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SPE® AUTOMOTIVE Automotive Plastics NEWS

DEC 2015
VOLUME 45, ISSUE 2

SPE® AUTOMOTIVE INNOVATION AWARDS COMPETITION & GALA
HONORING THE BEST IN AUTOMOTIVE PLASTICS

SPE® Automotive Division Names Winners of 45th-Annual Automotive Innovation Awards Competition

The year is nearly over and the 45th-annual SPE Automotive Innovation Awards Competition and Gala is behind us once again.

This year's program elicited a tremendous turnout of nearly 700 attendees from across the global automotive community. From the nine category winners, six different OEMs were recognized covering North America, Europe, Korea and Japan. It is always very difficult to narrow down the list of 60+ quality submissions we receive each year to pick finalists and then category and the Grand Award winners. Many times the difference between being a finalist and winning a category is the difference of a vote or two. I think this shows how competitive the Automotive Innovation Awards Program is each year and should give satisfaction to all the nominees for a job well done with respect to commercializing innovative solutions in this industry

We will now turn to planning for next year's event, expanding our blue ribbon judging panel and continuing to strive for improvement in the execution of this program. If you attended our Awards Gala on November 11th and have suggestions on what we can do better, please don't hesitate to let us know. Email your comments to: feedback@speautomotive.com.

Jeff Helms

2015 SPE Automotive Innovation Awards Chair

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

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AUTOMOTIVE DIVISION MEETING SCHEDULE & SPECIAL EVENTS CALENDAR

SPE® AUTOMOTIVE

SPE Auto. Div. Board Meeting
American Chemistry Council - Auto. Ctr. — 5:30 - 7:30 p.m.
Troy, MI USA — Dec. 7, 2015

SPE Auto. Div. Board Meeting
American Chemistry Council - Auto. Ctr. — 5:30 - 7:30 p.m.
Troy, MI USA — Feb. 8, 2016

SPE Auto. Div. Board Meeting
American Chemistry Council - Auto. Ctr. — 5:30 - 7:30 p.m.
Troy, MI USA — April 11, 2016

11th-Annual SPE Automotive Engineering Plastics Conference (AutoEPCON)
Detroit-Troy Marriott — ALL DAY
Troy, MI USA — May 10, 2016

SPE Auto. Div. Board Meeting
American Chemistry Council - Auto. Ctr. — 5:30 - 7:30 p.m.
Troy, MI USA — June 13, 2016

SPEAuto. Div. Golf Outing
Fieldstone Golf Club — ALL DAY
Auburn Hills, MI USA — Sept 6, 2016

16th-Annual SPE Automotive Composites Conference & Exhibition (ACCE)
The Diamond Banquet & Conference Center
at the Suburban Collection Showplace — ALL DAY
Novi, MI USA — Sept 7-9, 2016

18th-Annual SPE TPO Automotive Engineered Polyolefins Conference(TPO)
Detroit-Troy Marriott — ALL DAY
Troy, MI USA — October 2-5, 2016

Automotive Division Board of Directors meetings are open to all SPE members. All events are listed on our website at http: speautomotive.com/ec
EMail Steven VanLoozen at auto-div-chair@speautomotive.com for more information.

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CHAIR'S WELCOME

by Steven VanLoozen, SPE Automotive Division Chair

Season's greetings to all SPE members! It's hard to believe that yet another busy and challenging year has come and gone in a flash and we, as an industry, are a little bit closer to the 2025 mandates on emissions and fuel economy.

As I said last year and I'll repeat again, I feel that SPE is uniquely positioned to help the automotive industry meet these challenges through our technical conferences (many of which OEMs attend free), our publications (free with membership), our new social networking platform, The Chain and educational webinars (also free with membership), and one-on-one discussions with SPE members from all levels of the automotive plastics supply chain. If you work for an automaker and have an engineering challenge that plastics or composites can help, please reach out to us and we'll do our best to help you solve the problem. Don't know any SPE members? Look at the last page of this newsletter for contact information for our board of directors, any of whom will be happy to help you begin your search.

As we wind down our work responsibilities at year's end, I'd like to extend my wish for a blessed holiday season to everyone and their families. May 2016 bring health, happiness, and enthusiasm to all!

Kind Regards,

Steven VanLoozen

Steven VanLoozen
SPE Automotive Division Chair, 2014-2015 and 2015-2016
BASF Corp.

Category Winner: **Aftermarket**

Transparent Lightweight Wind Deflector

OEM Make & Model:	2016 General Motors Co. Corvette Stingray convertible sports car
System Supplier:	Polytec FOHA Inc.
Material Processor:	SABIC
Material Supplier:	SABIC
Tooling Supplier:	Pace Machine Tool, Inc.
Material / Process:	Lexan PC 9043 with Exatec 900 coating / CNC trimmed sheet

This is the first use of a self-mounted, transparent and frameless wind deflector for convertible cars that meets AS2 ANSI and ECE requirements. The steeply raked design minimizes air turbulence and noise when the top is down. Replacing glass with PC lowered mass 33% and allowed a contoured shape to be achieved that would have been difficult and costly in glass. A laser-etched monogram under the surface is unobtrusive to vision during driving, yet visible during inspection and meets regulatory requirements for glass marking. A plasma coating enhances scratch, chemical, and UV resistance for long use life.

Category Winner: **Body Exterior**

Push-to-Release Exterior Serviceability Fastener

OEM Make & Model:	2015 Ford Motor Co. Ford Mustang sports car
System Supplier:	ITW Deltar Fasteners
Material Processor:	ITW Deltar Fasteners
Material Supplier:	Ascend Performance Materials, LLC
Tooling Supplier:	A&P Tool, Inc. & M&M Tool and Mold, LLC
Material / Process:	PA 6/6 / Injection molding

Compared to other easy-service fasteners, which have twist heads to release, this injection-molded PA 6/6 fastener only requires that you push the center pin to the service position to remove. This fastener cannot back out or be removed from the installed position without deliberate actions by the customer. The pin and body are designed to not be easily separated; however, the fastener is reusable, unlike other push pins that become damaged in the process of removal. It meets EU lamp serviceability requirements, reducing the time needed to remove the fastener by 90% without tools.

