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

SPE® AUTOMOTIVE
Automotive Plastics NEWS
SEPT 2017 VOLUME 47, ISSUE 1

Automotive Composites Conference and Expo Preview

For the seventeenth year in a row, the Automotive Composites Conference & Exhibition (ACCE) organized by SPE's Automotive and Composites Divisions, returns to the Detroit suburb of Novi on September 6, 7 and 8. The event's mandate is to educate the global transportation composites supply chain on the latest developments in polymeric materials, process, machinery and applications. Billed as "the world's leading automotive composites forum," the conference draws more than 800 speakers, exhibitors, and attendees from the Americas, Europe, Asia, Africa, and the Middle East. Owing to its Motor City location (the Diamond Center at the Suburban Collection Showplace, Novi, MI, US) and the fact that entry fees are waived for transportation OEMs, the event boasts an enviable number of engineers and scientists working directly for automotive, commercial truck, agricultural equipment, off -highway, and plane manufacturers as well as their tier suppliers. Organizers schedule well-timed breaks between technical programming to visit exhibits (numbering 67 at press time), and offer evening receptions to help facilitate networking and energetic discussion about what the industry needs now and in the not-too-distant future.

Continued on Page 5

17th-Annual
SPE® Automotive Composites Conference & Exhibition
World's Leading Automotive Composites Forum
SOCIETY OF PLASTICS ENGINEERS
AUTOMOTIVE & COMPOSITES DIVISIONS

Composites: Solutions for a Multi-Material World

September 6-8
2017

CONTENTS

SPE Auto. Div. Golf Outing
Fieldstone Golf Club — ALL DAY
Auburn Hills, MI USA — September 5, 2017

17th-Annual SPE Automotive Composites Conference & Exhibition (ACCE)
The Diamond Banquet & Conference Center
at the Suburban Collection Showplace — ALL DAY
Novi, MI USA — September 6-8, 2017

IAG Parts Nomination Deadline — September 13, 2017

First Round - Automotive Innovation Awards Judging
Celanese Corp. — 8:00 a.m.- 5:00 p.m.
Auburn Hills, MI USA — September 27-28, 2017

19th-Annual SPE TPO Automotive Engineered Polyolefins Conference (TPO)
Detroit-Troy Marriott — ALL DAY
Troy, MI USA — October 1-4, 2017

Second Round / Blue Ribbon - Automotive Innovation Awards Judging
Celanese Corp. — 8:00 a.m.- 5:00 p.m.
Auburn Hills, MI USA — October 9, 2017

SPE Auto. Div. Board Meeting
American Chemistry Council - Auto. Ctr. — 5:30 - 7:30 p.m.
Troy, MI USA — October 9, 2017

47th-Annual SPE Automotive Innovation Awards Gala
Burton Manor — 5:00-11:00 p.m.
Livonia, MI USA — November 8, 2017

SPE Auto. Div. Board Meeting
American Chemistry Council - Auto. Ctr. — 5:30 - 7:30 p.m.
Troy, MI USA — December 4, 2017

Automotive Division Board of Directors meetings are open to all SPE members. All events are listed on our website at http://speautomotive.com

Email Matt Carroll at auto-div-chair@speautomotive.com for more information.

CHAIR'S WELCOME

by Matt Carroll,
SPE Automotive Division Chair

our past. our present.
Your Future.

Welcome back from a great summer! As noted in the Calendar of Events on page 2, our busy Fall Season is now upon us with several major events. First, the SPE Auto Division Golf Outing is held September 5th at Fieldstone GC where we routinely have more than 100 plastics professionals participating in a scramble and meal. Fred Deans and Teri Chouinard do a great job coordinating the golf event. Then, for three days, September 6th-8th, the Automotive Composites Conference and Expo is held at the Suburban Showcase in Novi. For non-golf attendees who arrive early, a tour of the IACMI (Institute for Advanced Composites Manufacturing Innovation) facilities in Detroit's Corktown is happening on September 5th. Bonnie Bennyhoff and Teri Chouinard from our SPE Automotive Team are coordinating much of the ACCE with a lot of help from Composites Division leaders Dale Brosius, Rani Richardson, and Uday Vaidya, just to name a few of the more than 40 volunteers for this program.

Moving into October, the 19th annual TPO Conference will again be at the Detroit-Troy Marriott on Big Beaver Road, run by the SPE Detroit Section. This conference has been a huge success for many years and is a great forum for all things TPO. Finally, in November, the SPE Headquarters team led by Robert Grace are promoting a Design in Plastics Conference in the Detroit area, which will have design elements from many industries, including automotive. Immediately following the Design Conference, the Innovation Awards Gala, chaired by our Jeff Helms, will once again be held at the Burton Manor in Livonia on November 8th. Many thanks to all our SPE Automotive Division volunteers who make the IAG "black tie" event truly memorable every year. Please go to **www.speautomotive.com** for details about these events.

At the June SPE Automotive Division Board Meeting, we installed four new members to the board: Brian Haggart from Styrolution (Education team Co-Chair), Rick Hamilton from Ford, Marc Bahm from BASF (our Webmaster) and Gary Kogowski from Ravago (AutoEpcon and our Awards Chair). We are only losing two board members: Suzanne Cole and Peter Bejin, both of whom gave us great service over the years. David Helmer from General Motors has agreed to be our Chair-Elect to succeed me next July and Alper Kiziltas from Ford Motor is our Vice-Chair, in-line after Dave ..... so we are in good hands going forward. The board is admittedly a little bigger this year but it's great to have so many involved volunteers. Special shout-out to Monica Prokopyshen who has managed the Education Committee for many years and is being replaced now by Co-Chairs Alper Kiziltas and Brian Haggart.

Welcome

Our SPE Fiscal Year runs from July 1st to June 30th and Bonnie Bennyhoff has prepared our annual financial report which is available upon request. While we reported a loss last year, it was more than rectified in 2016/2017 via attention to the "past due" files and also to excellent sponsorships for our events and mission from the Plastics Industry. Bonnie is forecasting a modest net revenue of $26K for 2017/2018. Many thanks to all our sponsors! For this newsletter in particular, the following is a quick homage to our **four Full Page Ad Sponsors.**

- BASF, the largest chemical producer in the world, has more than 17,500 employees and sales of $16.2 billion in 2016 in North America. In Wyandotte, MI, BASF has a Customer Care Center; Research and Development Center; Specialty Production & Experimental Safety group, with a total of 1082 BASF employees and 129 contractors (**https://www.basf.com/documents/us/en/Fact-Sheets/Wyandotte.pdf**).

- Incoe, founded in 1958 by Founder Mr. Alex Seres as **IN**jection **CO**ntrol **E**ngineering, has developed hot runner technology for injection molded plastic applications in virtually every market around the world. It is a global company that is 100% family owned and operated (**http://www.incoe.com/hotrunners/homepage.aspx**)

- Plastic Engineering & Technical Services (P.E.T.S.) was established in 1984 in southeast Michigan and began by providing mold flow analysis as its primary service. Now, P.E.T.S. provides hot runner systems, valve gate sequencers, temperature controllers in addition to the mold filling analysis (**http://petsgroupintl.com/**)

- Synventive is a designer and manufacturer of hot runner systems and components with manufacturing facilities in North America, Europe and Asia as well as sales offices and agents in 26 countries. Synventive has 1000 employees worldwide (**http://www.synventive.com**)

Next issue, I'll recognize our many Half Page Ad sponsors. Thanks again to all of our sponsors and volunteers. Looking forward to a great Fall Season.

Once again chaired by Rani Richardson of Dassault Systems, sponsorships for this three-day event are excellent which allows SPE, as a non-profit entity, to keep costs down. The cost to attend the full 3-day conference is only $675, which includes a free 1-year membership to SPE — the best deal in town! Of course, those who are SPE members save $100 USD

($575 to attend). Passes include access to all technical sessions, the exhibit floor, 3 networking breakfasts and lunches and 2 cocktail receptions!

At press time, over 90 regular presentations have been accepted in the final program. These will be presented in 30 sessions, with either three or four sessions occurring concurrently. Preliminary planned sessions include:

- Additive Manufacturing & 3D Printing (one session)
- Advances in Reinforcement Technologies (two sessions)
- Advances in Thermoplastic Composites (five sessions)
- Advances in Thermoset Composites (two sessions)
- Bonding, Joining & Finishing (three sessions)
- Enabling Technologies (process/machinery advances) (four sessions)
- Nanocomposite (two sessions)
- Opportunities & Challenges with Carbon Composites (two sessions)
- Sustainable Composites (recycled, bio-based, and natural fiber-reinforced composites) (two sessions); and
- Virtual Prototyping & Testing (five sessions)

Additionally, a new short session this year, titled ***Business Trends & Technology Solutions,*** is slated for mid-day of Day 2.

Four keynote topics and one panel discussion will be interspersed throughout the three-day event and include:

- David Erb, Senior R&D Program Manager at the University of Maine Advanced Structures and Composites Center: ***Road Mapping of Structural Thermoplastics and Manufacturing Research at the University of Maine;***
- Alison Starr, National Composite Centre: ***The UK National Composite Centre: Meeting the Challenges of the Automotive Industry;***
- Dale Brosius, Chief Commercialization Officer, IACMI – The Composites Institute: ***Fulfilling the Promise for Advanced Composites;***
- Dr. Patrick Blanchard, Global Technical Leader, Composites, Ford Motor Company: ***Completing The Transition From Metallic To Multi-Material Automotive Solutions – Challenges and Opportunities;***
- Along with PANEL DISCUSSION Moderator Dale Brosius (SPE Composites Division and IACMI), where Panelists will alternately take questions from Dale and the audience.

Pre-event social outings on Tuesday, September 5th include a daylong golf outing at Fieldstone Golf Club (Auburn Hills, MI, US) and a facilities tour at IACMI's Detroit, MI facility..

To keep things interesting, the ACCE also features awards for best paper and best composite parts, along with five student scholarships, and student posters.

Learn more at **http://speautomotive.com**

CALL FOR PAPERS

Want to share your knowledge with a global audience?

Society of Plastics Engineers is pleased to announce our Call for Papers for ANTEC® 2018!

SPE is soliciting papers in the following areas:

Additive Manufacturing/3Dp Advanced Energy
Alloys & Blends
Applied Rheology
Automotive
Bioplastics
Blow Molding
Color & Appearance
Composites
Decorating & Assembly
Electrical & Electronic Engineering Properties & Structure Extrusion
Failure Analysis & Prevention Flexible Packaging
Injection Molding
Joining of Plastics & Composites Medical Plastics
Mold Technologies
Plastic Pipe & Fittings Sustainability
Plastics in Building & Construction Polymer Analysis
Polymer Modifiers & Additives Product Design & Development Reaction Injection Molders
Rotational Molding Thermoforming
Thermoplastic Elastomers Thermoplastic Materials & Fomas Thermoset
Vinyl Plastics

Paper and Technical Marketing Presentation Deadline: January 12, 2018

CREATE SUBMISSION

goo.gl/KSdM5Z

Questions?

Edwin Tam
Technical Program Chair 2017
+1 401.642.3753

Scott Marko
Events Manager
+1 203.740.5442

ANTEC® Orlando 2018

www.4spe.org/antec

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

Learn more at **www.automotive.basf.us**

BASF
We create chemistry

TPO REPORT

by Sassan Tarahomi, TPO Conference Co-Chair

19th-Annual

SPE® DETROIT TPO AUTOMOTIVE ENGINEERED POLYOLEFINS CONFERENCE®

TPOs Leading Lightweighting

Oct 1-4, 2017

Auto-TPO.com

Dear SPE Automotive Division Member,

The 19th-annual SPE® TPO Automotive Engineered Polyolefins Conference, the world's leading automotive Polyolefins forum will be held at Detroit Marriott Troy on October 1-4, 2017. Our planning committee has been working hard since last October to prepare and deliver a great conference for you. Whether you're there to present a paper, exhibit your company's products and/or services, or to find solutions to pressing engineering challenges, we hope you find what you're looking for at this year's conference.

