PLASTICS:
INNOVATION IN MOTION

SPE Innovation Awards
Competition & Gala
AUTOMOTIVE
HONORING THE BEST IN AUTOMOTIVE PLASTICS

November 9, 2016
FREEDOM of DESIGN

Unlock new automotive design possibilities

Our diverse portfolio of engineered polymers delivers these advantages over metal, and more:

- Miniaturize small, thin-walled parts
- Consolidate multiple components into single units
- Create light-weight, innovative interior and exterior parts and components
Faurecia Innovations: reimagining the future of interiors

As the global leader in vehicle interiors, Faurecia works closely with its customers to develop solutions that are at the crossroads where Sustainable Mobility meets an Enhanced Life On-Board Experience. Our in-house expertise lends itself to innovating products that reimagine vehicle interiors and improve comfort, safety, and connectivity for individual and collective well-being.

Technical perfection, automotive passion
VIP Reception & Afterglow Sponsor

Celanese
The chemistry inside innovation™

Main Reception Sponsor
Wine & Flowers Sponsor
Student Program Sponsor

Gold Sponsors

Advanced Composites

Plastics Division

BASF
We create chemistry

faurecia
Bronze Sponsors

Silver Sponsor

Advertising Sponsors

Media / Association Sponsors
Welcome to the 2016 Innovation Awards Gala

Welcome to the 46th-annual SPE® Automotive Innovation Awards Gala, sponsored by the Automotive Division of the Society of Plastics Engineers (SPE). I’m honored to once again lead this annual program, the world’s oldest and largest recognition event in the automotive and plastics industries. Each year we see the latest and best results of cooperative innovation by automotive engineers, designers, and their suppliers whose combined ingenuity and creativity reinforce the dynamic nature of the automotive industry. My colleagues in the Automotive Division are excited to offer this tribute to the latest innovation in plastics and composites in ground transportation.

This year’s theme, Plastics: Innovation in Motion, reflects the notion of mobility and the changes beginning to take place in the global automotive industry around comfort and convenience while also delivering safe, inspiring, and efficient transportation. Plastics play an important role in delivering what car buyers want. Innovations in lighter weight components, powertrain technologies, and surprise & delight features on new vehicle programs will likely be a differentiating factor in the purchase decisions that we all make when buying our next vehicle. Several of these new technologies, materials, and processes will be presented tonight.

The competition this year was among the most intense in recent years, with a record 75 nominations across 9 different categories. Tonight’s program will recognize the accomplishments of the people and companies involved in this year’s most innovative use of plastics with awards in the following areas:

- Aftermarket
- Body Exterior
- Body Interior
- Lifetime Achievement
- Chassis & Hardware
- Environmental
- Materials
- Powertrain
- Process, Assembly & Enabling Technologies
- Safety
- Grand Award

We also will recognize a new entry into our SPE Automotive Division Hall of Fame and our newest recipient of the Lifetime Achievement Award, which recognizes the technical achievements of individuals whose work – in research, design, and/or engineering – has led to significant integration of polymeric materials on passenger vehicles.

Before we begin tonight’s program, I would like to thank the many volunteers, sponsors, and judges who make this event possible. It is their dedication and commitment – their passion for innovation – that enable the SPE Automotive Division to recognize the industry’s most innovative use of plastics and composites in automotive applications.

Once again, welcome to the 2016 SPE Automotive Innovation Awards Gala. Thank you for joining us and we hope you enjoy the event.

Sincerely,

Jeffrey Helms
Innovation Awards Chair 2010-2016
Global Automotive OEM Corporate Accounts Director
Engineered Materials
Celanese
**SCHEDULE OF EVENTS**

4:30-6:00 pm  Reception / Preview of Nominated Parts & Vehicle Displays

6:00 pm  Seating Begins

6:45-7:00 pm  Welcome / Dinner

Jeffrey Helms, Celanese, ’11-’16 SPE Automotive Innovation Awards Program Chair
Teri Chouinard, Intuit Group
Verghese Thomas, Chief Technology & Innovation Officer, Celanese

7:00-9:00 pm  Gala Program

Aftermarket
Kevin Pageau, International Marketing Alliance

Body Exterior
Tom Pickett, General Motors Co.

Body Interior
Yvonne Merritt, Ford Motor Co.

Lifetime Achievement
Dave Reed, General Motors Corp., retired

Chassis & Hardware
Rose Petrella-Lovasik, Ford Motor Co.

Environmental
Monica Prokopyshen, Chrysler Corp., retired

Hall of Fame
Nippani Rao, Asahi Kasei Plastics North America, Inc.

Materials
Suresh Shah, Delphi Corp., retired

Powertrain
Joel Meyers, Hyundai-Kia Technical Center America

Process, Assembly & Enabling Technologies
Steven VanLoosen, BASF Corp.

Safety
Suzanne Cole, Miller Cole LLC

Grand Award
Jeffrey Helms, Celanese

9:00-11:00 pm  Afterglow Reception
Everyone Invited to Attend

---

**BLUE RIBBON JUDGES**

Suzanne Cole, Miller Cole LLC
David Cole, AutoHarvest; Center for Automotive Research
Subi Dinda, DaimlerChrysler, retired; Oakland University
John Fillion, Chrysler Group LLC, retired
Kerri Jansen, Plastics News magazine
Gary Kogowski, Ravago Holdings Americas
Sean McElroy, Autoline Detroit
Thomas Moore, DaimlerChrysler, retired
Allan Murray, Allied Composite Technologies LLC, SPE Emeritus
Ron Price, Global Polymer Solutions
Nippani Rao, Asahi Kasei Plastics North America, Inc., SPE Emeritus
Tom Russell, Allied Composite Technologies LLC
Lilli Sherman, Plastics Technology magazine
Roy Sjöberg, WardsAutoWorld.com magazine
Conrad Zumhagen, The Zumhagen Company LLC

Special recognition for the rest of the committee members and judging coordinators: Fred Deans, Mark Lapain, Peggy Malnati, Norm Kakarala, Kevin Pageau, Jay Raisoni, Nippani Rao, Suresh Shah, & Dawn Stephens.

Special thanks to our student usher organizers, Teri Chouinard, Crystal van Houten, and Dave Reed.

Design: JPI Creative Group; Signage: That Color; Printing: Real Green; A/V Support: Concept Productions; Truffles: Business Design Solutions
I can’t believe it’s not leather!

Inteva Products’ Inteather™ material looks and feels just like leather, but is even more durable and “green.” Its unique features give global automakers more design, styling and process flexibility. Believe it.
WHAT HAPPENS WHEN

GOOD IDEA meets Brainpower

Innovation drives Michigan’s auto industry. Always will. An explosion of technological opportunity today will make tomorrow’s cars the most powerful computers we will ever use. And if you think that the auto industry in Michigan doesn’t offer the best, creative and high-tech career options in the world, think again. The future runs on Brainpower.
**Plastics Terms**

ABS  acrylonitrile butadiene styrene
ACM  alkyl acrylate copolymer
ASA  acrylic-styrene-acrylonitrile
CF   carbon fiber
CFRP carbon fiber-reinforced plastic
D-LFT direct-(ILC) long-fiber thermoplastic
EPP  expanded polypropylene foam
EVA  ethylene vinyl acetate
GF   glass fiber (reinforced)
GMT  glass-mat thermoplastic
GR   glass (fiber) reinforced
HDT  heat-deflection temperature
ILC  inline compounded
ITR  isophthalate terephthalate resorcinol
LCP  liquid crystal polymer
LFT  long-fiber thermoplastic
MFI  melt flow index
MFR  melt flow rate
MIC  molded-in-color
MPPE modified-polyphenylene ether (also called MPPO, modified-polyphenylene oxide)
OOA  out-of-autoclave (process)
PA   polyamide (also called nylon)
PC   polycarbonate
PC/ABS polycarbonate/acrylonitrile butadiene styrene
PC/ASA polycarbonate/ acrylic-styrene-acrylonitrile
PC/PBT polycarbonate/polybutylene terephthalate
PE   polyethylene
PEI  polyetherimide
PET  polyethylene terephthalate
PMMA polymethyl methacrylate (also called acrylic)
POM  polyoxymethylene (also called acetal)
PP   polypropylene
PPA  polyphthalamide
PPS  polyphenylene sulfide
PTFE polytetrafluoroethylene
PVC  polyvinyl chloride (also called vinyl)
PVB  polyvinyl butyral
PVDF polyvinylidene fluoride or polyvinylidene difluoride
SMA  styrene maleic anhydride
SMC  sheet-molding compound
TiO2  titanium dioxide
TPC-ET thermoplastic copolyester elastomer
TPE  thermoplastic elastomer
TPO  thermoplastic polyolefin
TPV  thermoplastic vulcanizate

**Common Abbreviations**

**Plastics Terms**

CAD  computer-aided design
CAE  computer-aided engineering
CLTE coefficient of linear thermal expansion
CNC  computer-numerical control
CUV  cross-over (sport-) utility vehicle
EA / EAs energy absorber(s)
EGR  exhaust-gas recirculation
EPA U.S. Environmental Protection Agency
EU  European Union
FIP  foam-in-place
FMVSS U.S. Federal Motor Vehicle Safety Standard
Gor  grille-opening reinforcement
HDT  heat-deflection temperature
HEV  hybrid-electric vehicle
HIC  head-injury criterion
HID  high-intensity discharge
ICE  internal combustion engine
IP  instrument panel
LED  light-emitting diode
Li-Ion lithium-ion
MPV  multi-purpose vehicle
NVH  noise/vibration/harshness
OEM  original-equipment manufacturer
PCR  post-consumer recyclate
ped-pro pedestrian protection (requirement)
PHEV plug-in hybrid-electric vehicle
PIR  post-industrial recyclate
SUV  sport-utility vehicle
TPC-ET thermoplastic copolyester elastomer
VOCs volatile organic compounds

**Automotive Terms**

A/C  air conditioning
AGS  active grille shutter
BEV  battery-electric vehicle
BIW  body in white
BSR  buzz/squeak/rattle

**Other Terms**

2D  two-dimensional
3D  three-dimensional
cm  centimeter
CO2  carbon dioxide
ft  foot
g  gram
in  inch
IR  infrared
kg  kilograms
lb  pound
KMPH kilometers/hour
km/h kilometers/hour
m  meter(s)
mm  millimeter
MM  million(s)
MPG  miles/gallon
MPH  miles/hour
N  Newtons
sec  second
SG  specific gravity
USD  U.S. dollars
**11**

**Aftermarket**

**Wicker Bill Assembly**
2016 General Motors Co.
Chevrolet Corvette Z06

System Supplier: 3 Dimensional Services Group  
Material Processor: 3 Dimensional Services Group  
Material Supplier: 3M Co.  
Material / Process: 3M 9490LE double-coated tape, 3M 300 MP/300 LSE / injection molding  
Tooling Supplier: 3 Dimensional Services Group  

This application uses a proprietary and patented acrylic adhesive whose chemistry does not cause stress cracking when in contact with the injection molded, transparent PC/ITR spoiler substrate. The tape provides excellent adhesion to several families of polymers and is produced in a unique manufacturing process. The spoiler provides added downforce for improved handling and maximizes rear visibility during racing; the tape secures the spoiler for racing, but allows it to be removed when returning to street driving, solving a number of install/uninstall issues.

**Dual-Option Insert Carbon Fiber Composite Fuel-Filler Door**
2017 General Motors Co.
Chevrolet Camaro

System Supplier: Polytec FOHA Inc.  
Material Processor: NOVO Plastics Inc.  
Material Supplier: Mitsubishi Rayon Co., Ltd., SABIC, Basler  
Material / Process: Pyrofil carbon fiber, Noryl GTX PA 6/MPPE, Urethane TR, clearcoat / injection or compression molding  
Tooling Supplier: Integrity Tool & Mold Inc.  

This fuel-filler door design features inserts of either injection molded and painted MPPE/PA6 (in black, metallic silver, or red to match body paint) or compression molded and clear coated carbon fiber-reinforced composite with visible weave. The unique design of the system accommodates either the 2.0 mm-thick injection molded or the 1.0 mm-thick compression molded insert. The specially designed tool enables the Camaro name (with a 0.25 radius) on the fuel-filler door to be painted. Proprietary material is used for the visible-weave carbon composite version and a special clear coat on that insert offers 75% savings.

**Carbon Fiber Composite Spoiler**
2016 General Motors Co.
Chevrolet Corvette

System Supplier: deBotech, Inc.  
Material Processor: deBotech, Inc.  
Material Supplier: Solvay  
Material / Process: Solvay MTM57 epoxy / autoclave cure  
Tooling Supplier: deBotech, Inc.  

