A PUBLICATION OF THE AUTOMOTIVE DIVISION OF THE SOCIETY OF PLASTICS ENGINEERS

SPE® AUTOMOTIVE Automotive Plastics NEWS

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15th SPE ACCE Returns with Robust Educational, Networking Opportunities

If the sponsor and exhibitor support of September's 15th-annual SPE Automotive Composites Conference & Exhibition (ACCE) are any indication, composites remain a hot topic in the Motor City as automakers work hard to meet tough new fuel efficiency and/or tailpipe emissions standards that are phasing in over the next decade in many geographies. At press time, the 2015 conference had 83 exhibitors and non-exhibiting sponsors. Not only are there more exhibitors and sponsors at this year's show — which will be held at the Diamond Center at the Suburban Collection Showplace (Novi, Michigan, USA) in the Detroit suburbs from September 9-11 — but many of the displays will be significantly larger, as the entire exhibition has been moved to a larger hall to better handle sponsor demand.

Continued on Page 5

SPE® AUTOMOTIVE COMPOSITES CONFERENCE & EXHIBITION

World's Leading Automotive Composites Forum

SOCIETY OF PLASTICS ENGINEERS
AUTOMOTIVE & COMPOSITES DIVISIONS

CONTENTS

AUTOMOTIVE DIVISION MEETING SCHEDULE & SPECIAL EVENTS CALENDAR

SPE® AUTOMOTIVE

SPE Automotive Division Annual Golf Outing
Fieldstone Golf Club — 8:30 a.m.- 4:00 p.m.
Auburn Hills, MI USA — Sept. 8, 2015

15th-Annual SPE Automotive Composites Conference & Exhibition (ACCE)
The Diamond Banquet & Conference Center
at the Suburban Collection Showplace — ALL DAY
Novi, MI USA — Sept. 9-11, 2015, 2015

First Round - Automotive Innovation Awards Judging
Celanese Corp. — 8:00 a.m.- 5:00 p.m.
Auburn Hills, MI USA — Oct. 1-2, 2015

17th-Annual SPE TPO Automotive Engineered Polyolefins Conference (Auto TPO)
Detroit-Troy Marriott — ALL DAY
Troy, MI USA — Oct. 4-7, 2015

Second Round - Blue Ribbon - Automotive Innovation Awards Judging
Celanese Corp. — 8:00 a.m.- 5:00 p.m.
Auburn Hills, MI USA — Oct. 12, 2015

45th-Annual SPE Automotive Innovation Awards Gala
Burton Manor — 5:00-11:00 p.m.
Livonia, MI USA — Nov. 11, 2015

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

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

CHAIR'S MESSAGE

by Steven VanLoozen, SPE Automotive Division Chair

I hope everyone had an enjoyable summer. Sadly, it's nearly over but I hope everyone had a chance to get away and recharge their batteries a bit. The necessity for lightweighting in automotive has not diminished and it seems there are more projects around plastics and composites than there are experienced engineering resources to support them. I do see a lot more young engineers as I interface with suppliers and OEMs. We believe the SPE Automotive Division can play a key role in helping these bright young people to accelerate their expertise. I urge our loyal members to share their experience with SPE and encourage the next generation of automotive engineers to join. The reality is we need their youth and energy as much as they can benefit from our age and experience.

The 15th-annual ***Automotive Composites Conference & Exhibition*** being held September 9-11 in Novi, Michigan, USA is an excellent opportunity to see the most recent automotive applications utilizing polymer-based composites. SPE's Automotive and Composites Divisions co-organize this event, which is widely considered *the world's leading automotive composites forum*. This year's ACCE will also include technical presentations on Additive Manufacturing & 3D Printing. We're very excited to have this growing technology represented at the conference.

Our 45th-annual ***Automotive Innovations Awards Gala*** will be held on November 11 at Burton Manor in Livonia, Michigan, USA. As many of you know, this event is an excellent way to showcase plastic/composite innovations that have been brought into production, and allows the industry to congratulate the people who helped bring these ideas to reality. Our theme this year is: **The Future Looks *Light***. Please submit nominations for the competition as soon as possible. The due date this year is September 16. The first round of judging (where category finalists are selected) takes place October 1 & 2, and the Blue-Ribbon judging (where category and the Grand Award winners are selected) is October 12. Our Awards Gala is where winners are announced. We are working hard to make sure this year's show will be our best one yet. We hope to see lots of our members participate.

The Automotive Division's board of directors would again like to extend our sincere gratitude to all of our members for their continued support. We look forward to seeing all of you at our upcoming events.

Kind Regards,

Steven VanLoozen

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

ACCE CONTINUED FROM PAGE 1

In addition to a large exhibition with more networking time worked into the schedule, event organizers have worked hard to put together a very interesting technical program. There are 24 separate sessions that will be held in three parallel tracks throughout the three-day event. New this year is a two-part *Additive Manufacturing/3D Printing* session organized by three members of the SPE Automotive Division board. Also back for the first time since 2008 is a *Bonding, Joining & Finishing* session. These join large sessions on *Nanocomposites, Virtual Prototyping & Testing*, and *Enabling Technologies* (the process/machinery session), and smaller sessions on *Opportunities & Challenges with Carbon Composites, Sustainable Composites* (on biopolymers, recycled polymers, and natural fiber-reinforced composites), *Advances in Thermoset Composites, Advances in Thermoplastic Composites,* and *Advances in Reinforcement Technologies*. Additionally, two *tutorials* are being offered to attendees at no additional cost: a two-hour session on *Adhesive Bonding of CFRP (carbon fiber-reinforced plastic) Composites* from Louis Dorworth of Abaris Training Resources, Inc.; and a one-hour session on *Bioplastics and Biocomposites for Automotive* from Karen Stoeffler of National Research Council Canada (NRCC). To make it easier and faster for attendees to get from the exhibits and food to session rooms and back, the technical program has been consolidated much closer to the exhibition hall to maximize networking opportunities.