Category Winner: Body Interior

Rear-Seat Folding Head Restraint

OEM Make & Model:	2015 Ford Motor Co. Ford F-150 pickup
System Supplier:	Windsor Machine Group
Material Processor:	Hawk Plastics Ltd.
Material Supplier:	ExxonMobil Chemical Co
Tooling Supplier:	IRC Engineering
Material / Process:	PP copolymer / Injection molding

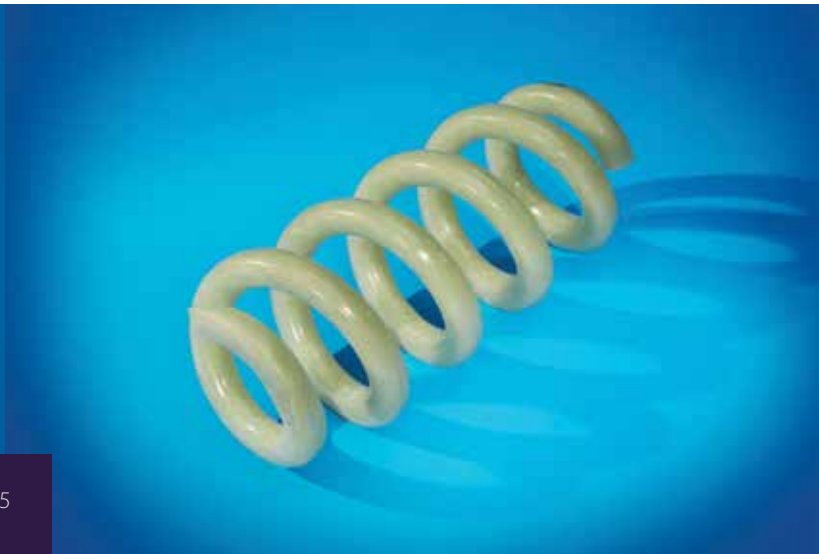
This rear seat, folding head restraint eliminates a welded steel structure and replaces it with a single-piece, living hinge plastic core as its main structural component. As a result, thickness is reduced 33 mm for improved comfort and rear visibility; mass is reduced 624 g/vehicle; manufacturing complexity is significantly reduced (eliminating the need for special tooling processes thanks to consolidation of 5 parts into 1); tooling costs are lowered; and piece price is reduced $1.50 USD/vehicle, while still meeting or exceeding all global safety requirements.

Category Winner: Chassis & Hardware

Fiberglass/Epoxy Composite Coil Spring

OEM Make & Model:	2015 Audi AG Audi A6 Avant 2.0-L TDI Ultra wagon
System Supplier:	S. Ara Composite S.A.S.
Material Processor:	S. Ara Composite S.A.S.
Material Supplier:	Hexion Inc.
Tooling Supplier:	Not available
Material / Process:	Epikote epoxy + fiberglass / Modified filament winding

This weight-saving epoxy/fiberglass composite coil spring is the first of its kind to be used in the suspension system of a series-production vehicle. Using a patented, modified filament winding process, the application replaced traditional steel coil springs, reducing weight 40% and enabling the suspension system to react more quickly to changing road surface conditions, thereby improving vehicle handling and NVH. Significant work was done on resin chemistry and resin/fiber interface to ensure efficient load transfer and long-term mechanical performance, as well as finding an efficient, cost-effective production method capable of meeting build volumes.



Category Winner: **Environmental**

Seat Fabric from Recycled Materials

OEM Make & Model:	2015 Ford Motor Co. Ford F-150 pickup
System Supplier:	Johnson Controls Inc.
Material Processor:	Sage Automotive Interiors
Material Supplier:	Unifi Manufacturing, Inc.
Tooling Supplier:	Not available
Material / Process:	Repreve PET / Multiple

The fiber used in this innovative seat fabric is made from a hybrid blend of 100% recycled materials, including post-industrial fiber and post-consumer water bottles. The fabric meets Ford design and comfort requirements without any compromise in quality, durability, or performance. The switch from virgin fiber was achieved at cost parity, while providing significant environmental benefits, including diverting over 5-million water bottles from landfills just this year. To help close the loop further, there are now PET bottle collection bins installed at the Ford Research & Engineering campus, which are recycled to help form this fiber.

Category Winner: **Powertrain**

Heated-Tip Fuel Injector

OEM Make & Model:	2015 Honda Motor Co. Honda Fit subcompact & City sedan
System Supplier:	Delphi Powertrain
Material Processor:	Delphi Powertrain
Material Supplier:	DuPont Automotive
Tooling Supplier:	Coltelleria Baldi
Material / Process: Injection molding	Zytel HTN54G35EF BKB336 PPA /

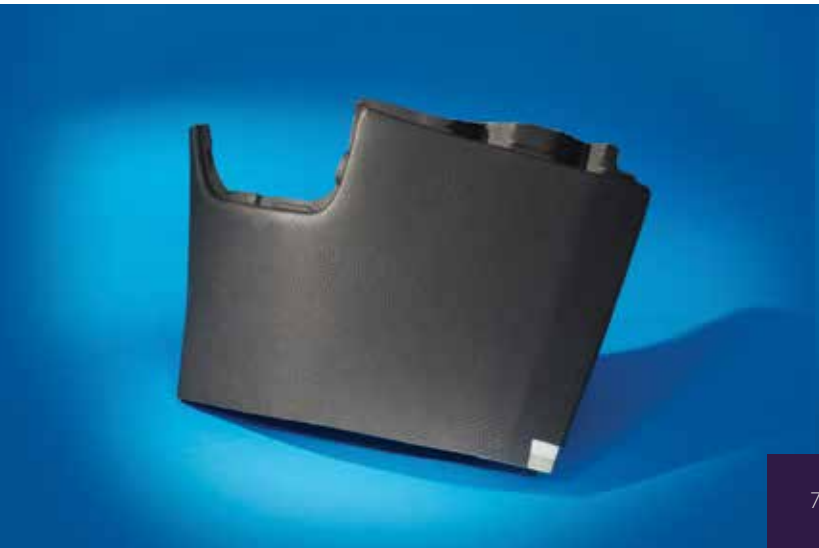
An electrical heater within the injector is energized by the vehicle controller, rapidly heating the ethanol fuel and dramatically improving vaporization while reducing emissions. Ink materials used in construction of the heater, body design, the ink-printing process on the body, and overmolding with PPA (which was designed for flow, heat resistance, and electronic compatibility) were all key to the success of this application. The technology saved $60 USD/vehicle as well as 8.8 kg, while improving cold starts on E100 fuel and eliminating the need for a redundant gasoline fuel system on the vehicle.