This 1-piece aftermarket epoxy/carbon fiber spoiler provides a premium carbon composite appearance and enables the same aerodynamic performance as production 3-piece spoilers with different aero variants while also reducing mass by 40%. The spoiler’s unique design and proprietary tooling combines solid wickerbills and an open cavity blade plus integral threaded inserts to facilitate manufacturing and assembly. The 1-piece construction offers a cleaner appearance due to reduction of fasteners. The spoiler is offered in both clearcoat with exposed weave and painted in carbon flash metallic paint.
<table>
<thead>
<tr>
<th>System Supplier</th>
<th>Shape Corp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Processor</td>
<td>Shape Corp.</td>
</tr>
<tr>
<td>Material Supplier</td>
<td>Celanese Corp.</td>
</tr>
<tr>
<td>Material / Process</td>
<td>Celstran GF-40-20 40% GR LFT-PP / injection molding</td>
</tr>
<tr>
<td>Tooling Supplier</td>
<td>Not available</td>
</tr>
<tr>
<td>Description</td>
<td>This all-composite design without metallic reinforcement is the first AGS-capable, injection-molded PP-LFT FEM bolster used on a heavy-duty pickup platform. Replacing steel and plastic/metal hybrids at a 3 lb/1.4 kg and $3 USD savings/vehicle, the design offers parts consolidation with locating features that aid fit &amp; finish, improves airflow, while meeting structural requirements for part deflections of &lt;1 mm on this 8,500 lb/3,856 kg class vehicle.</td>
</tr>
</tbody>
</table>

**Lightweight Glass**

<table>
<thead>
<tr>
<th>System Supplier</th>
<th>Pittsburgh Glass Works LLC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Processor</td>
<td>Pittsburgh Glass Works LLC</td>
</tr>
<tr>
<td>Material Supplier</td>
<td>Sekisui Chemical Co., Ltd.</td>
</tr>
<tr>
<td>Material / Process</td>
<td>PVB / multiple</td>
</tr>
<tr>
<td>Tooling Supplier</td>
<td>Pittsburgh Glass Works LLC</td>
</tr>
<tr>
<td>Description</td>
<td>Three of 5 glass positions on this vehicle feature chemically tempered glazing that is part of a thin, hybrid laminate solution with an interlayer of solar-control PVB film that reduces glazing weight approximately 37% while lowering heat transmittance to keep interiors cooler. Versus conventional 0.20 in./4.96 mm thick laminates featuring 2 layers of soda-lime glass (SLG) with a PVB interlayer, the new construction features standard-thickness layers of SLG and PVB plus a very-thin (0.03 in./0.7 mm) layer of chemically tempered glass for a total thickness of 0.14 in./3.56 mm. The resulting laminate is thinner, lighter, tougher, and offers optical advantages.</td>
</tr>
</tbody>
</table>

**MIC High Gloss Body Color TPO Fascia**

<table>
<thead>
<tr>
<th>System Supplier</th>
<th>Magna Exteriors, Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Processor</td>
<td>Magna Exteriors, Inc. - Nascote</td>
</tr>
<tr>
<td>Material Supplier</td>
<td>Advanced Composites, Inc.</td>
</tr>
<tr>
<td>Material / Process</td>
<td>ADX70004WFA TPO / injection molding</td>
</tr>
<tr>
<td>Tooling Supplier</td>
<td>Tycos Tool &amp; Die</td>
</tr>
<tr>
<td>Description</td>
<td>Painted fascias are prone to chip and peel, which leads to warranty costs and customer unhappiness. Additionally, painting adds significant cost with negative environmental impact. Instead, a high-gloss, weather- and mar-resistant, MIC TPO material matched to vehicle body panel color is used. Rigorous testing was conducted to assure the material was resistant to stone pecking and road chemicals and would not change shape when exposed to high heat. Additionally, a lens-grade mold with SP1 diamond polish and gating designed to minimize knitlines was used. The resulting part is 10% lighter, offers $800,000 USD annualized savings, and harmonizes with exterior painted components.</td>
</tr>
</tbody>
</table>

**Low Aerodynamic Drag Bumper System**

<table>
<thead>
<tr>
<th>System Supplier</th>
<th>FCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Processor</td>
<td>FCA</td>
</tr>
<tr>
<td>Material Supplier</td>
<td>SABIC</td>
</tr>
<tr>
<td>Material / Process</td>
<td>SABIC PP compound; Geloy B611P (PPc); Geloy HRA170; PP (bumper system); ASA/PC (grille) / injection molding</td>
</tr>
<tr>
<td>Tooling Supplier</td>
<td>Sanvito &amp; Somaschini S.p.A.</td>
</tr>
<tr>
<td>Description</td>
<td>This front bumper with computer-controlled active air splitter keeps the splitter closed during straight acceleration to direct air under the body and toward the large rear diffuser/extractor, which uses the Venturi effect to convert high-pressure airflow to low pressure. During braking or cornering, the front splitter opens at the correct angle to provide a downforce of 220 lb/100 kg for improved handling. The combined system helps the vehicle achieve a best-in-class, low aerodynamic drag coefficient of 0.32 while supporting signature styling with impact and scratch resistance at lower mass and cost than the previous material.</td>
</tr>
</tbody>
</table>
### 3D Radiator Grille
**2017 General Motors Co.**
**Chevrolet Bolt**

- **System Supplier:** Sam Shin Chemical Co.
- **Material Processor:** Sam Shin Chemical Co.
- **Material Supplier:** LG Chem Ltd.
- **Material/Process:** Lupoy 1000MU PC / injection molding
- **Tooling Supplier:** A-Tech Solution Co., Ltd.

A new appearance is achieved for this front grille by using “varied contouring” (variable wall thicknesses) on the B side of this injection molded, tinted PC part, which subsequently is UV coated on the A side and receives a 3-coat paint system on the B side. The end result is a unique 3D look on a 2D surface.

---

### Tailgate Gap Hider Assembly
**2016 Nissan Motor Co. Ltd.**
**Nissan Titan**

- **System Supplier:** Metelix Products Inc.
- **Material Processor:** Metelix Products Inc.
- **Material Supplier:** Washington Penn Plastics Co., Inc.
- **Material/Process:** PPC1GF2UV-RXF 20% GR-PP / blow molding
- **Tooling Supplier:** Metelix Products Inc.

This tailgate gap hider provides a structural “bridge” over the gap between the end of the pickup bed and the open tailgate, reducing debris intrusion and withstanding heavy loads without breakage or deformation during loading and unloading. The spring-loaded unit offers 2 installation options and deploys and stows automatically during tailgate operation. A blow molded 20% glass-reinforced PP copolymer reduces mass 20% vs. structural steel solutions and offers better performance than non-structural aftermarket offerings. Special coarse texturing helps match the gap hider to spray-on bed liners while improving surface scratch resistance.
To solve the challenges of conventional seat construction, which limits console storage and rear-seat leg room, this product eliminates molded urethane foam from the seat back and replaces it with an all-plastic shell featuring a larger concave region that enables optimum occupant comfort. An innovative suspension system also is used that consists of a forward plastic seat back panel attached to the frame via spring joints. The technology can increase front console width by ≈ 0.8 in./20 mm and reduce seatback thickness by ≈ 2.1 in./52 mm or reduce overall vehicle cost $35-$40 USD and mass 3-4 kg.

Reportedly, this is the thinnest full-size, deep-draw injection molded IP in North America at 1.9 mm/0.07 in. It was achieved by using a 30% glass-reinforced LFT-PP. Versus the 2.4 mm/0.09 in. microcellular foam molded benchmark, this design was 14% lighter, saved over $1 USD in materials as well as the microcellular-foaming investment, and helped optimize packaging. Moldfilling analysis with fiber orientation was used for accurate warpage predictions and to develop tooling countermeasures to facilitate part molding.

Cup holders are a focal point for customer critiques of vehicle interiors. Further, they must accommodate a wide range of container sizes without tipping during normal driving conditions. Incorporation of a living hinge (achieved via molded-in “fingers” and a flexible silicone-rubber band) in this cup holder design made it adjustable to accommodate many containers while reducing 10 parts to 3 with no secondary heat-stake operations. Furthermore, the design reduces part costs ≈ $1.50 USD/assembly, lowers tooling expenditure ≈ $100,000 USD, yet delivers equivalent appearance and performance.

This innovative second-row under-seat storage bin is designed to expand, collapse, and lock from either side of the pickup. When stowed, the bin maintains a low profile (with no mechanisms exposed) to allow use of the load floor. When expanded, it provides a large amount of usable storage. The tough injection molded TPO resin meets all fit/finish and toughness requirements to -30C, while enabling use of a 4-pin hinge design to be molded in a large plastic assembly.
## Composite Suspensions for Upper and Lower Backs

2017 Ford Motor Co. 
Lincoln Continental

**System Supplier:** Leggett & Platt Inc., Magna International  
**Material Processor:** Summit Plastic Molding, Century Plastics  
**Material Supplier:** BASF Corp., Advanced Composites, Inc., DuPont Automotive  
**Material / Process:** Ultramid B3ZG7 OSI 35% GR PA OSI; Ultramid B3EG3 15% GR PA; ADX 5017 18% talc-filled UV TPO; Delrin 100 POM / injection molding  
**Tooling Supplier:** Summit Plastic Molding, Mega Mold

Thanks to integrated composite designs, this “perfect position seat” suspension system delivers tuned suspension to optimize occupant comfort by cradling the upper back and providing side-torso support, which flexes to accommodate various occupant sizes. Special attachment features facilitate assembly and service time. The design also creates a robust dynamic crash-energy management system for rear-impact protection. Molded-in-color is used for A surfaces and craftsmanship. The system, for which 83 patents have been filed, reduces total seat weight by 8% and cost by 15% despite adding more features.

## MIC Discrete PAB Cover

2016 Ford Motor Co. 
Ford KA

**System Supplier:** Summit Polymers, Inc.  
**Material Processor:** Summit Polymers, Inc.  
**Material Supplier:** SABIC  
**Material / Process:** Cycolac XCY620 PC/ABS / injection molding  
**Tooling Supplier:** Not available

This console design converts from 2 cupholders plus a bin to 4 cupholders with the help of a patented slider tray assembly for greater user flexibility without the need to remove and stow components when not in use. The design of the injection molded PC/ABS cupholders accommodates beverage containers ranging from small coffee cups and water bottles to large all-day beverage containers while reducing weight 70% vs. the outgoing model and lowering costs $3 USD depending on content replaced.

---

**Passion Inspired Materials**

Great dancers are not great because of their technique, they are great because of their passion.  

- Martha Graham

---

**Quad-Barrel Convertible Cupholder**

2017 Ford Motor Co. 
Ford Super Duty

**System Supplier:** Summit Polymers, Inc.  
**Material Processor:** Summit Polymers, Inc.  
**Material Supplier:** SABIC  
**Material / Process:** Cycolac XCY620 PC/ABS / injection molding  
**Tooling Supplier:** Not available

Passenger airbag covers are often painted, which is costly and can lead to warranty issues. Traditionally, molded-in-color was not feasible because the TPO material used did not meet Class A surface requirements. A new MIC cover design with a recessed surface and new styling line improves appearance of the tear line, eliminates painting, and saves 35% of the total cost for these parts. Integrating a new and complex cooling system for both the A and B surfaces helps reduce sinks and gloss variance, while injecting through a rib instead of directly onto the B surface improves aesthetics further.

New Roadmap Available
Download free at www.plastics-car.com
Our portfolio of engineering plastics and polyurethane solutions offer the best of both worlds. Whether you need durable, stiff, lightweight, high heat resistance, improved comfort, aesthetics or a combination—BASF Performance Materials has a solution that puts you on the road to success. And, we do not always substitute metals; we also complement them to help drive performance at a higher level.

Learn more at www.automotive.basf.us
Dr. Lawrence Drzal Named 2016 SPE® Lifetime Achievement Award Winner

Dr. Lawrence T. Drzal, university distinguished professor of Chemical Engineering and director-Composite Materials and Structures Center at Michigan State University’s College of Engineering (MSU, East Lansing, Mich., U.S.A.), has been named the 2016 Lifetime Achievement Award winner by the Automotive Division of the Society of Plastics Engineers (SPE®). Drzal, the first academic winner of the award, is a composites expert who has specialized in surface and interfacial aspects of adhesively bonded joints plus the fiber / matrix interphase in composite materials and their processing; adhesion fundamentals; sustainable bio-based structural composite materials; and nanocomposite materials. During his career Drzal has given over 400 invited presentations at national and international conferences, published over 375 research papers, and has been awarded 35 patents.

Drzal credits his early engineering and co-op training coupled with his industrial and military service for his “problem-definition” approach to research, which has been characterized by observation of phenomena and identification of unresolved problems with common themes around technological advancement, sustainability, environmental friendliness, and benefit to society.” As a result, Drzal says he always has had the desire to provide both practical knowledge and fundamental knowledge in each research area and the research project he and his students have undertaken.

He is a founding member of both the Adhesion Society and the American Society for Composites and has served as president (1998-1999) of the Adhesion Society. He has chaired the Gordon Conference on Adhesion and the Gordon Conference on Composites and has served in many other professional activities related to chemical engineering, composite materials, and adhesion. He served on the editorial board of journals in the adhesion and composite materials fields (Composites Part A: Applied Science and Manufacturing; Journal of Biobased Materials and Bioenergy; Carbon Letters; and Nanocomposites) and was associate editor of the Journal of Adhesion.