The ACCE is well known for the diversity of its keynote presentations and the lively discussions its panel discussions engender. This year's technical program will feature five keynote presentations (spread over the three-day event) and a 90-minute panel discussion on Thursday afternoon, the show's second day. Day 1 keynotes include a talk by Anthony Schiavo, research associate, Lux Research Inc. on the topic of *Carbon Fiber 2.0: Roadmap for Growth to 2020 and Beyond* as well as a multi-speaker group that will address the topic of *Institute for Advanced Composites Manufacturing Innovation (IACMI): A Disruptive Moment in Automotive History.* Presenters in that 75-minute talk will include Dr. Craig Blue, CEO, IACMI; Dr. Larry Drzal, IACMI Director - Vehicles Technology Area, from Michigan State University; Dr. Byron Pipes, IACMI Director - Modeling and Simulation Technology Area, from Pursue University; Dr. Brian Rice, IACMI Director - Compressed Gas Storage Technology Area, from University of Dayton Research Institute; and Cliff Eberle, IACMI Director - Materials and Process Technology Area, from Oak Ridge National Laboratory. On Day 2, Deborah Mielewski, senior technical leader - Sustainable Materials and Plastics Research, Ford Motor Co. will give a talk entitled *Owning the Future: Sustainable Materials Research, Development & Implementation at Ford.* The new *Ford Mustang Shelby* sports car with composite wheels reportedly will be on display throughout the conference.

Right behind the Ford talk will be a second keynote by Stefan Stanglmaier, Technologieentwicklung CFK Material und Prozessabsicherung, BMW Group on the topic of *Mass Production of CFRP in Automotive Applications – Potential and Challenges in Implementing Local Reinforcements.* BMW reportedly will also have one of its *BMW i8* electric sports cars with carbon composite passenger cell on display the entire conference. On Day 3 Antony Dodworth, managing director, Bright Lite Structures will discuss *A Platform for Novel Lightweight Automotive Composite Structural Design* about another composites-intensive sports car.

With all the interest in hybrid metallic/composite vehicle structures, this year's panel discussion — on the topic of *Carbon Steel to Carbon Composites – Can the Existing Automotive Infrastructure be Leveraged to meet Lightweighting Targets?* — should be of great interest to many people, particularly suppliers who currently stamp steel. The panel will be led by Prof. Jan-Anders Månson, Ecole Polytechnique Fédérale de Lausanne (EPFL) who will moderate a panel comprised of Dr. Paul Krajewski, General Motors Co., Glade Gunther, Cytec Industries Inc., Peter J. Ulintz, Precision Metalforming Association, Rainer Kossak Ph.D., Novelis Inc., and Paul Thom, Schuler Inc., and with support from Gary R. Maddock, Zapp Tooling Alloys Inc.

To keep things interesting and educational, the ACCE also features best paper awards, student scholarship awards, a student poster competition (judged at the event), and a best part competition (also judged at the event). Other popular networking functions at the conference include pre-event social outings the day before the conference (Tuesday, Sept. 8) held in and around the Detroit area. The 21st-annual SPE Automotive Division golf outing will be held at beautiful Fieldstone Golf Club (Auburn Hills, Michigan). At 2:00 pm local time, Continental Structural Plastics (CSP) in Auburn Hills will host two-dozen people for a tour of the company's new world headquarters. SPE will provide transportation to and from the conference center for those who sign up ahead of time for the tour. Both golf outing and conference participants are invited to attend an evening reception on Tuesday night at the conference facility's Fireside Room. There are also two more evening receptions, hosted by BYK USA Inc. and Hexion Inc. respectively on Wednesday and Thursday evening.

Learn more at **http://speautomotive.com/comp.htm**. Review 14 years of ACCE proceedings and program guides free at **http://speautomotive.com/aca**. Those with Android® or iOS® smartphones or tablets can download the free SPE Events event app in their app store to view schedules, author bios, and mini-abstracts of presentations, keynotes, panels, and other event details. Content is available online at **http://spe.eventsential.org/Events/Details/456**.

Keynote Speakers Announced for 2015 SPE® TPO Automotive Engineered Polyolefins Conference

The seventeenth-annual ***SPE® TPO Automotive Engineered Polyolefins Conference***, *the world's leading automotive engineered-polyolefins forum*, will showcase talks by five keynote speakers from Ford Motor Co., Auto Harvest Foundation, Sumika Polymers North America, Inc., Asahi Kasei Plastics North America, and General Motors Co. Interspersed throughout the two-and-a-half-day conference, the keynotes will highlight important issues facing the automotive-plastics market, including customer wants and needs, future automotive trends, global outlook for automotive polyolefins, oil and shale gas impacts on vehicle lightweighting, and evolution of TPO material performance. Organized by the *SPE Detroit Section*, the 2015 conference returns to the Troy Marriott in the Detroit suburbs from October 4-7, 2015.

On Monday morning, after brief remarks by conference co-chairs the event begins with a keynote entitled *TPO: A Customer's Perspective* by **Michael Whitens**, director-Vehicle & Enterprise Sciences at **Ford Motor Co.** "We automakers live in a rapidly changing world where we're under relentless pressure to lower CO_2 emissions, reduce vehicle weight, increase safety and fuel efficiency, and of course continually add new technology while maintaining or lowering the cost of our vehicles," notes Whitens. "That's a very challenging set of deliverables for this whole industry. In my talk I'll discuss what a customer, namely Ford Motor Co., wants and needs with regard to thermoplastic polyolefins (TPOs). I'll cover some key improvements that have boosted performance and lowered cost over the past few decades, then describe areas where we'd like to see these materials improve as we move forward. If the TPO community can do this, it'll create the window of opportunity for TPOs to displace more costly materials."

An automotive industry veteran with more than 29 years of experience, Whitens has spent most of his career at Ford in various body engineering disciplines. He assumed his current role last July. Before that, Whitens was engineering director responsible for leading Global Ford Body Interior Engineering. In this capacity he was responsible for global design and development of Ford interior systems — from concept to customer. A recognized industry leader in the development of automotive interiors, Whitens and his teams have won many industry accolades, including the Premier Automotive Suppliers' Contribution to Excellence (PACE) award and SPE Automotive Innovation awards, as well as been issued numerous patents for component innovation, new material development, and interior execution. Whitens also has been the recipient of several quality awards, including national recognition for U.S. Design for 6-Sigma. He currently is a member of the SPE Automotive Division board and a member of Michigan Technological University's (MTU's) external advisory board for the Department of Electrical & Computer Engineering. He holds a Bachelor's of Science degree in Electrical Engineering from MTU and a Master's degree in Engineering Management from Wayne State University.

