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SPE® Automotive Division Honors the Most Recent and Innovative Uses of Plastics in Automotive at the 47th-Annual Automotive Innovation Awards Competition

The 47th-annual SPE Automotive Innovation Awards Competition and Gala is now behind us. This year's event drew 58 nominations and 820 gala registrations making it the largest attendance in recent memory, eclipsing last year's mark of 780. It is always very difficult for the First Round and Blue Ribbon Judges to narrow down the list of quality submissions we receive each year to pick finalists and then category and the Grand Award winners. Many times the difference between being a finalist and winning a category is the difference of a vote or two. I think this shows how competitive the Automotive Innovation Awards Program is each year and should give satisfaction to all the nominees for a job well done with respect to commercializing innovative solutions in this industry. This year we also had record support from our student volunteers with approximately 45 students and faculty from Ferris State, Lawrence Tech, Michigan State and Oakland Universities (picture of student on stage here, LC0A6430.jpg). These students are representative of the future of plastics engineering and will likely be much better prepared to handle the needs of automotive companies as pressure for cost and mass reduction escalate on new model programs.



From across the 9 category winners, this year's Grand Award went to the Body Exterior category winner, the Structural AGS with Integrated Loose Layer Construction on the 2018 Ford Motor Company Expedition luxury SUV (on stage photo attached should go here, LCOA6580.jpg). We also recognized the 2018 Chevrolet Traverse SUV with the Vehicle Engineering Team Award for its use of innovations in engineering plastics. And, we awarded this year's Lifetime Achievement Award to Dr. Suresh Shah, a long time contributor to innovations in automotive design and use of engineering plastics as well as a long time contributor to the SPE Automotive Division and Detroit Section. Congratulations to Suresh on a well-deserved recognition of his 40 years of contributions to the automotive and plastics industries.

Category Winner: Lifetime Achievement



Dr. Suresh Shah, retired, Senior Technical Fellow at Delphi Corporation, formerly General Motors – ACG



We will now turn to planning for next year's event, expanding our blue ribbon judging panel and recapping what went well and what could be done better for the 2018 program. If you attended our Awards Gala on November 8th and have suggestions on what we can do better, please don't hesitate to let us know. Email your comments to: feedback@speautomotive.com.

Jeff Helms

2017 SPE Automotive Innovation Awards Chair

See this year's SPE Automotive Innovation Awards Competition winners at <http://speautomotive.com/inno> and <http://speautomotive.com/awa>.

Attn. Editors: Photos of all the parts nominated for this year's SPE Automotive Innovation Awards Competition (including these Category and Grand Award winners) are available via Teri@intuitgroup.com.

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Dr. Suresh Shah, retired, Senior Technical Fellow at Delphi Corporation, formerly General Motors – ACG (Automotive Components Group) was honored as the 2017 Lifetime Achievement Award winner. Shah is a technical specialist, with over 30 years of experience and more than 45 Intellectual Properties including patents and trade secrets – more than 40% of these are in production, which is far more than the 4% industrial average. Shah advanced plastic processes including gas-assist injection molding, co-injection molding, microcellular molding, hybrid plastic/metal molding, direct (inline-compounded (ILC) long-fiber thermoplastic (D-LFT) composites and thin wall molding. He also advanced material developments involving natural fiber composites, nanocomposites, thermoplastic polyolefins (TPOs) and thermoplastic elastomers (TPEs). This expertise lead to several game changing innovations including the single piece, all plastic door hardware module known as SuperPlug®, and TPO thermoformable skin for instrument panels. He also developed many other innovative applications for exterior, interior and under-the-hood components. His rare combination of expertise in materials, processes, part design and analysis; has earned him a reputation as one of the best problem solvers in the industry. Shah has won more than 20 prestigious awards internationally. He is respected as an industry expert and a key opinion leader and has been interviewed over 30 times by industry trade journals, presented as a keynote speaker more than 15 times and has presented more than 80 technical papers worldwide.

