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SPE® AUTOMOTIVE DIV. NAMES WINNERS FOR 50TH ANNUAL AUTOMOTIVE INNOVATION AWARDS

TROY, (DETROIT) MICH. – The Automotive Division of the Society of Plastics Engineers (SPE®) today announced the winners for its 50th annual *Automotive Innovation Awards Gala*, the oldest and largest recognition event (established in 1970) in the automotive and plastics industries. The announcement was made November 10, 2021 during the 50th SPE Automotive innovation Awards Gala held at the Burton Manor in Livonia, Mich., USA. The Chassis/Hardware category winner was also this year’s Grand Award winner. The Grand Award winner is selected from the winners of each of 7 categories by a panel of Blue Ribbon Judges who are industry experts. A Vehicle Engineering Team Award (VETA) was also announced. The VETA honors work in research, design, engineering, and/or manufacturing that has led to the significant integration of polymeric materials on a notable vehicle.

To commemorate “50 Years of Plastics Innovation,” instead of picking a single Hall of Fame (HOF) Winner for 2021, the HOF committee selected the top 5 leading innovations from the previous 37 winners – from 1983 to 2019. The criteria for a HOF award is that the nomination be in use for at least 15 years and be: game changing; very successful worldwide; innovative in materials, process and application; and still being used. A Lifetime Achievement award was also presented.

This year, a special category was added to recognize **INNOVATIVE AUTOMOTIVE INDUSTRY PLASTIC SOLUTIONS FOR COVID-19 PROTECTION**. This honors the outstanding effort of the automotive industry to provide much needed Personal Protective Equipment (PPE) during the early days of COVID-19, bringing capacity to the market with automotive design and production strength at the same time most companies were dealing with COVID-19 shutdowns. The effort provided much needed protection to frontline medical workers at a time when the health challenge was at its peak and supply chains for PPE were unable to meet the urgent demand. Only the collaboration and commitment from the automotive manufacturers and supply base made that achievement possible. Winners from this year’s competition are listed below in category and submission order:

CATEGORY WINNER: Additive Manufacturing

Integrated Tether System

- **OEM Make & Model:** 2021 Ford Motor Co. Ford Maverick
- **Tier Supplier/Processor:** IAC Group / IAC Group
- **Material Supplier/Toolmaker:** Not Available / Not Applicable
- **Material /Process:** Not Available / Additive Manufacturing
- In an industry first, customers can select, download NFTL files, and 3D print their own swappable accessories (e.g. cupholders, trash bins, etc.) that fit in storage slots of their vehicle across the entire Maverick series. Initial designs were developed by Ford and its supply teams, but future ones could be suggested by customers. A variety of printer types and suggested materials can be used. This provides customers with flexible, customizable storage and use features or the option to maximize cabin space while avoiding significant tooling investment.

CATEGORY WINNER: Body Exterior

Grille with Integrated Lit Emblem

- **OEM Make & Model:** 2021 Ford Motor Co. Ford Mustang Mach E GT
- **Tier Supplier/Processor:** Magna Exteriors / LexaMar Div. of Magna Exteriors
- **Material Supplier/Toolmaker:** Covestro / Inevo Group
- **Material /Process:** PC / Injection Compression Molding
- This hardcoated and painted front grille with lit emblem provides a 3D, futuristic effect in a single part. Injection/compression molding forms the large-format clear PC grille with variable wall thicknesses (ranging from 3-5 mm) in a lower-tonnage press that helped minimize or eliminate flow lines and stress marks. After molding, the optical-quality part undergoes hardcoat silicone dip to provide excellent weathering and abrasion resistance, the pony emblem is milled out, and primer and paint are selectively applied to the B side of the part—the first use of paint-over-hardcoat for an auto exterior trim application.

CATEGORY WINNER: Body Interior

3rd Row Seatback

- **OEM Make & Model:** 2021 Toyota Motor Corp. Toyota Sienna
- **Tier Supplier/Processor:** Toyota Boshoku Corp. /Flex-N-Gate Corp.
- **Material Supplier/Toolmaker:** BASF Corp. / Concours Technologies, Inc.
- **Material /Process:** Ultramid B3ZG7 CR PA 6/ Injection Molding
- A 16-piece steel assembly was replaced with a single, shoot & ship plastic assembly for this 3rd-row seatback that reduced mass 30%, cost 15%, represented a 2x improvement in crash performance, and takes 63% less effort for occupants to raise the seat to its upright position, eliminating the need for a seat motor. This is industry's first fully-plastic freestanding seatback offering excellent energy absorption without need for metal support brackets. A new 35% short-glass, impact-modified PA6 resin was developed for this sequentially injected application.