Immediately after Whitens, **Dr. David Cole**, chair, **Auto Harvest Foundation** will give the second keynote of the morning entitled *The Auto Future: Fast, Furious and Exciting*. "The auto industry has gone through an amazing transformation in the past few years," explains Cole. "Through capacity reduction, restructured labor contracts, financial restructuring, staff reductions, new technological tools, global scale, and more, the U.S. auto industry's break-even has been significantly reduced. The domestic manufacturers, in particular, have become far more competitive as they have moved from a cost disadvantage to cost parity with many of their international competitors. This is evident with their surprising level of profitability. There are a number of concerns however: there is still excess capacity at the global level, with re-expansion of the domestic market there is a growing shortage of appropriately educated future employees, and that's exacerbated by accelerated retirement of 'Boomers.' Furthermore, there are tough new regulations to meet,

 CONTINUED FROM PAGE 7

economic uncertainty across many of the world's economies, and much more. Because of all this, we're at the edge of a revolution in both product and process technologies. New production facilities are both lean and agile with advanced software control everywhere. In the product area, the powertrain is moving to at least partial electrification, but advanced internal combustion engines assure a lively competition for some time to come. New material systems are being developed that feature significant advances in both materials and their manufacturing processes. And the connected vehicle is becoming a reality that will yield enormous benefits, particularly in safety. All in all, the modern auto industry is on the move and the process of change is accelerating."

Cole also is chair *emeritus* of the Center for Automotive Research (CAR) and the former director of the Office for the Study of Automotive Transportation (OSAT) at the University of Michigan's Transportation Research Institute as well as an engineering professor at the school. His technical and policy consulting experience includes a variety of assignments for industry, labor, and government and he has spoken to more than 1,000 different groups on automotive issues. He has been and is actively involved in the start up of nine different Ann Arbor, Micigan-based companies and is currently a director on the board of three automotive-related companies. In 1993 Cole received the National Automobile Dealers Association Foundation's International Freedom of Mobility Award. In 1994, *Design News* magazine named him as one of eight engineering leaders, and he was also selected to receive Sweden's Order of the Polar Star that same year. In 1998 Cole was named Marketing Educator of the Year by the Society of Marketing Executives and also received the Rene Dubos Environmental Award for his contributions to the industrial ecology of the automobile. In 1999 he was given the Chevalier of the National Order of Merit from France and he was the 2008 Mechanical Engineering Distinguished Alumni Award recipient from the University of Michigan. In 2013 Cole was inducted into the Automotive Hall of Fame, the industry's highest honor. He long has been active in industry engineering societies, including SAE International® where he served two terms on the board of directors and was named a *fellow* in 1986. He also is active in the Engineering Society of Detroit (ESD) and was elected to *fellow* status in 1990 as well as received ESD's highest award, the Horace H. Rackham medal in 2000. Additionally Cole is a member of the Society of Manufacturing Engineers (SME) and was elected to *fellow* grade in 2009. He is currently a member of the editorial advisory board of *Popular Mechanics* magazine and is listed in Marquis' Who's Who in America. He holds B.S. degree in Mechanical Engineering (M.E.) and Mathematics, M.S.M.E. and Ph.D. degrees from the University of Michigan, as well as an honorary doctorate from Cleary University.

On Tuesday, the conference's second day, **Brian K. Weider,** president - **Sumika Polymers North America, Inc.** will lead off with a keynote on the topic of *Global Outlook for the Polyolefin and Automotive Businesses.* "I'll start off by discussing long-term trends affecting polypropylene, polyethylene, and the elastomers supply base," says Weider. "Then I'll look at current trends in the automotive industry for TPOs and TPEs. Finally I'll discuss some future trends we anticipate that will affect the entire global automotive resin market."

Weider has spent more than 35 years in the plastics industry and 30 years of that in the automotive-plastics industry. He began his career in R&D at B.F. Goodrich and later joined the *Santoprene* TPE business of Monsanto. He also worked at GE Plastics in engineering resins and has spent the last 17 years at Sumitomo Chemicals. In his current role, he leads Sumika's North American efforts, which are solely focused on the automotive industry. Weider holds a B.S. degree in Chemical Engineering from The Ohio State University and a Master's degree in Business Administration from the Weatherhead School of Business at Case Western Reserve University.

Day 2 will feature a second back-to-back keynote from **John Moyer**, president & chief operating officer, **Asahi Kasei Plastics North America** who will give a talk entitled, *Oil, Shale Gas, Fuel Efficiency, Lightweighting, & Other Funny Things that Happened on the Way to the TPO Forum.* "My talk will begin with a discussion of all the changes in the world of energy costs," remarks Moyer, who adds "and I expect that there will be more changes between now and October of this year. I will also talk about compounders — both how we fit into this world of plastics and how we can change rapidly to meet the ever-changing world."

In his current role, Moyer leads activities for Asahi Kasei Plastics North America, a subsidiary of Asahi Kasei Chemical Corp. and a leading custom compounder of advanced engineered polymers for the automotive, commercial truck, commercial seating, water handling, and construction markets. During his time at the helm, Asahi Kasei Plastics has grown substantially in the U.S. and has expanded its business base to include Mexico, Brazil, Europe, China, India, and Japan. Moyer joined Asahi Kasei Plastics in 2005 as president. Previously he worked for Dow Chemical Co. for 24 years holding various manufacturing leadership roles in the U.S., Indonesia, and Hong Kong. He also has been involved in starting up new businesses in Indonesia and China. Moyer is a member of the board of directors for the Livingston County United Way, the board of trustees for Kettering University, and the board of trustees for Cleary University. He is a past board member for the Livingston Country Red Cross, the Howell Chamber of Commerce, and the Styron Asia Ltd. joint venture between Dow Chemical Co. and Asahi Kasei Chemical Co. Moyer holds a Bachelor's degree in Chemical Engineering from the University of Cincinnati.