Category Winner: Process / Assembly / Enabling Technologies

IMX Instrument Panel

OEM Make & Model:	2014 Hyundai Motor Group Hyundai i20 supermini
System Supplier:	Hyundai-Mobis
Material Processor:	HanilEhwa
Material Supplier:	Hanwha L&C
Tooling Supplier:	Hyundai-Motor Co.
Material / Process:	Multiflex 3202 TPO / Compression-injection molding

To eliminate scratches and a hard "plastic" feel, a 2-shot compression-injection soft IP was developed. The back-foamed TPO foil is compression-injected with the PP substrate, which in turn is integrally injection molded with the TPO passenger-side airbag door. All the work is done in a single tool. To increase foam softness and stability of the integral injection molding, the TRIZ method and design of experiments tools were used. The resulting part saves $10 USD/ vehicle and reduces mass 300 g.



Category Winner: Safety

Floor Rocker Reinforcement

OEM Make & Model:	2015 FCA US LLC Jeep Renegade SUV
System Supplier:	Proma Group
Material Processor:	Redstamp
Material Supplier:	SABIC
Tooling Supplier:	Redstamp
Material / Process:	Noryl GTX MPPE/PA 910 / Injection moldinging

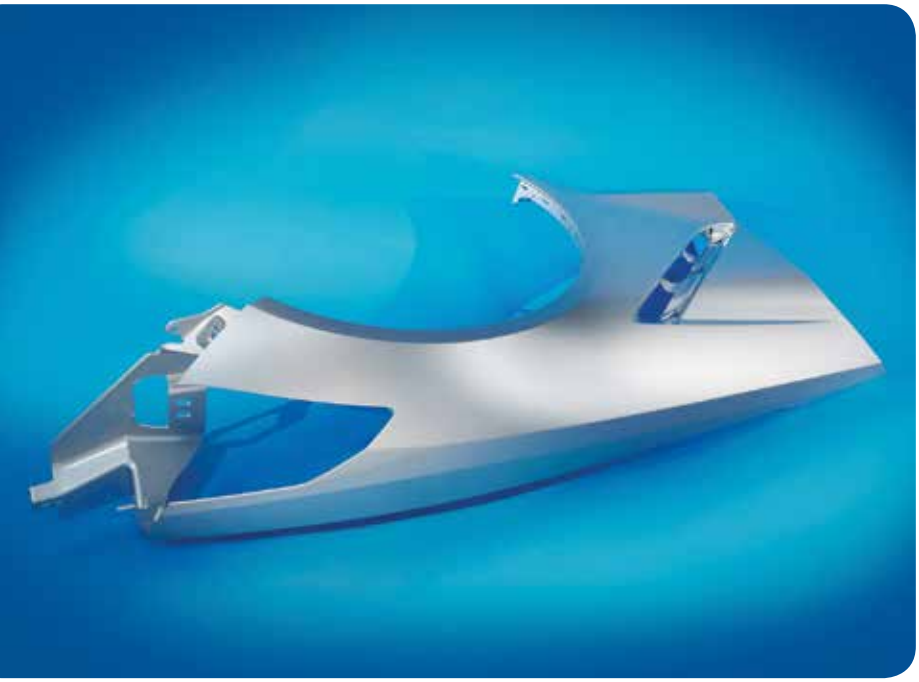
An optimized MPPE/PA 6 honeycomb geometry in a plastic/metal hybrid proved to be a very efficient energy-absorbing crash-box structure in this floor rocker reinforcement. Not only is the component E-coat capable, but it is very easy to assemble into the vehicle's BIW. Since the plastic honeycomb is integrally attached to 2 steel flanges during injection molding, no structural adhesives are needed. The mixed-material solution took 1 kg of weight out of the BIW, saved approximately 10%, and contributed tooling savings vs. previous steel solutions.

2015 SPE Automotive Division

GRAND AWARD & CATEGORY WINNER: Materials

ULTRALIGHT CLASS A BODY PANELS

2016 General Motors Co. Chevrolet Corvette sports car



System Supplier:	Continental Structural Plastics
Material Processor:	Continental Structural Plastics
Material Supplier:	Continental Structural Plastics
Tooling Supplier:	Century Tool & Gage, Paragon Die & Engineering Co.
Material / Process:	TCA Ultra Lite SMC / Compression molding

A new 1.2 SG SMC eliminated 9 kg of body-panel weight after a running change from a mid-density grade, where no tooling changes were required. Suitable for Class A or structural components, the new composite offers 28% mass reduction vs. mid-density (1.6 SG) grades and 43% vs. conventional (1.9 SG) SMC. It provides greater benefits vs. metal, including reduced weight and tooling costs, enhanced design flexibility, corrosion and dent resistance, and superior surface finish. Key to achieving the ultralow density was replacement of CACO3 with hollow-glass microspheres and use of a proprietary surface treatment to improve the resin/reinforcement interface.

Category Winner:
Hall of Fame

First GMT Composite Bumper

OEM Make & Model:	General Motors Corp. 1984 Chevrolet Corvette
System Supplier:	LOF Plastics
Material Processor:	Emabond Solutions, LLC
Material Supplier:	PPG Industries
Material / Proess:	Azdel PM 400 / Compression molding

This was the 1st use of GMT composites to form bumper beams for passenger cars. The application has been in use on vehicles for more than three decades and has proliferated beyond vehicles built by automakers in North America to those in Europe and Asia. Versus steel, the incumbent bumper beam material at the time, compression-molded GMT beams lowered mass 30%, greatly increased design flexibility, reduced tooling costs (especially beneficial for low-volume specialty models), eliminated rust and corrosion, and provided better impact performance (less vehicle damage) during low-speed impacts.

Lifetime Achievement Award

Fred Deans Named 2015 SPE® Automotive Division *Lifetime Achievement Award* Winner

Frederick (Fred) Deans, P.E., who has more than 45 years' experience at companies like Continental Structural Plastics, AZDEL, Inc., General Electric Co., and Pittsburgh Plate Glass (PPG) working in the automotive, architectural, and industrial market segments, has been named the 2015 *Lifetime Achievement Award* winner by the Automotive Division of the *Society of Plastics Engineers (SPE®)*. He is an expert in composite materials and molding processes, product engineering, specification development, global sales and marketing, and new product introductions.