GRAND AWARD & CATEGORY WINNER: Chassis/Hardware

Multi-Material Rear Leaf Spring

- **OEM Make & Model:** 2021 Ford Motor Co. Ford F150
- **Tier Supplier/Processor:** Rassini Suspensiones/ Rassini Suspensiones, SGL Carbon
- **Material Supplier/Toolmaker:** Hexion Inc., SGL Carbon / Not Available
- **Material /Process:** EPIKOTE Resin TRAC 06150, EPIKURE Curing Agent TRAC 06150, HELOXY Additive TRAC 06805/ High Pressure Transfer Molding (HP-RTM)
- This new hybrid rear leaf spring combines a high-strength steel main pack plus an HP-RTM fiberglass-reinforced epoxy composite helper that reduces mass 30% while providing the same stiffness and durability as a conventional steel leaf spring system. Additional benefits include increased payload capability, lower part count, decreased interleaf friction, smoother engagement, lower noise, and lower carbon footprint.

CATEGORY WINNER: Environmental

Wiring Harness Clip

- **OEM Make & Model:** 2021 Ford Motor Co. Ford Bronco Sport
- **Tier Supplier/Processor:** Lear/ HellermannTyton North America
- **Material Supplier/Toolmaker:** DSM/ HellermannTyton North America
- **Material /Process:** Akulon RePurposed PA6 PA6 / Melt Compounding, Injection Molding
- These rPA6 wire-harness clips are injection molded from 100% PCR ocean plastics. Ghost gear (fishing nets) are collected by fishermen in the Indian Ocean and Arabian Sea, providing jobs, more sustainable livelihoods, and healthier marine life. The material provides comparable performance to petroleum-based prime resin at 10% cost savings, lower energy, improved supply-chain stability, and LCA benefits. No tooling changes and minimal process changes were needed for this drop-in change.

CATEGORY WINNER: Materials

Composite Roof Receivers

- **OEM Make & Model:** 2021 Stellantis Jeep Wrangler and Jeep Gladiator
- **Tier Supplier/Processor:** Stellantis / Not Available
- **Material Supplier/Toolmaker:** Mitsubishi Chemical Advanced Materials / Maple Mold Technology
- **Material /Process:** KyronMAX S-4330 PPA w /30% USCF/ Injection Molding
- Six brackets for removeable hardtop and soft top roofs were converted from investment cast steel to 30% ultrashort carbon fiber (USCF)-reinforced PPA, providing comparable part strength while reducing costs 38% and mass 79%. Powder coating was eliminated and scratch & mar improved while providing a weatherable, MIC, Class A finish that allowed for mid-program replacement and backwards service compatibility. The USCF composite molds like neat polymers but outperforms LFT materials, is fully recyclable, and has a lower carbon footprint than metal/alloy parts. Direct-drop valve gates and T-nut fasteners also were key enablers.

CATEGORY WINNER: Process/Assembly/Enabling Technologies

Thick Lightbar Development

- **OEM Make & Model:** 2021 General Motors Co. Cadillac Escalade
- **Tier Supplier/Processor:** Valeo Lighting Systems / Valeo Lighting Systems
- **Material Supplier/Toolmaker:** Covestro LLC / Windsor Mold Group
- **Material /Process:** Makrolon LED PC / Multi-cavity, Multi-shot Injection Molding
- This challenging 780 mm long and 18 mm thick transparent-red light blade for rear taillamps functions offers a unique appearance and homogeneous lit appearance. Keys to making the patented application work were advanced simulation tools for design and functional optimization and warpage control; complex runner, parting line, shutoff valves, and multi-shot injection process control; plus a custom-formulated optical-grade of PC that helped manage quality, cost, and molding capacity and met all legal rear-lighting requirements. Despite technical challenges, program timing was reduced by 3 months and \$250,000 in prototype tooling was avoided through virtual prototyping.