Over his long and distinguished career, Dr. Lawrence Drzal has received numerous honors and awards including:

- 2016, University of Delaware’s Medal of Excellence in Composite Materials;
- 2008, Best Technical Paper Award, Thermoset Division, Society of Plastics Engineers;
- 2006, Fellow, Society for the Advancement of Materials and Process Engineering (SAMPE);
• 2006, Educator of the Year, Society of Plastics Engineers (SPE) - Composites Division;
• 2005, Best Paper Award, Coatings for Plastics Symposium;
• 2004, Fellow, SPE;
• 2004, Fellow, American Society for Composites (ASC);
• 2003, Highly Cited Materials Science Researcher, ISI;
• 2003, Best Paper Award, SPE Composites Division, ANTEC 2003;
• 2002, Fellow, American Institute of Chemists, Adhesion;
• 2002, Robert Patrick Fellow, The Adhesion Society, Adhesion Science;
• 2002, Member, European Academy of Sciences, Adhesion and Surface Modification of Polymers;
• 2002, Fellowship, Japan Society for the Promotion of Science;
• 1997, University Distinguished Professor, Michigan State University;
• 1997, Best Paper Award, ASC;
• 1996, Technomic Award, ASC, Outstanding Achievement in Research, Education and Service in the Field of Composite Materials;
• 1994, Award for Excellence in Adhesion Science Research, 3M and The Adhesion Society, Adhesion Science;
• 1993, Distinguished Faculty Award, Michigan State University;
• 1992, Edwin P. Plueddemann Award, Dow Corning and International Conference on Composite Interfaces, Excellence in Composites Interfacial Research;
• 1992, Withrow Distinguished Scholar Award, College of Engineering, Michigan State University;
• 1990, Best Academic Paper Award, Advanced Composites Conference;
• 1983, Best Paper Award, SAMPE Technical Conference;
• 1979, Charles J. Cleary Award, USAF Materials Laboratory, Scientific Materials Research Award;
• 1968-1971, National Science Foundation (NSF) Graduate Traineeship, Case Western Reserve University; and
• 1967, Engineer of the Year, College of Engineering, University of Detroit.

Drzal earned a B.S. degree in Chemical Engineering from University of Detroit and a Ph.D. in Chemical Engineering and Polymer Science from Case Western Reserve University. He joined MSU’s College of Engineering as a professor of Chemical Engineering in 1985 and became director of the school’s Composite Materials & Structures Center in 1986. A decade later, he became a university distinguished professor of Chemical Engineering & Materials Science.

* SPE is a registered trademark of the Society of Plastics Engineers. All other trademarks are the property of their respective owners.
Advanced Composites is proud to be a member of the Mitsui Chemicals & Prime Polymers commitment to the Global Automotive Market. With compounding resources throughout the globe (North America, South America, Japan, Europe, Thailand, China and India), the Mitsui Chemicals group is well positioned to service your engineered PP requirements.

www.advcmp.com
(937) 575.9800
**Air Induction System Mounting Structure**  
2016 General Motors Co.  
**Chevrolet Malibu**

**System Supplier:** Toledo Molding and Die, Inc.  
**Material Processor:** Toledo Molding and Die, Inc.  
**Material Supplier:** Solvay Specialty Polymers  
**Material / Process:** Ryton XK2340 PPS/PA / injection molding  
**Tooling Supplier:** Toledo Molding and Die, Inc.

This air-induction system mounting structure replaced a steel part that was very complex and challenging to manufacture with an injection molded PPS/PA part. The plastic mounting system reduces mass 68%, eliminates an anti-corrosion coating, reduces production costs 64% and brings tooling savings of 50% vs. the previous steel part. Additionally, the polymer part meets all application requirements for thermal stability, chemical resistance, dimensional stability, fatigue resistance, and stiffness.

**Strut Mount**  
2016 General Motors Co.  
**Cadillac CT6**

**System Supplier:** ContiTech North America, Inc.  
**Material Processor:** ContiTech North America, Inc.  
**Material Supplier:** BASF Corp.  
**Material / Process:** Ultramid A3WG10CR 50% GR-PA 6/6 / injection molding  
**Tooling Supplier:** Not available

This is the first use of a glass-reinforced PA material for strut-mount housings on all 4 corners of a vehicle and the first application of polyamide housings on the front and rear suspension systems. The injection molded parts integrate common components for both front and rear mounts, and employ a special thread assembly method with a locking feature. They reduce mass 30% vs. typical steel and aluminum parts and reduce noise transmission through the suspension system. Thanks to modular assembly, the design also offers greater tuning flexibility.
Chassis/Hardware

**Rear Differential Cross-Member**
2016 Daimler AG
Mercedes S-Class

- **System Supplier:** ContiTech North America, Inc.
- **Material Processor:** ContiTech North America, Inc.
- **Material Supplier:** BASF Corp.
- **Material / Process:** Ultramid A3WG10CR 50% GR-PA 6/6 / injection molding
- **Tooling Supplier:** Not available

This is said to be the first application where a PA/glass composite has been used as a cross-member to support the rear differential and complete the rear cradle of a vehicle. By replacing traditional parts in steel or aluminum, the injection molded glass-reinforced PA 6/6 design offered parts integration opportunities, is cost neutral, reduces noise transmission from the driveshift, and reduces mass 25%, helping improve fuel economy and reduce tailpipe emissions. The grade used has been optimized for dynamic loads and is controlled with tighter production specs.

**Dual Snap Hardware Mechanism**
2017 Ford Motor Co.
Lincoln Continental

- **System Supplier:** Hi-Lex Corp.
- **Material Processor:** Hi-Lex Corp.
- **Material Supplier:** Celanese Corp.
- **Material / Process:** Celcon POM, Riteflex TPC-ET / 2-shot injection molding
- **Tooling Supplier:** MPP

This is the first rear-door, window-lift carrier-plate mechanism that is all-plastic and features a double (dual) snap. It delivers design flexibility, labor cost savings, and greater design efficiency with multiple glass constructions, meeting project goals to reduce processing and assembly time, maintain rotational stability, and reduce design complexity. An injection molded, 2-shot, TPC-ET overmolded POM design integrates both a down-stop bumper and a glass bumper, eliminating a component and assembly steps. The innovative design also includes an additional snap-feature attachment to support glass tracking during up/down operations.

**Latching Refueling Valve**
2017 Ford Motor Co.
Ford Fusion & Lincoln MKZ

- **System Supplier:** Continental Automotive
- **Material Processor:** Advanced Molding Tech - USA
- **Material Supplier:** DuPont Automotive
- **Material / Process:** Zytel HTNWRF51G30 30% GR-PPA / injection molding
- **Tooling Supplier:** GBMC Luxshare

This challenging new design demanded a unique material with consistent properties after prolonged exposure to fuels, superior wear characteristics, a stable coefficient of friction over a wide temperature range, superior fuel swell and exposure resistance, and superior molding capabilities to properly fill tight-tolerance micro-features. An injection molded 30% GR-PPA with PTFE micro-powder (to enhance wear characteristics) met all requirements. The application saved over $10 USD/vehicle and reduced energy consumption vs. the previous valve. The novel technology has led to 1 issued and 7 pending patents.

**Outer Handle**
2017 Ford Motor Co.
Lincoln Continental

- **System Supplier:** ADAC Automotive
- **Material Processor:** ADAC Automotive
- **Material Supplier:** SABIC
- **Material / Process:** Cycoloy C1200HF PC/ABS / injection molding
- **Tooling Supplier:** Xinpiont

This application is industry’s first belt-integrated, outside door handle with switch activation to open both front and rear doors. The slender, minimalist, all-plastic, high-luster chrome-finish handle provides effortless operation, luxury feel, and quiet operation. The injection molded PC/ABS part with integrated zinc casting also features an e-handle with power-release switch to deliver a sleek, uninterrupted form that reduces mass 20% and cost 35% vs. conventional bond-on-bracket designs.
Blow-Molded Grille Reinforcement
2016 Nissan Motor Co. Ltd.
Nissan Titan

System Supplier: SRG Global
Material Processor: Metelix Products Inc.
Material Supplier: Washington Penn Plastics Co, Inc.
Material / Process: PPC1GF2UV-RXF 20% GR-PP / blow molding
Tooling Supplier: Metelix Products Inc.

This blow molded grille reinforcement adds stiffness to the chromed ABS grille assembly to meet OEM load/deflection and sightline/aesthetic requirements. The 20% GR-PP part assembles to the B side of the grille assembly within manufacturing tolerances yet meets thermal expansion/contraction characteristics of the grille without affecting the design profile by remaining hidden. Deflection under load for the unreinforced grille was reduced by 66%, while cost and weight were each reduced by 25% vs. a stamped steel reinforcement solution. A single parison is dropped, and excess material is punched out and then reprocessed to form subsequent parts.

Electronic Power-Steering Pulley
2017 General Motors Co.
GMC Acadia

System Supplier: Nexteer Automotive
Material Processor: PRISM Plastics
Material Supplier: DSM Engineering Plastics
Material / Process: Stanyl TW241F12 PA 4/6 / injection molding
Tooling Supplier: Not available

Project goals were to find ways to reduce cost without reducing performance of the electric power-steering gear-assist mechanism by replacing a powdered metal pulley with an injection molded plastic one. A high-flow grade of 60% GR-PA 4/6 that produces a resin-rich surface for improved belt wear was selected. It offers significant cost savings and reduces mass over 50% vs. the metal pulley. Its assembly method eliminates 3 bolts, which are replaced by a retaining ring. The molded torque tooth provides secure orientation and excellent load-carrying capabilities.

High Performance Carbon Composite Strut
2016 Daimler AG
Mercedes-AMG C-Class

System Supplier: Secar Technologie GmbH
Material Processor: Secar Technologie GmbH
Material Supplier: Toho Tenax
Material / Process: epoxy / pultrusion
Tooling Supplier: Not available

A standard steel strut was replaced by a pultruded composite strut with bonded metal joining elements, improving NVH, eliminating corrosion concerns, and optimizing the specific stiffness/weight ratio while reducing mass 45%. The 50K tow unidirectional carbon fiber-reinforced epoxy also features an insulating fiberglass layer to prevent stone chipping and provide galvanic protection. The cost-effective application produces no scrap and is being used on medium-volume vehicles (up to 30,000/year).
2016 SPE Automotive Innovation Awards Competition & Gala

Environmental

Closed-Loop Recycling of Bottles
2016 General Motors Co.
Chevrolet Equinox, GMC Terrain

System Supplier: Exo-s
Material Processor: Rogers Foam Co.
Palmetto Synthetics LLC
Unifi Manufacturing Inc.
Material Supplier: Wm. T. Burnett & Co.
Material / Process: Polyester
Tooling Supplier: Not available

By using injection molded PA 4/6 with a second proprietary polymer to increase surface hardness, contact wear (via chain intrusion into the plastic) was reduced on the wear faces of engine timing systems. Rotational friction torque (measured at the crankshaft) was reduced more than 1 Nm, improving fuel-reduction targets without any modifications to the engine block or system layout. Other benefits include greater durability, lower noise, and less frictional loss. Furthermore, cost was reduced more than 50% vs. competitive alternatives.

Biomass-Based Polyester Blend
2015 Hyundai Motor Group
Ioniq

System Supplier: Borg Warner Inc.
Material Processor: Century Mold Co., Inc.
Material Supplier: DSM Engineering Plastics
Material / Process: Stanyl HGR1 PA 4/6 / injection molding
Tooling Supplier: Century Mold Co., Inc.

By using injection molded PA 4/6 with a second proprietary polymer to increase surface hardness, contact wear (via chain intrusion into the plastic) was reduced on the wear faces of engine timing systems. Rotational friction torque (measured at the crankshaft) was reduced more than 1 Nm, improving fuel-reduction targets without any modifications to the engine block or system layout. Other benefits include greater durability, lower noise, and less frictional loss. Furthermore, cost was reduced more than 50% vs. competitive alternatives.

Floorboard with Low VOC Emission Resin
2016 General Motors Co.
Chevrolet Corvette

System Supplier: Molded Fiber Glass Companies
Material Processor: MFG Composite Systems Company
Material Supplier: Reichhold LLC
Material / Process: PET & vinyl ester / compression molding
Tooling Supplier: Not available

High-VOC balsa wood cores (from rainforest trees with supply issues as well as variable density and performance) were replaced by low-VOC reclaimed PET foam cores to produce compression molded sandwich-panel composite floorboards. Weight was reduced with no loss of rigidity. NVH values were improved, eliminating the need for a secondary acoustic barrier. Additionally, a low-VOC vinyl ester resin system, which was compatible with the PET cores, was developed for panel skins. The resulting system passes export VOC emissions requirements, reduces cabin odor, diverts material that otherwise would be landfilled, and provides more consistent panel properties.