Deans is currently chief-marketing officer, and a co-founder and principal of Allied Composites Technologies, LLC (ACT) as well as the owner of F. Deans & Associates, a Michigan-based enterprise. Previously he has held a variety of positions including director-New Business Development at composites molder and tier 1 supplier, Continental Structural Plastics, Inc., market and industry manager at GE Plastics; program manager at the GE Plastics'-PPG Industries' joint venture, AZDEL, Inc.; application development engineer at PPG Fiberglass AZDEL Products; OEM glass sales representative at PPG; and he started his career as a production engineer at PPG Industries' Works 1-Automotive Windshield plant and moved on to the roles of technical service engineer-Architectural Glass and Solar Products, and sales representative-OEM Automotive Products.

Among his accomplishments, Deans led development of the first unidirectional glass-mat thermoplastic (GMT) composites for new-generation automotive bumper systems. The first application of this technology was a single 12-million lb/5.4-million kg application program with a Japanese automaker. Within three years, every Japanese OEM was using GMT composite for bumper beams. He managed the commercialization and use of next-generation direct-long-fiber thermoplastic (D-LFT) composites for passenger car underbody shields and underhood applications, as well as load floors for off-road vehicles and heating/ventilation/air-conditioning (HVAC) bases. He also helped develop and commercialize an automotive glass-forming process and introduced monolithic tempered privacy glass for sport-utility vehicles (SUVs).

Additionally, Deans has a strong history of volunteering for engineering societies. He is a long-time member of the board of directors of the SPE Automotive Division (30+ years) and SPE Composites Division (13 years), as well as an intersociety volunteer on the Formula SAE® student design competition organized by SAE International®. Furthermore, he is a co-founder of and three-time conference chair or co-chair for the SPE Automotive Composites Conference & Exhibition (ACCE, in years 2001, 2004, and 2015). Deans' efforts were recognized by the SPE *Honored Service Member* award in 2003 and the SPE *Composites Division's Composites Person of the Year* award in 2006. He is a licensed professional engineer in the Commonwealth of Pennsylvania and holds a BSME degree from Valparaiso University and an MBA degree in Business Administration from the University of Pittsburgh.

An Engineer's Life...

By Debbie Mielewski, Ford Motor Co.

Although today she's an internationally recognized technology leader in the development of sustainable plastic products for vehicles produced by Ford Motor Co., she's received numerous industry honors, holds 10 U.S. patents, and has been featured on a TED$_x$ Detroit talk (https://www.youtube.com/watch?v=mNOCWTAp3xA), Dr. Debbie Mielewski remembers when she couldn't get an audience with Ford executives to discuss green products her team was developing. Biding her time, the Ford research scientist went back to the lab and kept her group working. Today those efforts are paying dividends by helping the automaker meet aggressive sustainability goals, reduce vehicle mass and carbon footprint, smooth out plastics costs tied to fluctuating oil and gas prices, and position itself as a market leader in eco-friendly transportation. All it took from Mielewski was vision, patience, and decades of hard work. Ah, the engineer's life!

Mielewski says her eco-conscious lifestyle and passion for sustainability were cultivated in her youth. She credits her Depression-era, World War II-veteran father for instilling his values, which included a love of recycling and reusing other people's discards. "My dad taught me to reduce, reuse, and recycle my entire life," Mielewski explains. "People that lived through the Great Depression learned how to get by with a lot less. What others considered 'junk,' we used." These days her home is furnished with garage-sale finds and her closet holds an enviable collection of blazers (think Chanel) sourced from resale shops. "I pride myself on consuming less. When I can't use something anymore, I do my best to find someone who can," she explains.

A second child with a penchant for mischief, the Detroit native acknowledges that she floundered at Center Line High School until a teacher named Larry Stoddard noted her knack for sciences, particularly chemistry. He encouraged and mentored her, then pushed her to focus, all the while showing her that being "smart was cool." Stoddard's influence didn't end when she graduated. Mielewski matriculated at University of Michigan-Ann Arbor (U of M), her teacher's *alma mater,* where she earned a B.S. degree in Chemical Engineering. She joined Ford in 1986 and again found 2 "fantastic mentors" at Ford Research named Dr. John Gerlock and Dr David Bauer, who taught her how to design and run a research program and how to recognize scientific discovery. Along the way she returned to U of M to pick up M.S. and Ph.D. degrees in Chemical Engineering while working full-time at Ford with full support of her Ford mentors. Her enthusiastic nature and her drive to "do the right thing" helped her rise through the ranks quickly. In a male-dominated industry, she built a largely female team. The women supported one another not only professionally but personally as each juggled the demands of work and raising children. "These women are all tremendously smart, talented scientists and we all have the same goal of wanting to make the world a better place," she notes.

In the late 1990s when SUVs ruled the road, Mielewski – then technical leader of plastics research at Ford – predicted a time when oil prices would soar, customers would feel the pinch, and Ford would need a solution. In her lab, she led the charge to reduce the amount of petroleum products Ford used to make plastic parts –

 CONTINUED FROM PAGE 13

a move with clear financial benefits, but also keen eco awareness. She began with soybean oil, a favorite of company founder (and former farmer), Henry Ford Sr. Mielewski and her team toiled for 5 years to develop a bio-based polyol using soybean oil for polyurethane seat foam that would meet durability and performance standards while boosting the automaker's sustainability profile. Finally, in 2001, she was ready to present her work to executives. She and her team sat outside a conference room for 3 hours waiting for their moment to shine. As they were called in, Mielewski recalls an executive asking, "Is this that green stuff?" She replied in the affirmative, to which she was told, "You guys can go." Stunned, she and her team left without getting the chance to say a word.

"Yes, we were discouraged," she acknowledges, "but in research we don't have to have immediate acceptance, and I knew deep down there would be a time when people would not only accept this work but would want it." Acceptance came in 2008 when oil prices soared to $160 USD/barrel and Ford executives were ready to listen. "That's when the magic happened and my phone started ringing off the hook," beams Mielewski, now a 29-year veteran of the materials research department. "We had good foams that were ready for prime time. I never expected the road to this moment would be easy, but I knew the payoff would be big."

