2017 SPE TPO AUTOMOTIVE ENGINEERED POLYOLEFINS CONFERENCE SPONSORS:

PLATINUM & EXHIBITOR

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

GOLD & EXHIBITOR

A. Schulman Inc. · ALBIS · ASAHI KASEI PLASTICS Advanced Material Solutions · AUTODESK · BOREALIS · Continental · CIMBAR Performance Minerals · CLARIANT · DOW · FUTURE OF TPE ENPLAST® AMERICAS · ENTEC · ExxonMobil Chemical · HAARTZ · H.B. Fuller · IMERYS Talc · INTEVA PRODUCTS · KINGFA 金发科技 · lyondellbasell · mcpp Power to Perform · MITSUI PLASTICS, INC. · MYTEX POLYMERS · PolyOne · ANALYSIS Management DECISIONS Robert Eller Associates LLC CONSULTANTS TO THE PLASTICS AND RUBBER INDUSTRIES · sabic · SIRMAX

EXHIBITOR

Adell · Alterra Holdings · americhem · American Chemistry Council Plastics Division · Arctic Minerals, LLC · BRANSON · BYK Additives & Instruments · Chase Plastics · CRAY VALLEY · CRODA Polymer Additives · DatapointLabs technical center for materials · elastron · Henkel · IAC · IMIFABI · Jowat · JSR · JSR Corporation · Kal-Polymers · KRÜSS · LOTTE CHEMICAL ALABAMA · MRC Polymers Engineered & Sustainable Resins · MAROON GROUP · Milliken · Beyond Clean™ Purgex™ · nexeo solutions · NOF CORPORATION · NOBLE polymers · plasmatreat solutions on top · PROCHIMIR TECHNICAL FILMS · PROGRESSIVE COMPONENTS · Quantum Analytics · RA RELIABLE ANALYSIS INC · RheTech · RTP Engineering Plastics · sāco AEI polymers · SONGWON · Specialty MINERALS · struktol · SUNSTAR · SPOLYMER · TECHMER PM POLYMER MODIFIERS · UCC · UNITED PAINT · ZOLTEK Toray Group

DRIVING INNOVATION FORWARD

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

SABIC.com

CHEMISTRY THAT MATTERS™

Welcome to the 2017 SPE TPO Conference

Thank you for attending the 19th-annual ***SPE® TPO Automotive Engineered Polyolefins Conference***, *the world's leading automotive Polyolefins forum*. On behalf of our hardworking planning committee and all of SPE, we welcome you to the conference and wish you a very successful event.

Whether you're here 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 show.

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

- We expect close to 1000 guests from around the world.
- We have our largest technical program ever (81 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 over 80 exhibitors.

Additionally, we have five exciting keynote speakers who are going to help you better understand the complex web of trends and market forces at work in our industry today and those that shapes our tomorrow. Not only will you leave here 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 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.

We'd like to acknowledge all the effort our committee of volunteers have expended helping bring this year's program to you. Our team is hard at work on this conference 11 months of the year. If there's something we could do better, please don't hesitate to tell a member of our committee so we can discuss it in our postmortem. If there's something we did right, please don't hesitate to tell us that too. We're always striving to make this event better.

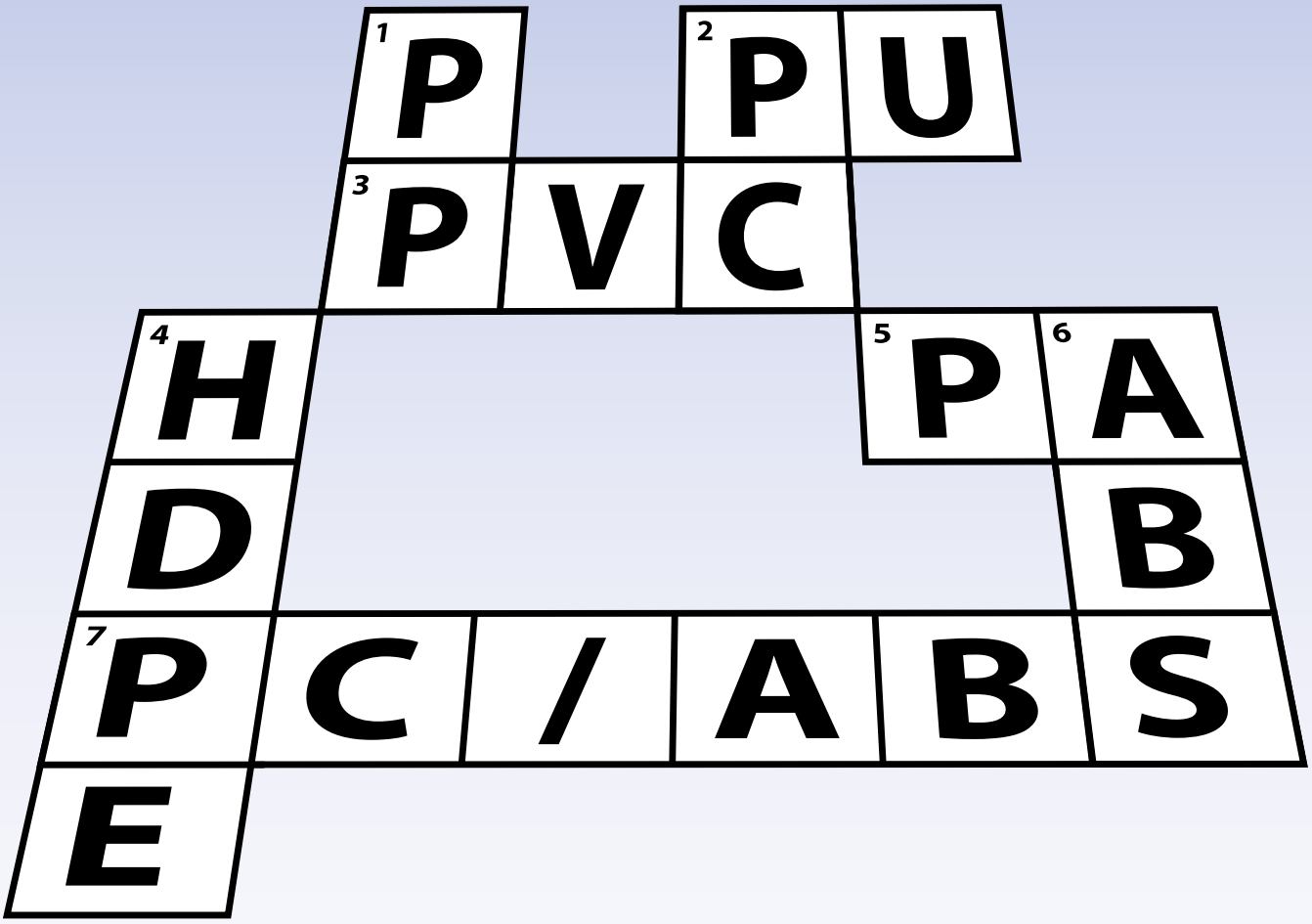
See you all at the conference,

Sincerely,

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

David Okonski
Conference Co-Chair
General Motors Corp.

With a variety of products to choose from,
we can help you *solve* your requirements ***FAST***.



• Formosa Plastics Corporation • Nan Ya Plastics Corporation

• Formosa Chemical Fibres Corporation • Formosa Plastics Corporation, U.S.A.

台塑關係企業
FORMOSA PLASTICS GROUP

Formosa Automotive Sales Team

Your Global Automotive Resin Source

2017 Planning Committee

19th-Annual SPE TPO Automotive Engineered Polyolefins Detroit Conference

Conference Operation / Sponsorship Co-Chairs

Dr. Sassan Tarahomi, Mitsubishi Chemical Performance Polymers, Inc.
David Okonski, General Motors Corp.

Technical Program Co-Chairs

Dr. Norm Kakarala, retired-Inteva Products LLC
Dave Helmer, General Motors Corp.

Session Co-Chairs

Surface Enhancements
Dr. Rose Ryntz, IAC Group
Jeff B. Crist, Ford Motor Company
Jim Keller, United Paint & Chemicals Corporation

Interior Applications
Robert Eller, Robert Eller Associates LLC
Dr. Sam He, Inteva Products, LLC
Kevin Lyons, Inteva Products, LLC

Reinforcements & Compounds
Mike Balow, Asahi Kasei Plastics North America, Inc.
Ermanno Ruccolo, Borealis

Biobased & Recycled Materials
Susan Kozora, IAC Group
Dr. Alper Kiziltas, Ford Motor Company

Additives & Modifiers
Neil Fuenmayor, LyondellBasell
Mark Jablonka, The Dow Chemical Co.

Lightweighting Polyolefin Parts
John Haubert, FCA US LLC
Normand Miron, Washington Penn Plastic Co., Inc.

Process Developments
Kurt Anthony, Washington Penn Plastics Co., Inc.
Dr. Suresh Shah, retired-Delphi Corp.

Modeling & Simulations
Dr. Li Lu, Ford Motor Company
Scott Grant, Autodesk, Inc.

Interior Emissions
Dr. Laura Shereda, Asahi Kasei Plastics North America, Inc.
Dave Helmer, General Motors

Adhesives & Coatings for TPOs
Dr. Pravin Sitaram, Haartz Corp.
Hoa Pham, Freudenberg Performance Materials

Other Committee & Staff

Staff Support
Karen Rhodes-Parker, SPE Detroit Sect.

Secretary
Jim Keller, United Paint & Chemical

Treasurer
Tom Powers, retired-Delta Polymers

House
Bill Windscheif, Advanced Innovative Solutions

Timeline / Job Descriptions
Dr. Sassan Tarahomi, MCPP
Bill Windscheif, Advanced Innovative Solutions, LTD

Keynote Speakers
Bill Windscheif, Advanced Innovative Solutions
Nippani Rao, Asahi Kasei Plastics North America, Inc.

OEM Participation
Neil Fuenmayor, LyondellBasell
John Haubert, FCA US LLC
Scott Aramian, Advanced Composites Inc.

USB Drives / Online Access
Sanjay Patel, Borealis AG
Neil Fuenmayor, LyondellBasell

Scholarships
Ermanno Ruccolo, Borealis
Sanjay Patel, Borealis AG
Dr. Sassan Tarahomi, MCPP
Dr. Norm Kakarala, retired-Inteva Products LLC
Bill Windscheif, Advanced Innovative Solutions, LTD
David Okonski, General Motors Corp.

Plaques / Awards / Parts Competition
Nippani Rao, Asahi Kasei Plastics North America, Inc.
Dr. Suresh Shah, retired-Delphi Corp.

Committee Member Recruitment
Dr. Sassan Tarahomi, IAC Group
David Okonski, General Motors Corp.

Proceedings Book
Karen Rhodes-Parker, SPE Detroit Sect.
Dr. Norm Kakarala, retired-Inteva Products LLC
Jill Gorter, JPI Creative
Jim Alexander, Maple Press

Conference Feedback
Dirk Zinkweg, The Dow Chemical Co.