V6 Engine Timing System Wear Faces
2016 FCA US LLC
Pentastar V6 Engines

System Supplier: Seoyon E-Hwa Interior Systems Manufacturing
Material Supplier: Seoyon E-Hwa Interior Systems Manufacturing
Material Supplier: SK Chemicals
Material / Process: Skytra bio-polyester-based PETG/ABS / injection molding
Tooling Supplier: Not available

The goals of this project were to develop a high-biomass-content thermoplastic polyester blend for window panels and steering-wheel bezels using biomass-based PETG — reportedly the first application in the world. The optimized PETG/ABS composition was used to replace a PC/ABS blend. Benefits include a 57% reduction in carbon emissions (145 tons/year), an 88% reduction in VOCs, and a significant increase in molded part chemical resistance. By weight, the biomass content is 25% and by C14, the biomass content is 14%.
“Sadly, former SPE Auto Division Board member Terry Cressy passed away on May 24th in Fort Myers, Florida. Terry had taken early retirement from DuPont, but was still active in automotive industry programs and projects as a ‘snow bird who will travel.’ He made significant contributions to the SPE Automotive Division and Detroit Section over his many decades of work as a board member. He also was a founding members of the SPE AutoEPCON conference and is considered to have been largely responsible for turning the Automotive Innovation Awards event into the gala it is now. Through DuPont support, he greatly increased the audio/visual support and publicity for the Awards Gala, turning it from a local restaurant dinner to the 700+ person international event it is now. We will miss Terry.”

— Al Murray

“How many ways do you miss a long term friend, an advocate, and innovative leader who brought energy and growth to the plastic industry? Terry was instrumental in making a difference in his many roles leading the SPE Automotive Division and nurturing the Innovations Awards event into one of the most outstanding celebrations of the most innovative automotive plastics developments. I was fortunate to work with Terry for over three decades — from his DuPont days, to the SPE Automotive Division and Detroit Section, the SPE AutoEPCON conference, and on many other SPE/industry projects. Terry was the first person who offered to help me in 2010 when I began producing the 40th Anniversary recognition of the 40th Awards program. I miss this special person and the gift of his many contributions to his friends, to me, and to the automotive plastics business.”

— Ron Price

“I had the pleasure of working with Terry on SPE programs and always admired his marketing expertise, dedication, and integrity. In addition to elevating and improving the SPE Innovation Awards Gala and helping to establish AutoEPCON, he enhanced the abilities of those he worked with through his nurturing leadership. I have often heard him described as ‘the nicest man in the industry’ and he certainly was one of our very finest. Terry was a true gentleman and will be greatly missed.”

— Teri Chouinard
SUBSCRIBE TODAY.
compositesworld.com

CW is CompositesWorld!
STRONG, EXPERIENCED AND DEDICATED TO STYRENICS

LURAN®, TERLURAN®, LUSTRAN®, TERBLEND® N AND NOVODUR®

The brands you know and trust – now with a new look.

INEOS Styrolution is the leading, global styrenics supplier. INEOS Styrolution combines the key styrenic assets of two industry powerhouses with over 80 years of experience in the field, complementary portfolios and world-class production facilities. We are dedicated entirely to styrenics and offer the broadest portfolio of standard and specialty styrenic products. Call 1-866-890-6354 to learn more.

ineos-styrolution.com

NEW! STYLIGHT*
A styrenic copolymer composite. Robust lightweight structure with outstanding surface quality for automotive interior such as seat structures, lower consoles, doors, lift gates and more.

Luran, Terluran, Lustran, Terblend and Novodur are registered trademarks of INEOS Styrolution.
* Trademark application pending
The first use of polycarbonate (PC) to injection mold a hard (painted) instrument panel (IP), featured on the 1977 Econoline® van from Ford Motor Co., has been named the 2016 Hall of Fame winner by the Automotive Division of the Society of Plastics Engineers (SPE®).

To be considered for a Hall of Fame award, an automotive plastic or composite component must have been in continuous service in some form for at least 15 years and preferably have been broadly adopted within the automotive or ground-transportation industries. This application certainly qualifies, as PC and PC blends have been used to injection mold IP retainers, uppers, upper trim, lowers, and lower trim for both hard (painted) and soft (skin & foam) IP systems for the last 39 years. The application has proliferated from its first use on commercial vans to high-volume full-size pickups and a number of passenger cars and sport-utility vehicles (SUVs). To date an estimated 200-million IPs using 2-billion pounds/907,185 tonnes of PC or PC blends have been produced globally in the passenger vehicle market. Several IP design variants have been category or Grand Award winners in past SPE Automotive Innovation Awards Competitions.

Interestingly, the original PC IP was molded in a tool that already had been cut for and was running acrylonitrile butadiene styrene (ABS) resin. Ford’s then Saline plant 1, which molded and assembled the IP for the Econoline van, was able to make a running change because both resins had similar shrinkage values in the tool.

Following the first use on commercial vans, other notable vehicles that highlight the spread of the technology across the industry include:

- In 1978, Ford Thunderbird and Mercury Cougar sedans (both from Ford) converted to PC IPs.
- In 1994, PC IPs debuted on the first cars from then Chrysler Corp. with the Dodge Neon compact car, which initially used PC and later PC/ABS.
- In 1996, the Cadillac Eldorado luxury sedan from then General Motors Corp. (GM) featured a glass-reinforced PC IP plus a styrene maleic anhydride (SMA) retainer.
• By 1997, Jeep Wrangler and Jeep Cherokee SUVs from Chrysler Corp. converted to PC/ABS IP. By 1998, when Chrysler merged with Daimler AG to form DaimlerChrysler, both the Chrysler Concorde and Dodge Intrepid full-size cars were using PC IPs with retainers in modified-polyphenylene ether (MPPE). That same year the Dodge Ram pickup sported the first PC/ABS IPs.

• By 1999, Mitsubishi Motor Corp. used PC/ABS IPs on the company’s Mitsubishi Galant sedans.

• In 2000, PC blends debuted on Buick LeSabre and Pontiac Bonneville lower retainers from GM. Impact-modified PC also debuted that year on active uppers on the Bonneville and Chevrolet Impala sedans. And by 2004, the first integrally molded hidden airbag door chute and cover in PC/ABS were used on Chevrolet Malibu and Pontiac G6 sedans from GM.

• PC and PC blend IPs became the default materials for high-volume full-size pickups produced by the Detroit “Big 3.” For example, GM’s Chevrolet Silverado pickups used PC and PC/ABS IPs between 1999 and 2006, and at peak production, 900,000 vehicles/year were sporting the technology. A similar story occurred with Ford’s F-150 pickups, which used PC/ABS IPs between 1997 and 2004 and also had production volumes of 900,000/year at peak production. Another strong contender was the Dodge Ram pickup from Chrysler and later DaimlerChrysler, which used PC/ABS IP technology between 1994 and 2008 and had peak production volumes of 450,000 units/year.

1 The plant was later owned by Visteon Corp., Ford Motor Co., ACH Holdings LLC, and is currently owned by Faurecia Interior Systems.

Vehicle photo courtesy of Ford Motor Co.
Beautiful finishes and metallic effects with Celanese materials

Premium looks can’t be achieved without one key element – an engineered materials partner you can trust. Discover these benefits with our MetalX® Appearance Polymers:

- Color matching and controlled gloss
- Laser markable
- UV stabilized
- Special effects
- Low VOCs
WEIGHTREDUCE

Discover lighter materials for amazing innovation

Create light-weight, innovative interior and exterior parts and components with engineered materials. Our diverse materials portfolio delivers these advantages over metal, and more:

- Reduced costs and increased strength
- Performance for the life of the vehicle
- Up to 40 percent lighter materials than metal
- Traditional and fiber-based thermoplastics

APPEARANCEPREMIUM

Premium looks can't be achieved without one key element – an engineered materials partner you can trust. Discover these benefits with our MetalX® Appearance Polymers:

- Beautiful finishes and metallic effects with Celanese materials
- Color matching and controlled gloss
- Special effects
- Laser markable
- UV stabilized
- Low VOCs

celanese.com
Materials

Low-Density Fascia Trim TPO
2017 General Motors Co.
Cadillac XT5 & GMC Acadia

System Supplier: General Motors Co. Spring Hill
Material Processor: General Motors Spring Hill Injection Molding North
Material Supplier: LyondellBasell
Material / Process: Hifax 1168P TPO / injection molding
Tooling Supplier: Concours Mold, Inc.

Through significant work at the molecular level, a new lower density (0.98 g/cm³) compounded TPO has been developed that meets all the stiffness, impact strength, dimensional stability, and melt-flow rate (MFR) requirements for automotive exterior body side moldings, rocker moldings, wheel flares, and fascias while reducing mass 5%, and cost ≈ $1 USD /vehicle. Owing to its higher MFR, the material can be molded at lower temperatures, saving burden rate and shortening molding cycle times. It offers the same mechanical performance as the standard density TPO it replaced.

Weatherable Structural SMC Truck Box & Trunk
2017 Honda Motor Co.
Honda Ridgeline

System Supplier: Continental Structural Plastics
Material Processor: Continental Structural Plastics
Material Supplier: Ashland Inc.
Material / Process: Arotran 805 unsaturated polyester / compression molding
Tooling Supplier: Century Mold Co. Inc.

The bed, tailgate, in-bed trunk, and cover on this pickup are compression molded in a new weatherable, UV-stable, MIC, structural SMC using unsaturated polyester resin. In-mold black coloring plus texturing are used to eliminate paint and the need for bed liners plus minimize the appearance of scratches and dings. The lockable trunk is a single molded SMC part that can be converted to a watertight cooler. Extensive development work was done to improve the UV resistance of SMC materials, which traditionally have not been weatherable.

NVH Baffles
2016 Ford Motor Co.
Ford F-150

System Supplier: Henkel AG & Co. KGaA
Material Processor: Henkel AG & Co. KGaA / Wittmann Battenfeld, Inc.
Material Supplier: Henkel AG & Co. KGaA
Material / Process: Teroson EV 27007 EVA / 2-shot injection molding
Tooling Supplier: Creative Die Mold Corp.

Because aluminum body panels expand at twice the rate that steel ones do, a new baffle sealing package was needed that would maintain adhesion to the substrate during thermal expansion of the aluminum. It also needed to reduce or eliminate NVH throughout the vehicle to improve driver comfort through a quieter interior. A new EVA expandable sealer with a blowing agent that activates during e-coat and produces an innovative elastic cross-linking network was developed to improve hot-tear strength and elongation vs. previous materials. The EVA foam is injection overmolded onto a PA substrate.

Roof Bow Support Pad
2016 FCA US LLC
Chrysler 300

System Supplier: FCA US LLC
Material Processor: Unique Fabricating, Inc.
Material Supplier: Zotefoams Plc
Material / Process: Zotek ND35 XL PA 6 foam / autoclave cure
Tooling Supplier: AC Steel Rule Die & Jamison Fixture & Tool

To eliminate buckling in sunroof panel during production, rolled pieces of butyl were used between roof bows and the outer skin to provide support. However, that product was labor intensive to use and challenging to consistently apply, which led to visible low spots in sheet metal on both sides of the sunroof panel and thus warranty concerns. To eliminate the buckling, specially formulated, cross-linked, autoclave cured PA 6 closed-cell foam was developed for use with butyl adhesive. The material survives e-coat and paint-oven temps, is lightweight, cost competitive, improves NVH, and saves $1 USD/vehicle vs. butyl rolls.

Photo courtesy of Honda North America, Inc.
**New PC/ABS for Exterior Applications**

**2016 General Motors Co.**

**Opel Astra Sports Tourer**

- **System Supplier:** General Motors Europe
- **Material Processor:** SRG Global
- **Material Supplier:** Trinseo LLC
- **Material / Process:** Pulse XT9215 PC/ABS / injection molding
- **Tooling Supplier:** Socem/SRG

Development of new filler technology with very-low CLTE improved dimensional stability and reduced gap sizes for exterior PC/ABS parts, helping improve fit & finish. High gloss and enhanced paint adhesion makes the material an excellent choice for painted applications. The new grade also is lower density (10%) for lighter lower-cost parts, provides excellent impact strength for better durability, and has improved dimensional stability to reduce warpage. And because MFI is increased, parts can be molded faster and in thinner walls. This allowed the new material to replace aluminum at half the weight and 40% cost reduction (excluding tooling).

---

**Window Frame Surround**

**2015 Daimler AG**

**Mercedes-Benz GLC, GLC Coupe, & E-Class**

- **System Supplier:** Dr. Schneider Automotive Group
- **Material Processor:** Dr. Schneider Automotive Group
- **Material Supplier:** LyondellBasell
- **Material / Process:** Softell TKG 317N PP compound / injection molding
- **Tooling Supplier:** Krumpholx

To meet window-frame surround requirements for high stiffness, low gloss, good surface quality and haptics, colorability with good processability, high scratch and UV resistance, and dimensional stability, a new 25% GR-TPO compound was developed to replace 15% GR-PA 6. The new grade offers higher stiffness, which facilitates thin-wall part design. It does not require drying prior to processing and its properties are not affected by ambient changes in humidity. The result is an 8% weight savings and ≈18% piece-cost savings.