Soy-based foam seats debuted later that year on the *Ford Mustang* sports car; today every Ford vehicle produced in North America is equipped with the eco-conscious seats and the team is hard at work researching other materials that could have global application. The impact of just this one invention is huge. Soy-based foam is up to 24% more renewable than petroleum-based foam with comparable properties and it reduces volatile-organic compound (VOC) emissions by 67%. The biomaterial has helped Ford reduce its annual petroleum usage by more than 5-million lb/2.3-million kg and its CO_2 emissions by more than 20-million pounds/9-million kg. "As the world's population continues to swell and resources become scarce, my gut keeps telling me that providing sustainable options to petroleum-based plastics is a wise move in the right direction," she predicts. "We *can* make cars that are just as durable, perform to the customer's expectations, and are better for the planet. We can change the way the world moves."

Under Mielewski's guidance, Ford now is a leader in sustainable materials research. Beyond soy-foam, the automaker uses storage bins reinforced with wheat straw on the *Flex* CUV, instrument panels padded with scrap cotton from blue jeans and kenaf in the door bolsters on the *Escape* CUV, decklid appliqué brackets and side-cladding reinforced with coconut fiber and rubber from recycled battery cases on the *Mustang*, rice hull-reinforced cowl brackets and structural guards reinforced with recycled tire rubber and coconut shells on *F Series* pickups, and has partnered on a closed-loop water-bottle recycling program that returns 100% recycled seat fabrics (from post-industrial and post-consumer polyethylene terephthalate (PET)) back to cover seats on *F-150* pickups. Other innovations her group has developed include the use of tomato fibers and retired U.S. currency to reinforce a variety of interior storage bins and trim pieces. Lately Mielewski's team also has been experimenting with algae to further boost the amount of biomaterial content in seat cushions.

"When you look at how many plastic and filler/ fiber combinations are used on today's automobiles," she points out, "you realize that each one them can be made more environmentally friendly. There's still so much to do, which is why I love my job and I love engineering because I can creatively develop the next generation of greener materials for future cars." She adds that if use of these materials expands beyond automotive to other industries, the impact can be huge. Ticking off the benefits, she mentions conserving petroleum, emitting fewer greenhouse gases, providing farmers with new revenue streams (for "waste" products they now pay to landfill or burn), lightweighting our cars and trucks, and offering the world both more robust material choices and a more closed-loop bio-economy. "Why wouldn't I be excited to contribute to such important work," she asks?

Reflecting on her own path, Mielewski she says she'll always appreciate the importance of mentors and mentoring because of the help she received. In fact, life recently came full circle when she gave the alumni commencement speech at her old high school and her mentor, Larry Stoddard showed up in the audience. "I strive to show the same kind of commitment and support to young people," she promises.

An Engineer's Life CONTINUED FROM PAGE 14

What is her advice for young engineers and those considering engineering as a career? Mielewski says they should care deeply about the work they do. "When you combine your passions with what you do for a living, it really isn't 'work' at all," she concludes. She also encourages young people to look for potential mentors throughout their careers. "The good ones can help steer your career," she recalls, "but the very best of them will teach you about personal / work life balance. No one succeeds working alone in a vacuum."

ABOUT DEBBIE MIELEWSKI

Dr. Debbie Mielewski is the senior technical leader of Sustainable Materials and Plastics Research at Ford Motor Company. She received her B.S.E. ('86), M.S.E. ('93), and Ph.D. ('98) degrees in Chemical Engineering, from the University of Michigan in Ann Arbor, and has been with Ford Motor Co. for 29 years. During that time she has worked at Ford Research in automotive paints, polymer processing, and materials development. She is passionate about the work she does to reduce Ford's environmental footprint and believes that these new materials are going to dominate the market in the future. She has appeared in a Ford national commercial, the NOVA "Making Things" series, and has been interviewed by countless media outlets. Mielewski has over 40 referred journal publications and holds 10 U.S. patents. Her work has been acknowledged with awards such as the Henry Ford Technology Award, the R&D100 award, the Free Press Automotive Leadership Award, the American Chemical Society's Industrial Innovation Award, and Ford's 2015 Dr. Haren Gandhi Research and Innovation Award.

COUNCILOR'S REPORT

October 9, 10, 11, 2015
Council I & II Meeting Minutes
Pittsburgh, Pennsylvania, USA

by Tom Pickett, SPE Automotive Div. Councilor

The 2015 Fall Councilor meeting was held October 9-11 at the Sheraton in Pittsburgh. Highlights of the meeting follow:

- Friday evening councilors were divided into teams to participate in team-building exercises. The teams assembled bicycles and donated them to the local Pittsburgh YMCA.
- In his opening remarks, SPE President Dick Cameron encouraged more interaction in the Fall Councilor meeting. He organized the meeting with 2 breakout sessions. He remarked that we at SPE need to bring more value to our SPE members. He also announced that the Plastics for Life parts competition will take place at ANTEC.
- CEO Wim De Vos discussed the new SPE business model. Under the old model, SPE had a large amount of revenue coming in from membership dues. However, with the new business model, revenue will largely be based on selling advertisements on the SPE website, The Chain, and the industry newsletter. Also new revenue will come from additional TopCons.
- Sarah Sullinger and Barbara Spain resigned from SPE HQ. SPE HQ has a staff of only 12 people. De Vos wants an SPE HQ person at each SPE event, which means that staff travel expenses have increased by $15,000 USD. SPE headquarters has invested in IT and technology, so operational expenses have increased as well. Investments in infrastructure take time to show results. SPE HQ is looking to hire an IT person and a full-time sales person.
- ANTEC made a profit of $180,000 in 2015. This was helped by aligning with NPE this year. The SPE financial report is posted on The Chain.
- A breakout session allowed each Councilor to learn about The Foundation opportunities, The Chain, the SPE website for sections or divisions, SPE headquarters resources, TopCon services for SPE group events, focused-content industry newsfeed, advertisement & marketing opportunities, and video tutorial series.
- Governance reform activity was presented. A taskforce activity was formed by Cameron and Scott Owens. The purpose is to be more nimble and responsive. A governance body (GB) was established. The GB will manage the society at all times. The election of the GB will come from Council and total membership. Presently 10 people sit on the committee. The GB is a diverse group consisting of the society president, president-elect, past-president, vice-president (VP) sections, VP divisions, VP young professionals, VP finance & business, VP events, VP marketing, VP education, and chief staff executive. The GB is elected by Council and membership at large. The councilors asked for a system to be put in place so the GB has some financial restrictions.
- Councilors were asked to discuss the future of ANTEC. ANTEC attendance has declined over the years. De Vos does not believe in the concept of ANTEC. In a mature plastics industry, he feels people are more interested in TopCons in a specific sector of the industry and not a general conference like ANTEC. He suggested only holding ANTEC every 3 years with NPE. More discussions on this topic is needed.
- Len Czuba requested financial support from sections and divisions to fund ANTEC student activities such as the luncheon, student travel, and awards. The levels of sponsorship are Bronze ($750), Silver ($1,500), Gold ($2,000), and Platinum ($2,500).
- Russell Broome announced a 3-way partnership between Paulson, Penn College of Technology, and SPE to offer training.
- Broome reviewed a graph of donations from sections and divisions for education. The graph is based on the input that he received back from the sections and divisions. Not all groups responded. He plans to resend the survey to ask for participation from all sections and divisions.
- Elections for the Executive Committee have been moved to the ANTEC Councilor Meeting instead of the Fall Councilor Meeting. Electronic voting will be used in future elections. Candidates will be asked to send in a video.
- De Vos reported that membership is at 16,600 members. There are 3,000 e-members and 855 new e-members. He hopes to add 200 e-members per month.