On Wednesday, the conference's third day, the event will begin with a keynote from **Matt Carroll**, engineering group manager, **General Motors Co.**, who will discuss *The Evolution of TPO Material Performance.* "The performance of thermoplastic polyolefins for both interior and exterior components has been scrutinized and steadily improved over the past 20 years," states Carroll. "Besides the all-important dimensional stability of parts, material properties like UV stability, oxidative stability, impact resistance, scratch and mar resistance, stiffness for handling, and paintability are all keys to producing successful parts. In several cases, the property needs are in conflict and a 'balancing act' is required to optimize part performance. In this talk, I'll review improvements in the performance of TPO over time and provide some personal thoughts about future usage and growth of this class of polymer in the automotive industry."

Carroll is a registered Professional Engineer in the State of Michigan and holds B.S. and M.S. degrees in Chemical Engineering from University of Detroit and Wayne State University respectively. Earlier in his career he worked at a paint plant for BASF Corp., a polymer plant owned by Huntsman, and at the Chicago-based facility for a plastics machinery manufacturer. Carroll joined General Motors in 1994 as a materials engineer and later became a vehicle system engineer on the *Buick Lucerne* program. In his current role, he is engineering group manager-Materials for the Body Exterior and Electrical group. Carroll has presented 15 conference papers and presentations, is the former newsletter editor and membership chair of the SPE Detroit Section, and is currently chair-elect and a member of the board of directors for the SPE Automotive Division.

ABOUT THE AUTO TPO CONFERENCE

Since 1998, the ***SPE TPO Automotive Engineered Polyolefins Conference*** has highlighted the importance of rigid and flexible polyolefins throughout the automobile – in applications ranging from semi-structural composite underbody shields and front-end modules to soft-touch interior skins and bumper fascia. Engineered polyolefins have been the fastest-growing segment of the global plastics industry for more than a decade owing to their excellent cost / performance ratio. The show typically draws more than 700 attendees from 20 countries on four continents who are interested in learning about the latest in rigid and elastomeric TPO as well as TPE and TPV technologies. Fully a third of conference attendees say they work for a transportation OEM, and roughly 20% work for a tier integrator / molder, with the balance from materials or reinforcement suppliers, equipment OEMs, industry consultants, and members of academia. A variety of sponsorship packages are available for companies interested in showcasing their products and / or services. Learn more at **http://auto-tpo.com/** or **http://speautomotive.com/tpo.htm**.

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Exhibit & Sponsorship Opportunities

Now in its 17th year, the show is the world's leading automotive engineered polyolefins forum featuring 60+ technical presentations, keynote speakers, networking receptions, & exhibits that highlight advances in polyolefin materials, processes, and applications technologies as well as a growing range of thermoplastic elastomers (TPEs) and thermoplastic vulcanizates (TPVs). This year's show will be held Oct. 4-7, 2015 at the Troy-Marriott (Troy, Michigan) in the suburbs of Detroit.

Showcase your products and services at the world's leading automotive engineered polyolefins forum. Many sponsorship packages are available. Companies interested in showcasing their products and/or services at the SPE Auto TPO Conference should contact TPOpapers@auto-tpo.com.

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ANTEC® REPORT by Barbara Spain, SPE Headquarters

Now in its 74th year, ANTEC® heads to Indianapolis, Indiana, USA in 2016 the week before the 100th running of the Indy 500™ car race. Our ANTEC teams are working diligently to produce an exciting event that will create a great experience for attendees, speakers, and exhibitors.

We can't say who they are yet, but we have invited some way-cool keynote speakers that we are sure you will not want to miss. Super sessions from the Automotive and 3D Printing/Additive Manufacturing (3D/AM) team will be chock full of creative innovation, and our Automotive Team already has a working title – "***Plastics Enabling the Car of the Future***," building off technology developed from the racing world. The 3D/AM group has plans to bring in some small printing equipment, and we may be able to 3D print our Linky figurines right on site!

A new feature in the exhibit hall this year will be the ***SPE Fellows Pavilion***. Not only will we honor our SPE Fellows, but we'll make them active participants in the event by incorporating both our ***Digital Student Poster Competition*** as well as the ***SPE Plastics for Life™*** global parts competition within the pavilion. Starting in 2016 we will avail ourselves of the extensive knowledge held by the SPE Fellows by having them judge both the posters and the parts competitions.

Networking opportunities abound in the form of our networking lounge, exhibit hall where the coffee flows, a great Monday networking reception, and division receptions galore. It's going to be a great place to garner and swap knowledge and meet people next year. In short, we can't wait to see you all there!

ANTEC Indianapolis 2016 will take place from May 23-25 at the JW Marriott Indianapolis. For information, contact Barbara Spain (bspain@4spe.org).

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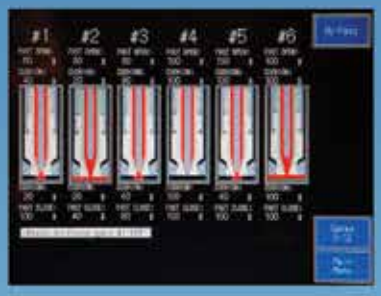

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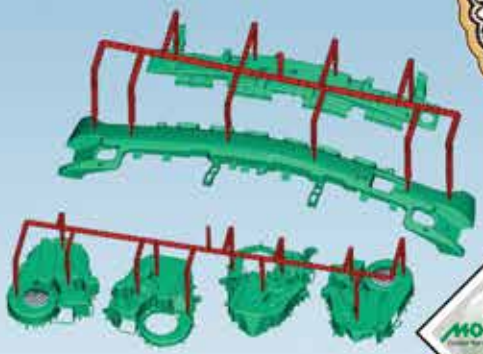

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Technical Report

Lightweighting Composites Through Selective Fiber Placement

by Christopher M. Pastore, *Philadelphia University*

Abstract

Lightweighting is essential for the reduction of energy consumption in transportation. The most common approach is through the application of high specific strength and stiffness materials, such as composites and high performance aluminum alloys. One of the challenges associated with the use of advanced materials is the high cost. This paper explores the opportunities of using hybrid composites (glass and carbon, for example) with selective fiber placement to optimize the weight subject to price constraints for given components.

The underlying idea is the use the more expensive carbon fiber only where needed thorough the use of a gradient hybrid material that incorporates glass everywhere else. The goal is a process that allows automation while optimizing weight and cost for a given structural element. Through a combination of theoretical and experimental evaluations, a methodology for evaluating the weight-cost efficiency of chopped fiber composites was developed and confirmed experimentally. Optimization is investigated using penalty function and exchange constant methods.