---

**Materials**

- **EV Home Charging Station**
  - **2016 Daimler AG**
  - **Daimler EV Fleet**
  - **System Supplier:** ABL Sursum
  - **Material Processor:** ABL Sursum
  - **Material Supplier:** Trinseo LLC
  - **Material / Process:** Emerge XZ92705.00 PC/Si / injection molded
  - **Tooling Supplier:** Not available

To meet demanding performance requirements for EV home charging unit base plates, a special flame-retardant PC/siloxane compound was developed. The material contains no halogenated additives, offers excellent low-temperature toughness and weatherability, plus improved chemical resistance. Additionally, the PC/Si material provides superior moldability for parts with deep cavities and low draft angles, and crack resistance at pinch points, which makes it easier to attach the plate with screws to home or garage.

---

**Lighter weight is not a trend. It’s a necessity.**

JOIN THE CONVERSATION AT NOWCONNECT.TRINSEO.COM
Materials

**Transmission Oil Catcher**

*2017 Ford Motor Co.*
*Ford F-150*

**System Supplier:** Parker Hannifin Corp  
**Material Processor:** Chomerics Div. of Parker Hannifin Corp.  
**Material Supplier:** DuPont Automotive  
**Material / Process:** Zytel HTN51TC50/SL BK083 PPA / injection molding  
**Tooling Supplier:** Chomerics Div. of Parker Hannifin Corp.

This transmission oil catcher returns transmission oil efficiently to the planetary gear bearings. Since the carrier spins at 7,500 RPMs, is exposed to hot automatic transmission fluid, and has clearances of 0.25 mm, the part cannot warp or creep and must provide excellent chemical resistance. A 50% LF-PPA grade with a complex runner system is used to mold parts with 1.2 mm walls (40% thinner than previous PA grades). The new product improves transmission reliability and lifespan, reduces NVH from gear noise, accommodates tight packaging space, and reduces mass 65% vs. metal designs.

**Vacuum Brake Tubes**

*2016 General Motors Co.*
*Chevrolet Silverado & GMC Sierra*

**System Supplier:** Cooper Standard  
**Material Processor:** Cooper Standard  
**Material Supplier:** DSM Engineering Plastics  
**Material / Process:** Arnitel CM622 TPC-ET / extrusion & 3D post-forming  
**Tooling Supplier:** Not available

A high-performance thermoplastic was needed for vacuum brake tubing to replace reinforced rubber. It needed broad temperature performance (-40-150°C), chemical resistance, burst strength to 60 bar min. and flexural strength to 50 N min. It also had to resist vacuum collapse after 2 hr @ 150°C and provide impact retention after 336 hr @ 150°C. The design was changed to use a smaller diameter, thinner wall to simplify engine/undercarriage routing and eliminate heat shields plus allow quick connects. A TPC-ET elastomer with high thermal oxidative stability was developed. It is 30% lighter, less costly, and eliminates brackets.

**Rhapsody Blue MIC Vehicle Environment**

*2016 Ford Motor Co.*
*Lincoln Continental*

**System Supplier:** Americhem Inc.  
**Material Processor:** Many  
**Material Supplier:** Americhem Inc. & Many  
**Material / Process:** PP, TPO, ABS, PA, POM / injection molding  
**Tooling Supplier:** Many

Project goals were to achieve a unique MIC color space that looks luxurious but appeals to today’s generation. It involved using the first transparent pigment-based interior color deliverable across 76 base resins for the vehicle interior. Once the color was mastered, early attempts showed it was prone to metamerism with a red/green directional hue shift. Numerous attempts to achieve color consistency bidirectionally with standard pigment adjustments did not solve the problem. Finally, the color was remastered using a non-TiO2 system that did not exhibit hue shift, eliminating the need to paint and creating a calming, cool color environment.

**Lightweight TPO Bumper Cover**

*2017 Hyundai Motor Group*  
*Hyundai Genesis G90*

**System Supplier:** ECOPlastic  
**Material Processor:** ECOPlastic  
**Material Supplier:** Hanwha Total Petrochemicals Co., Ltd.  
**Material / Process:** NB71 TPO / injection molding  
**Tooling Supplier:** Hyundai Motor Co.

A new, lighter weight TPO bumper cover was developed using high-crystallinity PP, ethylene-octane rubber, and a combination of nano-size talc and micron-size whisker fillers similar to magnesium oxy-sulfate. The material provides high mechanical performance, improved dimensional stability, and low CLTE thanks to the high aspect ratio filler. Weight is reduced 7-10% and the material is cost neutral vs. the material it replaced. Additionally, 6 patents have been obtained on the development.
Most plastics industry decision-makers get their information from *Plastics Engineering* – but we are much more…

We Connect to the Plastics Marketplace Through Our Digital Media

- Newsletters
- Websites
- Blogs
- Custom Eblasts
- Sponsored Webinars
- Online Academic Journals

Talk to SPE any time to discuss your marketing needs 2017. And our promise is to DELIVER!!

See How Powerful the right partnership can be

CONTACT: ROLAND ESPINOSA
Tel (201) 748-6819 • Fax (201) 748-6667
E-mail: respinosa@wiley.com
The Molding Blog is a news site focusing on advanced plastics technologies.
DRIVING INNOVATION FORWARD

Thermoplastics are making it possible to advance vehicle technologies. But getting the best results is a big challenge. SABIC can assist with industry-leading expertise in designing with a wide range of thermoplastic materials, for parts and systems across the entire vehicle. Because no matter what obstacles may hold our customers back, we’re there with ‘Chemistry that Matters™’ to help them drive forward.

SABIC.com
Transmission Bottom Pan in Long Glass Reinforced Polymer  
2017 Ford Motor Co.  
Ford F-150

System Supplier: Sogefi Group  
Material Processor: Sogefi Group  
Material Supplier: DuPont Automotive  
Material / Process: Zytel 75LG50HSL BK031 LFT-PA6/6 / injection molding  
Tooling Supplier: Sogefi Group

An injection molded 50% long-glass PA 6/6 serves as the main bottom oil pan for a 10-speed automatic transmission. It not only must provide chemical resistance to hot automatic transmission fluid, and maintain structural and sealing integrity for the life of the vehicle without deflection due to extremely tight stack up, but it also must resist damage from road debris and nearby exhaust plumbing. Furthermore, the pan is required to support the full weight of the transmission when the latter is removed from the vehicle. It reduces weight 55% and cost 15% vs. previous steel pans.

PVC Vent Tube  
2016 General Motors Co.  
LGE Platform

System Supplier: Chinaust Group  
Material Processor: Chinaust Group  
Material Supplier: Celanese Corp.  
Material / Process: Fortron FX75T1 PPS / reactive extrusion & thermoforming  
Tooling Supplier: Not available

Increased temperatures due to engine downsizing and turbo boosting required the development of a new material with thermal performance to 175°C for the crankcase ventilation tube. Additionally, the team wanted to eliminate metal and rubber parts but retain the flexibility to use quick connectors to the engine during final assembly. A flexible alloy based on unreinforced, impact modified PPS was selected. Parts are formed by reactive extrusion followed by thermoforming at 190°C for 25 minutes. They are 50% lighter than metal and save $3/part. They also offer better temperature and chemical resistance than previous PA 6 tubes.

Torque-Tube Bearing Spacer  
2015 General Motors Co.  
Buick Envision

System Supplier: American Axle & Manufacturing, Inc.  
Material Processor: NN Industrial Molding  
Material Supplier: DuPont Automotive  
Material / Process: Zytel HTNS1LG50HSL BK083 LFT-PPA / injection molding  
Tooling Supplier: HS Molds Ltd.

This metal-to-plastic conversion of a torque-tube bearing spacer provides significant weight savings to the drivetrain. The injection molded 50% long-glass PPA material eliminates machining on previous cast housings, provides high stiffness and low creep, outstanding impact resistance, high temperature performance, and holds ID and OD tolerances of ± 50 μ. It also reduces mass 80% and costs 40-60%. Further, the composite spacer improves serviceability / rework and eliminates galling on the torque tube.

Air Intake Manifold  
2015 Volkswagen AG  
EA21 Engine 1.6L engines

System Supplier: Hua Tao Ltd.  
Material Processor: Hua Tao Ltd.  
Material Supplier: SABIC  
Material / Process: SABIC G3135X PP / injection molding & vibration welding  
Tooling Supplier: Not available

This is the first air-intake manifold launched in China using 35% GR-PP to replace PA 6/6. The application provides 25-30% cost reduction and 15-20% molded-part weight reduction while retaining properties at high temperatures and improving weld strength, and NVH by 5 dB. Unique technology involving finer glass fibers and special sizing helps meet performance requirements. Parts are vibration welded.
BOUNDLESS INNOVATION.

Being vertically integrated allows ABC Group Inc. to establish a reduced carbon footprint, globally. We are widely recognized for our innovative designs, and the development of world-class thermoplastic components and systems. Ultimately, our creative lightweighting solutions drives a positive impact on the environment.

2.0L GTDI Turbo Compressor Outlet Duct
2017 FCA
Alpha Romeo Giulia

System Supplier: ABC Group, Inc.
Material Processor: ABC Group, Inc.
Material Supplier: BASF Corp.
Material / Process: Ultramid Endure D5G3 BM PA 6/6 / 3D flashless blow molding
Tooling Supplier: ABC Group, Inc.

To meet more stringent fuel efficiency and tailpipe emissions requirements, engines increasingly are being downsized and turbocharged, but that raises temperatures and pressures that underhood components see during operation. For example, charge air ducts, which take air from the turbocharger to the throttle body, can see continuous-use temps as high as 220°C and pressures as high as 207 kPa. Further, compact packaging space requires efficient designs. Switching to a heat-stabilized PA 6/6 capable of being 3D flashless blow molded reduces mass 30-40% and cost 20-25% vs. metallic designs.
Process, Assembly & Enabling Technologies

3D Flocking Tape on Inner & Outer Belt
2015 PACCAR Inc. Kenworth

System Supplier: Hutchinson Group
Material Processor: M.I. Integration
Material Supplier: RheTech A HEXPOL Co. / ExxonMobil Chemical Co.
Material / Process: Rhetech T20P100 PP & Santoprene 121-70M350 TPV / Injection molding + 6 axis robot application of flocking
Tooling Supplier: M.I. Integration

This 3D cell applies flocking tape to the bi-injected TPV/PP outer belt using a 6-axis robot. For optimal performance, the process requires multiple adjustments, including speed, contact pressure, heat, and proper guidance. It is able to meet general tolerances of ± 1 mm and CLD client requirements. Benefits of the process include reduction of secondary operations, eco-friendly recyclable part, design flexibility vs. extrusion, reduction in weight (10-15%) and cost (~25%), reduction of labor, and cosmetic and performance improvements. The flocking tape facilitates sliding across 3D parts.

Zipper Clip
2017 General Motors Co. Chevrolet Malibu

System Supplier: 3 Dimensional Services Group
Material Processor: 3 Dimensional Services Group
Material Supplier: Celanese Corp.
Material / Process: Celcon M90 POM / injection molding
Tooling Supplier: 3 Dimensional Services Group

The zipper clip is a plastic solution that gives the holding benefits of a stud-and-nut combination while reducing production limitations. Ideal for use where a nut is desired but not feasible, this is the first stud insert with 4 ratcheting control features and a self-centering 2-way locator that holds over 120 lb/54.43 kg of weight while it requires low ergonomic effort (5.11 lb/2.32 kg) for assembly. The design reduces spring back as well as weight and cost and eliminates the need for assembly equipment as well as an isolator, since it protects the stud from corrosion.

Composite Tambour Door
2017 Ford Motor Co. Lincoln Continental

System Supplier: NBHX Trim GmbH
Material Processor: American Autocoat
Material Supplier: BASF Corp.
Material / Process: Ultramid B3WG13 BK00102 63% GR-PA 6/6 / back injection molding
Tooling Supplier: Classic Die Precision Plastic Molds

This application features an insert-molded wood composite that is back injected via 15 gates to create individual plastic slats that are connected in the back. A 3-axis laser is used to separate wood between slats for a cohesive grain appearance. Unlike conventional flat compression molded wood tambour doors featuring layers of veneer, interply, and adhesive, these doors are curved. The part features 63% GR-PA 6/6 with extremely low shrink (0.05 mm) to match the non-shrinking wood. Use of a large number of gates on a relatively small part eliminates warpage.