TREASURER'S REPORT

by Dawn Stephens,
SPE Auto. Div. Treasurer

As at November 20, 2015, the division's account balances were:

Checking:	$192,725 USD
Savings:	$ 27,439 USD
PayPal®:	$ 15,213 USD
Total:	$235,377 USD

Technical Report

Selective Dispersion and Compatibilizing Effect of Cellulose Filler in Recycled PA 6 / PP Blends

by Amy Langhorst, Alper Kiziltas, Deborah Mielewski, Ellen Lee

Materials Research & Advanced Engineering, Ford Motor Company, Dearborn, MI 48124

Abstract

The use of sustainable composites is becoming increasingly favorable in the auto industry. By using combinations of recycled polymers and natural reinforcements to replace traditionally unfilled, glass filled, and talc filled polymeric components, the environmental impact of each vehicle can be reduced. The objective of this study was to develop composites containing recycled polypropylene (PP), recycled polyamide 6 (PA6), and cellulose, with physical properties consistent with unmodified polymers. This study investigated the material properties of PA6/PP blends with the following variables: a) the addition of a compatibilizer, b) the addition of cellulose, and c) the order in which components were mixed. The samples produced for this study had a fixed composition of 70:30 PA6:PP. Certain samples also contained 10 wt% cellulose and/or 6 wt% compatibilizer. The composites were produced using a twin screw extruder and injection molding. The resulting properties were investigated on a microscopic (SEM) and macroscopic scale (mechanical and thermal properties). The miscibility of PP and PA6 improved with the addition of a compatibilizer. Polymer blends containing a coupling agent exhibited the highest strengths and elongations, while cellulose-filled composites containing compatibilizer exhibited the highest stiffnesses. The mechanical and thermal properties of the composites generated were compared to physical requirements for composite components used in thermally challenging areas, such as under-the-hood in automotive applications.

Introduction

Because of legislative and consumer demand for more fuel efficient vehicles, the use of polymers and composites to develop lightweight automotive components has been increasing every year. The amount of polymer used per average vehicle has increased from 6% in 1970 to 16% in 2010, and is expected to reach 18% by 2020 [1]. A vehicle weight reduction of 10% results in a 3-7% improvement in fuel economy [1]. As polymer use per vehicle is increasing, so is post-consumer plastic waste. In 2012, the United States generated approximately 32 million tons of plastic waste but only recycled 2.8 million tons, or 3.2%, of the waste [2]. Finding new ways to reuse otherwise disposed polymeric materials in the automotive industry could reduce cost, while decreasing vehicle weight and the carbon footprint of each vehicle.

In the automotive industry, glass fibers and talc fillers are common polymer reinforcements due to their low cost and good mechanical properties. Many cellulosic natural fibers have been proven as good replacement for glass fiber reinforcement including kenaf, hemp, sisal, jute, and others. [3, 4] Naturally-occurring cellulose has a much lower density (~1.5 g/cm3) than glass fibers (~2.5 g/cm3). Weyerhaeuser, pulp and paper industry leader, in collaboration with the Ford Motor Company, found that cellulose reinforced plastic composites can be produced 20-40% faster (less cycle time), weigh 10% less, and consume less energy during processing than fiber-glass based materials [5].

 CONTINUED FROM PAGE 21

The use of polymer blends is also becoming more common in the automotive industry. A blend of two or more polymers is capable of providing intermediate properties of the neat polymers. In this article, we have chosen recycled PA6 and recycled PP and tried to produce polar-nonpolar hybrid materials. A blend of polyamide-6 (PA6) and polypropylene (PP) yields a material which is easier to process than neat PA6, is low cost, has high thermal and mechanical performance and is stable in the presence of moisture. However, due to the opposing polarities of the two materials, a compatibilizer is generally required to improve the miscibility of the blend. Polypropylene grafted maleic anhydride (PP-g-MA) has been proven as a suitable compatibilizer for these two materials by reacting with the amine groups on PA6 during melt processing [6-9]. In this study, cellulose fibers were incorporated into a recycled PA6/PP blend in the absence or presence of PP-g-MA via four different blending processes. The main objective was to study the dispersion of cellulose fibers in the recycled PA6/ PP blend, and examine the effect of the cellulose fibers on the morphology, mechanical, and thermal properties of this polymer blend.

Experimental

Materials and Generation of Composites/Blends

Post-consumer recycled (PCR) polyamide-6 (PA6) and polypropylene (PP) were kindly supplied in the form of homopolymer pellets from a commercial source. Polypropylene-grafted- maleic-anhydride (PP-g-MA) was also supplied in bulk pellet form and short cellulose fibers (~150 µm x 20 µm x ~2 µm) were supplied in the form of bulk powder. The supplied PA6 and PP had melting points of approximately 220°C and 160°C, respectively. Seven composites and four polymer blends were produced as indicated in Table I. Each blend/composite contained a ratio of PA6:PP of 70:30 wt%. Polypropylene grafted maleic anhydride (PP-g-MA) composed 6 wt% of applicable blends and composites, and cellulose composed 10 wt% of composites. The blends/composites varied by the order in which the components were mixed, not in composition. For example, Batch 1 of composite 1A mixed cellulose with PP via extruder. In a separate extrusion, PA6 was mixed with Batch 1 to complete the composite. All blends and composites lacking PP-g-MA are designated with an "A"; all blends containing PP-g-MA are designated with a "B". Table II indicates the final composition of each blend/ composite.