University Students
Dr. Sassan Tarahomi, MCPP

Day of Conference Staff Support
Rob Philp
Ed Bearse, Advanced Plastic Consultants LLC
Chris Hescheles, Mytex Polymers
Lyle Beadle

Advertising/PR
Karen Rhodes-Parker, SPE Detroit Sect.
Jill Bahm, PenPix Creative
Jill Gorter, JPI Creative

Website
Jill Bahm, PenPix Creative
Karen Rhodes-Parker, SPE Detroit Sect.

TV / News Media
Ron Price, Global Polymer Solutions

Audio/Video/Computers/ Smartphone App
Ron Price, Global Polymer Solutions
Rob Philp

APP
Scott Marko, SPE Headquarters

Signs/Posters
Dr. Sassan Tarahomi, MCPP
Karen Rhodes-Parker, SPE Detroit Sect.
Jill Gorter, JPI Creative
Suzanne Lee, That Color

2017 Keynote Speakers

Jeff Makarewicz

Senior Vice President, Vehicle, Quality, & Safety Engineering
Toyota Technical Center
Toyota Motor North America

Managing Through the Automotive Revolution – What's Next?

While the automotive industry is showing record sales and profits, strong headwinds are on the horizon, and the lessons of the past cannot be forgotten. Capacity, compliance, and competitiveness are weighing heavily on the minds of all companies. This presentation will provide insight into some of the challenges facing automakers and the impact and opportunities for the TPO industry.

Jeff Makarewicz is the senior vice president of Vehicle, Quality & Safety Engineering at the Toyota Technical Center (TTC) based in York Township, Michigan. TTC is Toyota's North American R&D center and a division of Toyota Motor North America (TMNA). In this position, Makarewicz oversees Vehicle Performance Development, Materials Engineering, Quality Promotion and Collaborative Safety Research Center.

Prior to this assignment, Makarewicz was the vice president of the Corporate Strategy Office and was responsible for product, business, and technical planning.

Makarewicz joined TTC in 1990 as an engineer in the Materials Engineering Department, Paint & Finishing Group. In 1993, he moved to Nagoya, Japan where he spent two years working for the Toyota Motor Corporation in the areas of paint and finishing. He returned to TTC in 1995 and in 2002 was promoted to general manager of the Materials Engineering Department where he was responsible for the evaluation, development, and design of materials. He holds numerous patents in these fields. In 2004 he became general manager of the Materials Research Department where he led Toyota's North American advanced research activity. In 2008, he became vice president of the Materials Engineering Division, and in 2011 moved to the Product Development Office on special assignment to focus on strategic initiatives.

Makarewicz earned a bachelor's degree in chemistry from the University of Michigan

Jeff Schuster

Senior Vice President of Forecasting
LMC Automotive

The State of the Auto Industry: Upcoming Trends and Innovations

I will discuss the state of the Auto Industry and upcoming trends and innovations. The auto industry is arguably in the most transitional period since the invention of the vehicle. Auto sales are trending flat, regulations have been impacting vehicle development and what we drive but may be changing, and technology is defining and altering the future of the industry. I will focus on:

- Where the global industry volume is headed in the near-term and the long-term
- What vehicle segments will outperform and the overall competitive outlook
- Shifts in North American production and sourcing
- Impact of regulations and technology, including longer term mobility

Jeff Schuster is responsibile for all activities in the Americas region. In addition, oversight of the global light vehicle sales and production forecasts and process is under his direction. Mr. Schuster is also a member of the LMC Automotive board of directors. Included in his role is the leadership and analysis that detail manufacturer, segment, platform, model, and plant trends. In addition, he is one of the firm's primary global automotive experts.

Schuster has been tracking and analyzing developments in the global automotive industry for more than twenty years and has been with LMC Automotive since its inception in 2011. He is widely quoted by the automotive media in print, internet, radio and television. He frequently makes industry conference and seminar presentations covering various topics including, the current assessment and outlook of the automotive industry.

Prior to joining the firm, Schuster led the automotive forecast division of J.D. Power and Associates and has experience in financial analysis and cash management in the automotive supply base.

Schuster holds a bachelor's degree in finance and a Master of Science degree in corporate finance from Walsh College. He is a board member of Society of Automotive Analysts and a member of the Automotive Press Association.

2017 Keynote Speakers

Dirk Zinkweg

Associate Marketing Director – Transportation

Dow Electrical & Telecommunications

Polyolefin Elastomer Impact Modifiers for Polypropylene, Future Trends and Predictions

This presentation will cover the trends we see leading up to 2025 from a material supply, market trend, and regulatory perspective for elastomeric impact modifiers. Topics covered will include how raw material suppliers into the TPO market will need to provide innovative products, technology, and services to meet the needs of OEMs, molders, and compounders alike to accelerate innovation and push the boundaries of performance, aesthetics, and fuel economy.

Dirk Zinkweg is the Associate Marketing Director for Transportation within Dow's Elastomers, Electrical & Telecommunications (EE&T) business. Dirk leads global marketing for Dow's ENGAGE polyolefin elastomers in impact modified polypropylene for automotive TPO.

Dirk has worked for Dow for 25 years and has held positions in seven separate business units, four different functions, and three countries. Dirk has specialized in new business development and marketing with particular focus on exploring new spaces in the industry. He is a coauthor on four patents, holds a Bachelor of Science in Honors Applied Chemistry (co-operative program) from the University of Waterloo, in Waterloo Ontario, and a Masters Degree in Business Administration from Northwood University, in Midland Michigan.

Dirk is an active member of the Detroit SPE TPO committee where he coordinates surveys and feedback for the ***SPE® Automotive TPO Engineered Polyolefins Global Conference*** the world's leading forum on the use of rigid and elastomeric thermoplastic polyolefins (TPOs) in automotive and ground transportation.

Darrell Williams

Director of Sales, Technical Service & Business Development

Braskem America, Inc.

State of the Polypropylene Industry – Supply and Technology

The North America polypropylene market continues to grow fueled by the material's performance, ease of processing and cost competitiveness. Future growth will be sustained by the development of innovative products that meet new performance demands related to sustainability and enhanced physical properties. Navigating a market that requires growing the polypropylene supply chain while delivering on the technical demands of an increasingly sophisticated OEM base will be reviewed.

Darrell Williams leads the Sales, Technical Service and Business Development teams. He has responsibility for product pricing, margin improvement, contract strategy, account management, technical service, sales process management, market segment strategies, client portfolio optimization. He also leads Braskem's business development activities, responsible for identifying the best growth opportunities that capture value, as well as hiring, training, developing and coaching a talented client interfacing team.

Mr. Williams joined Braskem America in 2010 as the Director of Supply Chain in 2011 where he had responsibility for the supply chain, transportation, sales support, business optimization and business administration teams.

Before joining Braskem America, Mr. Williams held a variety of roles within Sunoco Chemicals. As an Account Manager, and later a Group Sales Manager, he managed strategic accounts in key markets such as automotive compounding, caps and closures, packaging and film.

Prior to Sunoco Chemicals, Mr. Williams worked for M. Holland Company and Aristech Chemical Corporation where he served as a Technical Service Engineer. In these separate roles, he was responsible for customer technical service, applications development, market analysis and quality assurance. He worked with customers on a variety of thermoplastic polymers, including nylon, ABS, PE, PS, PP, polycarbonate, acrylics and polyacetal.

Mr. Williams earned a Bachelor of Engineering degree in Chemical Engineering from Youngstown State University. He also completed some graduate coursework at the University of Pittsburgh.

2017 Keynote Speakers

Patricia Davitt Long

Senior Vice President – Industry Affairs

Plastics Industry Association (PLASTICS)

Plastics Industry Economic Updates and Outlook

Patricia "Patty" Long brings over 30 years of experience in government relations, public affairs and communications. She currently serves as the Senior Vice President, Industry Affairs for the Plastics Industry Association (PLASTICS). In that capacity, she is responsible for overall issues management and leads outreach on behalf of member companies to government bodies, NGOs and other relevant stakeholders. Patty has spent the bulk of her career in association management having spent two years as an executive staff member of the National Asphalt Pavement Association and almost 20 years with the National Association of Manufacturers (NAM).

Patty is currently an adjunct professor at Georgetown University's School of Continuing Studies where she teaches ethics. She also serves as a member of the board of trustees of the Academy of the Holy Cross in Kensington, MD. She is a native of the Washington, D.C. area and is the mother of four daughters.

2017 Online Survey

WE NEED YOUR FEEDBACK!

Access online feedback form two ways:

- QR Code on your mobile device
- Direct to Web address

hiips://www.survteymonkey.com/r/SPE2017

Each day we will we will have a prize drawing for those that provide feedback!

Committee Contact Information

Conference Co-Chair / Sponsorship Co-Chair
Dr. Sassan Tarahomi, IAC
phone: +1.248.259.5624 starahomi@auto-tpo.com

Conference Co-Chair / Sponsorship Co-Chair
David Okonski, General Motors Corp.
phone: +1.281.870.6659 dokonski@auto-tpo.com

Technical Program Co-Chair
Dr. Norm Kakarala
phone: +1.248.433.1227 nkakarala@auto-tpo.com

Technical Program Co-Chair
David Helmer, General Motors Corp.
phone: +1.248.431.9804 david.helmer@gm.com

House Chair
Bill Windscheif , AIS Ltd
phone: +1.248.535.2595 bwindscheif@auto-tpo.com

Conference Registration
Karen Rhodes-Parker, SPE
phone: +1.248.244.8993 karen@spedetroit.com

Schedule of Events Sunday, October 1, 2017

12:00 PM Exhibition Set-up Starts

3:30 PM Tutorial 1: Reflections on Evolution and Growth of TPOs by **Mark Barrera**, Asahi Kasei Plastics **(Complimentary, Requires No Registration)**

4:15 PM Tutorial 2: Overview of Compounding and Applications of TPVs by **Dr. Dave Patel**, Mitsubishi Chemical Performance Polymers, Inc. **(Complimentary, Requires No Registration)**

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 **Mytex Polymers**

8:30 AM WELCOME REMARKS: Conference Co-Chair, **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 Company* **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 TPOs, TPEs 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,** *Magna* **& Nick Kolesch,** *Borealis*

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, Luca Gazzola,** *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 Company* **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 Company*
3:30 PM	Structure/Property/Applications of Thin Films from Polyolefin Dispersion (POD): **Houxiang (Sean) Tang PhD,** *The Dow Chemical Compnay*	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: **Dr. Kim McLoughlin, James Kahn,** *Braskem*	Latest Breakthroughs with Sustainable Hybrid Composites in Lightweight Applications: **Dr. Alper Kiziltas,Rob Banning, Kelli Bucki,** *Ford Motor Company, 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: **Dr. 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 Series: **Toro Kato,** *NOF America*	Higher Weld Strength and Deployment Performance TPE for Instrument Panel Chute Applications: **Dr. 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 **SPE Detroit Section**

8:00 AM WELCOME REMARKS: Conference Co-Chair, **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 Awards Presentations: Sponsor Recognitions and Awards for the 2017 TPO Parts Competition Winners (Presented by Dr. Suresh Shah & Nippani Rao)

Presentation of the 2017 SPE Detroit Section Lifetime Achievement Award to **Dr. Rose Ryntz**, IAC

