolmaker:** Washington Penn Plastic Co. Inc. / Square One Engineering
- **Material /Process:** PPH1TF2 UV YZ9A PP-T20 / Blow Molding

- This 1-piece, 104-cm snorkel body runs up the passenger-side A pillar to improve air induction performance in dusty conditions or when driving in heavy snow or rain. The large and complex part incorporates 4 insert-molded brackets in the functional blow-molded body. A 5-axis robot cuts inlet openings and access holes after demolding. Interchangeable intake and blocking plates further enhance functionality.

CATEGORY: Body Exterior

Flow Through Spoiler

- **OEM Make & Model:** 2023 General Motors Co. Cadillac Lyriq
- **Tier Supplier/Processor:** ABC INOAC Exterior Systems, LLC
- **Material Supplier/Toolmaker:** Trinseo PLC, Adhezion, Inc. / Delta Technologies, Custom Machine Inc.
- **Material /Process:** Pulse 2000EZ PC / ABS, PU / Injection Molding

- A specially designed flow-through spoiler modifies airflow at the rear of the vehicle, keeping window glass clean, improving rear visibility, eliminating the need for a rear wiper and motor assembly, and lowering vehicle mass 0.24 kg. The 2-piece bonded assembly eliminates an internal bracket, improving aesthetics and reducing dimensional variance while still meeting 1,200 N upward force requirements. Additionally, piece costs were reduced $8/vehicle and tooling avoidance saved $250,000.

CATEGORY: Body Exterior

Panoramic Sunroof Frame

- **OEM Make & Model:** 2022 Hyundai Motor Group Kia Sorento
- **Tier Supplier/Processor:** Inalfa Roof Systems Korea / NA
- **Material Supplier/Toolmaker:** GS Caltex Corp. / NA
- **Material /Process:** Hiprene ALG14BF PA6 / Injection Molding

- Several novel technologies contributed to this large injection molded LFT-PA6 panoramic sunroof frame. First, flat rather than round glass fibers provided higher dimensional stability and reduced warpage. Second, the twist pultrusion was used to produce LFT pellets whose fiber length exceeds the length of the pellets, again contributing to mechanical improvements. Weight was reduced 51% and part count dropped from 33 to 4 vs. a steel frame. Versus carbon fiber-reinforced LFT, torsional rigidity was 13% higher and breaking force 25% better at 24% lower cost.

CATEGORY: Body Exterior

Front Enclosed Illuminated Grille

- **OEM Make & Model:** 2023 General Motors Co. Cadillac Lyriq
- **Tier Supplier/Processor:** Minth Group Ltd.
- **Material Supplier/Toolmaker:** SABIC / Huawei Technologies Co., Ltd.
- **Material /Process:** Lexan LS1 PC / Injection Compression Molding

- This large and distinctive front grille with integrated lighting and decorative features offers welcome animations and notable aesthetics. Two-color injection/compression molding produces a weatherable, radar-transparent 1.55-m PC lens with high dimensional and tight warpage control. Laser ablation precisely removes black paint for show-through lit effects that can be changed without new tooling. Versus a conventional lens/bezel solution, mass was reduced 3-4 kg and cost $300,000.

CATEGORY: Body Exterior

Front Lighting

- **OEM Make & Model:** 2022 General Motors Co. GMC Hummer EV
- **Tier Supplier/Processor:** North American Lighting
- **Material Supplier/Toolmaker:** SABIC / DBM Reflex
- **Material /Process:** Lexan LS1 PC / Injection Molding

- This novel approach incorporating 11 functions into a single compact headlamp design is possible thanks to plastic and optical innovations. A high-precision PC micro-optical lens enabled multiple elements to double up on functions and permit multiple pass-through elements to share the same space while aligning with a slim center signature light bar and a lit wraparound appearance. Multifunctional headlamps combines high and low beam, daytime running lights, animated turn signal, side marker, clearance lamp, side reflex, decorative center signature, park lamp, and even indicates delayed charge and an animated charge status indicator.