This is another exciting year for our conference and it looks like we'll set a lot of records:

- We expect more than 900 guests from around the world.
- We have planned for 5 talks by influential keynote speakers in the plastics and automotive industry.
- We have our largest technical program with 80 presentations in ten technical tracks in three parallel sessions throughout the event.
- Two special workshops on early evening Sunday.
- We have our largest exhibition ever thanks to the support of a record number of sponsors and exhibitors.

Now allow me to tell you about our keynote speakers.

On Monday morning October 2nd, Jeff Makarewicz, Senior Vice President of Vehicle Quality & Safety Engineering from Toyota Motor North America will excite the crowd with his talk on "Managing Through the Automotive Revolution – What's Next?" Next, Jeff Schuster, Senior Vice President of Forecasting at LMC Automotive will inform us on "The State of the Auto Industry: Upcoming Trends and Innovations Research Center.

On Tuesday morning, Dirk Zinkweg, Associate Marketing Director - Transportation for Dow Electrical & Telecommunications will talk about the "Polyolefin Elastomer Impact Modifiers for Polypropylene, Future Trends and Predictions". Next, Darrell Williams. Director of Sales, Technical Service & Business Development of Braskem America, Inc. will tell us about "State of the Polypropylene Industry – Supply and Technology".

On Wednesday mid-morning break we will have our final keynote speaker, William (Bill) R. Carteaux, President & CEO of Society of Plastics Industry.

We planned these five exciting keynote speakers to help you better understand the complex web of trends and market forces at work in our industry today and what shapes our industry tomorrow. Not only will you be better informed than when you arrived — assuming you visit our sponsors and catch our technical program — but you also should leave with lots of new friends and industry contacts. That's because we've built numerous networking opportunities into our 2017 program.

In addition to three receptions (Sunday, Monday, and Tuesday evenings), and daily breakfasts and lunches (Monday through Wednesday), we've also built in morning and afternoon breaks into the program so you can ask questions, meet new people, grab a beverage, and avail yourselves of the tremendous amount of collective automotive-plastics knowledge assembled at this venue.

Registration is open now! I highly recommend you to register to attend this great conference by visiting our website **Auto-TPO.com** or sending an email or even calling Ms. Karen Rhodes-Parker at **karen@spedetroit.com** or call (248) 244-8920.

Finally, we'd like to acknowledge all the effort our committee of volunteers have expended helping bring the 2017 TPO Conference to you. We hope to see many of you in the conference and please don't hesitate to complete our daily feedback forms so we can review, analyze and discuss it in our monthly meeting to improve our conference quality. We're always striving to make this event better.

See you all at the conference,

Sincerely,

Dr. Sassan Tarahomi
Conference Co-Chair
Mitsubishi Chemical
Performance Polymers, Inc.

David Okonski
Conference Co-Chair
General Motors Co.

Schedule of Events

As of 8/20/2017

Sunday, October 1, 2017

12:00 PM	Exhibition Set-up Starts
3:00 PM	TUTORIAL 1: TBD
4:00 PM	TUTORIAL 2: TBD
5:00 PM	**EVENING RECEPTION:** ***Sponsored by Formosa Plastics Group***

Monday, October 2, 2017

SPE Automotive Engineered Polyolefins TPO Conference — Detroit

7:00 AM REGISTRATION & CONTINENTAL BREAKFAST: Sponsored by **Mitsubishi Chemical Performance Polymers**

8:30 AM WELCOME REMARKS: Conference Co-Chairperson, Dr. Sassan Tarahomi, Mitsubishi Chemical Performance Polymers, Inc.

8:45 AM KEYNOTE 1: Managing Through the Automotive Revolution
Jeff Makarewicz, the Group Vice-President of Vehicle, Quality, & Safety Engineering at the Toyota Technical Center

9:15 AM KEYNOTE 2: The State of the Auto Industry: Upcoming Trends and Innovations
Jeff Schuster, the Senior Vice President of Forecasting at LMC Automotive

9:45 AM TECHNICAL PROGRAM HIGHLIGHTS: Norm Kakarala / David Helmer – Lunch Sponsor and Reception Sponsor Remarks

10:00 AM BREAK: Sponsored by **Sirmax North America**

	Conference Hall- I	Conference Hall-II	Conference Hall-III
	SURFACE ENHANCEMENTS **Dr. Rose Ryntz,** *IAC Group* **Jeff B. Crist,** *Ford Motor Co.* **Jim Keller,** *United Paint & Chemical Corp.*	**INTERIOR APPLICATIONS** **Robert Eller,** *Robert Eller Associates LLC* **Dr. Sam He & Kevin Lyons,** *Inteva Products LLC*	**REINFORCEMENTS & COMPOUNDS** **Mike Balow,** *Asahi Kasei Plastics N.A. Inc.* **Ermanno Ruccolo,** *Borealis*
10:30 AM	Improvements in Mold-In-Color TPO Compounds: **Jason Fincher,** *Advanced Composites*	Auto Interior TPO's, TPE's and PP Compounds Evolving Toward the Future: **Bob Eller,** *Robert Eller Associates LLC*	Innovative PP Glass Fiber Compounds Based on Low Creep Advanced Copolymers: **Klaus Klemm/Dr. Erik Licht,** *LyondellBasell*
11:00 AM	Surface Enhancement via PP Metallic Compounds: **Dr. Tanmay J. Pathak,** *A. Schulman*	Design and Innovation – The Merging of Aesthetics and Technology: **Dr. Pravin Sitaram,** *Haartz Corporation*	Challenges with Creep in Underhood Applications: **Rodrigo Orozco,** *Asahi Kasei Plastics N.A.,Inc.*
11:30 AM	Components & Materials – Quantifying Human Touch Without Humans: **Peter Botticelli,** *SynTouch*	Injection Molded Softskins – High Performance Softskin Solutions for Automotive Interiors: **Joe Schulcz,** *Kraton Polymers LLC*	Advances in Lightweight Carbon Fiber Reinforced PP: Solutions for Visible Application: **Dr. Joe Laux & Nick Kolesch,** *Borealis-Magna*
12:00 PM	**LUNCH: Sponsored by Sumitomo Chemical Company**		
1:30 PM	Review of Automotive Soft-Feeling Interior Coating System: **John Bilson, Peter Lacke**	A Slush TPE Material for Automotive Interior Applications: **Dr. John O'Gara,** *Inteva Products LLC*	Advances in Glass Fiber Reinforced PP: Higher Stiffness and Improved Appearance: **Lorenzo Ferro,** *SIRMAX*
2:00 PM	Polypropylene TPO Compounds with Excellent Painted Surface Aspect for Lightweight Construction: **Mirela Tury Pastorini,** *Borealis*	Low Emissions Polypropylene Composites for Automotive Interiors: **Dr. Tanmay J. Pathak,** *A. Schulman*	A Focus on Surface Enhancement of High Crystalline Glass Reinforced Olefin Development: **Tim Howie,** *Asahi Kasel Plastics N.A.*
2:30 PM	Correlation of TAMU Scratch and Mar Test Methodology to Field Performance of Automotive Interior Parts: **Shuang Xiao,** *Texas A&M*	A New Introduction to Chemical Blowing Agents – A Lean Method for Creating Cellular Structures in Thermoplastic Injection Molding: **Peter Schroeck,** *Reedy International*	The Novel Talc Approach to Automotive Plastics Market: **Piergiovanni Ercoli Malacari,** *IMI Fabi spa*
3:00 PM	BREAK: Sponsored by **International Automotive Components (IAC)**		
	SURFACE ENHANCEMENTS **Dr. Rose Ryntz,** *IAC Group* **Jeff B. Crist,** *Ford Motor Co.* **Jim Keller,** *United Paint & Chemical Corp.*	**INTERIOR APPLICATIONS** **Robert Eller,** *Robert Eller Associates LLC* **Dr. Sam He & Kevin Lyons,** *Inteva Products LLC*	**BIOBASED & RECYCLED MATERIALS** **Susan Kozora,** *IAC Group* **Dr. Alper Kiziltas,** *Ford Motor Co.*
3:30 PM	Structure/Property/Applications of Thin Films from Polyolefin Dispersion (POD): **Houxiang (Sean) Tang PhD,** *Dow*	Evolution of Rigid Foams from A Hidden Component to A High End Visual Customer Touch Surface: **Jim Lowry,** *Sonoco Protective Solutions*	Properties of Injection Molded Kenaf/PP from Repelletized Non-woven Mat Offal: **Susan Kozora and Paris Stetkiw,** *IAC Group*
4:00 PM	Enduring the Harsh Environment of a Coating on Automotive Interior Cabin Rigid Plastic Substrates: **Mark Gilbert,** *Alberdingk Boley, Inc*	HMS PP: Advances in Materials for Foamed Products: **James Kahn and Dr. Kim McLoughlin,** *Braskem*	Latest Breakthroughs with Sustainable Hybrid Composites in Lightweight Applications: **Dr. Alper Kiziltas,Rob Banning and Kelli Bucki,** *FFord Motor Co., Trimax, International Paper and Celanese*
4:30 PM	Methylene Malonate Based Adhesion and Coating Solutions: **Aniruddha(Andy)Palsule,** *Sirrus Chemistry*	Superior Appearance TPE for Molded in Color Airbag Doors: **Nadeem Bokhari,** *Sumitomo Chemical Company*	Use of Naturally Occurring Fibers as well as Bio Waste Fillers for Interior and Exterior Automotive Applications: **Akshay H. Trivedi,** *Lear Corporation*
5:00 PM	Anti-Scratch Improver: NOF-ALLOY KA : **Toro Kato,** *NOF*	Higher Weld Strength and Deployment Performance TPE for Instrument Panel Chute Applications: **Nadeem Bokhari,** *Sumitomo Chemical Company*	Sisal Natural Fiber Reinforced TPO for Automotive Interior Applications: **Daniel Fuller and Riccardo Savadori,** *Celanese*

5:30 PM EVENING RECEPTION: Sponsored by **Advanced Composites**

Tuesday, October 3, 2017

SPE AUTOMOTIVE ENGINEERED POLYOLEFINS TPO CONFERENCE DETROIT

7:30 AM REGISTRATION & CONTINENTAL BREAKFAST: Sponsored by **TBD**

8:00 AM WELCOME REMARKS: Conference Co-Chairperson, David Okonski, General Motors

8:15 AM KEYNOTE 3: Polyolefin Elastomer Impact Modifiers for Polypropylene, Future Trends and Predictions, Dirk Zinkweg, the Associate Marketing Director for Transportation within Dow's Elastomers, Electrical & Telecommunications (EE&T) business

8:45 AM KEYNOTE 4: State of the Polypropylene Industry – Supply and Technology
Darrell Williams, Director of Sales, Technical Service and Business Development at Braskem

9:15 AM Lunch Sponsor and Reception Sponsor Remarks

9:30 AM Awards: Winners of the 2017 TPO Parts Competition, Recognition Awards

9:45 AM BREAK: Sponsored by **The Dow Chemical Company**

	Conference Hall- I	Conference Hall-II	Conference Hall-III
	ADDITIVES & MODIFIERS **Neil Fuenmayor,** *LyondellBasell Industries* **Mark Jablonka,** *Dow Chemical*	**INTERIOR APPLICATIONS** **Robert Eller,** *Robert Eller Associates LLC* **Dr. Sam He & Kevin Lyons,** *Inteva Products LLC*	**BIOBASED & RECYCLED MATERIALS** **Susan Kozora,** *IAC Group* **Dr. Alper Kiziltas,** *Ford Motor Co.*
10:15 AM	Extending Polyolefin Elastomer Impact Modifiers from Unfilled to Highly Filled TPO Compounds: **Dr. Jeff Munro,** *Dow*	New Generation TPO Materials for Airbag Cover Applications: **Katsuya Kida,** *Sumitomo Chemical Company*	New Development in Biobased Compounds for Automotive Industries: **Dr. Arash Kiani and Dr. Christian Lenges,** *Alterra Holdings Dupont Industrial Biosciences*
10:45 AM	A new Method to Modify PP for Improved Melt Strength: **Brett Robb,** *Total*	Styrene Block Copolymer with High Damping Property: **Yasushi Senda,** *Kuraray*	Blue Agave Reinforced PP Composites for Automotive Applications: **Amy Langhorst, Alper Kiziltas and Debbie Mielewski,** *Ford Motor Company*
11:15 AM	Overcoming Tackiness and Blooming Effects in Regions with Extreme Weather: **Diogo Grillo,** *LyondellBasell*	Properties of Oil Resistant TPV and its Material Design: **Ryoji Usui, Masato Kobayashi, Noriyoshi Oono, Toshiyuki Kayakawa, Kentaro Kanae and Yoshiaki Zama,** *JSR Polymers*	Exploring the use of Micronized Rubber Powder in Thermoplastic Elastomers for Automotive Applications: **Haikun Xu and Lavon Detweiler,** *Entech, Inc*
11:45 AM	Novel Light Stabilizer for Automotive Interior: **Dr. Robert Schmeltzer,** *BASF*	Designing Cockpit of the Future: **Aidano Nascimento,** *Inteva Products LLC*	Reuse of Paint System Waste as a Functional Filler for TPO: **Meagan Marko,** *Noble Polymers*