Considering the example of a hat-section for hood reinforcement, different material configurations were modeled and developed. For each, the required thickness of the hat section to meet the same bending stiffness as an all carbon composite beam was calculated. It was shown that selective placement of fiber around the highest moments results in a weight savings of around 14% compared to a uniformly blended hybrid with the same total material configuration.

From these calculations it is possible to estimate the materials cost of the different configurations as well as the weight of the component. Each solution has an advantage – it may be lighter than another, but not less expensive. To determine which is best it is necessary to find an exchange constant that converts weight into cost – the penalty of carrying the extra weight. The value of this exchange constant will depend on the particular application.

Depending on the value of weight, different materials appear optimal. When weight is valued between $1.00 and $5.30 per pound, the optimized hybrids offer the best solution to the problem.

 CONTINUED FROM PAGE 14

Background

Weight has a cost penalty (or conversely, weight reduction has a value or premium), depending on the application. The relatively high cost of composites is a barrier to their adoption in cost-sensitive (low weight penalty) energy applications. Multi-material preforming enables the production of composite components with increased structural efficiency and reduced cost. This will accelerate the deployment of high performance composites in energy applications.

Lightweight design and construction is essential for maximizing performance in many energy applications. For example, a 10% mass reduction in passenger automobiles reduces fuel demand by about 6 – 8%[1], hence routes to compliance with 2025 U.S. CAFE regulations (54.5 mpg) typically include demanding vehicle weight reduction targets. Similarly, utility scale wind turbines are growing larger with prototype blades approaching 100 m long, requiring a combination of low mass and stiffness that can only be delivered by fiber-reinforced composites, with carbon fibers being very desirable for high stiffness.

Carbon fiber composites maximize weight reduction in these applications, but at a very high cost premium. Most structural parts are over-designed with the entire material volume able to withstand the highest stress levels in the part. However, the parts rarely experience uniform stress - some areas are much more stressed than others. An optimized part can be designed such that all of the material approaches the design limit condition in at least one load case while never exceeding that limit in any load case. The use of a high precision, selective fiber placement technique can result in appropriately designed, minimal weight components. In an optimal configuration, lower cost materials can be incorporated in areas where benefits of the carbon fiber do not justify the cost premium, resulting in a reduced overall cost of production while fully satisfying all performance requirements.

This method has been realized in continuous fiber applications. Laminated composites often include glass at the core and carbon on the surface for bending resistance, and woven fabrics with glass in one direction and carbon in the other have been developed for applications with directional loading. However with continuous fiber composites there are limitations to the ability to vary the carbon and glass content. The use of short fiber deposition allows variation in carbon content in all dimensions of the part in an arbitrary pattern. Further short fiber deposition offers a significantly lower cost final product.

EDITOR'S NOTE: Read the rest of this award-winning paper in the SPE ACCE Archives after Sept. 8, 2015. Paper is at: **http://speautomotive.com/SPEA_CD/SPEA2015/pdf/RF/RF2.pdf**.

1. Lynette W. Cheah (2010), "Cars on a Diet: The Material and Energy Impacts of Passenger Vehicle Weight Reduction in the U.S.", Massachusetts Institute of Technology Ph.D. Thesis, Sept 2010.

ABOUT DR. CHRISTOPHER PASTORE

Dr. Christopher Pastore, *professor of Transdisciplinary Studies* in the Kanbar College of Design, Engineering and Commerce at ***Philadelphia University*** (**http://www.philau.edu/**; Philadelphia) has been named a winner of the ***Dr. Jackie Rehkopf Best Paper Award*** by the peer-review committee for the **SPE Automotive Composites Conference & Exhibition (ACCE)**. He authored a paper entitled *Lightweighting Composites through Selective Fiber Placement*, which he will present in the *Advances in Reinforcements* session on September 10 from 2:30-3:00 p.m. Pastore holds both a Ph.D. in Materials Engineering and an M.S. degree in Mathematics from Drexel University as well as a B.A. degree in Mathematics from LaSalle University. His book Sustainable Composites was published earlier this year, adding to a list of many publications in the field of composites, sustainability, and textiles.

SECRETARY'S REPORT

SPE Automotive Division Board April 13, 2015 Minutes

Next BOD Meeting: June 8, 2015

ATTENDEES

Teri Chouinard	Anthony Gasbarro	Scott Owens	Andy Stechner
Peter Bejin	Norm Kakarala	Tom Pickett	Dawn Stephens
Matt Carroll	Peggy Malnati	Monica Prokopyshen	Steve VanLoozen
Suzanne Cole	Yvonne Merritt	Jai Raisoni	
Fred Deans	Al Murray	Suresh Shah	

Meeting was held at the ACC in Troy, Michigan from 5:30 p.m. – 8:15 p.m.

SPECIAL PRESENTATION – Scott Owens

Scott presented a tour and overview of "The Chain," SPE HQ's online networking community: http://thechain.4spe.org/home. **Featured Places** include *Tech Talk* (a moderated technical forum for all SPE Members), *Leadership Lane* (a forum for volunteer leaders), *Career Central* (for members seeking career information), and *Campus Connection* (for SPE student members). **Working Communities** are provided for use by *Affiliate Boards* (for authenticated users of specific boards, like the SPE Automotive Division board of directors) and *Committees* (for use by event planning groups, etc.). SPE HQ is seeking to add **Premium Places** (accessible by members of technical divisions) and was seeking support from the SPEAD to open one for Automotive Plastics. *The Chain* opens up 2-way web communications. It utilizes a fully responsive design (suitable for all devices from smart phones to tablets and PCs), was launched in January 2015, and had about 3,000 members as at April 13, 2015. Scott Owens also discussed use of the tool for event promotion and management. Questions were asked about security measures SPE International implemented with the website and its modules; Peggy distributed an email response from SPE's webmaster.

EDUCATION – Monica Prokopyshen

Results from Explorathon® 2015, held at Cranbrook Kingswood Middle School on Wednesday, March 25, 2015 were presented. Elizabeth Egan (PlastiVan™ Educational Program), Monica Prokopyshen (SPEAD) and Barbara Cochran (AAUW) presented the "Designing with Plastics" sessions. St. Clair Middle School students from grade 7 sent their thanks to the SPEAD for the PlastiVan program. Read the education summary (from June issue of newsletter) for further details and excerpts of students' comments. Two new teachers have been hired by SPE HQ to support the PlastiVan program in Michigan.