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

	Conference Hall- I	Conference Hall-II	Conference Hall-III
	ADDITIVES & MODIFIERS **Neil Fuenmayor,** *LyondellBasell* **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 Company*
10:15 AM	Extending Polyolefin Elastomer Impact Modifiers from Unfilled to Highly Filled TPO Compounds: **Dr. Jeff Munro,** *The Dow Chemical Company*	New Generation TPO Materials for Airbag Cover Applications: **Katsuya Kida, Nobuhiro Natsuyama,** *Sumitomo Chemical Company*	New Development in Biobased Compounds for Automotive Industries: **Dr. Arash Kiani, Dr. Christian Lenges,** *Alterra Holdings* *Dupont Industrial Biosciences*
10:45 AM	A New Method to Modify PP for Improved Melt Strength: **Brett Robb,** *Total Cray Valley*	Styrene Block Copolymer with High Damping Property: **Yasushi Senda,** *Kuraray Co., Ltd.*	Blue Agave Reinforced PP Composites for Automotive Applications: **Amy Langhorst, Alper Kiziltas, 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: **Ryouji Usui, Noriyoshi Oono, Kentaro Kanae, Yoshiaki Zama,** *JSR Corporation*	Exploring the Use of Micronized Rubber Powder in Thermoplastic Elastomers for Automotive Applications: **Haikun Xu, Lavon Detweiler,** *Entech, Inc*
11:45 AM	Novel Light Stabilizer for Automotive Interior: **Dr. Robert Schmeltzer,** *BASF Corp.*	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* **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*	New Lightweight and Surface Technologies for New Field of Applications: **Jason Holbrook,** *KraussMaffei*
2:00 PM	Advanced Additive Technologies for Enhancing Properties of Glass Fiber Reinforced PP: **Yota Tzuneizumi,** *Adeka*	Foamable PP Compounds - Lightweight Solution for Lightweight Automotive Interior: **Ermanno Ruccolo,** *Borealis*	Freeformed Prototype Parts out of Production 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 & Company*	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* **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 Cray Valley*	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	Understanding the Polymorphism in β-nucleated iPP Injection Moldings Using a Combined XRD/flow Simulation Analytical Approach: **Anne Gohn,** *Penn State University*	Lightweight Interiors: **Mike Jary,** *Inteva Products LLC*	Lightweighting of Parts via Foaming for Class A Finishes: **Juergen Giesow PhD,** *Arburg*
4:30 PM	High Performance Migrating Anti-Scratch Solutions for Polyolefins: **Adam Maltby,** *Croda*	Integration Possibilities with Fiber-filled TPO in Interior Applications – A Road to Weight Reduction? **A. Yanev, 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,** *The Dow Chemical Company*	Influence of New High Performance Mineral Products on Mechanical Properties of TPO & Polypropylene Compounds: **Maz Bolourchi,** *Imerys Minerals*	Enabling Lightweighting by Enhancing the Bonding of TPO to Dissimilar Materials with Plasma Surface Conditioning: **Tim Smith,** *Plasmatreat North America*

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

Wednesday, October 4, 2017

7:30 AM REGISTRATION & CONTINENTAL BREAKFAST: Sponsored by **SPE Detroit Section**

	MODELING & SIMULATIONS **Dr. Li Lu,** *Ford Motor Company* **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: **Jeff Kloberdanz, Kenneth Kwasnik, Li Qi, Danielle Zeng,** *Ford Motor Company* **Srikar Vallury, Anthony Yang,** *Moldex3D*	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 Adhesives*
8:30 AM	Improving Warpage Prediction by Considering the Crystallinity Corrected PVT: **Srikar Vallury,** *Moldex3D,* **Xuming Su,** *Ford Motor Company*	VOCs and Odors in Cars: Why We Care, What Are Their Source, and How We Can Reduce Them: **Mark Dearth,** *Ford Motor Company*	Using Wetting Envelope to Fine-Tune and Troubleshoot Surface Treatment: **Marlen Valverde,** *H.B. 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: **Liang Xu, John Voyce, Thomas Schlegel,** *PolyOne*	Qualifying Hotmelt Adhesives for Automotive Interior Door Panels: **David Speth,** *Evans Adhesives*
9:30 AM	CAE Methodology for Side Impact of Interior Door Trim Armrest: **Raju Tuniki,** *EASI Engineering*	Origin and Component of Odor Emitted from the Automotive Polypropylene Materials: **Dr. Liang Lei, Juanxia Su,** *Kingfa Sci. & Tech (USA), Inc.*	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.

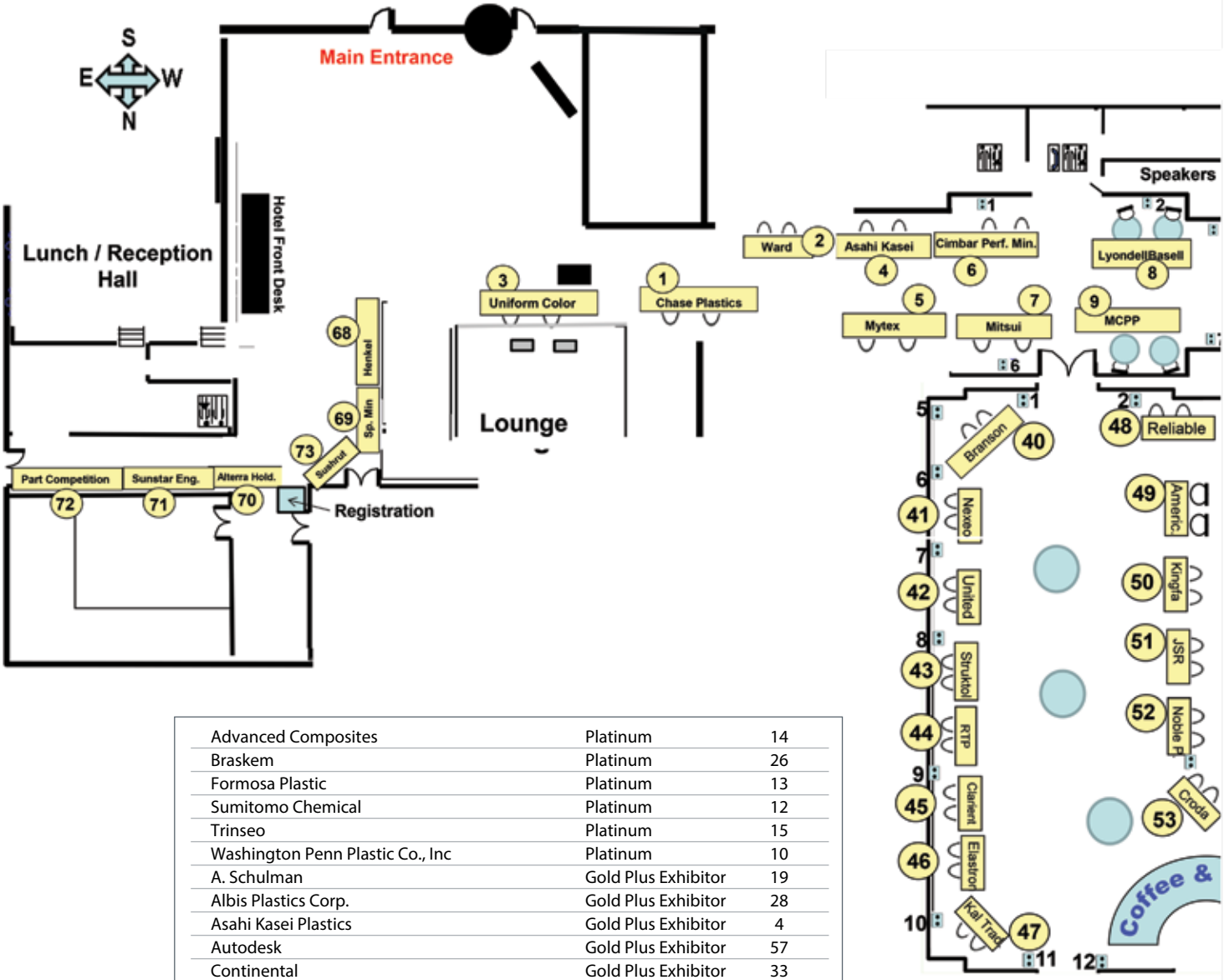
KEYNOTE 5: Plastics Industry Economic Updates and Outlook
Patricia Davitt Long, Senior Vice President – Industry Affairs, Plastics Industry Association (PLASTICS)

11:00 AM	Validation of Weld Line Strength using Simulation: **Jeff Higgins,** *Autodesk*	Low VOC Stabilization Systems for PP and PP-Based TPO Automotive Applications: **Jungdu Kim,** *Songwon*	1K Water Based Adhesive for Laminating TPO Foam Backed Skins to TPO Substrates for Automotive Interior Applications: **Jim Weir,** *Sunstar Engineering Americas*
11:30 AM	The Importance of Material Characterization for Simulation: **Jacob Trott,** *Beaumont Advanced Processing*	CAE Methodology for Sunload and Heat Aging Prediction of Automotive Interior Components: **Dr. Hui Wang, Dr. Li Lu,** *Ford Motor Company*	A New Path for Lamination Adhesives: Leaping Time Barriers and Erasing Steps: **John White,** *Henkel*

12:00 PM LUNCH: Sponsored by **Trinseo Automotive** ..... 1:00 PM Conference Concludes