Precise Integration-Enabled System
2015 General Motors Co. Chevrolet Volt

System Supplier: ITW Deltar
Material Processor: ITW Deltar
Material Supplier: Celanese Corp.
Material / Process: MetaLX Hostaform POM / injection molding
Tooling Supplier: ITW Deltar

The precision integration-enabled system is a patented locating and attachment feature that minimizes gaps or movement as well as manufacturing variation common with snap fits while leveraging the inherent elastic deformation properties of plastic. No external fixtures are needed, labor is reduced, and ergonomics are improved. This is the first application to use a MIC bezel for the housing that prevented water migration without need for additional seals. Also, the typical tooling action needed to mold snap fits is eliminated, saving tooling time and costs.
TPO-Coated Suspension Arm
2015 General Motors Co.
Cadillac ATS

System Supplier: Cymas Enterprises Ltd.
Material Processor: Cymas Enterprises Ltd.
Material Supplier: LyondellBasell
Material / Process: 7905 TPO / powder coating
Tooling Supplier: Not available

By using a cryogenically ground TPO powder coating to protect e-coated steel suspension arms instead of paint, service life is extended from 3-5 years to a decade, the fully encapsulated part gains improved stone-chip resistance and corrosion protection. Overspray can be reused, so the process generates almost zero waste, eliminates VOCs and isocyanates, and produces finished parts much faster than previous alternatives. Since there is no need for a post-bake process, it also saves energy. Thinner gauge, high-tensile steel is used for the suspension arms to save weight.

Hot-Gas Welded Thermostat Housing Assembly
2017 Ford Motor Co.
3.5L V6 Cyclone TIVCT GTDI engines

System Supplier: Plastic Tec - Bocar Group
Material Processor: Plastic Tec - Bocar Group
Material Supplier: DuPont Automotive
Material / Process: Zytel HTNS51G35HSLR BK420 35% GR-PPA / injection molding & hot-gas welding
Tooling Supplier: Schweiger GmbH & Co. KG

Hot-gas welding joins both halves of this 35% GR-PPA thermostat housing assembly. The part has a small welding-flange footprint but high weld strength because there is no fiber/material degradation during the joining process. In fact, it is the only welding process that permits bridging of glass across the joint. The weld distance is held within 0.1 mm, enabling parts to package into very limited spaces with tight tolerances. Since the part is not touched during welding, there is no sticking. Versus previous aluminum solutions, the PPA assembly is 30% lighter and 40% less costly.
A/C Register Chrome Vane Cap
2017 Ford Motor Co.
Lincoln Continental

Chrome-plated ABS vane caps with a contoured edge create unique styling and a new decorative finish to A/C register vanes without jeopardizing vane surface appearance. An automated process is used to apply adhesive bonding material to the vane cap and then assemble the vane to the vane body with zero-gap margins for excellent fit & finish. The process eliminates appearance defects due to mechanical locks on the vane body and permits parts to be handled within 20 sec.

Laser Ablation to Improve Bond Adhesion
2016 General Motors Co.
Chevrolet Corvette

Previously used to clean mold surfaces in the composites industry, a modified laser system is used to improve bond adhesion on composite parts. Replacing hand sanding, the robotic laser-ablation program reduces labor, benefits industrial hygiene (no dust, self-contained system), improves consistency and repeatability, shortens cycle time, eliminates perishable items (e.g. masks, sandpaper, and wipes), and lowers cost an average of 15%. The system’s flexibility permits program path, angle of attack, and energy level to be customized for each part’s unique material and geometry.

Carbon Core Structural Components
2015 BMW Group
BMW 7 Series Sedan

Carbon fiber-reinforced fast-cure epoxy and high-pressure RTM and liquid compression molding (LCM) are used to produce 27 CFRP parts for the vehicle’s mixed-material BIW structure to support production volumes of 80,000+ vehicles/year. The HP-RTM roof arc follows the shapes of the car body and offers an outstanding weight/performance ratio. The LCM tunnel reinforcement improves the vehicle’s torsional stiffness and is produced in <1 min. These “carbon core” parts replace metal, improve stiffness, ride/handling, and safety while reducing vehicle mass 40 kg for better fuel efficiency and tailpipe emissions.
**Process, Assembly & Enabling Technologies**

**Robotic Laser Cutting and Welding of TPO Fascia**
2017 General Motors Co.
Chevrolet Camaro ZL1

- **System Supplier:** Magna Exteriors, Inc.
- **Material Processor:** Magna Exteriors, Inc. / DexSys
- **Material Supplier:** LyondellBasell
- **Material / Process:** Hifax TYC1168X TPO / injection molding + robotic laser cutting & welding
- **Tooling Supplier:** Jenoptik AG

A hydraulic punch and sonic welding operation was replaced by robotic laser cutting and welding of a Class A exterior fascia. Unlike other welding processes, it is not necessary to thicken wallstock in weld areas to prevent readthrough with robotic laser welding of brackets on the backside of the part, and that reduces weight slightly. It also eliminates the need for contoured horns and punches. Clean cuts can be made in 1 sec on the painted side of the part. The dual-function process provides greater flexibility between programs and reduces floor space and tooling costs.

**Power Head Restraint Guide Sleeves**
2017 Ford Motor Co.
Lincoln Continental

- **System Supplier:** Grammer AG
- **Material Processor:** Treck Plastics
- **Material Supplier:** DuPont Automotive
- **Material / Process:** Delrin 100 POM / injection molding
- **Tooling Supplier:** HS Die & Engineering

This project created robust modular assembly features to allow quick connection of electrical connectors/wiring at lower cost for the power head restraint system. By integrating the electrical connector receptacle and wiring assembly into the injection molded POM guide sleeves, proper connector alignment is assured and power head restraints can be assembled in a similar manner and time as manual head restraints. This reduces assembly time, complexity, investment, and quality issues and has led to 2 patents being filed.
Efficient.
Fast.
Precise.

Laser technology for precise and efficient materials processing!

CO₂ beam delivery through the robot - beam in motion (BIM)

Laser Welding Plastics:
• 120W direct diode robot mounted Laser
• Utilizes thinner materials for lighter vehicles/lower costs
• Less cycle time than ultrasonic welding
• No pressure or hold time required
• Lower tooling cost than ultrasonic

Laser Cutting Plastics:
• Highest path/position accuracy available +/-500um
• Non-contact non-wearing process
• Lower tooling cost than traditional punch machines
• Processes Class A painted surfaces
• Completely flexible

Award winning, innovative, best-in-class materials processing of automotive Class A painted fascias.

Jenoptik

Jenoptik Automotive North America LLC.
1505 West Hamlin Rd, Rochester Hills, MI 48309
Tel: 248-853-5888  Fax: 248-853-1505
www.jenoptik.com
Safety

Seat Cushion Frame and Storage Door
2016 Ford Motor Co.
Ford Super Duty

System Supplier: Royal Technologies Corp.
Material Processor: Royal Technologies Corp.
Material Supplier: Celanese Corp.
Material / Process: Celstran GF40-20 LFT-PP / injection molding
Tooling Supplier: Vortec Tooling Solutions, Inc.

For the first time, a polymer composite has replaced magnesium in a structural seat-cushion frame and under-seat storage lid for a front center 20% seat with integrated restraint system. The application is weight neutral and lower cost (= $4 USD/unit), and satisfies all safety and crashworthiness requirements. Its flexible architecture allows for updates with future enhancements. Injection molded 40% LFT-PP is used to mold the frame, which also features an EPP antisubmarine foam block and a lockable ergo-latch. The assembly represents a significant reduction in carbon footprint vs. magnesium and has yielded 2 awarded and 2 pending patents.

Airbag Support
2017 Ford Motor Co.
Ford Explorer

System Supplier: ZF TRW
Material Processor: The Woodbridge Group
Material Supplier: JSP
Material / Process: Arpro EPP / steam-chest molding
Tooling Supplier: The Woodbridge Group

This is the first known application where EPP foam replaces stamped steel for a passenger knee airbag support bracket. The 15 lb/ft³/240 kg/m³ density foam sustains airbag deployment reaction loads at all environmental conditions and reduces mass 88% and piece cost 55% vs. the incumbent design. The weight reduction led to other benefits, including elimination of 2 assembly-aid clips, ergonomic improvements, improved vehicle fuel economy, and reduced shipping costs. The simplified manufacturing process involves no secondary processes, eliminates 3 torque monitoring joints for additional manufacturing savings, and is backward compatible for serviceability.

Modular Composite Front-Seat Cushion Pan
2017 Ford Motor Co.
Lincoln Continental

System Supplier: Leggett & Platt / Great Lakes Trim / Grammer Industries
Material Processor: Engineered Plastics/Grand Traverse Plastics / Johnson Electric
Material Supplier: BASF Corp. / Advanced Composites, Inc. / DuPont Automotive
Material / Process: Ultramid B3ZG7 OSI 35% GR-PA; ADX 5017 18% talc-filled UV-TPO; Delrin 100P NC010 POM / injection molding
Tooling Supplier: MacLean-Fog/Commercial Tool & Die / Johnson Electric

This patent-pending, plastics-intensive, modular composite front seat-cushion pan (in impact-modified 35% GR-PA), side-airbag deployment back panel (in talc-filled TPO), and power head-restraint drive nut (in POM) create a robust and dynamic crash-energy management system for front impact protection, side airbag deployment, and energy management for occupant impact protection. Further, the system enables modular assembly and scalable features for assembly ease. Already 83 patents have been filed and 12 granted on this innovative seat system.

Looking for a cost-effective way to reach transportation engineers working with plastics around the world?
Help sponsor our SPE Automotive Division Newsletter, distributed globally four times per year.

For rates & information, please contact Teri Chouinard at intuit Group, teri@intuitgroup.com +1.248.701.8003
Safety

Next-Generation Armrest for Side Impact
2016 Ford Motor Co.
Ford Super Duty

System Supplier: Yanfeng USA Automotive Trim Systems Company, Inc.
Material Processor: Yanfeng USA Automotive Trim Systems Company, Inc.
Material Supplier: LyondellBasell
Material / Process: SG702 PP / injection molding
Tooling Supplier: ToolPlas Systems Inc.

Minimizing door intrusion during side impacts usually requires intensive body-structure countermeasures. Abdomen criteria for 5th and 50th percentile dummies are primarily driven by door-trim armrest stiffness during side impacts. This new door-trim armrest improves safety as a tuning component by acting as a load limiter and absorbing energy. Comprised of a skin, foam pad, PP-nonwoven trampoline fabric, ABS armrest substrate, and PP trampoline frame, the system is significantly softer than previous designs, substantially outperforming static and dynamic functional requirements without adding countermeasures, cost, or weight. Further, armrest durability improves 6x, and costs and weight are reduced $31.80 and 3.8 kg per vehicle.

Crash Box Integrated Rear Bumper Beam
2016 Hyundai Motor Group
Ioniq

System Supplier: LG Hausys
Material Processor: Najung ENG
Material Supplier: LG Hausys (CFT) / LG CHEM (TPO)
Material / Process: LG Chem TPO / compression & injection overmolding
Tooling Supplier: Najung ENG

This crash box-integrated plastic rear bumper back beam meets Korean regulations and RCAR requirements at 21% lower weight and 39% lower cost than the conventional steel rear beam it replaced. The center of the hybrid beam is compression molded from continuous-fiber-reinforced PP/glass composite to induce effective front impact energy absorption. The entire back-beam shape and crash boxes on either end are injection overmolded using 60% GR-TPO, which has been modified for low-temperature performance.

Integrated Fascia Stiffener
2017 MY Ford Motor Co.
Ford Escape

System Supplier: Plastic Omnium
Material Processor: Plastic Omnium
Material Supplier: SABIC
Material / Process: Stamax 2700 40% GR LFT-PP / injection molding
Tooling Supplier: Basis

This patent-pending lower fascia (belly pan) stiffener is designed to balance the load requirements of both lower-leg pedestrian protection and low-speed damageability in a single component using a series of integrated stiffeners. Replacing plastic/metal hybrid and all-metal designs, all required features (including variations in material thickness, ribs, and various sections) are contained on the B side of the component and molded in a single tool, lowering assembly time, eliminating straps, and lowering BSR. The stiffener removes 1.5 kg of mass and saves $2 USD/vehicle piece cost plus an additional $50,000 USD in tooling avoidance.

What’s inside counts.

www.yfai.com

Yanfeng
Global Automotive Interiors
ATTEND THE WORLD’S LEADING AUTOMOTIVE COMPOSITES FORUM
You’re invited to attend the 17th-annual SPE Automotive Composites Conference and Exhibition (ACCE), September 6-8, 2017 in the Detroit suburbs. The show — which has become the world’s leading automotive composites forum — features technical sessions, panel discussions, keynotes, receptions, and exhibits highlighting advances in materials, processes, and equipment for both thermoset and thermoplastic composites in a wide variety of transportation applications.

PRESENT BEFORE AN ENGAGED, GLOBAL AUDIENCE
The SPE ACCE draws over 900 attendees from 15 countries on 5 continents who are interested in learning about the latest composites technologies. Few conferences of any size offer such an engaged, global audience vitally interested in hearing the latest composites advances. Interested in presenting your latest research? Abstracts are due March 31, 2017 and Papers on May 31, 2017 to allow time for peer review. Submit abstracts via http://submitACCEpapers.com.

SHOWCASE YOUR PRODUCTS & SERVICES
A variety of sponsorship packages are available. Companies interested in showcasing their products and / or services should contact Teri Chouinard of Intuit Group at teri@intuitgroup.com.