12:15 PM LUNCH: Sponsored by **Washington Penn Plastic Co., Inc.**

	ADDITIVES & MODIFIERS **Neil Fuenmayor,** *LyondellBasell Industries* **Mark Jablonka,** *Dow Chemical*	**LIGHTWEIGHTING POLYOLEFIN PARTS** **John Haubert,** *FCA US LLC* **Normand Miron,** *Washington Penn Plastics*	**PROCESS DEVELOPMENTS** **Kurt Anthony,** *Washington Penn Plastic Co., Inc.* **Dr. Suresh Shah**
1:30 PM	Extending the Value of TPO to Accelerate Lightweighting of Automotive Parts **Dr. Jian-Yang(JD) Cho,** *Solvay*	Effect of Various Weight Reduction Strategies on Mechanical Properties and Part Performance: **Matthew Thompson,***Advanced Composites*	Lightweighting of Parts via Foaming for Class A Finishes: **Juergen,** *Giesow PhD, Arburg*
2:00 PM	Advanced Additive Technologies for Enhancing Properties of Glass Fiber Reinforced PP: **Yota Tzuneizumi,** *Adeka*	PP Compound Solutions for Lightweight Automotive Interior: **Ermanno Ruccolo,** *Borealis* Freeformed Prototype Parts out of Pro-	duction Material: **Juergen Giesow PhD,** *Arburg*
2:30 PM	Balancing the Impact Stiffness and Melt Flow of Polypropylene with Breakthrough Performance Modifiers: **Dr. Scott. R. Trenor,** *Milliken*	Low Density Engineered Polypropylene Compound for Door Panels and Interior Trim: **Sunit Shah,** *LyondellBasell*	Feeding and Processing of Light Weight Fillers on a Twin Screw Compounder: **Alex Utracki,** *Coperion*

3:00 PM BREAK: Sponsored by **Cimbar Performance Materials**

TUESDAY, OCTOBER 3, 2017

SPE AUTOMOTIVE ENGINEERED POLYOLEFINS TPO CONFERENCE DETROIT

	ADDITIVES & MODIFIERS **Neil Fuenmayor,** *LyondellBasell Industries* **Mark Jablonka,** *Dow Chemical*	LIGHTWEIGHTING POLYOLEFIN PARTS **John Haubert,** *FCA US LLC* **Normand Miron,** *Washington Penn Plastics*	PROCESS DEVELOPMENTS **Kurt Anthony,** *Washington Penn Plastic Co., Inc.* **Dr. Suresh Shah**
3:30 PM	Performance Additives for PP-Based Automotive Applications: **Brett Robb,** *Total*	Development of Advanced TPOs for Thin Wall Interior Door Panels: **Roger Liu,** *LyondellBasell*	Technology Advances in Hot-Runner Systems for TPO Applications: **Mitch Gordon,** *Synventive Molding Solutions*
4:00 PM	Effect of Temperature and Shear Dependence on Crystal Polymorphism in Beta-Nucleated Isotactic Polypropylene During Injection Molding and its Resulting Bulk Mechanical Properties: **Anne Gohn,** *Penn State*	Lightweighting Interiors: **Mike Jary,** *Inteva Products LLC*	New Lightweight and Surface Technologies for New Field of Applications: **Jason Holbrook,** *KraussMaffei*
4:30 PM	High Performance Migrating Anti-Scratch Solutions for Polyolefins: **Adam Maltby,** *Croda*	Core-Back Foaming of Long Glass Reinforced Polypropylene, A Viable Technology for Weight Reduction? **A. Yanev and D. Brands,** *SABIC, Global Technology Automotive*	Utmost Repeatability through Constant Change: **Joachim Kragl,** *Engel*
5:00 PM	Polyolefin Dispersion for Automotive Interior Applications: **Dr. Amit Chaudhary,** *Dow*	Enabling Lightweighting by Enhancing the Bonding of TPO to Dissimilar Materials with Plasma Surface Conditioning: **Andy Stecher,** *Plasmatreat North America*	Influence of New High Performance Mineral Products on Mechanical Properties of TPO & Polypropylene Compounds: **Maz Bolourchi,** *Imerys Minerals*

5:30 PM EVENING RECEPTION: Sponsored by **Braskem**

WEDNESDAY, OCTOBER 4, 2017

7:30 AM REGISTRATION & CONTINENTAL BREAKFAST: Sponsored by TBD

	MODELING & SIMULATIONS **Dr. Li Lu,** *Ford Motor Co.* **Scott Grant,Autodesk**	INTERIOR EMISSIONS **Dr. Laura Shereda,** *Asahi Kasei Plastics N.A. Inc* **David Helmer,** *General Motors*	ADHESIVES & COATINGS FOR TPOS **Hoa Pham,** *Freudenberg Performance Materials* **Dr. Pravin Sitaram,** *Haartz Corporation*
8:00 AM	Experimental and Numerical Analysis of Tiger Stripes in an Injection Molded Automotive: **Li Qi, Jeff Kloberdanz, Kenneth Kwasnik and Danielle Zeng,** *Ford Motor Co.*	**Neil Fuenmayor,** *Lyondellbasell* Perspectives on Emissions Requirements: **Teri L. Kline,** *General Motors*	3D Spraying of Hot Melt Adhesive for Delicate Stitched Decors – Actual Challenges and Technical Solutions: **Sebastien Meliot,** *Jowat*
8:30 AM	Improving Warpage Prediction by Considering the Crystallinity Corrected PVT: **(Speakers tbd),** *Ford RIC and Model3D*	The Impact of Plasticizers and Adhesives on Vehicle Level VOC's: **Mark Dearth,** *Ford Motor Company*	Using Wetting Envelope to Fine-Tune and Troubleshoot Surface Treatment: **Marlen Valverde,** *HB Fuller*
9:00 AM	Thermal Oxidative Stability Testing of TPO Materials Using Conventional and Rotator Ovens: **David Alberts,** *General Motors*	Low VOC and Low Fogging TPE for Vehicle Interior: **Llang Xu, John Voyce, Thomas Schlegel,** *Polyone*	Introducing New Adhesive Technology for Automotive Interiors: **David Speth,** *Evans Adhesives*
9:30 AM	Using CAE Tool to Improve Door Side Impact Performance with TPO Materials: **Raju Tuniki,** *EASI Engineering*	Origin and Component of Odor Emitted from the Automotive Polypropylene Materials: **Dr. Liang Lei and Juanxia Su,** *Kingfa Sci & Tech*	Lamination with Olefin Adhesives on Polar and Non-Polar Substrates: **Helmut Doyen,** *Sika Corporation*

10:00 AM **BREAK: Sponsored by SPE Detroit Section**

10:15 AM INTRODUCTION OF KEYNOTE SPEAKER: Conference Co-Chair, Dr. Sassan Tarahomi, Mitsubishi Chemical Performance Polymers, Inc.

KEYNOTE: Plastics Industry Economic Updates and Outlook
Bill Carteaux, President and CEO of the Plastics Industry Association (PLASTICS)

11:00 AM	Validation of Weld Line Strength using Simulation: **Jeff Higgins,** *Autodesk*	The New Generation of Low VOC Coupling Agent: **Brittnie Carroll,** *Mitsui*	1K Water Based Adhesive for Laminating TPO Foam Backed Skins to TPO Substrates for Automotive Interior Applications: **Jim Weir,** *Sun Star*
12:00 PM	The Importance of Material Characterization for Simulation:**Eric Bowersox,** *Beaumont Advanced Processing*	Low VOC Stabilization Systems for PP and PP-Based TPO Automotive Applications: **Jungdu Kim,** *Songwon*	A New Path for Lamination Adhesives: Leaping Time Barriers and Erasing Steps: **John White,** *Henkel*

12:30 PM LUNCH: Sponsored by **Trinseo Automotive** ..... Conference Concludes

2016 SPE TPO AUTOMOTIVE ENGINEERED POLYOLEFINS CONFERENCE SPONSORS:

PLATINUM & EXHIBITOR

Advanced Composites (Mitsui Chemicals Group) · SUMITOMO CHEMICAL · TRINSEO · Washington Penn Plastic Co., Inc.

GOLD & EXHIBITOR

A. Schulman Inc. · ASAHI KASEI PLASTICS Advanced Material Solutions · BOREALIS · Braskem · CIMBAR Performance Minerals · DOW · ENPLAST AMERICAS · ExxonMobil Chemical · Formosa Plastics · H.B. Fuller · IMERYS Talc · INTEVA · lyondellbasell · MITSUI PLASTICS, INC. · multibase · MYTEX POLYMERS · PolyOne · Robert Eller Association LLC · سابك sabic · WELLMAN ADVANCED MATERIALS

EXHIBITOR

3M · ADDCOMP Polymer Additive Solutions · Adell · americhem · Arctic Minerals, LLC · AUTODESK · BRANSON · CGT the perfect finish. · ChasePlastics · Chemroy · Chem Trend · CLARIANT · coperion · CRAY VALLEY · CRODA Polymer Additives · ENTEC · HARTZ · Henkel · IAC · MIFAB · Jowat · JSR · JSR Corporation · Kal-Trading Inc · KINGFA 金发科技 · LOTTE CHEMICAL ALABAMA · MRC Polymers · MAROON GROUP · Milliken · MONARK · Purgex Beyond Clean · nexeo solutions · NOBLE polymers · plasmatreat · PolyAd Services · PROCHIMIR · Quantum Analytics · RA RELIABLE ANALYSIS INC · Radiant · RheTech · RTP · sāco AEI polymers · Sika BUILDING TRUST · SIRMAX · Specialty MINERALS · struktol · TECHMER PM · UCC · VINTECH · American Chemistry Council Plastics Division

— ADVERTISING —

EXHIBIT & SPONSORSHIP OPPORTUNITIES

ATTEND THE WORLD'S LEADING AUTOMOTIVE ENGINEERED POLYOLEFINS FORUM

Now in its 19th 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. 1-4, 2017 at the Troy-Marriott (Troy, Michigan) in the suburbs of Detroit.

PRESENT TO THE LARGEST GROUP OF DECISION MAKERS IN AUTOMOTIVE ENGINEERED POLYOLEFINS

The SPE TPO Automotive Engineered Polyolefins Conference typically draws over 800 attendees from 20 countries on 4 continents who are vitally interested in learning about the latest in rigid and elastomeric TPO as well as TPE and TPV technologies. Fully a third of conference attendees work for a transportation OEM, and nearly 20% work for a tier integrator. Few conferences of any size can provide this type of networking opportunity or put you before such an engaged, global audience interested in hearing the latest olefin advances. Interested in presenting your latest research?

SHOWCASE YOUR PRODUCTS & SERVICES AT THE WORLD'S LARGEST 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.