2017 SPE Automotive Division GRAND AWARD & CATEGORY WINNER: Body Exterior



Structural Active Grille Shutter (AGS) w/ Integrated Loose Layer Construction 2018 Ford Motor Company, Ford Expedition

- System Supplier: Magna Plastcoat
- Material Processor: Magna Plastcoat
- Material Supplier: Celanese
- Material / Process: Celstran 40-20 PP / injection molding
- Tooling Supplier: Integrity Tool

In the Body Exterior category, the Winner and Grand Award Winner was the **Structural Active Grill Shutter (AGS) with Integrated Loose Layer Construction** on the 2018 Ford Expedition luxury sport-utility vehicle (SUV) from Ford Motor Co. Tier supplier and processor Magna Plastcoat, material supplier Celanese and tool maker Integrity Tool also were named on the award. The material used for this application was Celstran 40-20 PP GF. This, possibly the largest 2-shot AGS in production today, was designed with an integrated locating and attaching system for consistent fit between the grille and headlamps, eliminating the need for FEM assembly, dunnage and shipping. In addition to reducing variable and piece costs by an estimated \$5 with an entirely thermoplastic solution, the enhanced design achieved \$16 internal assembly cost reduction per vehicle and eliminated around \$45 auxiliary costs by negating the need for a FEM. As a result, Ford avoided an estimated \$2 million in dunnage, assembly plant line and handling costs. Improved parts consolidation also phased out the need for four separate fasteners and associated labor. Using LFRT technology to develop a structure with polypropylene offset an estimated 3 lbs. of weight over alternative metal and nylon hybrid designs considered. An equivalent steel structure would weigh 18 lbs. more than the LFRT design, which delivers the required durability.



Category Winner: Aftermarket



Integrated Floor Bedliner Divider 2017 General Motors Co. Chevrolet Silverado

- System Supplier: Penda Corp.
- Material Processor: Penda/Durakon
- Material Supplier: A. Schulman
- Material / Process: Polytrope TPP1026EU TPO / twin sheet thermoforming
- Tooling Supplier: Penda Corp.

In the Aftermarket category, the winner was the **Integrated Floor Bedliner Divider** on the 2017 Chevrolet Silverado pickup from General Motors Co. Tier supplier and tool maker Penda, processor Penda/Durakon, and material supplier A.Schulman, also were named on the award. The material used for this application was A. Schulman Polytrope TPP1026EU TPO. This first time twin sheet thermoformed bedliner divider is integrated into the bedliner as one piece. A \$275 cost avoidance resulted by not having to manufacture a separate floor divider part. The divider incorporates a molded in locking feature to secure the divider into the truck wall when it is raised. It eliminates the need for a cargo net or separate divider allowing the customer to put smaller items in the bed without having the items move and slide around while the vehicle is in motion. Dual textures are achieved on both sides of the part and the design can be applied to different vehicle models and brands via an insert for different logos.

Category Winner: Body Interior



Instrument Panel Carrier 2017 BMW Countryman

- System Supplier: International Automotive Components (IAC)
- Material Processor: International Automotive Components (IAC)
- Material Supplier: SABIC
- Material / Process: Stamax PP LGF / injection molding
- Tooling Supplier: Siebenwurst

In the Body Interior category, the winner was the **Instrument Panel Carrier** on the 2017 Mini Countryman subcompact crossover utility vehicle (CUV) from BMW AG. Tier supplier and processor International Automotive Components (IAC), material supplier SABIC and toolmaker Siebenwurst also were named on the award. The material used for this application was Stamax PP LGF. Long glass fiber PP injection molding via structural chemical foaming with core-back process enabled the production of this part with very low VOC emissions, meeting VDA 278 specification. Extensive CAE work predicting warpage of the foamed part provided valuable insights, allowing for the modification of tooling in advance. Use of foaming means means less material is required resulting in a 15% weight savings, fewer emissions and less cost.



Category Winner: Chassis & Hardware

Category Winner: Environmental



Powertrain Mounting Clevis Bracket 2017 General Motors Co. Cadillac XT5

System Supplier:	Hutchinson
Material Processor:	Not available
Material Supplier:	BASF Corporation
Material / Process:	Ultramid A3WG10 CR BK00564 PA66+50%GF / injection molding
Tooling Supplier:	Not available

In the Chassis/Hardware category, the winner was the **Powertrain Mounting Clevis Bracket** on the 2017 Cadillac XT5 crossover sport utility vehicle (SUV) from General Motors Co. . Tier supplier and processor Hutchinson and material supplier BASF Corporation also were named on the award. The material used for this application was Ultramid A3WG10 CR BK00564 PA66+50%GF. This engine clevis bracket is the first composite mount designed for a 6 cylinder engine, and passing peak loads of 25 Kilo-newtons of force. The injection molded part replaces metallic solutions (stamping, welding and die-casting) used previously resulting in a 45% weight save. NVH was also improved (reduction in cabin noise) due to the damping characteristics of the polyamide compared to aluminum. Corrosion resistance is improved and the part can be recycled at end of life. Seven clevis brackets were developed for different powertrain combinations and there are no warranty claims after 1.5 years of production.