CATEGORY: Body Exterior

Largest 1-Piece Plastic Fascia

- **OEM Make & Model:** 2021 Rivian Automotive, LLC Electric Delivery Van
- **Tier Supplier/Processor:** Creative Liquid Coatings, Inc.
- **Material Supplier/Toolmaker:** LyondellBasell Industries / Omega Tool Corp.
- **Material /Process:** Hifax 1168X TPO / Injection Molding

- Development of a large, single-piece front fascia incorporating fenders, hood, latches, and hinges, decreased part count from 12 to 3, simplified vehicle assembly, reduced per-vehicle mass 8.8 kg and cost $140, and saved $3.2-million in tooling investment. The injection molded TPO fascia with PC grille is a key enabler for the passive pedestrian protection system and permits a smooth visual transition without cutlines or margins. For serviceability, the upper fascia can be removed without removing the lower fascia assembly.

CATEGORY: Body Exterior

Infinity Roof with Modular Sky Panels

- **OEM Make & Model:** 2022 General Motors Co. GMC Hummer EV
- **Tier Supplier/Processor:** Magna Exteriors-LexMar Corp.
- **Material Supplier/Toolmaker:** Covestro AG / Inevo Srl
- **Material /Process:** Makrolon AG2677 PC / Injection Compression Molding
- A large, 4-panel removeable modular roof system (in clear or custom opaque blue PC) provides greater occupant safety in the event of a rollover than glass while reducing mass 30-50% and lowering the vehicle's center of gravity. The lightweight panels are easy to remove and store, offer NVH benefits at higher frequencies, permit styling impossible or impractical in alternative materials, and help extend driving range. A special PC grade was formulated for UV stability, narrow viscosity range, and optimized clarity and coating adhesion.

CATEGORY: Body Interior

2nd Row Seat Backs & Cushions

- **OEM Make & Model:** 2022 Toyota Motor Corp. Toyota Tundra
- **Tier Supplier/Processor:** Flex-N-Gate Corp. & Adient / Flex-N-Gate Corp. & L&L Products
- **Material Supplier/Toolmaker:** BASF Corp. / SyBridge Technologies
- **Material /Process:** Ultramid B3ZG7 35% GR-PA6 & Elastocoat 74850 80% GR-PUR PA6 & PU / Pultrusion and Injection Overmolding
- This composite seat structure combines a pultruded continuous fiberglass-reinforced PUR reinforcement beam that is injection overmolded with short-glass/PA6 to form the seat frame geometry. By replacing a 60-piece high-strength steel frame structure with a 4-piece molded composite structure, significant crash performance improvements were achieved while both cost and mass targets of 20% reduction were met. Additionally, over 100 welds at 16 weld stations were eliminated, significantly improving quality control, and under-seat storage that wasn't possible with the previous solution was added.

CATEGORY: Body Interior

Integrated Console Map Pocket Assembly

- **OEM Make & Model:** 2023 Ford Motor Co. Ford F-250 and F-350 Super Duty
- **Tier Supplier/Processor:** Summit Polymers, Inc.
- **Material Supplier/Toolmaker:** Advanced Composites, Inc., ExxonMobil Corp., SABIC & The Materials Group/ Commercial Tool Group
- **Material /Process:** TPO, PC & PP / Injection Molding
- To address the need for model differentiation while managing costs and providing flexibility, this center console structure was split in 2 pieces that are mechanically fastened. The Class A front retainer provides a map pocket, and structure for the media bin and cupholder assemblies. The structural rear retainer manages armrest and floor-attachment loads. Producing 2 smaller tools was less expensive than a single large one and welding was eliminated. The approach also reduced mis-assembly issues, shortened assembly time, facilitated serviceability, lowered mass, and saved $457,000 in tooling avoidance and $2 piece cost.