CATEGORY WINNER: Industry Solutions for COVID-19

Powered Air Purifying Respirator

- **OEM Make & Model:** 2020 Ford Motor Co. Limited Use PAPR
- **Tier Supplier/Processor:** Ford Motor Co. / Denso Corp.
- **Material Supplier/Toolmaker:** Asahi Kasei America, Inc., Celanese / 3Dimensional Services, Protolabs
- **Material /Process:** PPTD40, POM Asahi P-40TC-1102 NT101, Celanese M90 CF2001 PolyPro, POM / Injection Molding
- The team produced the first all-plastic PAPR, converting previously metal components to plastic to reduce mass and costs and improve user comfort for this personal protective equipment used by medical workers caring for COVID patients. The lighter, more efficient design improved battery life, enabling workers to complete a 12-hr shift without needing to recharge the battery. NIOSH certification was achieved in just 3 days on the first try. Production was increased to 8,500 units/week from the 650/week the previous supplier achieved. All profits from sales were donated to COVID-19 relief funds and 4 patents are pending on the unit.

CATEGORY FINALIST: Industry Solutions for COVID-19

Ventilator Main Chassis Production

- **OEM Make & Model:** 2020 General Motors Co. / Ventec Life Systems V+Pro Emergency Ventilator
- **Tier Supplier/Processor:** HiTech Mold & Engineering, Inc. / HiTech Mold & Engineering, Inc.
- **Material Supplier/Toolmaker:** SABIC / HiTech Mold & Engineering, Inc.
- **Material /Process:** Lexan 500R 10% GF PC / Injection Molding and Threaded Insert Assembly
- In less than 18 days, the team sourced materials, built tooling, brought dimensional quality into spec, automated installation of 48 brass insert nuts (verified by vision systems), converted a manufacturing facility, trained a workforce, and scaled up production of tight-tolerance ventilator chassis components from thousands/year to thousands/week, eventually delivering 30,000 over 154 days. Whereas the previous supplier had struggled to meet accuracy, FTQ was raised to 98.7 at faster production times.

CATEGORY FINALIST: Industry Solutions for COVID-19

Emergency Ventilator

- **OEM Make & Model:** 2020 General Motors Co. / Ventec Life Systems V+Pro Emergency Ventilator
- **Tier Supplier/Processor:** Cascadia Custom Molding / West Michigan Molding, Inc.
- **Material Supplier/Toolmaker:** Avient Corp. / Proper Group International, Inc.
- **Material /Process:** Versollan OM1262NX-1 TPE / Injection Molding
- The team developed a unique TPE—offering modified flow, high adhesion to the PC/ABS substrate, and excellent chemical resistance—and shipped it within 24 hr. High-cavitation tooling was rapidly produced to ensure sufficient supply. A solid supply chain was established that met demand throughout 2020.

CATEGORY FINALIST: Industry Solutions for COVID-19

Warpage Correction in Ventilator O2 Bracket

- **OEM Make & Model:** 2020 General Motors Co. / Ventec Life Systems V+Pro Emergency Ventilator
- **Tier Supplier/Processor:** PTI Engineered Plastics / PTI Engineered Plastics
- **Material Supplier/Toolmaker:** Victrex PLC / PTI Engineered Plastics
- **Material /Process:** Vitrex 450FC30 PEEK / Injection Molding
- In less than 1 week, the PEEK resin was fully characterized for CAE material cards and tooling for a key ventilator component was redesigned using mold morphing/windage techniques to address warpage issues that had previously required post-mold fixturing and machining. New tooling was produced and first parts were shot 9 days later. This allowed the team to hold extremely tight tolerances without post-mold countermeasures. This enabled production to be scaled from thousands/year to thousands/week to meet high demand. Costs were reduced 30-40% by eliminating post-mold machining.

CATEGORY FINALIST: Industry Solutions for COVID-19

Ventilator Diaphragm

- **OEM Make & Model:** 2020 Ventec Life Systems V+Pro Emergency Ventilator
- **Tier Supplier/Processor:** Ventec Life Systems / Lumenflow Corp.
- **Material Supplier/Toolmaker:** Wacker Chemical Corp. / 2K Tool
- **Material /Process:** Elastosil LR 30003/50 Silicone Rubber / Liquid Silicone Injection Molding
- The team used its automotive skillset to retrofit processing equipment to switch from optical-grade silicone to conventional liquid silicone rubber, solve a void issue, build new tooling in just 19 days, and ramp up production of a critical ventilator diaphragm from 1,000/year to 4,000/week.