FOR MORE INFORMATION

www.auto-tpo.com
www.spedetroit.org or www.speautomotive.com/tpo
PH: +1.248.244.8993, Ext. 3 or email: karen@auto-tpo.com
SPE Detroit Section, 1800 Crooks Road, Suite A,
Troy, MI 48084, USA

FOR ADVERTISEMENT PLEASE CONTACT . . . . .

karen@auto-tpo.com

IAG

SPE® Announces Call for Nominations for 47th-Annual Automotive Innovation Awards Competition & Gala

47th-Annual
SPE® Innovation Awards Competition & Gala
AUTOMOTIVE
HONORING THE BEST IN AUTOMOTIVE PLASTICS

Intelligent Automotive Design with Plastics

November 8 2017

The Automotive Division of the Society of Plastics Engineers (SPE®) Is announcing a "Call for Nominations" for its 47th-annual ***Automotive Innovation Awards Gala***, the oldest and largest recognition event in the automotive and plastics industries, and due dates for the event's annual **Parts Competition**. This year's Awards Gala will be held Wednesday, **November 8, 2017** at the Burton Manor in Livonia, Mich. Winning part nominations (due by **September, 13, 2017**) in 9 different categories, and the teams that developed them, will be honored with a "Most Innovative Use of Plastics" award. A "Grand Award" will be presented to the winning team from all category award winners. An application that has been in continuous use for 15 years or more, and has made a significant and lasting contribution to the application of plastics in automotive vehicles, will be honored with a "Hall of Fame" award.

"As the auto industry is progressing to meet 2025 CAFE (corporate average fuel economy) and regional emissions standards, it is also advancing rapidly with intelligent vehicle technologies, many of which are already present on today's cars and trucks," explains Jeffrey Helms, global automotive director, Celanese Corp. who returns as the 2017 ***SPE Automotive Innovation Awards*** chair. "Plastics and composites have always been a material solution for lightweighting, comfort, performance and compact design. These same materials are now enabling the design of parts and components for autonomous vehicle components and subsystems. The intelligent use of the right plastics and robust design will assist automakers and their suppliers in delivering the technologies and features that customers want while meeting regulatory or affordability targets. This led to selection of ***Intelligent Automotive Design with Plastics*** as our 2017 program theme. Last year, our program attracted the largest attendance in recent history, with close to 800 attendees, and with increasing interest in intelligent vehicle systems, including autonomous vehicles, we expect this year's attendance to be that or higher.

About the Automotive Innovation Awards Competition & Gala

Since 1970, the ***SPE Automotive Innovation Awards Competition*** has highlighted the positive changes that polymeric materials have brought to automotive and ground-transportation industries, such as weight and cost reduction, parts consolidation, increased safety, and enhanced aesthetics and design freedom. At the time the competition started, in 1970, many OEM designers and engineers thought of plastics as inexpensive replacements for more "traditional" materials. To help communicate that plastics were capable of far more functionality than their typical use as decorative knobs and ashtrays indicated, members of the board of directors of SPE's Automotive Division created the competition to recognize successful and innovative plastics applications and to communicate their benefits to OEMs, media, and the public.

Over the years, the competition drew attention to plastics as an underutilized design tool and made industry aware of more progressive ways of designing, engineering, and manufacturing automotive components. From its humble beginnings, the competition has grown to be one of the most fiercely contested recognition events in the automotive and plastics industries.

Today, polymeric materials are no longer substitutes for more expensive materials, but rather are the materials of choice in hundreds of different applications throughout the vehicle. Without plastics, many of the auto industry's most common comfort, control, and safety applications would not be possible.

During the competition phase of the event, dozens of teams made up of OEMs and suppliers work for months to hone submission forms and presentations describing their part, system, or complete vehicle module to support claims that it is the year's ***"Most Innovative Use of Plastics."*** To win, teams must survive a pre-competition review and two rounds of presentations before industry and media judges.

There is no cost to nominate parts, however, nominations that are accepted into the competition need to be presented (in person or via webinar) by their nominating teams during the first round of ***Automotive Innovation Awards Competition*** judging, September 27 – 28, 2017 in Auburn Hills, Michigan. Finalists from that round advance to a second presentation before a panel of Blue Ribbon judges made up of media, retired chief engineers, and other industry experts on October 9, 2017 (also in Auburn Hills, Mich.) Winners of each part category, the Grand Award, Hall of Fame, and Lifetime Achievement winner will all be honored during the ***Automotive Innovation Awards Gala*** on November 8, 2017. This annual event typically draws over 700 OEM engineers, automotive and plastics industry executives, and media. Funds raised from the event are used to support SPE educational programs including technical seminars and conferences, which help educate and secure the role of plastics in the advancement of the automobile.

Current competition categories include:

- Aftermarket
- Body Exterior
- Body Interior
- Chassis/Hardware
- Electrical Systems
- Environmental
- Hall of Fame
- Materials
- Process, Assembly & Enabling Technologies
- Powertrain
- Safety

The mission of SPE is to promote scientific and engineering knowledge relating to plastics worldwide and to educate industry, academia, and the public about these advances. SPE's Automotive Division is active in educating, promoting, recognizing, and communicating technical accomplishments in all phases of plastics and plastic-based composite developments in the global transportation industry. Topic areas include applications, materials, processing, equipment, tooling, design, and development.

For more information about the SPE Automotive Innovation Awards Competition and Gala see **www.speautomotive.com** .

For more information on the Society of Plastics Engineers, visit **www.4spe.org**.

® SPE is a registered trademark of the Society of Plastics Engineers.

SOCIETY OF PLASTICS ENGINEERS · AUTOMOTIVE DIVISION

SPE® 47TH-ANNUAL INNOVATION AWARDS COMPETITION & GALA

AUTOMOTIVE

HONORING THE BEST IN AUTOMOTIVE PLASTICS

INTELLIGENT AUTOMOTIVE DESIGN WITH PLASTICS

Call for Nominations

- Most Innovative Use of Plastics Awards

Go to www.speautomotive.com to submit nominations and get more information.

For more information on the Society of Plastics Engineers, visit www.4spe.org.

Sponsorship Opportunities

This annual event typically draws over 700 OEM engineers, automotive and plastics industry executives, and media. A variety of sponsorship packages - including tables at the banquet, networking receptions, advertising in the program book, signage at the event and more are available. Contact Teri Chouinard of Intuit Group at teri@intuitgroup.com.

The Automotive Division of the Society of Plastics Engineers (SPE®) is announcing a "Call for Nominations" for its 47th-annual ***Automotive Innovation Awards Gala,*** the oldest and largest recognition event in the automotive and plastics industries. This year's Awards Gala will be held **Wednesday, November 8, 2017** at the Burton Manor in Livonia, Mich. Winning part nominations (*due by **September, 13, 2017***) in 9 different categories, and the teams that developed them, will be honored with a **Most Innovative Use of Plastics** award. A **Grand Award** will be presented to the winning team from all category award winners. An application that has been in continuous use for 15 years or more, and has made a significant and lasting contribution to the application of plastics in automotive vehicles will be honored with a **Hall of Fame** award.

Innovative Part Competition Categories:

- Aftermarket
- Body Exterior
- Body Interior
- Chassis/Hardware
- Electrical Systems
- Environmental
- Hall of Fame
- Materials
- Process, Assembly & Enabling Technologies
- Powertrain
- Safety

Nov 8, 2017

2016 Sponsors

VIP Reception & Afterglow Sponsor

Celanese — The chemistry inside innovation™

Main Reception Sponsor

sabic

Wine & Flowers Sponsor

DuPont

Student Program Sponsor

MEDC — Michigan Economic Development Corporation

Pure Michigan — We run on brainpower.

Gold Sponsors

Advanced Composites

American Chemistry Council — Plastics Division

BASF — We create chemistry

faurecia

Silver Sponsor

JENOPTIK

Advertising Sponsors

INEOS Styrolution — Driving Success. Together.

INTEVA Products

Bronze Sponsors

ABC Group

Asahi Kasei Plastics — Advanced Material Solutions

BOCAR Group

Continental

covestro

DSM

spi — Transportation & Industrial Plastics Committee

TRINSEO

Wittmann Battenfeld

Yanfeng — Global Automotive Interiors

Your partner
for automotive production

INCOE Hot Runner Systems are the heart of the injection molding process — managing and controlling Melt Logistics™ inside the mold.

Our global commitment is to be your partner — producing value in your process — and ultimately delivering satisfaction where it counts.

INCOE®
HOT RUNNER SYSTEMS
www.incoe.com
North America | Europe | Asia | South America

EDUCATION REPORT

by Alper Kiziltas,
SPE Automotive Education Chairs

SPE'S PlastiVan™ DRIVING OPPORTUNITIES IN PLASTICS AND ENGINEERING

The SPE PlastiVan program was "booked solid" in 2017. Recall that the PlastiVan Outreach Education Program is a hands-on science and technology program that excites middle school, high school students and the general public about the vast opportunities the plastics industry has to offer. The PlastiVan Program travels to schools and companies educating people of all ages about the chemistry, history, processing manufacturing, sustainability and application of plastics. The program is easily integrated into school curricula and typically allows up to 32 students per group (class) with 5 groups per day. Last year, SPE HQ charged us a reduced rate of $1350 per school (per day) visited and we plan to sponsor more visits in the upcoming year.

For more information about the PlastiVan™ Program, please contact Alper Kiziltas or Brian Haggart (see phone listing on back page of this newsletter) or contact Eve Vitale at evitale@4spe.org or +1 810.814.641

AUTOMOTIVE COMPOSITES CONFERENCE AND EXPO SCHOLARSHIPS

As part of our outreach to Education, the SPE Automotive and Composites Division recently announced the winners of the ACCE & Dr. Jackie Rehkopf Scholarships for the 2017-2018 Academic Year

This year, the Michigan Economic Development Corp. has sponsored four awards for students pursuing advanced studies in a composites-related field. Also, announced is the Dr. Jackie Rehkopf scholarship, created to honor the long-time SPE ACCE committee member, SPE Automotive Division board member, and automotive composites researcher. These awards are officially conferred during opening ceremonies at the 2017 SPE Automotive Composites Conference & Exhibition. Both scholarships are administered as part of the SPE Foundation®.

The three winners of the SPE ACCE graduate scholarships ($2,000 USD each) were Mr. Benjamin Blandford of Baylor University, Mr. Jake Fallon of Virginia Polytechnic Institute and Ms. Madhura Pawar of University of Massachusetts at Amherst. A fourth ACCE scholarship (also $2,000 USD) for a student attending a university or college in the U.S. state of Michigan was won by Mr. Christopher Hershey of Michigan State University. ACCE scholarship winners are required to present the results of their research at next year's SPE ACCE show, September 5-7, 2018.

The Rehkopf scholarship ($5,000 USD) was won by Mr. Arya Tewatia of Rutgers University. The Rehkopf scholarship winner is required to either present the results of their research at next year's SPE ACCE or publish them in an SPE journal. Learn more about these winners at the ACCE!

AUTOMOTIVE COMPOSITES CONFERENCE AND EXPO POSTERS

The SPE ACCE organization also invited graduate, undergraduate, community college and high school students to submit a title and abstract for student research posters. The Committee received 46 applications from students including 31 grad students, 12 undergrad and 3 high school students from 16 schools in the US, Canada and Germany. Judges will include industry experts, SPE board members, and the media. First, second-, and third-place awards (plaques) will be given in graduate, undergraduate and high school categories. Students presenting a poster in the competition may attend the entire conference at no entry fee (with or without their advisors). Poster winners will receive additional cash prizes. Additionally, all students in the competition will receive a travel stipend and a shared hotel room provided by SPE, as well free student memberships in SPE. The show also provides excellent networking opportunities for those close to graduating who might be starting to look for a job.

Student Poster Competition

Sponsored by

ASAHI KASEI PLASTICS
Advanced Material Solutions

Meet the Next Generation of Automotive Composites Engineers

The student poster session is an annual event at the ACCE where students from U.S. and international universities present state-of-the-art work related to materials and manufacturing technologies relevant to automotive applications. **This year's competition included 33 graduate, 12 undergraduate and 3 high school students from 16 schools in the U.S., Canada and Germany presenting their research at the 2017 ACCE.** Please join us in welcoming the students and take a good look at their hard work, which will be on display throughout the conference in Hall C (where lunch is served). This provides the students with an excellent opportunity to meet members of the automotive composites community and ask them what it's like to work as an engineer or scientist in this field. It also provides OEMs and their suppliers with the opportunity to meet the next generation of automotive composites engineers and scientists and potentially to hire them.