Next Generation Sustainable Content Bio Foam 2018 Ford Motor Co. Ford Fusion

System Supplier:	International Automotive Components (IAC)
Material Processor:	International Automotive Components (IAC)
Material Supplier:	BASF Corporation
Material / Process:	Elastoflex 3496/102 Resin, 113/4 Iso PU / foam in place
Tooling Supplier:	Not available

In the Environmental category, the winner was the **Next Generation Sustainable Content Bio Foam** on the 2018 Ford Fusion sedan from Ford Motor Co. Tier supplier and processor International Automotive Components (IAC) and material supplier BASF Corporation also were named on the award. The material used for this application was Elastoflex 3496/102 Resin, 113/4 Iso PU. This application provides a sustainable alternative to conventional petroleum based foams - at a lower weight and cost with more design flexibility. Caster based foam provides for a lower molded density and ability to be foamed in as little as 4 mm cross sections, and superior bond strength to mating materials. Foam in place tooling, where a cast PVC, TPE, or TPU skin is placed in the mold with a hard plastic retainer and the foam is injected between these two components, is used for processing. A weight savings of 20 - 40% (depending on foam thickness) and a cost savings of \$2 per average foamed in place instrument panel is achieved.



Category Winner: Materials



Low Friction Polymer for Chain Tensioner Arms 2017 Ford Motor Co. Ford F150 / Mustang

System Supplier: Borg Warner
 Material Processor: Not available
 Material Supplier: DSM Engineering
 Material / Process: Stanyl HGR2 PA46(+PTFE) / injection molding
 Tooling Supplier: Not available

In the Materials category, the winner was the **Low Friction Polymer For Chain Tensioner Arms** on the 2017 Ford F-150 pickup and Ford Mustang sports car from Ford Motor Co. Tier supplier Borg Warner and material supplier DSM also were named on the award. The material used for this application was Stanyl HGR2 PA46(+PTFE). This usage of a modified PA46 resin to enhance stiffness, on vehicles powered by a 5.0L V8 engine, was a drop-in replacement for PA66, for enhanced wear and friction performance. The resultant fuel economy savings (0.4%), from rotational torque reduction in the cam-shaft (0.5Nm), was equivalent to a 40lb weight reduction, and at 1/10th the cost. Annual environmental benefits include reductions in gas consumption by 12,000 Barrels and green-house gas emissions by 5,000 Tons. This innovation is highly translatable, to provide affordable fuel economy improvement, and will be utilized on more Ford vehicles, beginning in 2018. The total potential environmental impact of translations, at Ford, may be multiple times the values noted for the Mustang and F-150.

Category Winner: Powertrain



Turbo Charger Outlet T-Joint 2018 Hyundai Motor Co. Genesis G80, Kia Stinger

System Supplier: Hwaseung R&A Co., Ltd.
 Material Processor: SEJI Solotech, Inc.
 Material Supplier: DuPont Korea Inc.
 Material / Process: PA66 / injection molding
 Tooling Supplier: Not available

In the Powertrain category, the winner was the **Turbo Charger Outlet T-Joint** on the 2018 Genesis G80 and Kia Stinger sedans from Hyundai Motor Co. Tier supplier Hwaseung R&A Co., Processor Songwoo Industrial and Seji Solotech, Inc., and material supplier DuPont Korea Inc. also were named on the award. The material used for this application was PA66. A 42% weight and 35% cost reduction, and improved airflow reducing the pressure drop (-8kPa) to increase fuel economy and improve NVH performance was achieved by designing and molding this part with plastic compared to the previous aluminum die cast part. Air flow noise was also reduced and long term durability increased via the rib pattern design. Special 3-gate positioning tooling was designed to minimize stress in weld-line area for strength and durability and for processing optimization. A new 35% glass fiber reinforced, heat stabilized polyamide 66 resin was developed for good retention of properties over time at temperatures up to 220 degrees C.