CATEGORY: Body Interior

Pinless End Item Assist Handle

- **OEM Make & Model:** 2020 Ford Motor Co. Ford Explorer
- **Tier Supplier/Processor:** ITW
- **Material Supplier/Toolmaker:** BASF Corp. & RheTech, A Hexpol Co. / NA
- **Material /Process:** PA 635GF, PP20GF / Injection Molding

- A new pinless assist handle design improves craftsmanship/aesthetics, reduces component count, enables fully automated assembly, and saves $1.28/vehicle. The application has been deployed on 9 different vehicle name plates produced in 10 different manufacturing facilities on 3 continents since 2020MY with no customer issues.

CATEGORY: Body Interior

Under Seat Storage Bin

- **OEM Make & Model:** 2023 Ford Motor Co. Ford F-250 and F-350 Super Duty
- **Tier Supplier/Processor:** Yangfeng Automotive Interior Systems Co., Ltd.
- **Material Supplier/Toolmaker:** West Michigan Compounding / NA
- **Material /Process:** TPO / Injection Molding

- This collapsible and lockable under-seat storage bin injection molded from 100% PIR MIC TPO uses locking sidewall and divider-wall mechanisms as well as magnets to lock the front wall when closed, permitting the jack tool kit to be stored securely. With no compromise to functionality, this lighter and less costly storage bin eliminates 17 components and 26 fasteners, saves 1,700 g and $21, and improves sustainability.

CATEGORY: Body Interior

Gear Tunnel Pass Through Tambour Door

- **OEM Make & Model:** 2021 Rivian Automotive, LLC R1T
- **Tier Supplier/Processor:** BOS Automotive Products, Inc. / KB Components
- **Material Supplier/Toolmaker:** Trinseo PLC, Mocom Compounds GmbH & Co. KG, INEOS Styrolution Group GmbH, Kraiburg TPE GmbH & Co. KG, & Monmouth Rubber & Plastics Corp. /Grupo Socem
- **Material /Process:** PC/ABS, PA6, ABS, TPE, & SBR / Overmolding

- This application represents the auto industry's first use of a tambour door to provide behind-rear-seat storage access and is also the largest tambour door in the industry. Multiple polymers were used to ensure premium appearance and consistent, quiet, and smooth (non-binding) operation in a low-cost, lightweight design.

CATEGORY: Chassis/Hardware

Exhaust Actuator Heat Shield

- **OEM Make & Model:** 2020 General Motors Co. Chevrolet Corvette
- **Tier Supplier/Processor:** Tenneco, Inc. / Van Norman Molding LLC
- **Material Supplier/Toolmaker:** Sumitomo Bakelite North America, Inc. / Granby Mold Inc.
- **Material /Process:** MPC-5218 Phenolic – GF / Compression Molding

- Desert testing showed that internal electronics for the vehicle's exhaust valve actuator were over temperature. A hybrid composite shield was developed combining thin stamped aluminum skins with Grip Metal hooks (controlled for size, curl, and hook density) to retain a core of high-temperature fiberglass-reinforced phenolic. Aluminum's high thermal reflectivity and phenolic's thermal insulation, high compressive strength and chemical stability, high inherent flame retardance, and heat resistance >300°C lowered temperature on the electronics 50°C while reducing mass 55% and indirect costs by $10/vehicle. A special compression tool combines both materials.

CATEGORY: Chassis/Hardware

Tension Leaf Spring

- **OEM Make & Model:** 2022 General Motors Co. Chevrolet Silverado & GMC Sierra
- **Tier Supplier/Processor:** Mubea (Muhr und Bender KG)
- **Material Supplier/Toolmaker:** Multiple / Mubea (Muhr und Bender KG)
- **Material /Process:** Epoxy / Prepreg Layup and Compression Molding

- The first all-composite leaf spring for light truck programs reduces mass up to 75% vs. all-steel and 58% vs. hybrid steel/composite solutions while doubling durability, eliminating corrosion, improving ride comfort, lowering NVH, and increasing payload. Fiberglass-reinforced epoxy prepreg is used to form a single leaf with a progressive spring rate that eliminates the shackle, shackle bushing, and helper leaves yet passes all OEM test requirements.