Judges made up of media, industry experts, ACCE attendees, and SPE board members will review all posters in advance of ACCE and again with student authors during the first day of the conference. Students of winning posters judged to be in the Top 3 in graduate and undergraduate categories, and the First-Place winner of the high school category will receive plaques from JP Wiese, Automotive Marketing Manager for Asahi Kasei Plastics, this year's competition sponsor. This will take place during a formal recognition ceremony from **4:45 - 5 pm** in the Diamond Ballroom on the first day of the conference. Additionally, student participants will receive monetary support to help defray travel expenses.

John Moyer,
President of Asahi Kasei Plastics

Asahi Kasei Plastics is a global supplier of advanced thermoplastic materials for automotive interiors, exteriors and under hood applications. They also provide materials for pool and spa, heavy truck, furniture and electrical and electronic applications. With service that goes well beyond materials, Asahi's application development engineers work cooperatively with their clients to solve new challenges, provide mold-flow and FEA support and when things are ready to go, experienced technical service personnel for field trials.

"Though it is our first time sponsoring the student poster competition, Asahi has a long history of celebrating the growth and development of our up and coming engineers." said John Moyer, President of Asahi Kasei Plastics. "Change being the only constant, we must always keep an open mind, try new things and keep experimenting. Innovation comes from this place, and our students are our future innovators."

Students and their posters will be ranked according to the following criteria:

- Content (student and poster demonstrate clarity of topic, objectives, and background)
- Motivation for research and technical relevance to conference theme
- Methodology and approach to problem
- Quality of proposed research results/findings
- Conclusion is supported by information presented
- Presentation (display aesthetics) are pleasing and there is a logical flow between sections
- Knowledgeable (presenter has a good grasp of the subject)
- Understandability (poster is effective without student being present to explain it)
- Overall rank vs. other posters and presenters.

Student Poster Competition

Since 2008, the SPE ACCE poster competition has been organized annually by Dr. Uday Vaidya, SPE Composites Division board member and education chair, as well as professor of Mechanical, Aerospace and Biomedical Engineering, University of Tennessee - Knoxville, University of Tennessee/Oak Ridge National Laboratory Governor's chair in Advanced Composites Manufacturing, and chief technology officer with the Institute for Advanced Composites Manufacturing Innovation (IACMI). He was assisted this year by Dr. David Jack, associate professor of Mechanical Engineering at Baylor University and Alper Kiziltas of Ford.

Topics, student authors, and schools accepted into this year's competition at press time include the following (names of student presenters are underlined):

Student Poster Entries

Graduate Students

1) *Investigation of Fiber-Matrix Separation in Rib Filling During Compression Using a Direct Fiber Simulation,* **Ian Walter, University of Wisconsin, Madison**
2) *Finite Element Analysis and Material Characterization of Structural Railroad Ties made with Recycled Composite* **Daniel Paul Pulipati, Baylor University**
3) *Implementation of LVDT to Decrease Time Associated with Ultrasonic Scans of Carbon Fiber Composites* **Nathaniel Blackman, Baylor University**
4) *Strength and Fatigue Performance of Random Fiber SMCs under Biaxial Loading,* **Monish Urapakam Ramakrishnan, University of Michigan-Dearborn**
5) *Detection and Evaluation of Defects in Class-A Surface SMC panels,* **Navraj S. Heer, Western University**
6) *An Insight on Foaming of Long Fiber Thermoplastic Composites,* **Sai Aditya Pradeep, Clemson University**
7) *Lightweighting Closures' An Incubator for Composites-enabled Weight Reduction Strategies in Automotive Applications* **Yerra Veera Aditya, Clemson University**
8) *Cost Modeling and Estimation of a Carbon Fiber Reinforced Thermoplastic Composite Vehicle Door Assembly* **Pardhvi Shah, Clemson University**
9) *Design Optimization of a Carbon Fiber Reinforced Thermoplastic Composite Vehicle Door Assembly for Weight Reduction,* **Anmol Kothari1, Clemson University**
10) *Effect of Spinning Conditions of Mesophase Pitch Fibers on the Properties of Carbon Fibers* **Victor Bermudez, Clemson University**
11) *Curing Characteristics of Epoxidized Soybean Oil Based Epoxy-Anhydride Thermoset* **Shatori Meadows, Tuskegee University**
12) *Effect of Initial Fiber Length on Fiber Attrition During Processing of Long Glass Fiber-Reinforced Polypropylene* **Siegfried Werner, University of Wisconsin Madison**
13) *Surface Treatment of Additive Tooling for Compression Molding,* **Pritesh Yeole, University of Tennessee**
14) *Effect of Polymer Melt Rheology on Predicted Die Swell and Fiber Orientation in Fused Filament Fabrication Nozzle Flow* **Zhaogui Wang, Baylor University**
15) *Enhancement of Low Surface Energy Polymers with Plasma Treatment,* **Vidya Hiremath, University of Tennessee**
16) *Sustainable Composites from Food Wastes for Green Manufacturing,* **Alison Gowman, University of Guelph**
17) *Electrospun Bio-Fibers for Automotive Energy Devices* **Connor J. Davies, University of Guelph**
18) *Miscibility, Thermal and Mechanical Assessment of Ternary Biocomposites (PP/PLA/PHBV) with Sustainable Biocarbon* **Michael R. Snowdon, University of Guelph**
19) *Durable, High Performing, and Odor-free Nylon 6/ Biocarbon Bio-composites for Automotive Applications* **Dylan Jubinville, University of Guelph**
20) *Calculation of the Effective Stiffness and Thermal Expansion Tensors from the Orientation State of Anisotropic, Short-Fiber, Composites Printed with the Big Area Additive Manufacturing Process,* **Timothy Russell, Baylor University**
21) *Determining Ply Orientation for Unidirectional Carbon Fiber Laminated Composites Utilizing an Ultrasonic Technique* **Benjamin McAdoo Blandford, Baylor University**
22) *Natural Fiber Composites,* **Elliott Sanders, University of Maine**
23) *Wood Composites,* **Ezatollah (Nima) Amini, University of Maine**
24) *Bio-based Polyurethane Composites for Automotive Applications,* **Sayli Bote, PhD Ford Intern**
25) *Polylactide and Natural Fiber Based Long-Fiber Thermoplastics (LFTs) for Automotive Interiors* **Pritam Giri, PhD Ford Intern**
26) *Mechanical Properties and Spinning Behaviour and of Polyamide 6/Ferrite-Compounds* **Robert Brüll, Aachen University (Germany)**

27) *Non-Destructive Inclusion Detection and Quantification for Carbon Fiber Laminated Composites with Pulse-Echo Ultrasonics,* **John Moreton, Baylor University**

28) *Using a Five Axis Robotic Arm to Automate Composite Nondestructive Testing,* **Joe Fabbo, Michigan State University**

29) *Electromagnetic NDT on Measurement of Disbond In Composite Materials,* **Zhiyi Su, Michigan State University**

30) *Hyperbranched Glycerol Polyesters as New Impact Modifiers for Sustainable Thermoplastic Blend Materials with Balanced Performance,* **Oscar Valerio, University of Guelph**

31) *Nanoscale Mechanisms of Dynamic Response in Nanocellulose Biocomposites,* **Yufeng Tian, MS Ford Intern: University of Michigan-Dearborn**

32) *Tailored Fiber Alignement and the Effect of Strength of Notched Carbon Fiber Composites,* **Emma Floyd, Michigan State University**

33) *A Study of Fatigue-Induced Damage and Healing Behavior of Thermoplastic Bonded Joints,* **Syed Fahad Hassan, Michigan State University**

Undergraduate Students

34) *3D-printed High-strength Ultra-lightweight Biocomposites for High-volume Automotive Parts Applications*
Claire Benwood, University of Guelph

35) *Nitrogen-Doped Distiller's Dried Grains With Solubles (DDGS) Biocarbon Supercapacitors in Automotive Electrical Systems*
Christoff Reimer, University of Guelph

36) *Poly(lactic acid)/poly(glycerol succinate-co-maleate) Bio-nanocomposites: Effect of Cellulose Nanocrystals on the Mechanical and Thermal Properties*
Elizabeth Brown, University of Guelph

37) *Miscanthus Biocarbon as a Renewable Carbon sSubstitute for Automotive Manufacturing Applications*
Ian Major, University of Guelph

38) *Ultrasonic Non-Destructive Inspection Identification of Material State and Temperature in Amorphous and Semi-Crystalline Materials*
Elliott W. Jost, Baylor University

39) *Sustainable Green Composites from Apple Pomace and Bioplastic,* **Maisyn Picard, University of Guelph**

40) *Characterization of Biocarbon Generated by Pyrolysis of Agricultural Hull Residues for Polymer Composite Applications,* **Peter Quosai, University of Guelph**

41) *Optimizing Strand Cooling in Extrusion Compounding of Composite Materials*
Nathaniel Brown, Clemson University

42) *The Evolution of Automotive Design and Development*
Habib Rafka, Clemson University & Univ of Pennyslvania

43) *Overmolding Studies on Extrusion Compression Long Fiber Thermoplastics*
Ryan Ogle, University of Tennessee

44) *Mode-I Behavior of Reversible Adhesives*
Benjamin Swanson, Michigan State University

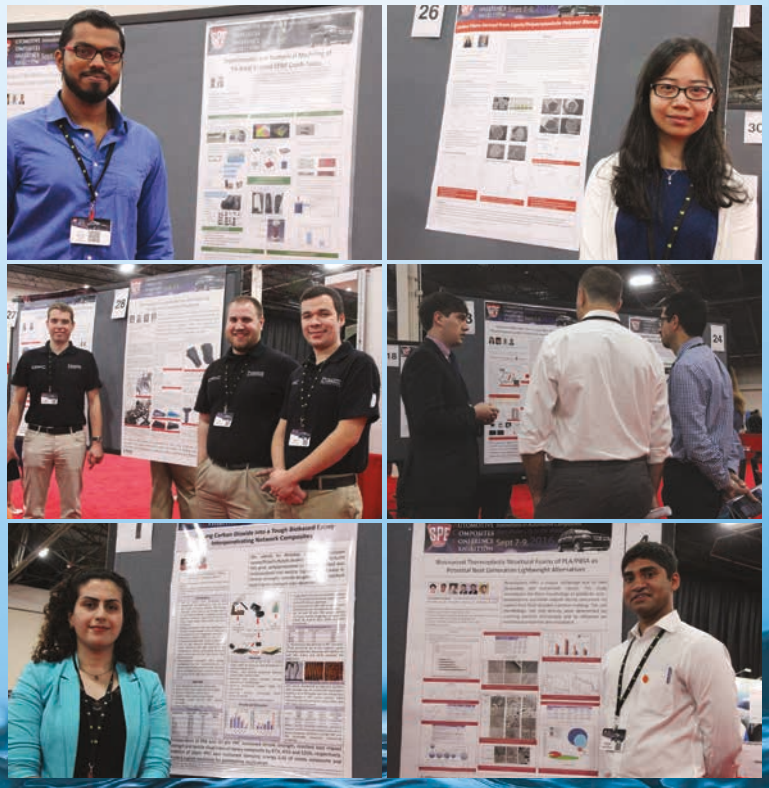
45) *Design of Bio Based Flexible and Rigid Polyurethane Foam Formulations using Bio, Petroleum, & Silicone Based Polyols*
Nathaniel Arnold, Michigan State University

High School Students

46) *Advancements in the Use of CO_2-based Polyols in Flexible Foam Applications,*
Alp Aydin, High School Ford Intern

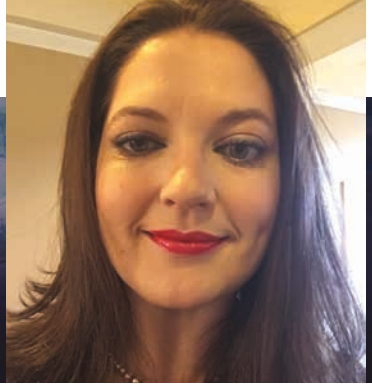
47) *Upgrading Biomass for Sustainable and Lightweight Automotive Applications*
Logan Boals, High School Ford Intern

48) *Sustainable Fillers as a Replacement for Mineral Fillers in Polyamide Composites*
Robert Chen, High School Ford Intern



SECRETARY'S REPORT

SPE Automotive Division Board
JUNE 12, 2017 Meeting Minutes



ATTENDEES

Matt Carroll, Tom Pickett, Dhanendra Nagwanshi, Alper Kiziltas, Cynthia Flanigan, Peter Bejin, Brian Haggart, Teri Chouinard, Steve Van Loozen, Bonnie Bennyhoff, Brian Grosser, Crystal VanHouten, Gary Kogowski, Chuck Jarrett, Norm Kakarala, Nippani Rao, Al Murray, Ed Luibrand, Rick Hamilton *Ph: Rose Petrella,* *Mark Bahm,* *Ron Price,* *Umesh Ghandi*

Meeting was held at the ACC (American Chemistry Council) in Troy, 5:32pm –7:14 pm.