Category Winner: Process / Assembly / Enabling Technologies



Category Winner: Safety



Two Shot Interior Decoration Bezel 2018 Ford Motor Co. Ford Fiesta

- System Supplier: Faurecia Interior Systems
- Material Processor: Faurecia Interior Systems
- Material Supplier: Lotte Advanced Materials
- Material / Process: INFINO LT120 PC & Starex LX0760 / 2-shot injection molding
- Tooling Supplier: JP Grosfilley SAS

In the Process/Assembly/Enabling Technologies category, the winner was the **Two Shot Interior Decoration Bezel** on the 2018 Ford Fiesta subcompact from Ford Motor Co. Tier supplier and processor Faurecia Interior Systems, material supplier Lotte Advanced Materials and tool supplier JP Grosfilley SAS also were named on the award. The material used for this application was INFINO LT120 PC and Starex LX0760. This unique 3-D decorative effect was achieved with 2K 'reverse' injection molding (1st shot tinted PC) with overmolding of grained surface with 2nd shot (self colored pigmented ABS). This is the first time this process was used to achieve the 3-D visual effect (color and texture) for a part of this size and geometry. A 30% cost save was achieved vs IMD/IML/high gloss painting and there was a 20% scrap reduction vs conventional 2-layer high gloss piano black appearance.

Gen-3 4-Way Head Restraint 2018 Ford Motor Co. Ford F150

- System Supplier: Windsor Machine and Stamping
- Material Processor: Windsor Machine and Stamping
- Material Supplier: Ravago
- Material / Process: Hylon N1000STHL PA / injection molding
- Tooling Supplier: Integrity Tool & Mold

In the Safety, the winner was the **Gen-3 4-Way Head Restraint** on the 2018 Ford F-150 pickup from Ford Motor Co. Tier supplier and processor Windsor Machine and Stamping, material supplier Ravago and tool supplier Integrity Tool & Mold also were named on the award. The material used for this application was Hylon N1000STHL PA. This low cost, low mass, head restraint provides exceptional rigidity for whiplash protection. Its flexible design allows the front surface of the head restraint to be translated closer to or further from the occupant by 60 mm without incurred costs (allowing for the precise balancing of comfort and safety). Using plastic, in place of steel, as the primary load bearing component is new to front row head restraints. The part design eliminates manufacturing complexity making use of intelligent geometries so that readily available materials could be used. A \$10.73 Million savings (\$2.80/vehicle) is projected by the end of MY2020.



Category Winner: Hall of Fame

Category Winner: Vehicle Engineering Team Award



Thermoplastic Polyolefin Skin Instrument Panel 2000 General Motors Co. Pontiac Bonneville

- System Supplier: Inteva Products LLC (Delphi Interior Systems)
 Material Processor: Inteva Products LLC (Delphi Interior Systems)
 Material Supplier: Mytex Polymers (formerly Exxon Mobil Chem. & Mitsubishi Chem. Corp. joint venture)
 Material / Process: TPO / injection molding
 Tooling Supplier: Mytex Polymers (formerly Exxon Mobil Chem. & Mitsubishi Chem. Corp. joint venture)

The use of TPO skin on IPs was recognized in the industry in 1999, when GM won the SPE® Most Innovative Use of Plastics Award in the Body Interior category. It improved safety by enabling air bag deployments, and reduced windshield fogging with the reduction of VOCs and odors without plasticizers and toxic stabilizers. The environmentally friendly all polyolefin system also enabled closed loop recycling and the replacement of PVC while reducing mass 10%. The TPO skin also improved interior quality by preventing brittle cracking, color fading (UV protection is improved by 4 times) and warping. Overall esthetics were improved by the dry haptic leather-like feel inherent in TPO skin.

General Motors Co.

for Significant Use of Innovative Plastic Content on the 2018 MY Chevrolet Traverse

The team:

- Introduced a first surface appearance, thin wall, structural, long glass fiber polypropylene on the floor console carrier saving the program 30% mass or 2.2 lbs. This eliminated the need for metal reinforcements to take \$1.50/assembly out of the part as well.
- Launched the first serial production polyamide clevis bracket reducing the part weight by 45% relative to the previous aluminum design while increasing damping by a factor of 10.
- Developed a new LED headlamp system that includes nine tailored elements – nine individual lenses on top of nine 1x1 LEDs producing approximately 720 lumens. These lenses include three large lenses (2 low beam / 1 high beam) coupled with six smaller ones (4 low / 2 high beam) and enabled lamp performance that is balanced with the customer requirements.
- And extended the use of low density (0.96 g/cc) TPO on the front and rear fascias, wheel opening moldings, claddings and rocker moldings.

The use of plastics and composites contributed to enhanced performance (8% power gain with the 3.6L V6), weight savings (7% lower than the previous program), improved fuel economy (17% increase) with best in class cargo space and up to 14 available advanced safety features.