For More Information
+1.248.244.8993 ext. 4
http://speautomotive.com/comp
印刷杂志 Prints
《中国塑料橡胶CPRJ》和CPRJ国际版
China Plastic & Rubber Journal &
CPRJ International

电子报 eNews

研讨会 Conference

在线订阅 SUBSCRIPTION AdsaleCPRJ.com/Members

超过600,000位专业人士通过CPRJ获取最新市场新闻和技术报导。
More than 600,000 industrial professionals depend on CPRJ for latest market news & product technology.

马上注册即享5大权利
Register as a member to enjoy 5 benefits

1. 每周电子报 eNews Weekly
2. 产品查询 Product enquiry
3. 文章刊登机会 Articles publication
4. 展会论坛参观特惠 Discounts for admission of exhibitions & conferences
5. 读者个性化服务 Customized readers service

CPRJ塑料橡胶
China Plastic & Rubber Journal
CPRJ国际版
China Plastic & Rubber Journal China Rubber Journal

大会指定媒体 Official Media

展会论坛参观特惠 Discounts for admission of exhibitions & conferences

雅式出版有限公司 Adsale Publishing Limited
(雅式集团 Adsale Group)

邮箱 : crpj@adsale.com.hk
The SPE® Automotive and Composites Divisions, in conjunction with The SPE Foundation®, have formed an endowed scholarship to honor the memory of Dr. Jackie Rehkopf and are still accepting donations. The groups hope to raise funds for a sufficiently large endowment to allow annual scholarships to be given to deserving undergraduate or graduate students studying engineering or science and with plans to work in the field of transportation composites.

Rehkopf spent her career doing research in the field of automotive plastics and composites. She was a long-time SPE ACCE committee member, session organizer, and two-times technical program co-chair. She also served on the SPE Automotive Division board as a director from 2005 through 2014, plus was intersociety chair for 2 years and treasurer for 2 years. She was active from the mid-1990s until 2014 with SAE International®, helping organize a large plastics session for over a decade for SAE Congress. Additionally, she wrote a book in 2011 entitled Automotive Carbon Fiber Composites: From Evolution to Implementation that was published by SAE. She was awarded an SAE Outstanding Technical Contribution Award for her work in co-developing and sponsoring the SAE Standard J2749 High Strain Rate Tensile Testing of Polymers. She authored many publications and presented at numerous technical conferences during her 20 year career.

In both academia and industry, Rehkopf’s research interests were in mechanics of materials. After earning both B.S. and Ph.D. degrees in Civil Engineering from the University of Waterloo in Canada, she moved to the Detroit area and began work in 1994 as a materials engineer for Ford Motor Co. After 4 years, she became a technical specialist at Ford in the company’s Research Lab Safety Department (from 1998-2003) and later in the Materials Engineering Department (from 2003-2006). She left the automaker in 2006 to join Exponent as a senior engineer and consultant in the areas of mechanics of materials, structural mechanics and dynamics, experimental testing, and failure analysis. Rehkopf’s expertise was in high-strain-rate behavior of both metallic and polymeric materials, and fatigue and creep of reinforced and non-reinforced plastics. In 2010, she joined the R&D department of Plasan Carbon Composites as a senior researcher working on carbon fiber-reinforced composites. During her first 2 years at Plasan, she split her time between the company’s Customer Development Center in Michigan and offices at Oak Ridge National Laboratory where she was principal investigator for a 3-year U.S. Department of Energy (DOE)-sponsored project that Plasan participated in on predictive modeling of carbon fiber composites in automotive crash. In 2013, Rehkopf became director of research at Plasan with a focus on developing new materials systems to facilitate the use of carbon fiber composites in mainstream automotive applications. She lost a year-long battle to cancer in 2014.

SPE® Still Accepting Donations for Dr. Jackie Rehkopf Endowed Scholarship

Those interested in contributing to the Dr. Jackie Rehkopf endowed scholarship should send a check (made out to The SPE Foundation) to:

The SPE Foundation - Rehkopf Scholarship
Attn: Gene Havel
6 Berkshire Blvd, Suite 306
Bethel, CT 06801 USA

PLEASE mark in the Notes section of your check that the funds are for the Rehkopf Scholarship so they are applied to the correct fund. For more information, call +1 203.740.5457 or email foundation@4spe.org. Donations made by U.S. citizens are tax deductible.
The Hall of Fame Award is given annually for an application that has been in continuous use for 16 years or more, and has made a significant and lasting contribution to the application of plastics in automobiles.

<table>
<thead>
<tr>
<th>Year</th>
<th>Recognized</th>
<th>OEM</th>
<th>Application</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td></td>
<td>General Motors Co.</td>
<td>GMT Composite Bumper</td>
<td>PP/Glass GMT</td>
</tr>
<tr>
<td>2014</td>
<td></td>
<td>General Motors Co.</td>
<td>Blow-Molded CVJ Half Shaft Drive-Axle Boot</td>
<td>TPE</td>
</tr>
<tr>
<td>2013</td>
<td></td>
<td>Ford Motor Co.</td>
<td>Integrated Front-End Module System</td>
<td>SMC</td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td>General Motors Co.</td>
<td>First Publicly Accessible Airbag System</td>
<td>multiple</td>
</tr>
<tr>
<td>2011</td>
<td></td>
<td>General Motors Co.</td>
<td>Integrated Door Hardware Module</td>
<td>PC/PBT</td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td>General Motors Co.</td>
<td>Front &amp; Rear TPO Bumper Fascias</td>
<td>TPO</td>
</tr>
<tr>
<td>2009</td>
<td></td>
<td>General Motors Co.</td>
<td>Thermoplastic Vertical Body Panel</td>
<td>MPPE/PA</td>
</tr>
<tr>
<td>2008</td>
<td></td>
<td>Chrysler LLC</td>
<td>Rear Seat Cushion</td>
<td>PUR Foam</td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td>Ford Motor Co.</td>
<td>Radiator End Tank</td>
<td>PA 6/6</td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td>General Motors Corp.</td>
<td>Thermoplastic Front Grille</td>
<td>ABS</td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td>Porsche</td>
<td>Theroplastic Intake Manifold</td>
<td>PA</td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td>Ford Motor Co.</td>
<td>Box Beam Bumper</td>
<td>PC/PBT</td>
</tr>
<tr>
<td>2003</td>
<td></td>
<td>General Motors Corp.</td>
<td>Dual-Density Energy Absorbing Bumper System</td>
<td>PA</td>
</tr>
<tr>
<td>2002</td>
<td></td>
<td>General Motors Corp.</td>
<td>Mini-Wedge Latch and Door-Lock Actuator</td>
<td>PA</td>
</tr>
<tr>
<td>2001</td>
<td></td>
<td>General Motors Corp.</td>
<td>Wiper-System Transmission Housing</td>
<td>SMA</td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td>Volkswagen AG</td>
<td>Instrument-Panel Retainer</td>
<td>HDPE</td>
</tr>
<tr>
<td>1999</td>
<td></td>
<td>Ford Motor Co.</td>
<td>Fuel Tank</td>
<td>PA</td>
</tr>
<tr>
<td>1998</td>
<td></td>
<td>Citroën</td>
<td>Hydraulic Clutch Actuator</td>
<td>PA</td>
</tr>
<tr>
<td>1997</td>
<td></td>
<td>Ford Motor Co.</td>
<td>Fan Shroud</td>
<td>PA</td>
</tr>
<tr>
<td>1996</td>
<td></td>
<td>General Motors Corp.</td>
<td>Transmission Seal</td>
<td>PPS</td>
</tr>
<tr>
<td>1995</td>
<td></td>
<td>General Motors Corp.</td>
<td>Front Fenders</td>
<td>RIM-PUR</td>
</tr>
<tr>
<td>1994</td>
<td></td>
<td>Ford Motor Co.</td>
<td>Guide-Flex Energy Absorbers</td>
<td>EVA</td>
</tr>
<tr>
<td>1993</td>
<td></td>
<td>General Motors Corp.</td>
<td>Headlamp Assembly</td>
<td>PC</td>
</tr>
<tr>
<td>1992</td>
<td></td>
<td>General Motors Corp.</td>
<td>Front/Rear Bumper Covers</td>
<td>RIM-PUR</td>
</tr>
<tr>
<td>1991</td>
<td></td>
<td>General Motors Corp.</td>
<td>Composite Exterior Body Panels</td>
<td>SMC</td>
</tr>
<tr>
<td>1990</td>
<td></td>
<td>General Motors Corp.</td>
<td>Tilt Steering-Wheel Centering Sphere</td>
<td>Acetal</td>
</tr>
<tr>
<td>1989</td>
<td></td>
<td>General Motors Corp.</td>
<td>Transverse Leaf Spring</td>
<td>Epoxy</td>
</tr>
<tr>
<td>1988</td>
<td></td>
<td>American Motors Corp.</td>
<td>Battery Case</td>
<td>PP</td>
</tr>
<tr>
<td>1987</td>
<td></td>
<td>Ford Motor Co.</td>
<td>Windshield Interlayer</td>
<td>PVB</td>
</tr>
<tr>
<td>1986</td>
<td></td>
<td>General Motors Corp.</td>
<td>Grill-Opening Panel</td>
<td>SMC</td>
</tr>
<tr>
<td>1985</td>
<td></td>
<td>Chrysler Corp.</td>
<td>Heater Housing</td>
<td>PP</td>
</tr>
<tr>
<td>1984</td>
<td></td>
<td>Chrysler Corp.</td>
<td>Disc-Brake Piston</td>
<td>Phenolic</td>
</tr>
<tr>
<td>1983</td>
<td></td>
<td>General Motors Corp.</td>
<td>Front-Fender Wheel Liner</td>
<td>PP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General Motors Corp.</td>
<td>Emissions Control Canister</td>
<td>PA</td>
</tr>
</tbody>
</table>
If your company is involved in extrusion—be it film, sheet, pipe, profile, tubing or compounding, or some combination thereof—Extrusion 2016 is for you!

The conference presentations consist of morning sessions devoted to technical and business issues common to all types of extrusion, followed by breakout sessions devoted to specific types of extrusion. These presentations, together with the exhibits at Extrusion 2016, will give you unprecedented access to new technology, tips and techniques, and best practices aimed at helping you boost efficiencies at your operation.

SPE ACCE ATTENDEES—REGISTER TODAY & SAVE $100! Use Promo code: SPEACCE16

To register, for more information, or for a list of confirmed presenting companies, please visit: ExtrusionConference.com