OPENING – Matt Carroll

Review of Agenda for Meeting.

FINANCIAL – Bonnie Bennyhoff

Financial year to date we have Net Revenue of $358,165.15. Bonnie compared revenues 2017 vs 2016. Revenue looks good.

Reviewed Fiscal Year 2018 Budget. Motion approved to accept budget proposals with a few modifications.

Account Balances as of June 12, 2017 – Checking $549,401.10, Savings $27,456.31, Paypal $100 for a Total of $577,707.41.

Motion approved to move $250,000 to savings and look at savings options.

ACCE REPORT – Teri Chouinard, Bonnie Bennyhoff

68 abstracts submitted – goal is 90. Deadline for abstracts extended to June 15, 2017. Paper deadline is July 15th. 68 sponsors totaling $324,650. Registration fees will increase by $100; Now $575 for SPE members and $675 for non-members.

ACCE Scholarship recipient Bios to go out in an email. Composites Division Awards Chair Ian Swentek handles ACCE Scholarship Reviews and Awards.

DESIGN IN PLASTICS - Steve Van Loozen

Design in Plastics Conference 2017 features presentations, panels and workshops on materials, processes, collaboration, design thinking, future trends and more.

HP will stage new multi-jet printer at CCS for students to print designs. Design brief is being finalized. Chuck Jarrett volunteered to help with this conference, as needed.

EDUCATION – Matt Carroll

Focus on promoting PlastiVan for next year since it is already booked solid this year.

NEWSLETTER – Dave Helmer

June Newsletter printed and mailed out on time.

September newsletter, article due date 8/15/2017 – would like to get extra copies available to ACCE conference September 6-8th.

Standard report outs from each area plus looking for a technical article(s) – suggest a preview article from ACCE conference and/or TPO conference or look to past conferences

Any extra topics please forward to david.helmer@gm.com.

CHAIR REPORT – Matt Carroll

Schedule of Events, Awards, the 2017/2018 SPE Automotive Executive Committee, Committee Chairs, and Board of Directors was updated.

Schedule of Events

August 14, 2017 - Auto. Div Board Meeting.
August 24, 2017 – SPE 75th Anniversary @ the GEM Theater

Awards

SPE Automotive Division received the 2017 SPE Plastics for Life Most Innovative Part – Sustaining Life Award.

Executive / Committee Chairs / Board of Directors

Alper Kiziltas was elected Education Co-Chair and will join the Executive Committee for next year. Gary Kogowski agreed to be Awards Chair. Dave Helmer is Chair Elect. Proposed new Board Members Mark Bahm, Gary Kogowski and Brian Haggart.

ANTEC – Matt Carroll

ANTEC 2017 was a great success. ANTEC 2018 will be held in Orlando, Florida and then ANTEC 2019 will be in Detroit.

Minutes

SECRETARY'S REPORT Continued

SPE Automotive Division Board
JUNE 12, 2017 Meeting Minutes

AUTOMOTIVE

AUTOEPCON – Gary Kogowski

2017 was a record gross year. Steady growth year over year. There were 31 exhibitors and 318 registered attendees.

MEMBERSHIP – Steve Van Loozen

Automotive has 963 active members. There are 62 elapsed memberships. Investigating setting cards at out at the IAG Event to collect emails of potential members.

IAG – Jeff Helms

IAG is on track. The big push won't start until August.

Lifetime Achievement Award will be presented to Dr. Suresh Shah.

INTERSOCIETY REPORT – Dhanendra Nagwanshi

25th ESV (Enhanced Safety of Vehicle) Congress – 2017, Department of Transportation held June 5th-8th. Key topics included:

- Highly automated vehicles (HAVs) – Car manufacturer's, supplier's, regulator's and academia perspective
- Crashworthiness – Front, side and rollover crashes
- Restraint systems
- Crash avoidance systems

COMMITTEE UPDATES – Matt Carroll

Social, Golf, Councilor, New Business

A full councilor's report of the May 6th council meeting can be read in the June newsletter. Next councilor's meeting will take place August 25th-26th in Detroit.

Welcome Rick Hamilton, Global Core Manger for Interiors at Ford. Happy to have you as part of the SPE Automotive Division.

Meeting adjourned.

SECRETARY'S REPORT

SPE Automotive Division Board
AUGUST 14, 2017 Meeting Minutes

ATTENDEES

Al Murray, Alper Kiziltas, Bonnie Bennyhoff, Matt Carroll, Tom Pickett, Cynthia Flanigan, Richard Hamilton, Teri Chouinard, Steve Van Loozen, Brian Grosser, Gary Kogowski, Chuck Jarrett, Norm Kakarala, Ron Price, Dave Reed, Dave Helmer, Fred Deans, Mark Lapain, Suresh Shah

Meeting was held at the Lockhart BBQ in Royal Oak, 5:30pm – 7:15pm

Teri Chouinard substituted as secretary for Crystal Van Houten at the meeting.

OPENING – Matt Carroll

Review of Agenda for Meeting.

FINANCIAL – Bonnie Bennyhoff

Bonnie presented the Balance Sheet for our new fiscal year which started July 1st. Account Balances as of August 14th, 2017 – Checking $542,861, Savings $27,458, Paypal $60, for a Total of $570,379. Bonnie's plan is to keep at least $250,000 in checking for program expenses and put $250,000 into a rainy day savings account. She is still investigating low risk alternatives for the savings. Bonnie also presented our Annual Financial Report FY2016-2017 which is available upon request.

ACCE REPORT – Teri Chouinard, Bonnie Bennyhoff

85 abstracts submitted and 90 Sponsorships at $378,000. Teri has a few Exhibition spots left.

Question was raised with respect to free attendance to the ACCE conference for Automotive Division Board Members. Bonnie agreed to check with the ACCE Executive Committee and let us know. As a side note, the ACCE Executive Committee is considering to only allow "active" ACCE committee members to attend for free.

ACCE Scholarship Reviews and Awards were handled by Gene Havel at SPE HQ, Ian Swentek of the Composites Division and Matt Carroll this year. For next year, our Education Committee will be more involved in this process.

DESIGN IN PLASTICS - Steve Van Loozen, Chuck Jarrett

There will be a conference November 6-8, 2017 at CCS (Center for Creative Studies), but the CCS Competition is pending. Chuck Jarrett agreed to pursue the student competition idea this week and figure out if it will be a GO or not. Time is getting tight and the CCS professors might not support at this stage.

EDUCATION – Alper Kiziltas

The ACCE Poster Competition includes 46 Student participants. This competition is sponsored by Asahi Kasei Plastics. The request is in for ACCE to cover some student travel costs.

Also will focus on promoting PlastiVan for next year since it is already booked solid this year. Another idea that came up is to give each Michigan University Student section some funding (maybe $500 each?), possibly at our December social event.

NEWSLETTER – Dave Helmer

September newsletter article due date is 8/15/2017. Would like to have extra copies of the September newsletter available for each ACCE attendee bag, so 1500 copies were requested for this edition.

The next newsletter due date is not until November 15th. Any extra topics please forward to david.helmer@gm.com.

CHAIR REPORT – Matt Carroll

Upcoming events were reviewed and are on page 2 of the newsletter. August 24, 2017 is the SPE 75th Anniversary @ the GEM Theater and tickets are $150 each. Matt will look into having a free table from SPE HQ or purchase a table for 10 SPE Automotive Division Board Members to attend.

Since our October meeting conflicts with the TPO Conference, it will be moved back to Monday, October 9th.

1800 Crooks Office Moving

The SPE / ACC office is moving on September 1st from 1800 Crooks to 5750 New King Street, still in Troy. The ACC lease ends on August 31st and the new landlord wants us out.

The new space has storage, a full conference room and kitchenette, like the last space. Cost remains the same for us at $5000 per year rent.

Per Barbara Robertson, the ACC Automotive Leadership Team offered the library materials to our universities partners as teaching tools. MSU has requested the materials.

SECRETARY'S REPORT Continued

SPE Automotive Division Board
AUGUST 14, 2017 Meeting Minutes

As for the items and boxes in storage at 1800 Crooks, we need to review and move or discard materials before August 31. .

AWARDS – Gary Kogowski

Gary let us know that the Honored Service Member paperwork is due in October if we have any candidates. He also would like to know if anyone has other ideas about fun awards for the team.

MEMBERSHIP – Steve Van Loozen

Some brainstorming occurred:

a) have board members call lapsed members for a discussion.

b) reach out to students for free memberships. See if SPE will contribute towards these.

c) Put promotional cards at each seat at the IAG Event to collect emails of potential members.

IAG – Matt for Jeff Helms (Jeff was in Texas)

Team was asked by Matt to make a big push in September for nominations. Hope to have more OEM's participating this year.

INTERSOCIETY REPORT – Matt for Dhanendra Nagwanshi (Dhanendra in Washington DC)

Matt and Dhanendra met with SAE Detroit reps on July 18th and discussed the possibility of bringing both memberships together for an interesting and fun social event. A tour of the Ford Piquette street historical plant was mentioned as a possibility for an event in early 2018. Matt and Dhanendra will follow-up.

SOCIAL – Teri Chouinard, Fred Deans

Plans are in process for a "Sponsor Appreciation" Holiday Event bringing Sponsors and BOD Members together. Sponsors will be recognized for their contributions and updated to the many scholarships, young talent nurturing, and educational programs their sponsorships have enabled in the automotive plastics industry. This will be in early December at Ruth's Chris Steak House in Troy and include select beers, wine and cocktails and appetizers from their "Happy Hour" menu offering first class selections that are a bargain.

Golf - The Golf Outing actually made approximately $5K last year! Fred Deans noted that the event is going great with more sponsorships and foursomes than ever in recent years. So far, all sponsorships (including foursomes) are sold and additional foursomes and singles amounting to 127 attendees have been invoiced. We have room for even more foursomes – please contact Teri 248.701.8003 or teri@intuitgropu.com.

OTHER BUSINESS

- Next councilor's meeting will take place August 25th-26th in Detroit. Suresh will attend for us.
- Oakland University wants to start a new SPE Student Chapter so let's link in to them.

Meeting adjourned.

TREASURER'S REPORT

Bonnie Bennyhoff,
SPE Automotive Division
Treasurer

Happy New Fiscal Year! Just like we do in our personal lives at the start of a new year, I would like to reflect on the Auto Division's previous year accomplishments, areas for improvement and share some goals we have for 2017-2018.

Starting with the mundane, shoring up Accounts Receivable was a big accomplishment from my viewpoint: we collected $64k in past dues and continue to be current with receivables. We also cut Newsletter expenses significantly, allowing us to maintain a print edition.

Toward our goal of "reinvesting" funds back into our industry by sponsoring educational programs and awarding student scholarships - make that a double check √√. We awarded over $21,000 in scholarships and paid more than $20,000 to send the PlastiVan to local middle and high schools (the PlastiVan program is an educational outreach from the Society of the Plastics Industry –SPI).