SOCIAL MEETING – Teri Chouinard

An education on wine tasting and the benefits of SPE membership is scheduled for April 30th. An e-blast describing the event was distributed.

MEMBERSHIP – Steven VanLoozen

New OEM memberships have been received. In addition, SPE HQ has been giving out free student memberships and the board discussed whether our efforts could be coordinated with their own. The committee will follow up with new members and, if free memberships aren't renewed, investigate why.

TREASURER'S REPORT – Dawn Stephens

The fiscal year is July 1 to June 30. As at April 13, 2015 the account balances were:

Checking:	$206,627
Savings:	$27,433
Total:	$234,060 USD

The SPEAD had to reopen its PayPal® account at a cost of $30 per month in order to process payments on the ACCE eTouches registration system.

COUNCILOR'S REPORT – Tom Pickett

SPE International election results can be found in the Councilor's Report (from the June newsletter). SPE HQ earned $103,000 for the financial year. Finances were helped by reduced spending on membership acquisition mailings and improvements in advertising and publication revenue. Details are on *The Chain.* The SPEAD board passed a motion to clarify HQ's privacy policy with respect to the membership and boards. The incoming president, Dick Cameron, wants to work on relevance. The membership of Young Professionals is important. Cameron feels that adding value is critical. Five breakout sessions discussed the role of governance and the ideal number of people and organizational structure.

ANTEC 2015 – Suresh Shah

Matt Carroll gave a good talk on nylon at the March 25th ANTEC automotive session. The last session only had three attendees, likely in part due to the uncertainty of whether it would be presented. The SPEAD held a business meeting at ANTEC; Matt, Suresh, Tom and Anthony attended. The BOD is looking for a volunteer to be the SPEAD's technical program chair for next year's ANTEC automotive session.

MARCOM – Peggy Malnati

AutoEPCON 2015: May 5, 2015 at the Troy Marriott.

ACCE 2015: Sept. 9-11, 2015 at Diamond Center in Novi. Theme: *Composites — The Next Generation of Lightweighting*

- SPE HQ is not currently charging for student memberships, which saves $1920 in costs for the ACCE 2014. In addition the Diamond Center overcharged for 2014, so the conference receives a $21,000 credit for the 2015 event.
- Three press releases were issued and 32 paper offers have been accepted. CD artwork and the program template have been completed. Swap ads have been sent to publications.

SECRETARY'S REPORT
Cont. from page 17

IAG 2015: Nov. 11, 2015, Burton Manor, Livonia. Theme: *The Future Looks Light*

- First Round Judging Oct. 1-2, Celanese, Auburn Hills.
- Blue Ribbon Judging Oct. 12, Celanese, Auburn Hills.
- Pre- and post-event ads and the program guide template have been completed.

SPE AD Website: December 2014 still holds the all-time record for highest number of unique visits (62,539), but January 2015 set the 3rd highest all-time record at 58,500 and March set the 2nd highest record at 61,507. SPEAD doesn't pay for position.

Automotive Plastics News: The cost to print and mail a large newsletter is $9,000 and a small one $7,000. To cut costs, the March newsletter was reduced to 40 pages, the mailing list was cut and fewer copies were printed. Ad rates for four issues are $4,500 (full page), $3,500 (half page) and $2,400 (quarter page).

Other Marcom: The SPEAD received the highest Pinnacle and Communication Excellence awards. Every event swap henceforth must be pre-approved by HQ and only division or section logos may be used, not the generic SPE shield. HQ approved the Infocast *2nd Lightweighting* Summit (March 3-5) swap. SPEAD members receive a 15% discount, the Auto Div. has a booth, and division literature will be distributed.

SPONSORSHIP – Teri Chouinard / Dawn Stephens

There are potential new newsletter sponsors.

3-D PRINTING CONFERENCE – Matt Carroll / Al Murray

It was suggested that the term "additive manufacturing" (layer by layer printing) be used rather than 3-D printing. The committee is targeting month-end for the receipt of abstracts. There will be enough papers for an ACCE session.

OTHER BUSINESS

- This April, an SPE speaker will give a talk on SPE & ACCE in Japan at the Society of Automotive Composites.
- Jeff accepted an invitation to discuss the SPE Automotive Innovation Awards Competition late August in Mexico. He will discuss IAG innovations. We were also offered a free ad in the Spanish-language magazine that holds the conference focused on automotive plastics for tier suppliers each August.
- SPE ACCE and IAG winners went on to win two of the six SPE HQ's Plastics for Life™ awards:
  - The Quality of Life award went to ACCE Body Exterior Winner: Nissan GT-R Decklid.
  - The Grand Award went to IAG Process / Assembly / Enabling Category Winner: Ford F-150 Single Collimator Headlamp Lens.
  - More details can be found at: http://4spe.org/plasticsforlife

SECRETARY'S REPORT

SPE Automotive Division Board
June 8, 2015 Minutes

Next BOD Meeting: August 10, 2015

ATTENDEES

Peter Bejin
Teri Chouinard
Matt Carroll
Fred Deans
Anthony Gasbarro
Jeff Helms
Norm Kakarala
Peggy Malnati
Tom Pickett
Monica Prokopyshen
Andy Stecher
Suresh Shah
Ed Luibrand
Dawn Stephens
Steve VanLoozen
Umesh Gandhi
Dave Reed

Meeting was held at the ACC in Troy, 5:30 p.m. – 7:36 p.m.

SPECIAL PRESENTATION

Since Scott Owen's overview of *The Chain*, SPE Steve VanLoozen has been testing it. **http://thechain.4spe.org/home** As of June 8, SPE HQ still hadn't updated the automotive BOD list provided on April 13th. Scott wants an automotive group for *The Chain*, but we need a volunteer to manage it. The SPEAD board passed a motion to clarify HQ's privacy policy with respect to the membership and boards. Responses to the governance question were consolidated and the emphasis was on proportional representation and the use of tools and software for communications. The BOD had new questions on SPE's privacy policy with respect to 3rd-party conference registration providers.