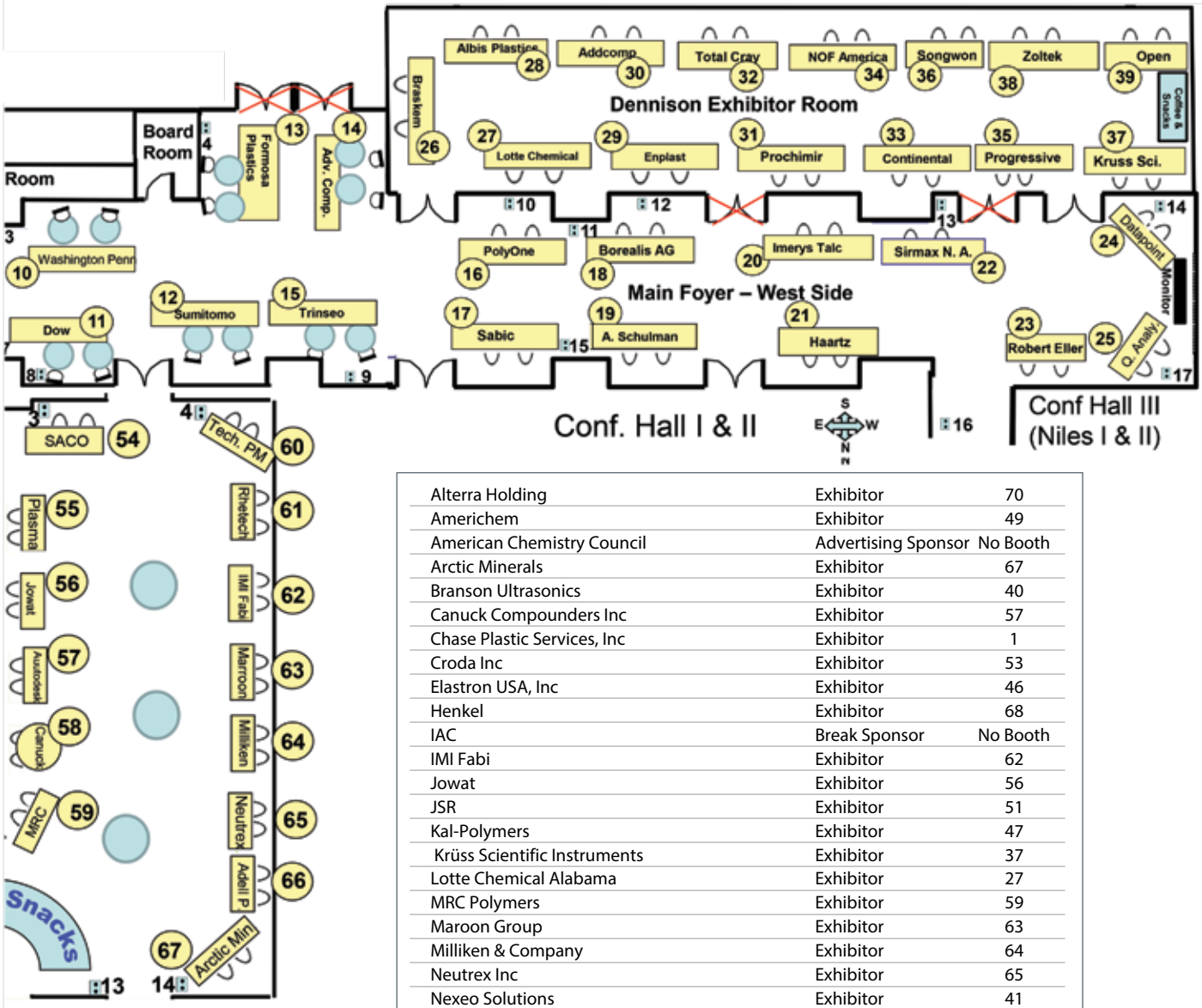
2017 Sponsors


TRINSEO™
SMART
QUIET
SAFE
Interiors matter. Automotive customers require desirable aesthetics, reliable safety, great comfort, and digital connectivity. Our automotive products portfolio enables you to proactively meet these key requirements of an ever-evolving market.
MAGNUM™ ABS Resins
PULSE™ PC/ABS Resins
ENLITE™ PP-LGF
VELVEX™ Reinforced Elastomers
Ready for tomorrow's interiors.
trinseoautomotive.com



Advanced Composites	Platinum	14
Braskem	Platinum	26
Formosa Plastic	Platinum	13
Sumitomo Chemical	Platinum	12
Trinseo	Platinum	15
Washington Penn Plastic Co., Inc	Platinum	10
A. Schulman	Gold Plus Exhibitor	19
Albis Plastics Corp.	Gold Plus Exhibitor	28
Asahi Kasei Plastics	Gold Plus Exhibitor	4
Autodesk	Gold Plus Exhibitor	57
Continental	Gold Plus Exhibitor	33
Borealis	Gold Plus Exhibitor	18
Cimbar Performance Minerals	Gold Plus Exhibitor	6
Clariant Plastics & Coatings	Gold Plus Exhibitor	45
DatpointLabs Technical Center for Materials	Exhibitor	24
The Dow Chemical Company	Gold Plus Exhibitor	11
Enplast Americas	Gold Plus Exhibitor	29
ExxonMobil	Gold No Exhibit	No Booth
Haartz Corporation	Gold Plus Exhibitor	21
Imerys Talc	Gold Plus Exhibitor	20
Inteva Products	Gold No Exhibit	No Booth
Kingfa Sci. & Tech. (USA), Inc.	Gold Plus Exhibitor	50
LyondellBasell	Gold Plus Exhibitor	8
Mitsubishi Chemical Performance Polymers, Inc	Gold Plus Exhibitor	9
Mitsui Plastics	Gold Plus Exhibitor	7
Mytex Polymers	Gold Plus Exhibitor	5
Polyone	Gold Plus Exhibitor	16
Robert Eller Associates	Gold Plus Exhibitor	23
SABIC	Gold Plus Exhibitor	17
Sirmax North America, Inc	Gold Plus Exhibitor	22
Addcomp	Exhibitor	28
Adell Pastics	Exhibitor	66

Locations



Alterra Holding	Exhibitor	70
Americhem	Exhibitor	49
American Chemistry Council	Advertising Sponsor	No Booth
Arctic Minerals	Exhibitor	67
Branson Ultrasonics	Exhibitor	40
Canuck Compounders Inc	Exhibitor	57
Chase Plastic Services, Inc	Exhibitor	1
Croda Inc	Exhibitor	53
Elastron USA, Inc	Exhibitor	46
Henkel	Exhibitor	68
IAC	Break Sponsor	No Booth
IMI Fabi	Exhibitor	62
Jowat	Exhibitor	56
JSR	Exhibitor	51
Kal-Polymers	Exhibitor	47
Krüss Scientific Instruments	Exhibitor	37
Lotte Chemical Alabama	Exhibitor	27
MRC Polymers	Exhibitor	59
Maroon Group	Exhibitor	63
Milliken & Company	Exhibitor	64
Neutrex Inc	Exhibitor	65
Nexeo Solutions	Exhibitor	41
NOF America	Exhibitor	34
Noble Polymers	Exhibitor	52
Plasmatreat	Exhibitor	55
Prochimir Inc	Exhibitor	31
Progressive Components	Exhibitor	35
Quantum Analytics	Exhibitor	25
Reliable Analysis	Exhibitor	48
Rhetech	Exhibitor	61
RTP Company	Exhibitor	44
SACO AEI Polymers	Exhibitor	54
Songwon Industries	Exhibitor	36
Specialty Minerals Inc	Exhibitor	69
Struktol	Exhibitor	43
Sunstar Engineering Americas, Inc	Exhibitor	71
Sushrut Polymers	Exhibitor	73
Techmer PM	Exhibitor	60
Total Cray	Exhibitor	32
Uniform Color Company	Exhibitor	3
United Paint & Chemical Corp.	Exhibitor	42
WardsAutomotive	Media Partner	2
Zoltek	Exhibitor	38

Global solutions. Local Support.

We're providing the best to automotive and we're here to serve you.

Sumitomo Chemical and our Sumika Polymers automotive group supports the global auto industry by creating innovative products that push the technology envelope. But we don't stop there. Our facilities located in every major region, support local economies, preserve the environment and focus on problems facing society.

Sumitomo Chemical provides the best of both worlds – delivering sustainable automotive solutions that are safer and more cost effective, while working to enrich lives throughout the world.

Polypropylene Compounds

SUMITOMO™ NOBLEN® PP

THERMOFIL® GFPP

Thermoplastic Elastomer

ESPOLEX® TPE

Synthetic Rubber

ESPRENE® EPDM

SUMITOMO™ sSBR

Polymethylmethacrylate

SUMIPEX® PMMA

PP Foamed Sheet

SUMICELLER® PP Sheet

SUMITOMO CHEMICAL

Group Companies of the Americas

SumikaPolymers.com

+1(248)284-4797

Creative hybrid chemistry for a better tomorrow.

Surface Enhancements

Session Co-Chairs:

Dr. Rose Ryntz, *IAC Group* **Jeff B. Crist,** *Ford Motor Company* **Jim Keller,** *United Paint & Chemical Corporation*

Improvements in Mold-In-Color TPO Compounds

Jason Fincher
Advanced Composites, Inc.

Advanced Composites has identified three material formulations to address customer requests for improvements in mold-in-color TPO. An enhanced scratch resistance formulation was developed for interior applications. A separate material was designed for lower gloss for interior applications. Conversely, another innovative compound has potential application for higher gloss exterior and interior applications. These materials provide opportunities for increased customer satisfaction and overall utilization of mold-in-color TPO.

Surface Enhancement via PP Metallic Compounds:

Dr. Tanmay J Pathak
A.Schulman Inc.

Light weighting and low emissions are desirable aspects for any compound developed for automotive applications. In addition the enhancement of an automotive surface for visual appeal and improved aesthetics is also a key area of research in polymer composites targeted for such applications. There has been considerable development on surface appeal via metallic polymer compounds using effect pigments which allows reduction of weight by metal replacement. However, during injection molding, these compounds could lead to weld line imperfections in parts especially where the flow fronts come together. This is essentially due to poor metallic pigment distribution. The current work shows the development of a Polypropylene metallic composite with the focus on weld line improvement by proper choice of material and tool design to allow injection molded metallic TPO for exterior class A. This development also provides lower costs and lower emissions as it eliminates painting of such TPO compounds.

Components & Materials - Quantifying Human Touch Without Humans

Peter Botticelli
SynTouch

Touch is the most powerful and least understood of the human senses. The way a product feels creates strong impressions about its quality, desirability, and value. However, the underlying features that make one product feel better than another has been elusive. Specifications for the feel of materials were subjective, defining interior components used on outdated technologies that can't capture what humans perceive. Understanding precisely how the materials and functional components in automotive interiors feel enables you to optimize them for customers' delight, speed your product development cycles, reduce cost, and more.

Review of Automotive Soft-Feeling Interior Coating Systems

John Bilson*
Peter-Lacke

Some of the property requirements of automotive interior coating systems are harsher than automotive exterior coating systems. The presentation covers reviewing required properties and the challenges in developing coating systems for different types of plastic substrates with focus on the specific challenges for soft touch coatings. Measuring haptics, soft touch "pitfalls", as well as formulating tools with related components to the challenges will be discussed in the presentation.

Polypropylene TPO Compounds with Excellent Painted Surface Aspect for Lightweight Construction

Mirela Tury Pastorini
Borealis

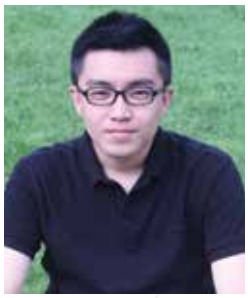
The presentation focuses on the influence of the phase morphology, painting process and paint adhesion test conditions on the paint adhesion of polypropylene TPO compounds. These aspects have been systematically investigated using Borealis state of the art automated paint robot, steam jet test equipment and scanning electron microscopy (SEM). The results are being used to develop polypropylene TPO compounds to meet stringent paint adhesion OEM requirements showing excellent surface aspect and, additionally, providing lightweight solutions through low density material or thin wall part construction.

Correlation of TAMU Scratch and Mar Test Methodology to Field Performance of Automotive Interior Parts

Shuang Xiao*,
Polymer Technology Center, Department of Mechanical Engineering, Texas A&M University

Hung-Jue Sue
Polymer Technology Center, Department of Mechanical Engineering, Department of Materials Science and Engineering, Texas A&M University

Jeff Woos, David Lipka
Nissan Motor Co., Ltd.,



Application of thermoplastic olefins (TPOs) as automotive interior parts continues to be attractive to the automotive industry owing to their light weight, high recyclability, as well as low material and manufacturing cost. However, the susceptibility of TPOs to surface damage has been a major problem ever since the application of TPOs in automobiles, which affects their aesthetic appearance during service. The Initial Quality Study (IQS) by J.D. Power provides assessment of new vehicle quality based on the problems reported by vehicle owners during the first 90 days of ownership. The "interior scuff/soil" is the No.4 most reported problem by vehicle owners in IQS statistics. Therefore, solving the scuff/soil problem can provide significant improvement for the IQS rating. In this study, by using the ASTM D7027/ISO 19252 standard scratch machine along with Automatic Scratch Visualization (ASV®) software package, the scratch visibility, ironing mar visibility and roughening mar visibility of a series of black textured TPOs were investigated. It is found that both scratch visibility and ironing mar visibility generated by 1 mm diameter spherical tip and barrel tip, respectively, correlate well with the IQS scuff/soil rating by J.D. Power. These two testing protocols may be used to predict the IQS scuff/soil rating during material and grain design stage of the interior parts. Furthermore, the roughening mar visibility generated by sandpaper tip is found to be effective in evaluating the mar visibility resistance of glossy surfaces. The effect of grain features on mar visibility resistance of textured surfaces is discussed.