CATEGORY: Chassis/Hardware

Composite Engine Stabilizer Bracket

- **OEM Make & Model:** 2022 Stellantis Jeep Grand Wagoneer
- **Tier Supplier/Processor:** L & L Products, Inc.
- **Material Supplier/Toolmaker:** BASF Corp. / NA
- **Material /Process:** Ultradur B4040 G11 PBT + PET + 55% GF / Injection Molding

Incumbent die cast aluminum was replaced with 55% GR-PBT/PET on an engine stabilizer bracket that joins left and right engine mounts. The composite solution meets or exceeds benchmark metallic performance at lower mass and cost, better NVH, and far longer tool life. Compression limiters are inserted into the injection molded part. No secondary operations are required.

CATEGORY: Electric & Autonomous Vehicle Systems

High Damping AC Compressor Bracket

- **OEM Make & Model:** 2023 General Motors Co. Cadillac Lyriq
- **Tier Supplier/Processor:** Vibracoustic SE / Spencer Plastics, Inc
- **Material Supplier/Toolmaker:** Ascend Performance Materials LLC / Allegiance Mold LLC
- **Material /Process:** Vydyne AVS 4AC5 BK0826 PA GF / Injection Molding

- Reducing cabin noise is a new challenge offered by EVs. This structural AC compressor bracket represents the auto industry's first use of a novel, high-damping, semi-aromatic polyamide copolymer specifically developed to address this issue. Bracket excitation was reduced 10 dB and audible cabin noise was lowered 7 dB (80%) The fast cycling material can be dropped into conventional PA6/6 tooling without modification.

CATEGORY: Electric & Autonomous Vehicle Systems

Plug & Play Fuel Cell Media Supply Unit

- **OEM Make & Model:** VDL Bus & Coach
- **Tier Supplier/Processor:** EKPO Fuel Cell Technologies GmbH / ElringKlinger AG
- **Material Supplier/Toolmaker:** DuPont de Nemours, Inc. / ElringKlinger AG
- **Material /Process:** Zytel HTN HTN51G35EF BK083 & HTN51G35EF BK236LT PPA / Injection Molding and Laser Welding

- This injection molded and laser welded media-supply assembly for both active and passive anode recirculation on fuel-cell vehicles offers true plug-&-play functionality for different classes of vehicle. Tooling required a high degree of accuracy, particularly flatness in the weld areas. Design features prevent potential leakage from hoses and connections for the anode loop. By replacing PPS with PPA, wallstock was thinned 17%, material consumption was lowered 11%, and direct costs were lowered 20-25%.

CATEGORY: Electric & Autonomous Vehicle Systems

High Voltage Power Distribution System

- **OEM Make & Model:** 2022 Ford F-150 Lightning
- **Tier Supplier/Processor:** Aptiv PLC / Yazaki North America, Inc.
- **Material Supplier/Toolmaker:** DuPont de Nemours, Inc. / NA
- **Material /Process:** Crastin FR684 & HR5339 PBT / Injection Molding, Silicone Over Molding

- This customizable, shielded high-voltage power distribution system permits 7 sets of subassemblies and up to 64 possible configurations from a single tool, providing both flexibility and scalability for future programs. Three different materials are used: a flame retardant 25% GR-PBT forms the internal assembly and terminal blocks and a silicone seal is overmolded directly onto a 30% GR-PBT cover. A unique shielding system uses stamped connection interfaces that reduce mass by 2/3s vs. cast products while maintaining electromagnetic shielding.

CATEGORY: Electric & Autonomous Vehicle Systems

EV Battery Pack Module End Cap

- **OEM Make & Model:** 2022 Jaguar Land Rover Range Rover
- **Tier Supplier/Processor:** Xandor Automotive GmbH
- **Material Supplier/Toolmaker:** SABIC / NA
- **Material /Process:** Stamax 30YH570 LGFPP / Injection Molding

- These hybrid EV battery pack end caps replaced die cast aluminum with an injection molded LFT-PP material with intumescent FR package that met all required thermal, mechanical, and electrical insulation requirements. The high-flow 30% GR grade achieves UL V-0 at 1.5 mm. Versus PA6, it offers excellent fire performance, low moisture absorption, reduced warpage, is 11% lighter.