And finally, all three major events Automotive Division sponsors/co-sponsors annually – the Innovation Awards Gala in November (IAG), Automotive Engineering Plastics Conference (AutoEPCON) in May (with the Detroit Section), and the Automotive Composites Conference & Exhibition (ACCE) in September (with the Composites Division), continued to be successful thanks to the support of our sponsors and participants. A big thank you goes out to all of you!!

Of course there are things to improve upon. A few that come to mind are: 1) increased communication (the kind that can bring value) to our members (2) employ volunteer resources more efficiently (3) better utilize cash flow to maximize interest-earning potential on unused funds.

As for our goals, this fiscal year is off to a great start with the Education committee identifying new ways to support students in general, and specifically to provide funding for SPE student chapters. This will play into our next goal of increasing membership, particularly young professionals. We'd love your help to identify worthy programs that could use our support: please let us know if you have ideas that fit our mission.

As of August 18, 2017, the division's account balances were:

PayPal Bank:	$ 60.00
Checking:	$548,478.27
Savings:	$ 27,458.15
Total:	$575,996.42

INTERSOCIETY REPORT

Dhanendra Nagwanshi,
SPE Automotive Division
Intersociety Chair

Every two years, professionals in the field of motor vehicle safety come together at a global conference to exchange information on the latest advancements.

In early June, the 25th edition of this event – known as the Enhanced Safety of Vehicles (ESV) conference – took place in Detroit. This conference, sponsored by NHTSA (DOT), brings industry, academia and regulators together from 15 different countries.

As SPE Automotive Division Intersociety Chair and in my Automotive Marketing role with SABIC, I participated in this event.

Highly automated vehicles (HAVs) was a spotlight-stealing topic at this year's ESV. In anticipation of this development, NHTSA has already released a preliminary framework for the adoption of these vehicles – which some say may come sooner vs. later. Development of these HAVs may create more opportunities for the use of plastics and composites, especially if durability and stiffness requirements change.

After more than 40 years, ESV continues to keep pace with technical innovation to find new opportunities for advancing safety. The conference also lived up to its billing as a forum to encourage international cooperation and collaboration.

On this topic of coming together, I am pleased to share that Matt Carroll (Chair, SPE Automotive Division) and I met with colleagues from the SAE Detroit Section last month. We had a productive discussion, which resulted in multiple ideas for future collaboration between our two societies. One idea, for example, is to have some kind of joint tour/event in the January/February timeframe. We will continue to explore and refine this potential activity in the near future.

In the meantime, I am always open to thoughts on ways we can reinvigorate interactions with other professional organizations. Please do not hesitate to reach out and share your good thinking with me. As they say, the best idea is to have a lot of ideas.

THIS CHANGES EVERYTHING+

Synventive molding solutions
A business of BARNES GROUP INC

Sequential Valve Gating will never be the same. Through numerous patented design enhancements, **SVG+** offers unprecedented performance, efficiency and reliability. All of this comes in a completely upgradeable package allowing you to test drive it before you buy it. No other technology on the market can offer the same, period.

In 26 countries – Worldwide | www.synventive.com

Technical Report

Controlling Temperature is Key for Additive Manufacturing with Semi-Crystalline Engineering Plastics

Patrick Duis, *Wim Zoetelief, Arjen Bogaerds*

Additive manufacturing with plastics is moving into demanding applications with a continuous requirement for increasing complexity, placing additional demands on material suppliers. When considering Fused Filament Fabrication (FFF) or Fused Deposition Modeling (FDM), two polymers currently dominate the market — the biopolymer polylactic acid (PLA) and the more traditional polymer acrylonitrile butadiene styrene (ABS). These two materials are popular for several reasons, they have good printing behavior and they're not too expensive and, in the case of PLA, it is also more "eco-friendly."

The downside of these materials is that the mechanical and thermal properties, especially for PLA, are underwhelming. In addition, they do not have excellent resistance to high temperatures or weathering. So, it's clear that the FFF 3D plastics printing market needs materials that have a better combination of printability and in-use properties; meaning producers of engineering thermoplastics need to develop grades specifically for FFF. However, producers of FFF 3D printers and their customers need to be aware that engineering thermoplastics may demand special attention to processing conditions, which may require some hardware engineering and software tweaking. Optimizing processing parameters is a critical factor to fine-tune the physical properties of 3D printed parts, which DSM has learned over years of experience with their Somos® stereolithography (SLA) materials.

With the current state of FFF 3D printing, the mechanical capabilities of the technology are exceeding their thermodynamic capabilities. Printers can reach speeds of up to around 300 mm/s, however in many cases when engineered thermoplastics are used, the mechanical properties of the finished parts are inadequate because of poor inter-laminar strength caused by poor thermal bonding. The principal problem is that while the printing equipment is highly capable of depositing the filament very accurately at a high speed, the equipment's capacity does not match this ability to melt the polymer sufficiently. Next to this, a controlled print chamber helps to print with lower warpage of the part.

PATRICK DUIS

Patrick Duis is the primary author of this month's Technical Article, which was developed for the SPE AutoEpcon in May 2017. Patrick received a Diploma in Mechanical/ Aircraft engineering from MTS Tilburg in 1998 along with further education in Plastics Engineering from Avans Hogeschool Tilburg and PT groep POST HBO. He has spent the last nineteen years in the plastics industry and is currently the Additive Manufacturing Business Development Manager for DSM Engineering Plastics, located in Geleen, Netherlands.

To raise the temperature to this point, heat is added from the surface of the nozzle with an external heater block. Since the thermal conductivity of a polymer is low (0.3 w/mk), it will take some time to reach a homogeneous temperature distribution at the nozzle exit. Using numerical simulations of the heat balance in a frequently used hot-end, a "v6" from UK 3D printer component supplier E3D, it is possible to demonstrate how much the homogeneity of the temperature distribution decreases with increasing printing speed.

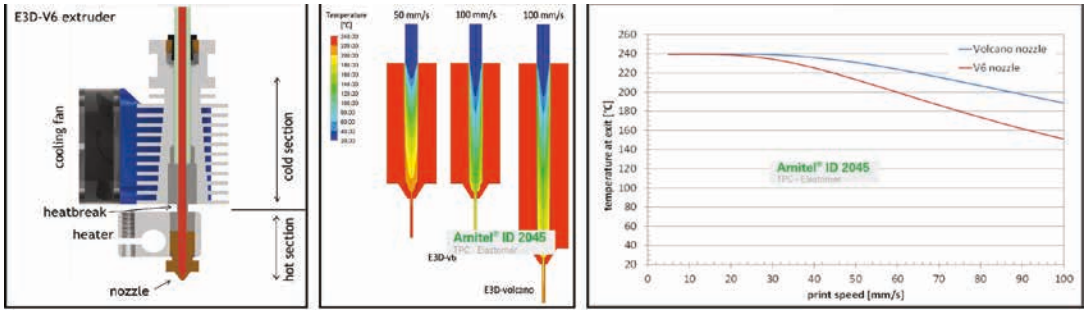


Figure 1. Typical FFF nozzle temperature distribution with increased printing speed.

 CONTINUED FROM PAGE 37

The calculated temperature contours in the hot-section of the E3D extruder as shown in Figure 1 are achieved with a nozzle temperature of 240°C and a filament feed temperature of 25°C. The flow rate used is that for printing widths of 0.5 mm in 0.2 mm layers, using the indicated printing speed. Also, a longer nozzle can enhance the material heating (ex. volcano nozzle by E3D). Material parameters are for Arnitel® ID 2045, a bio-based grade of co-polyester TPC, which is in the family of semi-crystalline theromplastics that was developed by DSM for FFF printers.

Next to this effect, controlling the print environment is increasingly important when changing from amorphous to semi-crystalline materials. First, we need to ensure that the material is melted in a controlled method. The trend to semi-crystalline materials is driven by the engineering performance of these materials, including better mechanical properties, long term heat stability, chemical resistance, etc. The main challenge is the increased volume change when cooling down from melt to solidification, typically known as shrinkage due to the crystal structure. This shrinkage results in warpage and prints that fail. The typical FFF build plate is made of glass and from this glass substrate, the part will need to be built using adhesives to keep the polymer bonded to the glass. If the 'warpage' forces become too large, the part-glass interface fails and the part is torn off the substrate.

A way to reduce this is to "control "the printing environment and print with higher environment temperatures (above the glass transition temperature - Tg), which minimizes the chance of a bad print. DSM has developed an analytical model to predict the crystallinity and thermal behavior during the FFF process, which creates better insight in the way layers start to crystallize in the process. By predicting the processing settings, DSM can tune the process settings to reduce the effect on warpage.

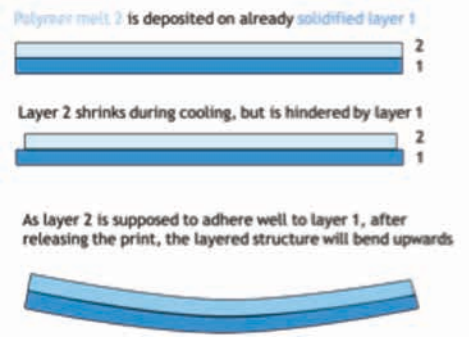


Figure 2. Shrinkage effect between layers.

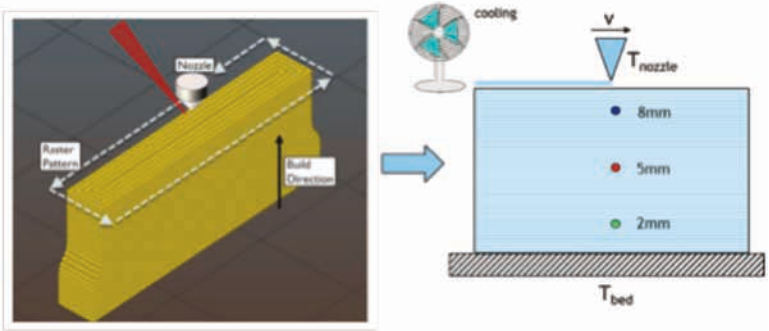


Figure 3. Model of a printed sample for modeling the process.

Figure 2 includes two examples on the temperature control and distribution in the nozzle and how the crystallization behavior can be influenced by the process. A simple geometry is modelled with all the parameter settings of the process (print speed, temperature of the melt, bed, and chamber and print speeds). DSM combines this data with all the material parameters to model the heat distribution and the crystallization behavior throughout the print and now can look at the printed substrate at a certain position. In Figure 3, the print is at 2.5 and 8mm during printing. All parameters can vary to control the crystallization speed.

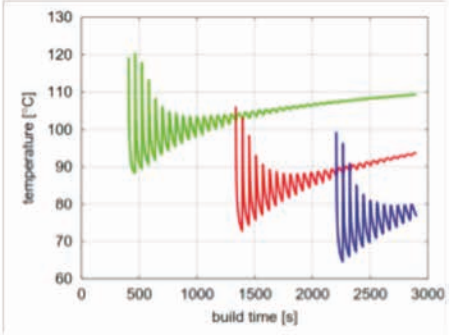


Figure 4. Thermal history and temperature behavior at Tamb 25°C and Tbed 120°C.

Figure 4 shows the thermal history of the part during the print job. The ambient temperature is 25°C and the Temperature of the heated glass substrate is 125°C. The first layers are close to 110°C, however, at a higher build geometry the temperature is close to 80°C. The effect of the heated bed fades away when the build is evolving.

 CONTINUED FROM PAGE 37

When the temperature history is known, we can link the model to crystallization and volumetric shrinkage behavior. In this way, we can "control" the crystallization behavior during the build of the part. In Figures 5, 6, 7 and 8, the chart on the left shows the temperature history that is plotted at a certain condition and the plot on the right is the crystallization conversion. When the material is fully crystallized, the value is 1. When we apply different settings, you can observe that the layers in crystallization behavior can be controlled. The dotted line in the right chart shows the difference between standard PA6 and optimized PA6 (DSM Novamid® ID 1070) for additive manufacturing. The difference in crystallization speed is clearly demonstrated. Slower crystallization helps to fuse the layers together, hence a stronger layer-to-layer adhesion.