Prior to extrusion, cellulose fibers and recycled polymers were dried to reduce moisture content to less than 1% using an oven at 80°C for at least 6 hours before the extrusion process. The dry polymers and cellulose were separately starve-fed into a twin screw extruder (ThermoHaake Rheomex Model PTW25) from K-Tron gravimetric feeders. After extrusion, the materials were immediately quenched in a water bath kept at room temperature. The compounded materials from the twin screw extruder were granulated using a lab scale grinder/ chopper. The ground particles were also dried to reduce moisture content to less than 1% using a conventional oven at 80°C for 6 hours before injection molding (Boy Machines Model 80M) into ASTM test specimens.

EDITOR'S NOTE: Read the rest of this award-winning paper in the SPE ACCE Archives at:
http://speautomotive.com/SPEA_CD/SPEA2015/pdf/SC/SC1.pdf

ABOUT AMY LANGHORST

Amy Langhorst, research engineer in the Plastics Research group of Materials Research & Advanced Engineering at Ford Motor Co., Dearborn, Mich., U.S.A.) was named a winner of the Dr. Jackie Rehkopf Best Paper Award by the peer-review committee for the 2015 SPE Automotive Composites Conference & Exhibition (ACCE). Langhorst was lead author along with Dr. Alper Kiziltas, Dr. Deborah Mielewski, and Dr. Ellen Lee, all of Ford Motor Co., on a paper entitled *Selective Dispersion and Comptabililizing Effect of Cellulose Filler in Recycled PA 6/PP Blends*, which was presented on September 10 from 2:00-2:30 p.m. in the Sustainable Composites session. Before joining the Plastics Research group, Langhorst previously worked with Ford's Fuel Cell group on the development of novel materials for enhanced hydrogen storage. She also worked on the launch of the 2015 *Ford Edge* crossover utility vehicle (CUV) at the Oakville Assembly Plant in Ontario, Canada. She graduated from the University of Michigan-Ann Arbor with a Bachelor's degree in Materials Science and Engineering in 2013.

EDUCATION REPORT

by Monica Prokopyshen, SPE Automotive Division Education Chair

Many thanks to the Michigan Economic Development Corp. (MEDC) for sponsoring the student program at the SPE Automotive Innovation Awards Gala on November 11, 2015. Bob Metzger (MEDC) provided "Pure Michigan" souvenir tee-shirts to the participants that said: *"An idea is only as good as the thinking behind it. We run on brainpower."*

In addition to their minds, however, our much appreciated, courteous, conscientious student volunteers put their skills, charm, professionalism, and muscles to work assisting with myriad interdependent tasks on the day of the event before, during, and after the formal portions of the awards program. Their long day combined study, travel, networking, and work and included those all too familiar "Drop everything. I need you for a rush job," requests that we all love so dearly.

I would also like to recognize the division's Teri Chouinard, Peggy Malnati, Gordie Miesel, Dave Reed, and Dawn Stephens who helped recruit, coordinate, create certificates, and register students, along with faculty and student coordinators at the respective universities.

Teri Chouinard observed, "The students were very helpful and I was impressed with their professionalism. Everyone clapped enthusiastically, and many stood up for them as well, when they were called to the stage. "When the gala attendees were heading home: "the students kept checking with me before they left to make sure everything was done."

Dave Reed concurred and added, "I was very impressed with the *gung ho* attitude of the students. Some had to drive many hours to get to Burton Manor to help set up, and all faced long drives to get back to their schools after helping to take down displays. All the students were professional and eager to pitch in."

"The students were all very professional and courteous," noted Gordie Miesel, SPE *Emeritus*, who added that among the volunteers, some were graduating seniors who would be great assets to any company.

EDUCATION REPORT

Cont. from pg 24

It is our pleasure to recognize the faculty support and these inspiring and enthusiastic students from Ferris State University, Kettering University, Lawrence Technological University, Michigan State University, and University of Michigan who contributed to the success of the 45th SPE Automotive Innovation Awards Gala.

University of Michigan

Christopher Orr
Lucas Rasnic
Nolan Muller
Yanliang Liu

Michigan State University

Aaron Beavers
Ray Szeto
Brian Chiou
Daniel Balavitch

Ferris State University

Prof. Robert Speirs
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Kaylyn Steele
Heath Harding

Lawrence Technological University

Don Reimer
Jingyi Su

Kettering University

Adam Henry, SPE Student Chapter president
Dillon Frost
Faculty Advisor, Susan Farhat
President Dr. Robert McMahan
Jason Sutter
Khary Atchinson
Zac Coblentz
Nick Moll
Dylan Hett
Brandon Potts
Ashley Simmons
Jason Sutter
Paul Woodson

MSU students are left to right: Daniel Balavitch, Ray Szeto, and Aaron Beavers. U of M students are center to right: Yanliang Liu, Lucas Rasnic, Christopher Orr, and Nolan Muller.

Kettering University students, left to right Adam Henry, Dillon Frost, Zac Coblentz, SPE Auto. Div. director, Dave Reed, Nick Moll, Dylan Hett, and Brandon Potts.

Ferris State University students who helped out at the Awards Gala.

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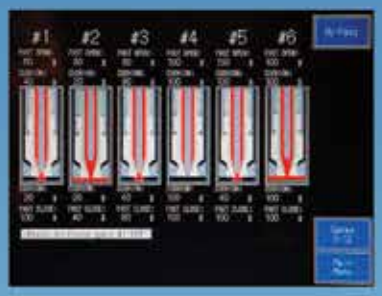

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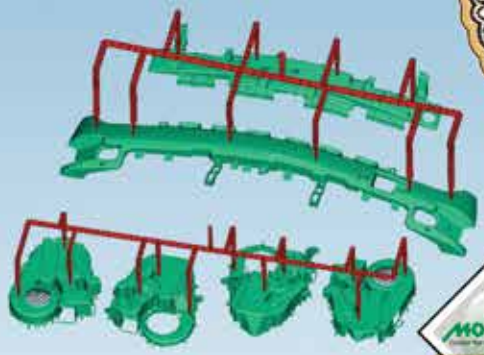