CATEGORY: Materials

Instrument Panel Skin

- **OEM Make & Model:** 2022 SAIC General Motors Corp. Ltd. Chevrolet Monza
- **Tier Supplier/Processor:** Yangfeng Automotive Interior Systems Co., Ltd.
- **Material Supplier/Toolmaker:** Orinko Advanced Plastics Co., Ltd. & Kraton Corp. / Yanfeng Automotive Interior Systems Co., Ltd.
- **Material /Process:** TPE EE 75150 & DK7501 SEBS TPE EE & SEBS / Injection Molding

- A new top pad skin material was engineered to offer extra-high flow to enable 0.8-1.0 mm skin thicknesses. The material is 100% recyclable and offers high UV and thermal stability, yet provides good cold-temperature ductility for stable passenger airbag deployment. By replacing slush molding with injection molding, the carbon footprint is halved, weight is reduced 20%, cycle times are lowered from 10 min to 1.5 min, and tooling lead times were reduced 33%. The material is available in multiple colors; graining and a water-based coating improve haptics.

CATEGORY: Materials

Dual Cordset EV Charger Lens

- **OEM Make & Model:** 2023 General Motors Co. Cadillac Lyriq
- **Tier Supplier/Processor:** Webasto Group
- **Material Supplier/Toolmaker:** SABIC / NA
- **Material /Process:** Lexan LUX7430C PC / Injection Molding

- A PC/silicone copolymer provides high melt flow for thin-wall molding, plus ductility, low-temperature impact strength, and improved thermal stability. Rated UL94 V-0 at 1.2 mm and UL746C F1 UV, the flame retardant material's good weatherability eliminates the need for hard coating, saving $3/part. It also has passed UL2594 standard for safety. The resin can be formulated for either transparency or light diffusivity, improving LED visibility in sunlight or difficult visibility situation.

CATEGORY: Materials

Thermoplastic BEV Thermal Management Solution

- **OEM Make & Model:** 2023 General Motors Co. Cadillac Lyriq
- **Tier Supplier/Processor:** Cooper Standard Automotive, Inc.
- **Material Supplier/Toolmaker:** DuPont de Nemours, Inc., Dow Chemical Co., LyondellBasell Industries / Cooper Standard Automotive, Inc.
- **Material /Process:** PA6/12, PA66 & PP / Extrusion, Molding, Forming, and Automated Assembly

- Two developments provide a lightweight, thermoplastic solution for EV thermal management systems. PlastiCool 2000 multilayer tubing for glycol applications to 120°C provides excellent chemical resistance, 25% better permeation resistance and 60% lower weight than EPDM, and is available in smooth, convoluted, round, and non-round configurations. Ergo-Lock+ modular VDA connectors are flexible, offer visual and scannable latch verification, reduce insertion forces >30%, The system's modularity permits hundreds of connector configurations to be produced from a standard set of molded subcomponents at lower total cost.

CATEGORY: Materials

Ultralow CLTE TPO

- **OEM Make & Model:** 2022 General Motors Co. GMC Hummer EV Pick-up
- **Tier Supplier/Processor:** Plasman
- **Material Supplier/Toolmaker:** LyondellBasell Industries / Omega Tool & Die, Windsor Tooling
- **Material /Process:** Hifax TYC 1087X TPO / Injection Molding

- This ultra-low CLTE TPO permits tighter gap tolerances between parts on vehicle exteriors. Its high-flow and higher stiffness enable longer, more complex parts to be molded with fewer gates and in thinner wall sections while maintaining a broader processing window. The material maintains low-temperature impact and is available in weatherable/MIC or paintable versions. Its first application is for door claddings and rocker moldings.