Structure/Property/Applications of Thin Films from Polyolefin Dispersion (POD)

Sean Tang
The Dow Chemical Company

Polyolefin dispersion through mechanical dispersion process enables waterborne dispersion of polyolefin resins that are not easily obtainable through other approaches. This combines the environmental benefits and ease of application characteristics of waterborne systems with the desirable mechanical and chemical properties of polyolefin resins. In this talk, the structure/property of thin films derived from PODs will be discussed as functions of composition, formulation and processing variables. The potential applications of PODs as surface coating, primer, and additives, especially on automotive TPO, will also be discussed in light of their unique structures/properties.

Enduring the Harsh Environment of a Coating on Automotive Interior Cabin Rigid Plastic Substrates

Mark Gilbert
Alberdingk Boley, Inc.

This presentation will discuss the various requirements stipulated by General Motors Worldwide Engineering Standards – GMW1486 – Performance Requirements of Paints on Interior Plastic Substrates. The focus will concentrate on the specific arduous requirement of Sunscreen and Insect Repellent Resistance – GMW14445 – on the various commonly found rigid plastics utilized currently in the automotive market for car interiors. Two different water-based polycarbonate polyurethane dispersions have been evaluated, one containing N-Methyl-pyrolidone and one being "Solvent-Free". Performance has been evaluated using two different crosslinkers, including polycarbodiimide and polyaziridine.

Methylene Malonate Based Adhesion and Coating Solutions

Aniruddha(Andy)Palsule
Sirrus Chemistry

Methylene malonates are 1,1-disubstituted alkenes that have an electron withdrawing double bond in the center of the structure that can be polymerized anionically in presence of bases. This platform covers monomeric and oligomeric structures with a variety of main chain substituents for performance benefits. This chemistry can be initiated rapidly and at room temperature, by the presence of a base or a nucleophile in various substrates. This phenomenon lends itself to neat solutions for grafting, coating and bonding various substrates of basic characteristics at low temperatures and resulting in the formation of a covalent bond with various surfaces. Surfaces can also be modified to be specifically receptive to methylene malonates resulting in dramatically improved adhesion characteristics at room or low temperatures, without the use of solvents. This paper presents the demonstration of such strategies to obtain improved adhesive and coating solutions. Specific topics covered will include automotive clear coats development and plastics bonding strategies.

Anti-Scratch Improver: NOF-ALLOY KA Series

Toro Kato
NOF America

NOF®-ALLOY KA series is an espeically designed additive for polyolefins, thermoplasticsw olefine elastomers, thermoplastic styrene elastomers and rubbers. This material drastically promotes its scratch prood property with no big impact on surface, mechanical and thermal properties, and mold ability. In addition, NOF®-ALLOY KA series can prevent a noise problem which is concerned with the automotive interior parts made up of polyolefins.

Interior Applications

Session Co-Chairs: **Robert Eller,** *Robert Eller Associates LLC* **Dr. Sam He & Kevin Lyons,** *Inteva Products LLC*

Auto Interior TPOs, TPEs and PP Compounds Evolving Toward the Future

Bob Eller
Robert Eller Associates LLC

This paper will review:

- Auto interior TPO demand evolution and the factors affecting it
- TPEs at the polyolefins interface
- Analysis of the driving forces, performance requirements and example materials around which forward strategies must be developed
- Identification of key players and fabrication processes in the evolving interiors applications

Design & Innovation – The Merging of Aesthetics & Technology

Dr. Pravin Sitaram
The Haartz Corporation

Automotive Interiors is a constantly evolving field in terms of material development. The Haartz Corporation has engineered a range of soft TPO constructions for door trim as well as instrument panel applications. This paper will look at advanced material technology to create unique products for automotive interior applications without losing focus on superior chemical resistance, odor and VOC.

Injection Molded Softskins – High Performance Softskin Solutions for Automotive Interiors

Joe Schulcz*, Marcus Greger
Kraton Polymers LLC

A new soft skin solution for the automotive marketplace utilizing innovative SEBS polymer systems is to be introduced by Kraton Polymers. This discussion will focus on an overview of the new Kraton Injection Molded Softskin (IMSS) product, including insights from various perspectives such as product performance, processing, and full overview of IMSS versus other soft skin systems. The discussion concludes with a video demonstration of the injection molding of a full instrument panel skin.

A Slush TPE Material for Automotive Interior Applications

Dr. John O'Gara
Inteva Products

Historically, plasticized polyvinyl chloride (PVC) has been used exclusively in slush molding. In order to overcome PVC's limitations, a molded-in-color slush thermoplastic elastomer (TPE) has been developed that provides a premium appearance skin for automotive interior applications. The TPE material is based upon polyolefins and elastomers. This TPE technology offers mass savings, improved low temperature impact, and excellent aging and emissions behavior. In addition, this product provides good scratch/mar/scuff performance. Details of the product and process behavior will be discussed relative to alternative materials.

Low Emission Polupropylene Composites for Automotive Interiors

Dr. Tanmay J. Pathak
A Schulman Inc.

Low emission products are highly sough after in the automotive industry for interior applications which include measuring odor and fog, Votatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs). A Schulman Inc. has developed glass and mineral filled compounds that meet the regulatory requirements for VOCs and SVOCs in GMW and VW specs through a careful selection of base polypropylene, additives and compounding tehnology which will be presented in this work. The development included a careful selection of resins, targeted additive sgtrategy and an approporiate porocess to minimize the VOC and SVOC count measured via chromatography on the final compound.

A New Introduction to Chemical Blowing Agents – A Lean Method for Creating Cellular Structures in Thermoplastic Injection Molding

Peter Schroeck
Reedy International

Chemical foaming agents have been in use for more than fifty years and the technology is still evolving. Questions processors are asking today include: "What is the initial investment?", "Will laboratory results be scalable?", and "What will change about my product?" New understandings in chemical foam applications will allow automotive TPO molders to meet target goals stemming from C.A.F.E. Processors can now take a new look at a proven, lean method for reducing part weight and increasing profits.

Interior Applications

Evolution of Rigid Foams from A Hidden Component to A High End Visual Customer Touch Surface

Jim Lowry
Sonoco Protective Solutions

Sonoco Protective Solutions is a leading manufacturer of molded foam components for typical under panel automotive applications. Rigid foams have played a key roll in helping to light weight vehicles, while increasing safety. In this presentation we will look at how rigid foam is evolving from a hidden component and becoming more of a high-end visual customer touch surface. It will still add value through reduced weight, impact performance, uncomplicated assembly and features such as: wire management, sound reduction and reducing overall number of components.

HMS PP: Advances in Materials for Foamed Products

Kim McLoughlin*, James Kahn
Braskem

Lightweighting of interior and other automotive components are becoming more common place due to several newer developing technologies. Additionally, Polypropylene is used currently used in a wide array of automotive applications because of its exceptional mechanical properties, thermal stability, sustainability (recyclability). These performance characteristics can be enhanced significantly by foam process technologies that reduce density and ultimately contribute to weight savings.

HMS (High Melt Strength) polypropylene has been available for several years (and at times limited), but with renewed interest in these materials, Braskem has developed and introduced a HMS-PP that can be extruded for performance 'low density' foams while maintaining high stiffness. These foams can be produced across a broad range of densities, utilizing a variety of cell nucleation agents and physical blowing agents. Uses and applications for such foams can be found the Mobility and Industrial sectors ranging from HVAC ducts to headliners

Superior Appearance TPE for Molded in Color Airbag Doors:

Dr. Nadeem Bokhari
Sumitomo Chemical Company

A novel TPE material has been developed that provides superior cosmetic appearance and scratch resistance. Additional properties include very good cold impact ductility to successfully meet the North American and Asian OEM requirements.

Higher Weld Strength and Deployment Performance TPE for Instrument Panel Chute Applications

Dr. Nadeem Bokhari
Sumitomo Chemical Company

A next generation TPE material with the highest weld strength and superior cold deployment performance for the instrument panel passenger airbag chute applications. This newly developed material successfully replaces all 4 types of existing TPEs used in different instrument panel passenger airbag designs. Very low glass transition temperature proprietary rubber enhances this materials cold and hot deployment performance to meet the global OEM requirements

New Generation TPO Materials for Airbag Cover Applications

Katsuya Kida
Sumitomo Chemical Company

Development of seemless type instrument panel system with passenger airbag cover has recently been a hot topic in the field of automotive interior parts. Many of these airbag covers are installed on the inside surface of instrument panels with vibration welding. We developped next generation TPO materials to achieve excellent vibration weldability for airbag cover applications, while maintaining other high properties such as fluidity, impact resistance and so on.

Styrenic Block Copolymer with High Damping Property

Yasushi Senda
Kuraray Co., Ltd.

In this automotive area, where designers are asked to reduce weight while improving performance, sound and vibration attenuation is an increasingly important design consideration.

Kuraray Co., Ltd. has developed a series of Styrenic Block Copolymers that offer significant damping of sound and vibration while being highly miscible in polyolefins. This presentation reviews molecular structure, formulation, and testing of these Styrenic Block Copolymers showing them to be an effective material solution for automotive designers of today.

Properties of Oil-Resistant TPV and its Material Design

Ryouji Usui*, Masato Kobayashi, Noriyoshi Oono, Toshiyuki Kayakawa, Kentaro Kanae, Yoshiaki Zama
JSR Corporation

Thermoplastic vulcanizates (i.e TPV) is a special class of thermoplastic elastomer, and has been replacing on cured rubber especially for environmental friendliness and cost reduction. Conventional TPV formed with ethylene-propylene-diene rubber and polypropylene, however, cannot be applied to Oil-resistant parts. In this presentation, we introduce newly developed TPV showing excellent oil resistance, also discuss about its material design and comparison with other oil-resistant elastomers.

Designing the Cockpit of the Future

Aidano Nascimento
Inteva Products

The session will share observations and analysis of the past, present and future of the automotive cockpit. Focus will be placed on the range of technologies that will begin transforming how we interact with our cars and what the near-term cockpit, instrument panel and Human Machine Interface will look like for the next several product cycles. Nascimento will share insights on:

- Transformation of the cockpit
- Mega-trends influencing the cockpit
- Interior trends influencing the cockpit
- Using inspiration to design the experience

Driving New Levels of **PERFORMANCE** and **INNOVATION**

Braskem is committed to delivering differentiated automotive and compounding solutions to achieve next generation performance.