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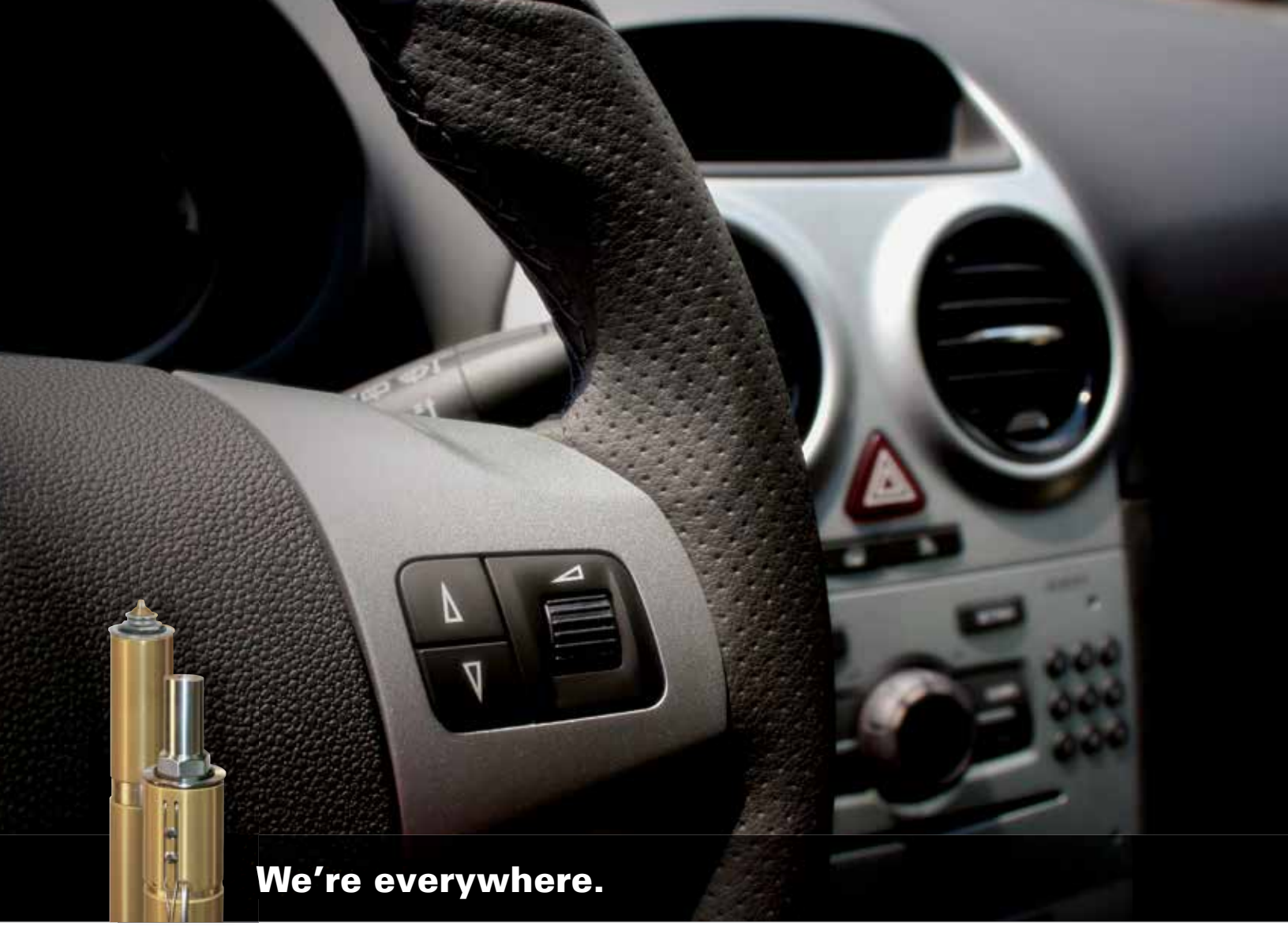

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ph: 248.244.8993, ext. 4 • web: http://SPEAutomotive.com • email: info@SPEAutomotive.com

Division Officers & Executive Committee

Steve VanLoozen, Chair
BASF
+1.734.552.2864

Yvonne Merritt, Immediate Past-Chair
Ford Motor Co.
+1.313.673.8776

Matt Carroll, Chair-Elect
General Motors Co.
+1.586.218.9405

Ed Luibrand, Vice-Chair
Fiat Chrysler Automobiles
+1.248.512.0641

Dawn Stephens, Treasurer
SPE
+1.248.244.8993, ext. 4

Monica Prokopyshen, Secretary
Retired - Chrysler LLC
+1.248.608.6259

Tom Pickett, Division Councilor
General Motors Co.
+1.248.431.9724

Dr. 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

Committee Chairs

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Monica Prokopyshen, Education
Retired - Chrysler LLC
+1.248.608.6259

Jeff Helms, Awards Program
Celanese Corp.
+1.248.377.6895

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Allied Composite Technologies LLC
+1.248.760.7717

Maheen Kahn, Intersociety
Lord Corp.
+1.586.864.4598

Teri Chouinard, Social, Sponsorship, Membership
Intuit Group, LLC
+1.810.797.7242

Peggy Malnati, Communications, Webmaster, Newsletter Editor
Malnati & Associates
+1.248.592.0765

Directors

TO MAY 2016

David Reed +1.734.674.0736
Retired - General Motors Co.

Mike Masserant +1.313.805.4833
Ford Motor Co.

Suzanne Cole +1.810.750.3863
Miller-Cole LLC

Peter Bejin +1.313.319.2242
Ford Motor Co.

Ron Price +1.248.563.6343
Global Polymer Solutions

Mike Whitens +1.313.805.5932
Ford Motor Co.

TO MAY 2017

Kevin Pageau +1.248.835.4999
Sonoco Protective Solutions

Dr. Suresh Shah +1.248.635.2482
SPE

Mark Lapain +1.248.567.5455
Magna International

Dr. Norm Kakarala +1.248,655.8483
Retired - Inteva Products, LLC

Ed Luibrand +1.248.512.0641
Fiat Chrysler Automobiles

Peggy Malnati +1.248.592.0765
Malnati & Associates

TO MAY 2018

Fred Deans +1.248.760.7717
Allied Composite Technologies LLC

Dr. Jay Raisoni +1.248.659.8232
Retired - Inteva Products, LLC

Chuck Jarrett +1.248.417.4390
SABIC

Brian Grosser +1.248.941.9368
Samsung Chemical USA

Anthony Gasbarro +1.248.721.0276
Marubeni Specialty Chemicals, Inc.

Umesh Gandhi +1.734.995.7174
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