EDUCATION – Monica Prokopyshen / Fred Deans

PlastiVan™ - The division received origami cards and thank you letters from appreciative PlastiVan students. Margie Weiner was pleased to conduct a session 20 minutes from SPE HQ at a Connecticut middle school. The principal's enthusiastic response was re-tweeted many times on social media. The Detroit Section will hold a June meeting on a) scholarships for this coming year and b) efforts to support Schoolcraft College's new plastic school. Dave Reed gave a talk on innovation and careers at Kettering University. Nipanni Rao and Fred Deans will give a presentation at Michigan State University.

SOCIAL MEETING – Teri Chouinard

The next event is the golf outing on Tuesday, Sept. 8 at Fieldstone Golf Club in Auburn Hills, Michigan. Proceeds support SPE student chapters. As of June 11, $10,000 in sponsorship and team registrations have been pledged. The ACCE facilities tour the same day will be hosted by Continental Structural Plastics (CSP).

MEMBERSHIP – Steven VanLoozen

New OEM memberships have been processed. The committee will follow up with new members and student memberships. In addition, SPE HQ has been providing free student memberships and the board discussed whether our efforts could be coordinated with HQ's. The Membership committee will be transitioned to Fred and Teri as 2015-2016 co-chairs. Volunteers are sought to help the committee recruit members from transnational companies.

TREASURER'S REPORT – Dawn Stephens

The fiscal year is July 1 to June 30. As at June 5, 2015 the account balances were:

Checking:	$234,672
Savings:	$27,434
PayPal®:	21,749
Total:	$283,855 USD

SPEAD had to reopen its PayPal account at a cost of $30 per month in order to process payments on the ACCE eTouches registration system.

COUNCILOR'S REPORT – Tom Pickett

No Councilor's meeting since ANTEC, so no update to report.

ANTEC 2015 – Anhtony Gasbarro

Planning has started for 2016 with the goal of a full day for automotive sessions in Indianapolis, Indiana. The timeline is challenging to obtain new (never before published) papers by Sept. for the spring event. The team is also seeking a volunteer to be the SPEAD's technical program chair for next year's ANTEC automotive session.

MARCOM – Peggy Malnati

ACCE 2015: Sept. 9-11, 2015 at Diamond Center in Novi. The target for schedule publication is early July. Four press releases were issued; 62 paper offers have been accepted to date

IAG 2015: Nov. 11, 2015, Burton Manor, Livonia. First Round Judging Oct. 1-2, Celanese, Auburn Hills, Michigan. Blue Ribbon Judging Oct. 12, Celanese, Auburn Hills. The first press release was distributed and the first Spanish-language call for part nominations ad was created.

SPEAD Online: April 2015 hit an all-time record for highest unique visits (63,683), with May at no. 2 (62,635) and December 2014 in 3rd place (62,539). Three of the four highest traffic months on record have been the most recent consecutive months. SPEAD doesn't pay for position.

Automotive Plastics News: Two new advertisers have been added. To keep cost down, the June newsletter was reduced to 36 pages, the mailing list was reduced and fewer copies were printed. Feature articles in the June issue include: Engineer's Life (Suresh Shah), SPE Staff (Russell Broome, Managing Director), and Designer's Den (*The End of Defensive Design: Simulation for Aggressive Composites Use*).

Jackie Rehkopf Scholarship: Peggy reported on the status of using The Community Foundation of SE Michigan (CFSEM) to manage an endowed scholarship. CFSEM increased the minimum funding requirement from $100,000 to $250,000. This and other issues make CFSEM an infeasible option to pursue. It was recommended that the relationship be terminated and other options be considered, like the SPE Foundation, but there wasn't a quorum present to vote on the motion. The SPE Foundation offers more flexibility and lower entry costs. It can handle endowed scholarships, pass-through scholarships, and can send to international schools without fees to SPE entities. Peggy is now on the foundation board to observe how the process works. BOD approval and a letter of intent to Russell Broome are required to exercise this option. Once a decision is made, pledges and checks can be processed.

SPONSORSHIP – Teri Chouinard / Dawn Stephens

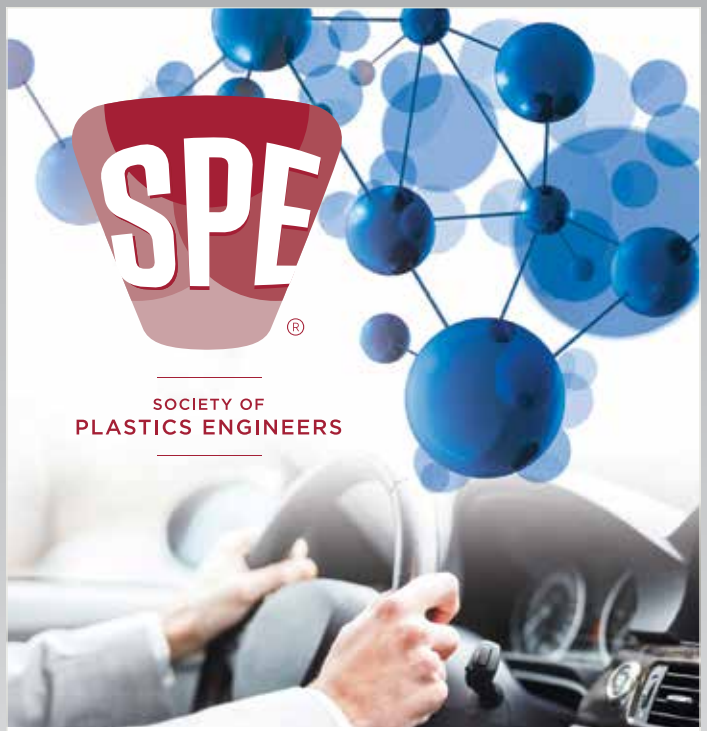
There are potential new newsletter sponsors.

3-D PRINTING CONFERENCE - Matt Carroll / Al Murray

The committee is targeting month-end for the receipt of abstracts. There will be enough papers for an ACCE session.

OTHER BUSINESS

Steve VanLoozen was re-elected SPEAD Chair for 2015-2016.



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TREASURER'S REPORT

by Dawn Stephens,
SPE Auto. Div. Treasurer

As at August 10, 2015, the division's account balances were:

Checking:	$268,208 USD
Savings:	$ 27,436 USD
PayPal®:	$ 9,331 USD
Total:	$304,976 USD

Thanks to our sponsors for making our 21st golf outing a big success!