Collaborating with our highly-valued clients and automotive industry leaders, we drive solutions that stretch the limits of innovation and technology to help improve people's lives.

Come see us at BOOTH 26

Braskem

2017 Sponsors

2017 Sponsors

Reinforcements & Compounds

Session Co-Chairs: **Mike Balow,** *Asahi Kasei Plastics N.A. Inc.* **Ermanno Ruccolo,** *Borealis*

Innovative PP Glass Fiber Compounds Based on Low Creep Advanced Copolymers

Klaus Klemm*, Dr. Erik Licht
LyondellBasell

For structural applications PP-GF is a very economic material solution. In comparison with PA-GF, the mechanical strength of PP-GF compounds at elevated temperatures has been significantly lower. Especially at termperatures higher than 100ºC and for parts that are exposed to permanent stress, conventional PP-GF grades are limited and an improvement is necessary for these compounds to become a technical solution. Recently developed *Hostacom* PP-GF materials from LyondellBasell do show significantly better creep performance which leads to longer lifetime under permanent load before part failure. Long term tensile creep test results are presented and the capabilites of this new material class are highlighted in a surge tank application.

Challenges with Creep in Underhood Applications

Rodrigo Orozco
Asahi Kasei Plastics N.A.,Inc

Creep experiments are time consuming and expensive. Moreover, incorporating temperature effects on creep can lead to an expanded laboratory test matrix, further driving up costs. An approach to creep simulation in ABAQUS is presented, where frequency domain experimental data is shifted using time-entropy superposition to create the material's time dependent response. Frequency domain master curves are then transformed into the time domain to simulate creep with any combination of temperature and loading history, saving time and expense.

Advances in Lightweight Carbon Fiber Reinforced PP: Solutions for Visible Application

Joe Laux *
Magna
Nick Kolesch
Borealis

Borealis presents the advancement of its Fibremod Carbon, PP carbon fibre reinforced, products for use in visible automotive applications. The revolutionary Fibremod Carbon grades were launched approximately two years ago and based on the strong market response the next generation grades have been developed.

Borealis will introduce new PP carbon fibre reinforced solutions for painted body panels and unpainted tailgate carriers jointly with the development partner Magna Exteriors. Within this work products have been developed which provide class A surface after painting and also on non-painted parts, while maintaining excellent dimensional stability and outstanding stiffness at an extraordinary low density.

Advances in Glass Fiber Reinforced PP: Higher Stiffness and Improved Surface Appearance

Lorenzo Ferro*, Luca Gazzola
SIRMAX

Glass fiber reinforced polypropylene compounds have been used extensively in structural non-visible automotive applications. Starting from a microscopic investigation, this work will present the development of short glass fiber reinforced PP compound with higher stiffness or aesthetic appearance. The former improvement allows achieving further weight saving, while the latter allows the use also in visible parts. Exemplifying solutions will be presented.

A Focus on Surface Enhancement of High Crystalline Glass Reinforced Olefin Development

Tim Howie
Asahi Kasel Plastics N.A.

Semi-crystalline olefins have excellent chemical resistance and over the past few decades they have been designed to maximize strength and stiffness. By enhancing the surface of these engineered olefins we can greatly decrease cosmetic issues and broaden the use to everyday life.

The Novel Talc Approach to Automotive Plastics Market

Piergiovanni Ercoli Malacari
IMIFabi Spa

Automotive plastics market is a very demanding and growing business. Talc is a functional mineral for polymer modifications in this market. Specifically, talc plays a relevant role in thermoplastic olefins (TPO) where the very unique final performances can be achieved.

IMI Fabi have developed a full range of products to fulfil the most demanding request in this area with a global presence to satisfy the main automotive requirements.

With an extensive experience in the field along with an application-oriented approach (specialties), IMI Fabi have rationalized and integrated its offer to fit with the market demand.

In this framework, the new automotive product range can satisfy the most stringent requirements. These range from lightweighting to thermal stability enhancement and from sustainable products to odor control, thus focusing the approach on automotive final performances. The global availability of those products makes the offer even more attractive as it can be easily integrated in modern supply chains for efficient supplies.

In this paper, a new automotive product range will be presented providing specific technical information to better understand the comprehensive range of products offered to the market.

2017 Sponsors

Biobased & Recycled Materials

Session Co-Chairs: **Susan Kozora,** *IAC Group* **Dr. Alper Kiziltas,** *Ford Motor Company*

Properties of Injection Molded Kenaf/PP from Repelletized Non-Woven Mat Offal

Susan Kozora*, Paris Stetkiw
IAC Group

With increased use of natural fiber/PP based non-woven mats in many automotive applications, it's imperative to find a solution for the offal generated in the process typically used for these types of materials. Offal from a non-woven kenaf/PP mat was reformulated and repelletized to provide an injection moldable material for alternate use. Test specimens were molded and tested to characterize the material. The formulation was optimized portions of offer the best in performance and cost.

Latest Breakthroughs with Sustainable Hybrid Composites in Lightweight Applications

Dr. Alper Kiziltas*
Ford Motor Company
Rob Banning
Trimax, International Paper
Kelli Buck
Celanese

Cellulose fibers have received considerable attention within automotive as a class of reinforcing agents for polymer composites for their low cost, low density, high mechanical properties, and environmental benefits. Presented are results of a study examining novel hybrid composites using a combination of cellulose fibers and long glass fibers in a polypropylene (PP) for potential use in console components. The hybrid composite leads to superior weight, cost savings, & environment benefits versus inorganic reinforced composites.

Use of Naturally Occurring Fibers as well as Bio Waste Fillers for Interior and Exterior Automotive Applications

Akshay H. Trivedi
Lear Corporation

In this study, we have evaluated plastic parts made by incorporating two different naturally occurring fibers. (1) Long abaca fibers via a unique extrusion process (LFT-D) followed by compression molding. This process eliminates the intermediate compounding process to make pellets used for conventional plastic processing. This fiber is much lighter than glass fiber and parts made with it are comparable in mechanical properties with glass filled polymer of same loading. (2) wood pine fiber generated from tree waste and shavings of wood articles by conventional compounding and injection molding. This fiber is lighter than synthetic talc and offers better mechanical properties.

Our studies and testing shows a lot of promise for the use of these kind of naturally occurring fibers and bio waste fillers for exterior and interior automotive applications.

Sisal Natural Fiber Reinforced TPO for Automotive Interior Applications

Daniel Fuller*,
Riccardo Savador
Celanese

Sisal natural fibers come from the Agave Sisalana plant that is native to southern Mexico but now thrives in multiple global regions. Since the 1960's, Sisal natural fibers have been harvested in Mexico, Brazil, Tanzania, Kenya, Madagascar, China, Haiti, and Florida (USA). The sisal fiber has good tensile properties and has been used for applications including packaging twine, carpet, textiles, and rope. It is naturally resistant to salt water and is commonly used for rope in the mooring of boats.

Automotive industry trends are driving the implementation of natural fiber reinforcements to achieve numerous complementary goals, including those relative to vehicle mass reduction, fuel efficiency improvement, CO2 emission reduction, and responsible environmental stewardship. These trends are driving interest in using sisal natural fibers to reduce part density (weight) while maintaining good physical properties and providing targeted visual appearance in thermoplastic polyolefin compounds.

Sisal natural fibers compounded into PP and TPO matrices can provide good tensile, flex, and impact properties at a much lighter weight than talc, mineral, and fiber glass reinforced compounds.

New Development in Biobased Compounds for Automotive Industries

Dr. Arash Kiani*
Alterra Holdings

Dr. Christian Lenges
DuPont Industrial Biosciences

Alterra Holdings and DuPont Industrial Biosciences are developing compounding and formulation technologies to incorporate Nuvolve® Engineered Polysaccharides into various thermoplastic polymers. Initial results from developments with PP, PHA, PLA, TPE and TPV will be presented. An example will be an automotive application for car mats with special focus on the opportunity for weight reduction. Data will be presented to compare the physical properties of standard car mat compounds with Nuvolve® based compounds.

Biobased & Recycled Materials

Blue Agave Reinforced PP Composites for Automotive Applications:

Amy Langhorst*, Alper Kiziltas and Debbie Mielewski,
Ford Motor Company

In recent years, automakers have been replacing synthetic fillers in polymeric components, such as glass or talc, with natural fibers to reduce the weight and carbon footprint of their vehicles. Ford recently partnered with Jose Cuervo to use blue-agave fibers, a waste product of tequila manufacturing, as polymeric reinforcement. However, natural fiber composites have an affinity for water, potential odor/ emissions, and low temperature degradation. Some of these challenges can be resolved by torrefying the fibers prior to compounding, but these processes cause significant fiber mass loss. This study investigates the effects of low-temperature heat treatment of blue-agave fibers to balance the benefits and drawbacks of torrefaction. Composites containing heat-treated blue-agave fibers and polypropylene were produced via twin-screw extrusion and injection molding. The resulting mechanical and thermal properties were investigated. Additionally, industrial manufacturing of automotive components using blue-agave composites was successfully demonstrated

Exploring the Use of Micronized Rubber Powder in Thermoplastic Elastomers for Automotive Applications

Haikun Xu*, Lavon Detweiler
Entech, Inc.

Micronized rubber powders (MRPs) have shown superior compatibility in TPOs and excellent elastomeric properties. However, it requires efforts to explore the use of MRPs in useful products and a few challenges need to be addressed. In this study, MRP-filled TPEs were compounded at various loading ratios and the effect of sizes of MRPs was investigated. In addition, the surface details of injection molded parts were studied and induction-heated molding were implemented to improve the surface finish for automotive applications.

Reuse of Paint System Waste as a Functional Filler for TPOs

Meagan Marko
Noble Polymers

Noble Polymers has partnered with Series One to develop TPO formulations using recycled powder coat, Re.Paint™, and calcium carbonate filter media, Re.Calc™. The result is a high recycled content TPO that can compete with traditional materials. Through reclaiming expertise and unique process development, these materials are converted into functional additives within the TPO system. The result is a winning opportunity to make a positive environmental decision without sacrifice. g polycarbodiimide and polyaziridine.

2017 Sponsors

2017 Sponsors

Additives & Modifiers

Session Co-Chairs: **Neil Fuenmayor,** *LyondellBasell* **Mark Jablonka,** *Dow Chemical*

Extending Polyolefin Elastomer Impact Modifiers from Unfilled to Highly Filled TPO Compounds

Jeff Munro*, Russell Barry, Takahiko Ohmura, Hem Tanwar, Dirk Zinkweg
The Dow Chemical Company

Polyolefin Elastomers have been preferred impact modifiers for TPO compounds for several decades. Use of Polyolefin Elastomer impact modifiers over a range of filler levels will be discussed to demonstrate key attributes of elastomer design in each case. The influence of rheology on elastomer particle breakup in a polypropylene matrix was studied via modelling. The effect of Polyolefin Elastomer resin design on CLTE of TPO compounds with various talc levels will also be discussed.