CATEGORY FINALIST: Industry Solutions for COVID-19

Flexible Air Breathing Tube for Powered Air Purifying Respirator (PAPR)

- **OEM Make & Model:** 2021 Ford Motor Co. Powered Air Purifying Respirator
- **Tier Supplier/Processor:** TI Fluids Systems / Flexaust
- **Material Supplier/Toolmaker:** Celanese, AT Polymers, TechmerPM, INEOS Styrolution Group GmbH, DuPont / Not Available
- **Material /Process:** EVA, LDPE, PE, ABS, PA6/6/ Thermoforming and Injection Molding
- To meet NIOSH certification requirements, the team used automotive tools to deliver on all project objectives in less than 30 days. A new breathing tube design was developed where one size fits bodies ranging from 5th percentile female to 95th percentile male in a variety of postures. The design features quick connects to ensure a robust connection and offers 25% greater airflow but consumes 24% less current for extended battery life. It also is lighter and 8 dB quieter. The team delivered 42,000 breathing tubes during the program.

CATEGORY FINALIST: Industry Solutions for COVID-19

PPE Production Through #TyvekTogether and Project Airbridge

- **OEM Make & Model:** Not Applicable
- **Tier Supplier/Processor:** Not Applicable / Not Applicable
- **Material Supplier/Toolmaker** DuPont / Not Applicable
- **Material /Process:** Tyvek®/ Not Applicable
- Two different programs—Operation Airbridge and #TyvekTogether—dramatically increased production capacity for hospital gowns and coveralls for healthcare workers and first responders. Additionally, a new fabric was formulated in just 3 weeks to optimize utilization and increase downstream production. Idle capacity and resources at 15 U.S.-based partners were used. In total, the team produced and shipped 17.6-million garments to replenish the National Stockpile.

CATEGORY FINALIST: Industry Solutions for COVID-19

Multi-Use Isolation Gown

- **OEM Make & Model:** 2020 Ford Motor Co. Isolation Gown
- **Tier Supplier/Processor:** Joyson, Windsor / Not Applicable
- **Material Supplier/Toolmaker** Highland Industries, Aunde / Not Applicable
- **Material /Process:** Nylon 6,6, Polyester / Weaving, Coating, Sewing
- Responding to the scarcity of PPE early in the pandemic, the team repurposed airbag and seat trim materials and used idle cut & sew facilities to produce 50x washable isolation gowns for frontline workers. Two different fabrics were developed and approved in less than 2 weeks (PA6/6 with silicone coating and PET with paraffin/C6 fluorocarbon coating) and gown designs were modified to prevent sleeves from riding up when workers were gloved. A total of 1.32-million gowns have been shipped to date. Efforts were made to reduce gown cost to health-care providers.

CATEGORY FINALIST: Industry Solutions for COVID-19

Apollo PPE Face Shield

- **OEM Make & Model:** 2020 Ford Motor Co. PPE face Shield
- **Tier Supplier/Processor:** Troy Design Manufacturing / Placon
- **Material Supplier/Toolmaker:** Ex-Tech / Placon
- **Material /Process:** PET APET & RPET PE / Die Cutting and Rotary Cutting
- This is the first time this type of PPE equipment has been produced at extremely high volumes. Within 2 days' time, the team developed its first clear face shields and within 13 days, 1.1-million units had been produced and delivered. To address supply constraints and potential failure modes, material was changed from RPET to APET and pushpin attachments replaced stapling. Supply streams and manufacturing teams were capacitated to over 5-million pieces/week. In total, over 21-million units were shipped to protect frontline workers.

CATEGORY FINALIST: Industry Solutions for COVID-19

Acteev Technology

- **OEM Make & Model:** Not Available
- **Tier Supplier/Processor:** Not Available / Not Available
- **Material Supplier/Toolmaker:** Not Available / Not Available
- **Material /Process:** Not Available / Spunbond and Meltblown NonWoven Media; Continuous Filaments, Monofilaments and Staple Fibers; Molded Applications
- A new low-odor fabric introduced in Nov. 2019 was repurposed to produce washable and reusable nonwoven face masks for the pandemic. Key to the material's efficacy is the fact that zinc ions are embedded in the polymer matrix during polymerization, so the antibacterial treatment doesn't wash or wear off and remains active for the life of the product. The technology also can be used for knits, woven fabrics, and engineering plastics and is covered by more than 100 patents to date.