CATEGORY: Materials

Rear Combination Lamp and Applique LIghtblade

- **OEM Make & Model:** 2023 General Motors Co. Chevrolet Blazer
- **Tier Supplier/Processor:** Magna Lighting / Plastiques Moore, Inc.
- **Material Supplier/Toolmaker:** Röehm America LLC / Magna International, Inc.
- **Material /Process:** Acrylite LD12 PMMA / Injection Molding

- This PMMA resin is crystal clear when unlit but allows extraction of light when viewed from the edge without external structures or graining thanks to use of a proprietary nanoparticle. This creates 100% internal reflection and a homogeneous illuminated panel without hotspots or pixilation. Virtual prototyping during the design phase reduced costs and time to market.

CATEGORY: Powertrain

Start /Stop Accumulator Piston

- **OEM Make & Model:** 2020 General Motors Co. Chevrolet Equinox
- **Tier Supplier/Processor:** Borg Warner, Inc./ NMC Dynaplas, Ltd.
- **Material Supplier/Toolmaker:** DSM Engineering Materials / NMC Dynaplas, Ltd.
- **Material /Process:** Stanyl TW241F12 PA4/6/ Injection Molding
- By switching from aluminum to 60% GR-PA4/6 on an accumulator piston, 2 polymer wear bushings were eliminated while lowering wear, and cost and mass were reduced 47% and 70%, respectively. The highly efficient part design met all performance requirements for fatigue, thermal cycling (-40°-140°C), chemical resistance, wear, creep, and fluid pressure/spring force resistance.

CATEGORY: Powertrain

High Pressure Oil Cooler Gasket Seal

- **OEM Make & Model:** 2022 General Motors Co. Chevrolet Silverado & GMC Sierra
- **Tier Supplier/Processor:** Uchiyama Marketing & Development America LLC
- **Material Supplier/Toolmaker:** Uchiyama Marketing & Development America LLC & DuPont de Nemours, Inc. / Uchiyama Marketing & Development America LLC
- **Material /Process:** UMC V7401 Ethylene Acrylic Elastomeric Plastic / Injection Molding
- Oil cooler gaskets are small parts with important sealing functions between oil coolers and oil pumps in demanding engine environments. To eliminate leaks seen with fluorocarbon seals during temperature cycling, a new ethylene acrylic TPV was developed. It offers superior low-temperature sealing and maintains good compression set and controlled oil swelling from -40°-150°C and 14 bars oil pressure. Gasket height also was increased to provide higher contact pressure and better sealing. Costs were reduced 66% and sustainability was increased since the thermoplastic material is recyclable.

CATEGORY: Process/Assembly/Enabling Technologies

Thick Optical Lens

- **OEM Make & Model:** 2020 General Motors Co. Chevrolet Silverado
- **Tier Supplier/Processor:** Valeo Lighting Systems
- **Material Supplier/Toolmaker:** Trinseo PLC / NA
- **Material /Process:** Altuglas PMMA / Two-Shot Rotary Injection Molding
- To injection mold this high-precision, >30-mm thick PMMA low-beam projection lens with optical microstructures at low cost and high volumes, a multishot, multilayer, multicavity approach was used. Controlling cavity pressure was critical to achieving tight dimensional control and optical performance. A complex, multicavity tool with multiple stations allowed lens thickness to be successively built up without long cycle times or risk of warpage. Thanks to new simulation tools, all prototyping was done virtually, reducing cost and increasing speed to market. Versus glass, mass was reduced 58%, less energy was used, and the C02 footprint was lowered 20%.