2015 SPONSORS INCLUDE:

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SECRETARY'S REPORT

SPE Automotive Division Board August 10, 2015 Minutes

Next BOD Meeting: October 1-2, 2015

ATTENDEES

Teri Chouinard
Matt Carroll
Fred Deans
Jeff Helms
Umesh Gandhi
Mark Lapain
Ed Luibrand
Peggy Malnati
Yvonne Merritt
Al Murray
Scott Owens
Ron Price
Monica Prokopyshen
Jay Raisoni
Dave Reed
Rose Petrella
Nippani Rao
Suresh Shah
Dawn Stephens
Elizabeth Johnston Tengler
Steve VanLoozen

Meeting was held at the ACC in Troy, Michigan from 5:30 p.m. – 7:13 p.m.

EDUCATION – Monica Prokopyshen / Fred Deans

The division sponsored the PlastiVan™ for the 22nd Annual Learning Fair, July 21-22 in Jackson, Michigan. We would like to thank Ford Motor Co. for donating sustainable polymer samples to the PlastiVan teams for educational purposes. The deadline for Detroit Section scholarship applications was last Friday. Fred will present an overview of SPE for a potential new student chapter at Bay Mills Community College (Bay Mills, Michigan). For more details, refer to the Sept. Education Report.

SOCIAL MEETING – Teri Chouinard

The next event is the golf outing, Tuesday Sept. 8, at Fieldstone Golf Club in Auburn Hills, Michigan. As of August 10, $12,000 in sponsorship and team registrations have been pledged.

MEMBERSHIP – Steven VanLoozen

The Membership committee is being transitioned to Fred and Teri for the 2015-2016 fiscal year. A kick-off event with students is planned to inform them about membership benefits as well a free membership promotion.

TREASURER'S REPORT – Dawn Stephens

The fiscal year is July 1 to June 30. As at Aug. 10, 2015 the account balances were:

Checking:	$268,208
Savings:	$27,436
PayPal®:	9,331
Total:	$304,976 USD

Most of the board meeting was focused on discussing the 2015-2016 budget. Methods to strengthen the division's financial position were discussed including: renegotiating the conference revenue-sharing terms; services that should be provided by headquarters; restructuring conferences, and other cost cutting/revenue raising options.

The newsletter cost and distribution were discussed, as one example. The number of pages and print distribution have been reduced. The June newsletter cost $10,600, down from March ($11,046) and Dec. ($15,000). The June print distribution was 900 with a web download of 3,500.

The budget was approved with minor changes and the understanding that it is subject to refinement as more information becomes available.

COUNCILOR'S REPORT – Tom Pickett

There has been no Councilor Meeting since the last SPEAD Board Meeting – thus there is nothing to report.

ANTEC 2015 – Suresh Shah

A volunteer to act as technical program chair for next year's automotive division session is still sought.

IAG – Jeff Helms

Nov. 11, 2015, Burton Manor, Livonia. The contract with Burton Manor has been signed. It's time to start submitting nominations as the deadline is next month. A subcommittee reviewed costs and revenue for this year's event budget.

MARCOM – Peggy Malnati

ACCE 2015: Sept. 9-11, 2015 at Diamond Center in Novi. Five press releases were issued – 3 more are in the editing/approval process. The event app is live with 2015 content. There are 68 papers as of today. There are new sessions on Additive Manufacturing/3-D Printing as well as a return of the Bonding, Joining & Finishing session. Along with interesting keynote speakers and panels, the *BMW i8* will be featured.

IAG 2015: The first press release was distributed in May. The Hall of Fame Release is in the approval process.

SPE AD Online: Four of the highest traffic months on record have been the most recent four consecutive months. June holds the all-time record at 64,512 unique hits. SPEAD doesn't pay for position.

Automotive Plastics News: To keep costs down, the June newsletter was limited to 36 pages. The Sept. issue will be available at the ACCE conference.

Jackie Rehkopf Scholarship: The SPE Foundation was selected to manage the scholarship because it offers more flexibility and lower entry costs. The collection for the fund will be launched in September.

SPONSORSHIP – Teri Chouinard / Dawn Stephens

Faurecia has signed on as a full-page newsletter sponsor. The most recent newsletter cost $10,600 for a print distribution of 900.

NEW BUSINESS

Matt Carroll was elected SPEAD Chair-Elect for 2015-2016. Suresh will coordinate the nomination of Jeff Helms for Honored Service Member.

EDUCATION REPORT

by Monica Prokopyshen,
SPE Automotive Division
Education Chair

SPE® AUTOMOTIVE

2015-2016 Education Budget

The 2015-2016 SPE Automotive Division's education budget has been set at $30,000 USD. The $1,500 Plastivan™ cost for the Jackson Learning Fair (2015-2016 fiscal year) was a paid in June.

22nd-Annual Jackson Learning Fair, July 21-22

We participated in the 22nd-annual, hands-on Jackson Learning Fair on July 21-22. This community event allows children and adults to explore technology, industry, and the arts. The SPE AD agreed to contribute $1,500 USD in sponsorship dollars when a long-time plastics industry manufacturer could no longer support it. The PlastiVan™ team's activities were focused on automotive, chemistry, manufacturing, and the sustainability of plastics. All three educators worked about 10 hours/day demonstrating, assisting participants in conducting experiments, and giving information about the industry to adults. The presenters for this event were Elizabeth Egan, Robin Thomas, and Margie Weiner. Combined, they saw over 2,000 people during the 2-day event. This was a huge event for the community.

Donation to Plastivan Program

Ford Motor Co. donated sustainable polymer samples to the Plastivan program for educational purposes. Materials donated included two types of polylactic acid (PLA)-based fabrics, soy-based foam, and molded plastic bars reinforced with wheat straw, shredded currency, and tomato fibers. Three sets of samples of each material were provided — one for each of the Plastivan educators. Many thanks go to Elizabeth Johnston Tengler, Debbie Mielewski, and Mica DeBolt for donating the samples.

Other Updates

Student appreciation letters were received from the Smith Middle School in Troy, Michigan, USA.

Fred Deans will be working with Bay Mills Community College in Michigan to set up a new SPE student chapter.

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