CATEGORY WINNERS – Top 5 Hall of Fame Awards from 1983 – 2019 :

- HDPE (High-Density Polyethelene) Fuel Tank awarded to Volkswagon AG in 2000
- Front & Rear TPO (Thermoplastic Polyolefin) Bumper Fascias awarded to General Motors Co. in 2010
- PVB (Polyvinyl Butyral) Windshield Interlayer awarded to Ford Motor Co. in 1988
- PA (Nylon) Thermoplastic Intake Manifold awarded to Porsche AG in 2005
- PC (Polycarbonate) Headlamp Assembly awarded to Ford Motor Co. in 2007

CATEGORY WINNER: Vehicle Engineering Team Award (VETA) - Ford Motor Co. 2021 Ford F-150

The team at Ford Motor Co. (Dearborn Mich.) and its suppliers that developed the 2021 model year Ford F-150 pickup has been named the **Vehicle Engineering Team Award (VETA)** winner. The VETA award was created by SPE in 2004 to recognize the technical achievements of entire teams – comprised of 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 notable vehicles. For 44 years, F-Series has been the bestselling pickup in the U.S. and the 2021 edition features numerous plastics and composites innovations, many of which were nominated in other categories of this year's competition, including:

Body Exterior Nomination:

- Cowl Vent Grille

Body Interior Nominations:

- Armrest Insert
- Max Recline Seat
- 1st-Row Center Seat Mobile Workstation
- Upper Govebox with Remote Release
- Work Surface Foldout Armrest

Chassis/Hardware Nominations:

- Multimaterial Rear Leaf Spring
- Folding Shifter

Materials Nomination:

- Coolant Flow Management Baffle

CATEGORY WINNER - Lifetime Achievement Award:

Nippani R. Rao (1939 – 2021), a pillar in the automotive industry and long-time Board of Director for the SPE Automotive and SPE Composites Divisions and SPE Detroit Section, has been named SPE's Lifetime Achievement award winner for 2021 posthumously. Nippani Rao contributed many years of thoughtful and responsible leadership to SPE resulting in conferences, events and programs improved from his leadership. During his industry tenure, Nippani served in many leading SPE roles:

- SPE Automotive Division – Board Member
- SPE Composites Division – Board Member
- SPE Detroit Section – Board Member
- SPE Automotive Division Lifetime Achievement Award – Chairperson
- SPE Automotive Division Hall of Fame Awards – Chairperson
- Blue Ribbon Committee for the SPE Automotive Innovation Awards – Judge
- SPE Detroit Section – Awards Committee Chair
- SPE ACCE Part Competition – Judge
- SPE Detroit Section - TPO Conference Founder
- Active in the TPO Conference since its inception in 1999
- Active in the ACCE Conference since its inception in 2001
- SPE Detroit Section Annual Golf Outing – Resurrected the Event

His Work Experience Includes:

- President, RAO Associates 2009 – 2021
- Technology Manager, Asahi Kasei, LLC 2008 – 2010
- Materials Engineering Supervisor, Chrysler LLC 1986 – 2008
 - Nippani's engineering responsibility included the award-winning Dodge Viper body innovations with RTM (Resin Transfer Molding). He has numerous material patents. Nippani greatly valued SPE and made sure Chrysler stayed involved in the Society.

His Formal Education includes:

- Xavier University, MS and MBA, Chemical Engineering and Marketing
- University of Cincinnati, Master's Degree, Chemical Engineering

Awards:

- SPE Detroit Section – Honored Service Member
- The SPE Automotive Div. was proud to honor Nippani R. Rao with the 2021 Lifetime Achievement Award posthumously and a tribute at this year's SPE Automotive Div. Innovation Awards Gala.

The 2021 SPE Automotive Innovation Awards Gala was made possible by support from the following sponsors:

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SPE's Automotive Innovation Awards Program is the oldest and largest competition of its kind in the world. Since 1970, the Program 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. Dozens of teams made up of OEMs, tier suppliers and polymer producers submit nominations describing their part, system, or complete vehicle and why it merits the claim as the *Year's Most Innovative Use of Plastics*. This annual event typically draws over 800 OEM engineers, automotive plastics industry executives, and media. As is customary, funds raised from this event are used to support SPE educational efforts and technical 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.

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

Attn: Editors: Photos of the Winners, Finalists, and all nominations, 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>

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