A New Method to Modify PP For Improved Melt Strength

Brett Robb*, Philippe Lodefier, Anthony Marozsan, Virginie Chabrol
TOTAL Cray Valley

Polypropylene is a semi-crystalline polymer with a lack of melt strength. HMS-PP is used to overcome this deficiency. The HMS-PP products are based on high levels of long chain branching. Introducing Dymalink 9200, a polar zinc salt widely used in the rubber industry, into PP the Dymalink assembles into ionic clusters promoting a unique dynamic network leading to unusual high melt strength behaviour even at very low loadings. Data has been produced using rheological tools.

Overcoming Tackiness and Blooming Effects in Regions with Extreme Weather

Diogo Grillo*, Mariana Machado, Ana Sarturato
LyondellBasell

The objective of the present study is to evaluate how some of the main characteristics of the polypropylene compounds like polymer matrix, filler type and content, interactions between different additives may increase or reduce the migratory effect of additives and also to propose materials that will bring better performance in tackiness and blooming.

Novel Light Stabilizer for Automotive Interior Applications

Robert Schmeltzer*, Feng Zuo, Gregor Huber
BASF

Polymeric materials are widely used in automotive industry. Stabilization systems are essential for these materials to sustain desired properties during processing and end-use applications. This paper gives an overview of the various stabilizers and the principles in selection of suitable stabilization systems for different automotive requirements. Latest developments of high performance stabilization systems for increasingly demanding requirements with additional auxiliary benefits and improved secondary properties are highlighted.

Extending the Value of TPO to Accelerate Lightweighting of Automotive parts

Jian-Yang Cho*, Jerry Eng, Andrea Landuzzi, Brent Sanders
Solvay

Automotive Industry is looking for replacement of heavier materials and TPO has become the lead candidate to make cars lighter and more fuel efficient. Innovation is needed to accelerate TPO market adoption and expand the opportunities, as this trend poses additional performance requirements, such as optimizing physical properties, cost and durability. This presentation will discuss examples of how new high performance stabilizers that optimize polyolefin composites durability in a cost-effective way can accelerate industry sustainability and value creation.

Advanced Additive Technologies for Enhancing Properties of Glass Fiber Reinforced PP

Yota Tsuneizumi*, Naoko Dai, Takashi Ayabe, Shinichi Ishikawa, Naoshi Kawamoto
Adeka
John Mara, Robert Weiler
Amfine

Converting metallic parts to plastic parts is now a popular way for reducing weight to achieve higher automotive fuel efficiency. GF-PP is one of the common solutions, but the improvement in a compound's properties are still necessary to expand the applications of GF-PP. This paper describes the features of advanced antioxidants, hindered amine light stabilizers and flame retardants which are capable of enhancing multiple properties of GF-PP.

Balancing the Impact Stiffness and Melt Flow of Polypropylene with Breakthrough Performance Modifiers

Scott Trenor
Kraton Polymers

Compounders strive for balance of three key properties: impact, stiffness and MFR. Adding rubber increases impact, but negatively affects processability whereas peroxides increase processability but degrade impact. A breakthrough compatibilizer enhances peroxide resulting in improvements in MFR without sacrificing impact and improvements in impact without sacrificing MFR. The tricky part is understanding how to change current formulations to take advantage of MFR and impact performance benefits that were not attainable with PP in the past.

Performance Additives for PP-Based Automotive Applications

Brett Robb*, Anthony Marozsan, Bill Dougherty
TOTAL Cray Valley

Thermoplastic olefins (TPO) and thermoplastic elastomers(TPE) are multiple-phase structures and each phase contributes unique properties. Judicious selection of additives that modify a targeted phase provides the opportunity to modify or enhance the performance of these Compounds. From the portfolio of additive chemistries available from Total Cray Valley, several unique additives that incorporate combinations of functionality, compatibly and mobility will be reviewed that provide performance enhancements to both physical and rheological properties of TPO and TPE.

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
School of Engineering at Penn State Behrend

The efficiency of linear trans gamma-quinacridone to nucleate formation of beta-crystals in isotactic polypropylene (iPP) during injection molding was studied by polarized optical microscopy (POM) and wide-angle X-ray scattering (WAXS). This study attempts to link both temperature and shear dependence of the crystallization process to the final microstructure. It was found that highly nucleated samples were unable to produce strictly beta phase at the skin of the part, where the highest cooling rate is induced. The non-nucleated iPP produced the beta phase in the high shear region of the molded part, in the region of 100-250 um into the depth of the specimen. In the neat iPP, beta phase was also seen to have a large population in the core of the molded part, where low shear is induced by the part geometry. This shows that the melt has memory of shear back into the injection unit of the molding machine. Samples that formed a higher content of the beta-crystal phase also proved to have degreased strength with increased ductility due to the looser packing of the crystals.

High Performance Migrating Anti-Scratch Solutions for Polyolefins

Adam Maltby
Croda

Migrating additives are commonly used as antiscratch for TPO materials. Erucamide and oleamide are effective in these applications, but have some drawbacks such as instability, visible bloom, volatiles, stickiness and odour. Croda has previously presented alternative products in this area and this work extends the data generated on these "2nd Generation" additives using the "Erichsen Cross-hatch" scratch test and fogging testing. The sources of instability and methods to alleviate this are also discussed.machine. Samples that formed a higher content of the beta-crystal phase also proved to have degreased strength with increased ductility due to the looser packing of the crystals.

Polyolefin Dispersion for Automotive Interior Applications

Amit Chaudhary*, Parvinder Walia
The Dow Chemical Company
Sarah Wakumoto
Colorado State University

HYPOD™ aqueous polyolefin dispersions represent a new class of waterborne polymeric material produced by a proprietary BLUEWAVETM Technology. These dispersions are commercially available for use in various coating applications, and have characteristics similar to other water-based dispersions/ emulsions. With a wide array of olefin, the polyolefin dispersion (POD) composition can be tailored to a specific application and performance requirements. Experimental POD have been developed for automotive interior applications, targeting soft skins and other automotive interior applications.

Lightweighting Polyolefin Parts

Session Co-Chairs: **John Haubert,** *FCA US LLC* **Normand Miron,** *Washington Penn Plastics*

Effect of Various Weight Reduction Strategies on Mechanical Properties and Part Performance

Matthew Thompson
Advanced Composites, Inc.

Multiple options exist for decreasing the weight of injection molded automotive components. Advanced Composites has evaluated the effect of compound density reduction, wall thickness reduction, and foaming on the performance of injection-molded parts made using a diagnostic mini-door panel tool. This work also investigated the effect of altering chemical foaming agent content on part performance. Advanced Composites has designed compounds that will enable processers to take advantage of each of these weight reduction opportunities.

Foamable PP Compounds – Lightweight Solution for Automotive Interior

Ermanno Ruccolo
Borealis

Mobility concepts are changing with stringent government legislation and new OEM standards driving a new generation of TPOs. Parts from the foam injection process offer potential weight savings when compared to solid plastic parts. Within this work, a TPO compound was developed for foaming of interior automotive visible parts. As there are no standardized methods for foamed parts, one part of this study focused on the development of test standards including a unique foaming mold.

Low Density Engineered Polypropylene Compound for Door Panels and Interior Trim

Sunit Shah*
LyondellBasell
E. Collins
Volkswagen Group of America

The need for automotive OEMs to reduce vehicle weight remains ever greater. This paper explores options for weight reduction of interior components. It introduces low density TPO compounds designed to meet the requirements for VW door panels, and compares properties to those of incumbent materials currently in use. The paper further demonstrates weight savings and performance improvements achieved with new low density TPO compounds on a commercial door panel program.

Development of Advanced TPOs for Thin Wall Interior Door Panels

Roger Liu*, Siqi Xue, Steven Wang
LyondellBasell

This paper discusses the main solutions of weight reduction via thin wall methodology and the specification definition of a thin wall door panel material using structural CAE analysis, including systematic analysis for typical application tests. Thin wall design may easily incur potential surface appearance defects. Working in close cooperation with OEMs and strategic partners, LyondellBasell has developed unique materials for thin wall parts to achieve excellent appearance performance through innovative materials technology and advanced manufacturing processes.

Lightweight Interiors

Mike Jary
Inteva Products

The presentation will discuss the various technologies that are enabling lightweighting of the automotive interior. Numerous technologies and strategies for removing weight in the cabin while still enhancing comfort, quiet and aesthetics will also be discussed.

- The importance of lightweighting
- How the vehicle interior contributes to lightweighting
- Progression of technology enabling lightweighting
- Technology enablers including CAE, materials, tooling and equipment

Lightweighting Polyolefin Parts

Integration Possibilities with Fiber-filled TPO in Interior Applications – A Road to Weight Reduction?

Angel Yanev*, Dave Brands
SABIC, Global Technology Automotive

Tim Osswald, Sebastian Goris, Abrahan Bechara
University of Wisconsin-Madison

Often overlooked, automotive interior applications offer potential for weight reduction via integration possibilities of haptics and semi-structural functionality. This paper presents a benchmark of TPO materials offering integrated haptic functionality and insight into the fiber breakage mechanism, important for strength and stiffness in semi-structural applications, where long glass reinforced polypropylene (LGFPP) is often used. Results of Couette experiments illustrate the fiber breakage mechanisms and indicate the effect of initial pellet size on fiber length.

Influence of New High Performance Mineral Products on Mechanical Properties of TPO & Polypropylene Compounds

Maz Bolourchi
Imerys Minerals

The Automotive demand for lightweighting and increased performance of TPO materials has led to innovations. New high performance mineral products/formulations have been developed to address the continuous demand in automotive applications. These newly launched grades can be used for improved processability, throughput, lightweighting and/or enhancement of properties for TPO compounds. Experimental data will be presented in TPO and polypropylene formulations showing improved performance with specific focus on stiffness/impact balance, rheology, scratch resistance, shrinkage/CLTE, thermomechanical properties, and processability.

Process Developments

Session Co-Chairs: **Kurt Anthony**, *Washington Penn Plastic Co., Inc.* **Dr. Suresh Shah**

New Lightweight and Surface Technologies for New Field of Applications

Jason Halbrook
Krauss Maffei

Krauss Maffei has introduced new lightweight & surface technologies in the form of organo sheet over-molding, and in-mold painting. The FiberForm process integrates the IR oven heating of the organ sheet into the machine controls to produce a light weight part molded mostly of continuous fiber glass mat, carbon fiber, or aramid embedded as pre-impregnated material that is then over-molded to a complex geometric shape. The ColorForm process incorporates Krauss Maffei reaction process technologies into injection molding to create an in-mold painting technology with finished parts as they exit the mold. Both of these technologies are enhanced with the use of Krauss Maffei's new process control software known as APC – Adaptive Process Control, which develops a viscosity index to control the process in real time.

Freeformed Prototype Parts out of Production Material

Juergen Giesow PhD
Arburg

Rapid Prototyped parts through Freeforming capabilities with exactly the material that the part will be produced in mass production. Discussion on how this technology works and how it can help to quickly go though the Prototype stage and convert the generated information into the final product.

Further we will review the capability of Freeforming and individualizing mass produced parts quickly in very unique was.