CATEGORY: Process/Assembly/Enabling Technologies

Multi-Station Thick-Lens Molding

- **OEM Make & Model:** 2021 General Motors Co. GMC Yukon
- **Tier Supplier/Processor:** Magna Lighting
- **Material Supplier/Toolmaker:** Covestro AG / Absolute Tool Technologies
- **Material /Process:** Makrolon LED 2245 000000 PC / Injection Molding

- This innovation permitted production of an 18-mm thick molded lens for a total internal reflection optical system, which ensures light exits the face of the lens and appears to float in space, creating a rich glow. Lens thickness is progressively built up via a 3-stage/3-station injection molding process that permits an effective cycle time of 89 sec vs. 20 minutes in earlier generations. The light pipe material is PMMA and the light blade is produced in PC.

CATEGORY: Process/Assembly/Enabling Technologies

Direct Exposure Laser Welding

- **OEM Make & Model:** 2022 General Motors Co. Chevrolet Blazer
- **Tier Supplier/Processor:** Magna Lighting
- **Material Supplier/Toolmaker:** Various / SPM Automation
- **Material /Process:** Makrolon LED 2245 000000 PC / Injection Molding, Laser Welding

- Hot-plate welding was replaced with a new process called direct epoxure laser welding to meet customer styling requirements for the light guides. Scanning lasers replace heated tools and can weld opaque lens borders without need for more costly laser-transparent materials. Additonally, clearance between internal components and weld ribs was reduced and ribs can be heated very precisely. The current design's complex geometries would not have been possible with traditional welding proecsses. Additionally, scrap was reduced 40-50% and energy usage by 85-95%.

CATEGORY: Sustainability

Reclaimed TPO/Foam System

- **OEM Make & Model:** 2020 General Motors Co. Chevrolet Silverado & GMC Sierra
- **Tier Supplier/Processor:** Inteva Products, LLC
- **Material Supplier/Toolmaker:** Inteva Products, LLC / NA
- **Material /Process:** Inteather TGTPO ECO TPO / Extrusion and Repellitizing; Co-Extrusion of TPO Sheets; Vacuum Forming & Injection Graining; Press Lamination; and Assembly

- Thanks to a patented recycling process, PIR bilaminate scrap comprised of TPO skins attached to cross-linked olefin foam is given new life in the same interior trim applications without sacrificing quality or performance. An additive package eliminates/binds/deactivates reactive residuals and trapped gases from foam. Just on this program, 680,389 kg of TPO resin is reclaimed annually, reducing landfilled scrap 93%, replacing 50% of prime TPO, and lowering CO2 emissions and energy usage 48% each.

CATEGORY: Sustainability

Light Color Capable Recycled Interior Trim

- **OEM Make & Model:** 2020 General Motors Co. GMC Hummer EV
- **Tier Supplier/Processor:** NYX Inc.
- **Material Supplier/Toolmaker:** Advanced Composites, Inc. / NYX Inc.
- **Material /Process:** ADX 8302 PP / Injection Molding

- This lower garnish trim component molded in light colors from 50% PCR PP met or exceeded all physical, mechanical, and aesthetic performance requirements vs. prime PP while offering improved melt flow, a broader processing window, and identical shrink for a drop-in replacement in existing tooling. This proves that PCR trim components can move from Class B to Class A applications even in light colors. Approximately 30 12-oz food containers are repurposed to form each garnish part, increasing sustainability and decreasing landfill burden.

CATEGORY: Sustainability

Reprocessed Cosmetic Black Polycarbonate

- **OEM Make & Model:** 2022 General Motors Co. Cadillac Escalade
- **Tier Supplier/Processor:** Valeo Lighting Systems
- **Material Supplier/Toolmaker:** In-Plas Recycling / Windsor Mold Group & Redoe Group
- **Material /Process:** PC / Injection Molding

- Outer lens frames in high-gloss piano black for these 2-shot headlamp and front combination lamp systems, are injection molded from 100% PIR PC. Careful control of the feedstream ensures consistent molding of complex shapes and a high-quality cosmetic finish with no sacrifice to other properties while improving lighting sustainability.