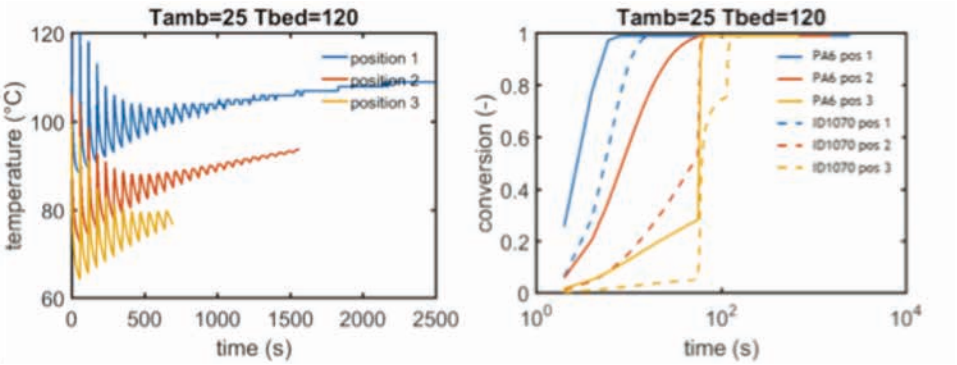


Figure 5. This figure demonstrates that the first layers crystallizes first.

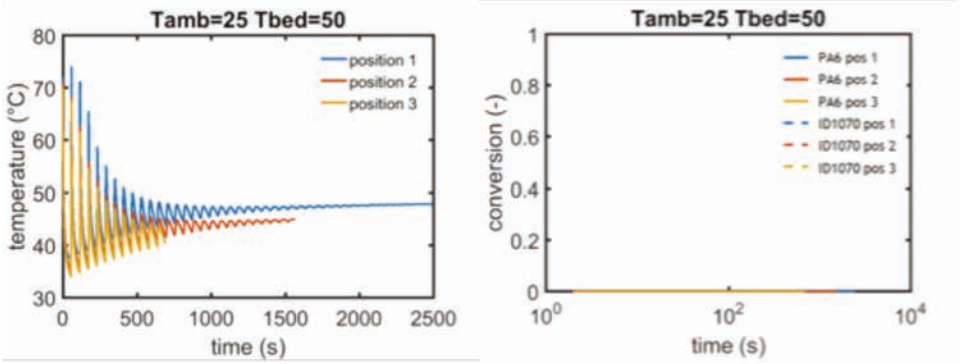


Figure 6. When all temperatures are low, crystallization is hindered.

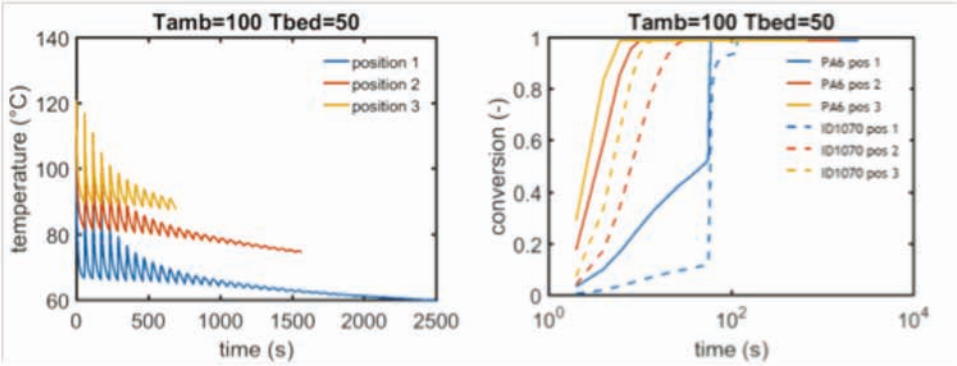


Figure 7. When the ambient temperature is high, the last layers crystallize first.

 CONTINUED FROM PAGE 37

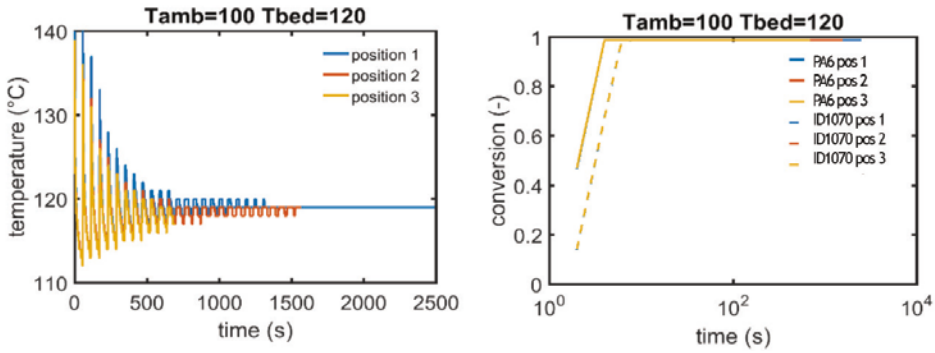


Figure 8. When applying high temperatures for bed and environment, crystalization is observed simultaneously

As shown in the figures 5,6, 7 and 8, we can control the crystallization of a printed FFF part by controlling the environment and bed temperatures. In figure 8, we clearly see that when we apply both temperatures around 100 degrees, we can print Novamid® ID1070 (PA6) with limited warpage effects.

We can "steer" the warpage and create parts that can be used for functional prototyping, as well as end use parts. Next to the crystallinity, we can also model the effect on layer thickness and printing speed on the fusion strength between layers.

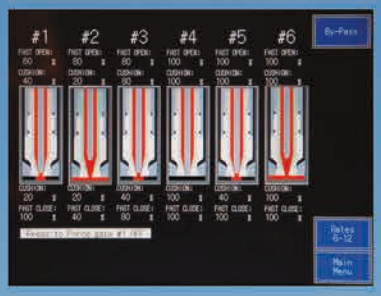
Currently, DSM is conducting trials on newly developed machines with heated chambers to obtain the right settings for the printer material combination. By fully understanding the process and material parameters, we can build a strong part with low warpage to meet the demands from the automotive industry.

TAKE CONTROL OF YOUR PROFITS

with P.E.T.S. - And see what 35+ years of experience can do for your bottom line

ALL NEW HOTRUNNERS

- Reduced size for Faster Start-ups
- Flexible Manifold Heater Elements allow easy replacement
- Clampless Drop Heaters
- Dual Circuit Backup Heaters on Drops No need to remove tool for bad heater
- Fully Unitized & Tested
- Leak Proof Drops

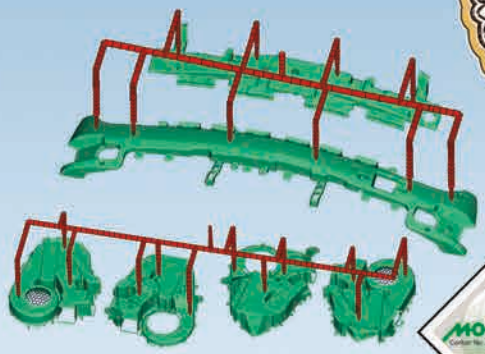


Smart Gate™ Sequencer

- Control Pin Speed and Acceleration at each Gate Independently
- Works on Position - Position
  Position - Time
  Time - Time
  Time - Position
- Compatible with All Hot Runner Suppliers
- Decrease Scrap - Increase Profits!

Plastic Engineering & Technical Services, Inc.

The Hot runners that feed the industry



moldflow
Gold Certified Consultant

MoldFlow

- Gold Certified Consultants
- 35+ Years MoldFlow Experience
- Fill, Cool, Warp, Gas Assist, Counter Pressure and Injection Compression
- Moldex3D available as well

Moldex3D
MOLDING INNOVATION

Temperature Controllers

CARD TYPE CONTROLLERS
- 20A per zone
- TC Reverse Detection
- Manual Mode Option
- Low Price!

GUI TYPE CONTROLLERS
- All of Above, plus:
- 12-128 Zones

FOR MORE INFORMATION ON ANY OF OUR PRODUCTS AND SERVICES:
Sales@PETSinc.net · or call directly: Steve Hinderer · 248-249-4955

PLASTIC ENGINEERING & TECHNICAL SERVICES, INC.
Performance. Value. Delivered.

www.petsinc.net

Plastic Engineering & Technical Services Inc (P.E.T.S.) – HQ
4141 Luella Lane,
Auburn Hills, MI 48326
+1 248.373.0800
sales@petsinc.net
www.petsinc.net

P.E.T.S. Hotrunner (Shenzhen) Co. Ltd.
Shenzhen, China

sales@petsbotrunner.com
(86) 0755.2910.9973

P.E.T.S. Europe Ltd
Unit 7 Beaver Industrial Estates
Southmoor Lane
Havant, Hampshire, PO9 1JW
+44 (0) 23.9249.2411
sales@petsinc.net

P.E.T.S. Hotrunner (Mexico)
Blvd Luis D. Colosio 1979-2
Col. San Patricio
Saltillo Coah, Mexico
011.52.844.1808.1381
salesmx@petsinc.net
sales@petsinc.net

P.E.T.S. Hong Kong
P.E.T.S. International Systems
Unit 505, Wing On House
71 Des Voeux Rd.: Central, HK

Society of Plastics Engineers
Automotive Division
1800 Crooks Road, Suite A
Troy, MI 48084 USA

Automotive Division Hotline

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

2017/2018 Executive Committee

Matt Carroll, Chair
General Motors Co.
+1.586.218.9405

Dave Helmer, Chair-Elect
General Motors Co.
+1.248.431.9804

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

Steve VanLoozen, Past-Chair
Celanese Engineered Materials
+1-248.289.2508

Dr. Alper Kiziltas, Vice-Chair
Ford Motor Co.
+1.313.322.0595

Bonnie Bennyhoff, Treasurer
Retired - ExxonMobil
+1.734.660.3200

Crystal VanHouten, Secretary
Grupo Antolin
+1.248.825.7135

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

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

2017/2018 Committee Chairs

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

Gary Kogowski, Awards Chair AutoEpcon Co-Chair
Ravago Americas
+1.248.797.7433

Alper Kiziltas, Education
Ford Motor Co.
+1.313.322.0595

Brian Haggart, Education Co-Chair
Styrolution
+1.248.228.5959

Fred Deans, Golf Outing
Allied Composite Technologies LLC
+1.248.760.7717

Steve Van Loozen, Membership, AutoEpcon, Tech Programs
Celanese Engineered Materials
+1-248.289.2508

David Helmer, Newsletter Editor
General Motors Co.
+1.248.431.9804

Dhanendra Nagwanshi, Intersociety
SABIC
+1.248.760.3860

Marc Bahm, Webmaster
BASF
+1.734.309.1738

Teri Chouinard, Social, Sponsorship, IAG MARCOM
Intuit Group, LLC
+1.248.701.8003

Bonnie Bennyhoff, ACCE Administration
Retired - ExxonMobil+1.313.322.0595

Jeff Helms, Innovation Awards
Celanese Corp.
+1.248.377.6895

2018-2020 Directors

TO MAY 2018

Ron Price +1.248.563.6343
Global Polymer Solutions

Mike Whitens +1.313.805.5932
Ford Motor Co.

Tom Pickett +1.248.431.9724
General Motors Co.

Monica Prokopyshen +1.248.608.6259
Retired - Chrysler LLC

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

Brian Grosser +1.248.941.9368
Lotte

TO MAY 2019

Kevin Pageau +1.248.835.4999
Sonoco Protective Solutions

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

Cynthia Flanigan +1.313.317.7538
Ford Motor Co.

Dhanendra Nagwanshi +1.248.760.3860
SABIC

Andy Stecher +1.847.783.3283
Plasmatreat

TO MAY 2020

Fred Deans +1.248.760.7717
Allied Composite Technologies LLC

Richard Hamilton +1.313.268.2344
Ford Motor Co.

Umesh Gandhi +1.734.995.7174
Toyota Technical Center

Chuck Jarrett +1.248.310.3283
The Materials Group

Mark Bahm +1.734.309.1738
BASF

Gary Kogowski +1.248.797.7433
Ravago Americas

Brian Haggart +1.248.228.5959
Styrolution