SPONSORSHIPS ARE AVAILABLE! Contact Jackie Dalzell at jdalzell@ptonline.com
<table>
<thead>
<tr>
<th>Year</th>
<th>OEM</th>
<th>Application</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>General Motors Co.</td>
<td>Ultralight Class A Body Panels</td>
<td>SMC</td>
</tr>
<tr>
<td>2014</td>
<td>Ford Motor Co.</td>
<td>Active Glove Box</td>
<td>TPO</td>
</tr>
<tr>
<td>2013</td>
<td>Nissan Motor Co.</td>
<td>All-Olefic Liftgate</td>
<td>TPO/PP</td>
</tr>
<tr>
<td>2012</td>
<td>General Motors Co.</td>
<td>All-Olef, Soft Skin, Stitched Full IP System</td>
<td>TPO</td>
</tr>
<tr>
<td>2011</td>
<td>Ford Motor Co.</td>
<td>Microcellular-Foam Instrument Panel</td>
<td>PP</td>
</tr>
<tr>
<td>2010</td>
<td>Ford Motor Co.</td>
<td>Diesel-Exhaust Fluid (DEF) System</td>
<td>Multiple</td>
</tr>
<tr>
<td>2009</td>
<td>General Motors Co.</td>
<td>Shielded Plastic Case Radio</td>
<td>PC/ABS</td>
</tr>
<tr>
<td>2008</td>
<td>BMW</td>
<td>Twin-Sheet Blow-Molded Fuel System</td>
<td>HDPE</td>
</tr>
<tr>
<td>2007</td>
<td>General Motors Corp.</td>
<td>Backlighting with Color-Converting Plastic</td>
<td>PC</td>
</tr>
<tr>
<td>2006</td>
<td>DaimlerChrysler</td>
<td>Blow-Molded Front- &amp; Rear-Bumper System</td>
<td>TPO</td>
</tr>
<tr>
<td>2005</td>
<td>Honda Motor Co.</td>
<td>Composite In-Bed Trunk</td>
<td>SMC</td>
</tr>
<tr>
<td>2004</td>
<td>Ford Motor Co.</td>
<td>Door Trim with Integrated Acoustic Chamber and Subwoofer</td>
<td>PP</td>
</tr>
<tr>
<td>2003</td>
<td>DaimlerChrysler</td>
<td>Roof Module</td>
<td>PC Copolymer</td>
</tr>
<tr>
<td>2002</td>
<td>DaimlerChrysler</td>
<td>Extruded Polymer Film Fascia</td>
<td>Multi-Layer ionomer</td>
</tr>
<tr>
<td>2001</td>
<td>General Motors Corp.</td>
<td>Nanocomposite TPO</td>
<td>Nanocomposite TPO</td>
</tr>
<tr>
<td>2000</td>
<td>Ford Motor Co.</td>
<td>Controlled Energy Management Bumper Isolator</td>
<td>HDPE</td>
</tr>
<tr>
<td>1999</td>
<td>DaimlerChrysler</td>
<td>Fan Shroud and Reservoir Assembly</td>
<td>PP</td>
</tr>
<tr>
<td>1998</td>
<td>Mitsubishi Motors</td>
<td>1&quot; Section Bumper Beam</td>
<td>PP-GMT</td>
</tr>
<tr>
<td>1997</td>
<td>Ford Motor Co.</td>
<td>&quot;Carpet to Car Parts&quot;</td>
<td>PA</td>
</tr>
<tr>
<td>1996</td>
<td>General Motors Corp.</td>
<td>Structural Battery Tray</td>
<td>PP-GMT</td>
</tr>
<tr>
<td>1995</td>
<td>Ford Motor Co.</td>
<td>Integrated Front-End System</td>
<td>SMC</td>
</tr>
<tr>
<td>1994</td>
<td>General Motors Corp.</td>
<td>Thermoplastic Air-Intake Manifold</td>
<td>PA Copolymer</td>
</tr>
<tr>
<td>1993</td>
<td>Ford Motor Co.</td>
<td>Front-Suspension Stabilizer Link</td>
<td>POM</td>
</tr>
<tr>
<td>1991</td>
<td>Chrysler Corp.</td>
<td>Integrated Child’s Seat and Top Impact Pad</td>
<td>PP-GMT, Expanded MPPE</td>
</tr>
<tr>
<td>1990</td>
<td>General Motors Corp.</td>
<td>Exterior Door Panel</td>
<td>PC/ABS</td>
</tr>
<tr>
<td>1989</td>
<td>Chrysler Corp.</td>
<td>Composite Wheel</td>
<td>SMC/XMC</td>
</tr>
<tr>
<td>1988</td>
<td>General Motors Corp.</td>
<td>Front Fender</td>
<td>MPPE/PA</td>
</tr>
<tr>
<td>1987</td>
<td>General Motors Corp.</td>
<td>Quarter-Panel Assembly – Sportside</td>
<td>SMC</td>
</tr>
<tr>
<td>1986</td>
<td>General Motors Corp.</td>
<td>Quarter Window</td>
<td>PMMA</td>
</tr>
<tr>
<td>1985</td>
<td>General Motors Corp.</td>
<td>Windshield with Anti-Lacerative Layer</td>
<td>Polyvinyl Butyral/PE Film</td>
</tr>
<tr>
<td>1984</td>
<td>Ford Motor Co.</td>
<td>Drive Shaft</td>
<td>Vinyl/ester/Graphite/Glass</td>
</tr>
<tr>
<td>1983</td>
<td>General Motors Corp.</td>
<td>Exterior Body Panels</td>
<td>SMC, RIM, RRIM, &amp; TPO</td>
</tr>
<tr>
<td>1982</td>
<td>General Motors Corp.</td>
<td>Tailgate Assembly</td>
<td>SMC</td>
</tr>
<tr>
<td>1981</td>
<td>Ford Motor Co.</td>
<td>Radiator-Core End Caps</td>
<td>PA</td>
</tr>
<tr>
<td>1980</td>
<td>General Motors Corp.</td>
<td>Rear-Axle Leaf Spring</td>
<td>Epoxy</td>
</tr>
<tr>
<td>1979</td>
<td>Ford Motor Co.</td>
<td>Grille-Opening Panel Assembly</td>
<td>SMC</td>
</tr>
<tr>
<td>1978</td>
<td>General Motors Corp.</td>
<td>Bucket Seat Frame</td>
<td>SMC</td>
</tr>
<tr>
<td>1977</td>
<td>Ford Motor Co.</td>
<td>Instrument Panel</td>
<td>PP</td>
</tr>
<tr>
<td>1976</td>
<td>Ford Motor Co.</td>
<td>Fender Aprons</td>
<td>PC</td>
</tr>
<tr>
<td>1975</td>
<td>American Motors Corp.</td>
<td>One-Piece Jeep Top</td>
<td>RIM-PUR</td>
</tr>
<tr>
<td>1974</td>
<td>General Motors Corp.</td>
<td>Fascia and Rear Bumper Cover</td>
<td>PP</td>
</tr>
<tr>
<td>1973</td>
<td>Ford Motor Co.</td>
<td>Block-Heater Motor Housing</td>
<td>Phenolic</td>
</tr>
<tr>
<td>1972</td>
<td>General Motors Corp.</td>
<td>Radiator Fan-Shroud Assembly</td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>Ford Motor Co.</td>
<td>Transmission Reactor</td>
<td></td>
</tr>
</tbody>
</table>
Plaque & Trophy Orders

Trophies

Grand Award: $500. USD each
Category Winner: $325. USD each
Finalist: $160. USD each

Nomination Display Plaques

9x12 in.: $16. USD each (available for ALL nominated parts)

PLEASE NOTE: Company names will be listed on duplicate trophies and plaques in the same manner they were listed on presentations and signs at the Awards Gala unless SPE is notified in advance that changes must be made.

Prices do not include shipping.
You will be contacted after your order is received to confirm the application, quantity, and shipping costs.

To place an order, visit http://SPEADStore.com
Questions: please send an e-mail to info@speautomotive.com.
2016-2017 Executive Committee

Matt Carroll, Chair
General Motors Co.
+1.586.218.9405

Fred Deans
Allied Composite Technologies LLC
+1.248.760.7717

Steve VanLoozen, Past-Chair
OPEN, Chair-Elect
+1.734.552.2864

Suresh Shah, Division Councilor
Retired – Delphi Corp.
+1.248.635.2482

Bonnie Bennyhoff, Treasurer
Retired - ExxonMobil
+1.248.244.8993, ext. 4

 Crystal VanHouten, Secretary
Grupo Antolin
+1.248.825.7135

Allan Murray, Director Emeritus
Allied Composite Technologies LLC
+1.248.814.8072

Nippani Rao, Director Emeritus
Asahi Kasei Plastics North America, Inc.
+1.248.444.1753

David Reed, Director Emeritus
Retired - General Motors Co.
+1.734.674.0736

2016-2019 Directors

TO MAY 2017

Fred Deans +1.248.760.7717
Allied Composite Technologies LLC

Jay Rasoni +1.248.659.8232
Retired - Inteva Products, LLC

Dhanendra Nagwanshi +1.248.760.3860
SABIC

Brian Grosser +1.248.941.9368
Lotte Advanced Materials USA

Peter Bejin +1.313.319.2242
Ford Motor Co.

Umesh Gandhi +1.734.995.7174
Toyota Technical Center

TO MAY 2018

Alper Kiziltas +1.313.322.0595
Ford Motor Co.

Cynthia Flanigan +1.313.317.7538
Ford Motor Co.

Suzanne Cole +1.810.750.3863
Miller-Cole LLC

Ron Price +1.248.563.6343
Global Polymer Solutions

Mike Whitens +1.313.805.5932
Ford Motor Co.

Tom Pickett +1.248.431.9724
General Motors Co.

TO MAY 2019

Kevin Pageau +1.248.835.4999
Sonoco Protective Solutions

Mark Lapain +1.248.567.5455
Magna International

Norm Kakarala +1.248.655.8483
Retired - Inteva Products, LLC

Ed Luibrand +1.248.512.0641
FCA US LLC

Monica Prokopyshen +1.248.608.6259
Retired - Chrysler LLC

Peggy Malnati +1.248.592.0765
Malnati & Associates

2016-2017 Committee Chairs

Norm Kakarala, ANTEC Programs
Retired – Inteva, LLC
+1.248.655.8483

Monica Prokopyshen, Education
Retired - Chrysler LLC
+1.248.608.6259

Jeff Helms, Awards Program
Celanese Corp.
+1.248.377.6895

Fred Deans, Golf Outing
Allied Composite Technologies LLC
+1.248.760.7717

Dhanendra Nagwanshi, Intersociety
SABIC
+1.248.760.3860

Steve Van Loozen, Membership &
AutoEPCON
BASF
+1.734.552.2864

Teri Chouinard, Social & Sponsorship
Intuit Group, LLC
+1.248.701.8003

Peggy Malnati, Communications &
Webmaster
Malnati & Associates
+1.248.592.0765

David Helmer, Newsletter Editor
General Motors Co.
+1.248.431.9804

2016-2019 Committee Chairs

TO MAY 2017

Matt Carroll, Chair
General Motors Co.
+1.586.218.9405

Steve VanLoozen, Past-Chair
OPEN, Chair-Elect
+1.734.552.2864

Dhanendra Nagwanshi
SABIC
+1.248.760.3860

Brian Grosser
Lotte Advanced Materials USA
+1.248.941.9368

Peter Bejin
Ford Motor Co.
+1.313.319.2242

Umesh Gandhi
Toyota Technical Center
+1.734.995.7174

TO MAY 2018

Suresh Shah
Division Councilor
Retired – Delphi Corp.
+1.248.635.2482

Bonnie Bennyhoff, Treasurer
Retired - ExxonMobil
+1.248.244.8993, ext. 4

Crystal VanHouten, Secretary
Grupo Antolin
+1.248.825.7135

Allan Murray, Director Emeritus
Allied Composite Technologies LLC
+1.248.814.8072

Nippani Rao, Director Emeritus
Asahi Kasei Plastics North America, Inc.
+1.248.444.1753

David Reed, Director Emeritus
Retired - General Motors Co.
+1.734.674.0736

TO MAY 2019

Kevin Pageau +1.248.835.4999
Sonoco Protective Solutions

Mark Lapain +1.248.567.5455
Magna International

Norm Kakarala +1.248.655.8483
Retired - Inteva Products, LLC

Ed Luibrand +1.248.512.0641
FCA US LLC

Monica Prokopyshen +1.248.608.6259
Retired - Chrysler LLC

Peggy Malnati +1.248.592.0765
Malnati & Associates
Congratulations from the SPE® Automotive Division

46 years of Recognizing the Plastics Innovation that Reduces Weight, Saves Money, Eliminates Finishing Steps, Adds Functionality, & Makes Vehicles More Stylish & Durable.

BECAUSE YOU IMAGINED

MAXIMUM PERFORMANCE IN A CAR THAT’S 800 POUNDS LIGHTER.

With a global network of research centers, Innovation Centers and nearly 10,000 scientists, we’ll work with you from concept to commercialization to achieve lighter vehicle weight and enhanced performance. Whether it’s turbocharging or replacing metal with polymer parts, we have the resources and people to help with your next challenge.

Visit dupont.com/automotive

DuPont Performance Materials
Giving Shape to Smart Ideas.
EXTREME PERFORMANCE

Automotive polymers fit for the rigors of the road

Engineered materials from Celanese help engineers develop automotive systems that exemplify the highest caliber of driving excellence with solutions that prevent corrosive wear and stand up to:

- Harsh temperature fluctuation – tolerance to high heat in small engine compartments
- Intense vibration – dimensional stability and flexible resilience
- Chemical exposure – resistance to fuels, road deicers and chemical cleaners
- Extreme weather – UV resistant with minimal impact from the sun’s harsh rays
The SPE Automotive Innovation Awards Gala would not be possible without the gracious support of our sponsors, who underwrite the cost of this event. Hence, it is with great appreciation that we thank and acknowledge the contributions of the 2016 SPE Automotive Innovation Awards Gala sponsors and other patrons for making this event a success.

**VIP Reception & Afterglow Sponsor**  
Celanese

**Main Reception Sponsor**  
SABIC

**Wine & Flower Sponsor**  
DuPont

**Student Program Sponsor**  
Michigan Economic Development Corp.

**Gold Sponsors**
- Advanced Composites, Inc.
- American Chemistry Council - Plastics Division
- BASF
- Faurecia Interior Systems

**Silver Sponsor**
- Jenoptik Automotive NA LLC *

**Bronze Sponsors**
- ABC Group Inc.
- Asahi Kasei North America, Inc.
- Bocar Group
- ContiTech North America, Inc.
- Covestro AG
- DSM Engineering Plastics
- SPI: The Plastics Industry Trade Association
- Trinseo LLC
- Wittmann Battenfeld, Inc.
- Yanfeng Global Automotive Interiors

*: Ad upgrade

**Advertising Sponsor**
- INEOS Styrolution America, LLC
- Inteva Products LLC

**Media & Association Sponsors**
- AutoBeat Daily
- Automotive Design & Production Magazine
- China Plastic & Rubber Journal
- China Plastic & Rubber Journal International
- CompositesWorld
- Industrias Plásticas
- Noticiero del Plástico
- Plastics Engineering Magazine
- Plastics Insight
- Plastics Technology Magazine
- Plastics Technology México
- Prototype Today
- Rubber Fibre Plastics International Magazine
- Reciclado y Plásticos
- TheMoldingBlog.com
- WardsAuto.com