CATEGORY: Sustainability

Recycled PET Headliner

- **OEM Make & Model:** 2021 Rivian Automotive, LLC Electric Delivery Van
- **Tier Supplier/Processor:** Motus Integrated Technologies
- **Material Supplier/Toolmaker:** Milliken & Co. / Motus Integrated Technologies
- **Material /Process:** PET / Thermoforming

- This deep-draw headliner features 100% recycled PET coverstock (50% from bottles and 50% from scrap yarn) on the A side and a 40% recycled PET substrate (from scrap yarn) on the B side. The material proved capable of achieving up to a 500-mm draw during thermoforming and had no problem molding a 7° draft angle. Additionally, the headliner contained fewer materials, was more sustainable, and its cross-section could be molded thinner (4.0-5.5 mm vs. 5.5-7.0 mm for GR-PP headliners).

Category and Grand Award winners will be selected from these finalists during the Blue Ribbon judging by a group of journalists, academics, and retired industry chief engineers and announced on November 2, 2022 during the 51st annual SPE Automotive Innovation Awards Gala at the Burton Manor in Livonia, Michigan. A Vehicle Engineering Team Award (VETA) will also be presented to recognize automotive designers and engineers, tier integrators, materials suppliers, toolmakers, and others – whose work in research, design, engineering, and/or manufacturing has led to significant integration of polymeric materials on a notable vehicle. A Lifetime Achievement Award will also be presented to honor a person who has made significant contributions to the industry.

Since 1970, the ***SPE Automotive Innovation Awards Competition*** has highlighted the positive changes that polymeric materials have brought to automotive and ground-transportation industries, such as weight and cost reduction, parts consolidation, increased safety, and enhanced aesthetics and design freedom. At the time the competition started, in 1970, many OEM designers and engineers thought of plastics as inexpensive replacements for more "traditional" materials. To help communicate that plastics were capable of far more functionality than their typical use as decorative knobs and ashtrays indicated, members of the board of directors of SPE's Automotive Division created the competition to recognize successful and innovative plastics applications and to communicate their benefits to OEMs, media, and the public.

Over the years, the competition drew attention to plastics as an underutilized design tool and made industry aware of more progressive ways of designing, engineering, and manufacturing automotive components. From its humble beginnings, the competition has grown to be one of the most fiercely contested recognition events in the automotive and plastics industries. Today, polymeric materials are no longer substitutes for more expensive materials, but rather are the materials of choice in hundreds of different applications throughout the vehicle. Without plastics, many of the auto industry's most common comfort, control, and safety applications would not be possible.

During the competition phase of the event, dozens of teams made up of OEMs and suppliers work for months to hone submission forms and presentations describing their part, system, or complete vehicle module to support claims that it is the year's *"Most Innovative Use of Plastics."* To win, teams must survive a pre-competition review and two rounds of presentations before industry and media judges.

There is no cost to nominate parts, however, nominations that are accepted into the competition need to be presented (in person or via webinar) by their nominating teams during the first round of *Automotive Innovation Awards Competition* judging. Finalists from that round advance to a second presentation before a panel of Blue Ribbon judges made up of media, retired chief engineers, and other industry experts.

This annual event usually draws over 800 OEM engineers, automotive and plastics industry executives, and media. Funds raised from the event are used to support SPE educational programs including technical seminars and conferences, which help educate and secure the role of plastics in the advancement of the automobile.

The mission of SPE is to promote scientific and engineering knowledge relating to plastics worldwide and to educate industry, academia, and the public about these advances. SPE's Automotive Division is active in educating, promoting, recognizing, and communicating technical accomplishments in all phases of plastics and plastic-based composite developments in the global transportation industry. Topic areas include applications, materials, processing, equipment, tooling, design, and development. For more information about the SPE Automotive Div., see https://speautomotive.com/ . For more information on the Society of Plastics Engineers, see www.4spe.org.

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For more info: https://speautomotive.com/innovation-awards-competition-and-gala/

Attn: Editors: Photos of the Finalists, as well as large collection of SPE Automotive Division digital photography, is available for download at: https://www.flickr.com/photos/speautomotive/albums/with/72157673717033072