Feeding and Processing of Light Weight Fillers on a Twin Screw Compounder

Alex Utracki
Coperion

Effectively feeding low bulk density material into a co-rotating twin-screw extruder has always been a challenge. With the introduction of finer particle size fillers (sub-micron in some cases) as well as new generations of polymer reactor resins, the issue has become even more problematic. As bulk density decreases, the materials tend to fluidize more easily. Fluidization lowers the effective bulk density even further and exacerbates feeding issues. Operations within the compounding process where material is more susceptible to fluidization are: transfer from storage vessel to feeders, from feeder to twin-screw extruder and within the feed zone conveying section of the twin-screw extruder. This paper will explore methods to minimize the potential for fluidization such as dense phase conveying from storage to feeder, minimization of the feeder height above the extruder feed opening, incorporating a vent into the feed hopper, extending the length of the conveying zone in the extruder feed section and Feed Enhancement Technology to increase the conveying efficiency of fine particle / low bulk density materials into the extruder.

Technology Advances in Hot Runner Systems for TPO Applications

Mitch Gordon
Synventive Molding Solutions

TPO is commonly used in many cosmetically demanding applications. Recent developments in hot runner valve pin control technologies are allowing molders to obtain cosmetics not previously possible. These enabling technologies do add to the upfront tooling costs putting molders in a difficult position of guessing when the additional investment is necessary. A modular approach to implementing these technologies can greatly reduce the financial risk to the molder by allowing them to evaluate the needs of the tool prior to making the investment.

To this extent the advent of SVG+ ("Scalable Technology") allows for a molder to ascertain the need for more advanced pin control if necessary while having a level of diagnostics previously unavailable for a sequentially valve gate system should more advanced control not be necessary.

Lightweighting of Parts via Foaming for Class A Finishes

Juergen Giesow PhD
Arburg

Weight reduction, Class A finishes, Mechanical Properties. What combinations can be achieved byusing state of the Art Technologies?

It will be discussed how cost effective Materials can be reinforced right at the machine to reduce the weight of a product with no or minimal effect to Mechanical properties. Further Foaming applications will be discussed that allow for weight reduction, but also for Class A finishes by using the newest Technologies available.

Combining new Technologies in one molding cell allow achieving an outcome that is either foamed and optically acceptable or reinforced and light weight, or even both.

Utmost Repeatability through Constant Change

Joachim Kragi
Engel

The presentation describes a new breed of artificial intelligence in machine controller integrated process control. Software that measures actual curve points and compares it against the machine calculated predicted points and then actually changes process relevant parameters in the very same cycle to guarantee utmost repeatability. This highly intelligent software also introduces new process parameters which have a much greater correlation to part quality criteria than most of the currently used ones. This program family includes highly intelligent, self-optimizing solutions for the injection unit and clamp unit of the machine.

Enabling Lightweighting by Enhancing the Bonding of TPO to Dissimilar Materials with Plasma Surface Conditioning

Tim Smith
PlasmaTreat North America

The consensus among automotive OEMs is that reducing vehicle weight is one of the best means to achieve greater fuel efficiency and meet more stringent emission standards. Thus, an emphasis on lightweighting has driven the content of metals, particularly steel, in automobiles from nearly 80% by vehicle weight in 1970 to less than 60% today. There are significant challenges when TPO needs to be joined or bonded to dissimilar materials. In such cases, the differences in surface chemistry across TPO and these other materials make attaining proper adhesion of adhesives and sealants difficult.

This paper examines the use of plasma surface conditioning to enhance the adhesion of adhesives, sealants to plastics, composites to TPO and other materials. Plasma improves adhesion by removing organic contaminants that reduce electrostatic and mechanical forces, and by increasing the functionality of the surface chemistry. We also highlight the use of plasma to deposit hydrophilic thin-film coatings to reduce galvanic corrosion and oxidation of alloys. This paper will present empirical data demonstrating the effectiveness of plasma for achieving improved bonding of TPO to dissimilar materials in high-value, high-production, automotive applications.

Influence of New High Performance Mineral Products on Mechanical Properties of TPO & Polypropylene Compounds

Toni Rice
Synventive Molding Solutions

The Automotive demand for lightweighting and increased performance of TPO materials has led to innovations. New high performance mineral products/formulations have been developed to address the continuous demand in automotive applications. These newly launched grades can be used for improved processability, throughput, lightweighting and/or enhancement of properties for TPO compounds. Experimental data will be presented in TPO and polypropylene formulations showing improved performance with specific focus on stiffness/impact balance, rheology, scratch resistance, shrinkage/CLTE, thermomechanical properties, and processability.

2017 Sponsors

2017 Sponsors

Modeling & Simulations

Session Co-Chairs: **Dr. Li Lu**, *Ford Motor Company* **Scott Grant,** *Autodesk*

Experimental and Numerical Analysis of Tiger Stripes in an Injection Molded Automotive Parts

Jeff Kloberdanz*, Kenneth Kwasnik, Li Qi, and Danielle Zeng
Ford Motor Company

Srikar Vallury, Anthony Yang
Moldex3D

Tiger stripes are critical defects for injection molded parts, especially for unpainted appearance applications. In this work, Moldex3D's flow solver, considering polymeric viscoelasticity, is used to simulate the tiger stripe phenomena on a spiral shaped part. A Design of Experiment (DOE) is conducted to study the factors contributing to the tiger stripe effect. Simulation results show the start of a promising correlation between the flow-induced stress distribution and the tiger striping observed in the experiment. This presentation will add to years past with the inclusion of the correlation seen with actual production parts for an IP topper.

Improving Warpage Prediction by Considering Crystallinity-Corrected PVT

Srikar Vallury*, Susan Lin, Anthony Yang, Xuming Su
Moldex3D NA, Inc.

Danielle Zeng, Lingxuan Su, Patricia Tibbenham
Ford Motor Company

Shrinkage and warpage predictions of injection molded parts is still an engineering challenge to process and Simulation engineers. One reason is the lack of correct material modeling from melt state to solid state. For instance, the effect of the rate of cooling on PVT cannot be properly measured through the current material testing theory and procedure. In this paper, injection molding experiments and simulations were conducted on a plaque and a real part to study the warpage behavior. PVT is corrected by crystallinity kinetics to consider the cooling rate effect. The comparisons show that the corrected PVT can significantly improve the warpage prediction accuracy.

Thermal Oxidative Stability Testing of TPO Materials Using Conventional and Rotator Ovens

David Alberts
General Motors

Thermal oxidative stability is a critical evaluation method for polypropylene and TPO materials. Testing has been added to polypropylene based material specifications, per ISO 4577, requiring the use of a rotator oven, which is expensive to use and not commonly found in test labs. Replacing the rotator oven with a conventional oven could lead to cost savings and expedited approvals.

This presentation analyzes appearance and tensile strength data after various thermal exposures to compare the two oven methods. Substrates tested include a polypropylene copolymer, TPV and TPO. We also compared the effects of removing antioxidant at various thermal exposures.

CAE Methodology for Side Impact of Interior Door Trim Armrest

Raju Tuniki
EASI Engineering

The complete evaluation of side impact crash test is performed in full vehicle test and so the engineers are not able to test the door performance during vehicle development cycle. Thus the need for door trim assembly component level testing. The CAE methodology is a tool to evaluate door trim side impact performance in the design stage before building the prototypes. Testing multiple prototypes is expensive and time consuming, in order to reduce cost and time it is required to evaluate the designs through CAE simulations. The paper describes a CAE methodology to evaluate door trim armrest performance in a Lateral Impact New Car Assessment Programme (LINCAP) impact and Oblique Pole side impact component level testing. To manage costs and time, the aim was to assess the capabilities of a CAE methodology as a base engineering approach without the need for multiple traditional physical prototypes testing of the door trim. This CAE methodology results show good correlation to test data and thus help expedite the design development cycle effectively.

Validation of Weld Line Strength Using Simulation

Jeff Higgins
Autodesk

The use of composite materials is greatly expanding in automotive. CAFE standards are propelling the automotive industry towards lightweighting through metal replacement. Composites are a viable replacement material due to their light weight and high stiffness and strength. One of the main disadvantages of composite materials, however, is that their performance is directly tied to the manufacturing process. Factors such as fiber orientation, residual stress and strain, fiber volume fraction, manufacturing defects, and weld lines can all greatly influence the performance of a composite structure. In fact, weld lines are often the root cause of structural failures for injection molded components. The structural integrity of the material at weld line locations is compromised due to fiber alignment and weak bond strengths of the meeting flow fronts.

This presentation will provide a general overview and discussion regarding the power of leveraging manufacturing data in structural simulation for injection molded, fiber filled thermoplastics. We will also present a mathematical model for predicting weld line strength by using the manufacturing process history, as well as a strategy for mapping the weld surface strengths to a structural simulation. Correlation and discussion of predicted results to experimental data will also be presented.

The Importance of Material Characterization for Simulation

Jacob Trott,
Beaumont Advanced Processing

Simulation is a powerful tool in the world of injection molding. Material characterization is one of the key links to accurate simulation results and plays a pivotal role in the results users are seeing today. It is critical to understand the importance of material characterization and to know what testing is important to the analysis you are running. The characteristics of these materials that are feeding the simulation are directly related back to the test methodology and equipment used. Many materials exist in the Autodesk Moldflow database in varying forms of completeness; the user must be able to judge whether these materials are acceptable for the user's needs. Beaumont Advanced Processing, since acquiring the Autodesk Moldflow Plastics Laboratory, now performs quality material characterizations for the Autodesk Moldflow community.

2017 Sponsors

KINGFA

TOTAL PACKAGE

REAL SOLUTION

One of the leading compounding firm with a strong global footprint

Headquarter is located in Guangzhou, China, with plants located throughout Asia-Pacific, Europe, and North America.
We are dedicated to providing a total package combining material science and value-added technical solutions.

Automotive:
Kingfa develops plastic compounds with new technology such as Lightweight, Low emissions, And Surface Finishing, etc.

Non-automotive:
Kingfa provides polymer solutions for a wide range of applications such as home appliances, IT, lighting, electrical and electronics, tools, etc.

Kingfa Sci. & Tech. (USA), Inc.
47440 Michigan Ave Canton MI 48188
Website: www.kingfa.com
Telephone: 734-888-4100

Interior Emissions

Session Co-Chairs: **Dr. Laura Shereda**, *Asahi Kasei Plastics N.A. Inc* **David Helmer,** *General Motors*

Perspectives on Emissions Requirements:

Teri L. Kline
General Motors

Government regulations affecting vehicle interior emissions and substances used in vehicles are expanding globally. Chemical regulations, designed for the protection of human health and the environment, have historically focused on chemical manufacturers but are now being expanded to restrict chemicals in consumer products such as vehicles. This presentation will give an overview of the current global interior emissions and chemical regulations affecting vehicles.

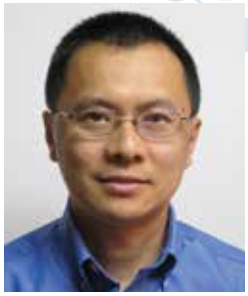
VOCs and Odors in Cars: Why We Care, What Are Their Sources, and How We Can Reduce Them

Dr. Mark A. Dearth*, Jennifer Zhu, Mark Polster, Tim Hallifax.
Ford Motor Company

New Car smell and the perceptual differences in major automotive markets around the world sets the backdrop for discussing what drives the China regional differences in perception or response. This work will cover an overview of in-vehicle sources, which chemicals we should be concerned about, how do VOCs behave in cars, how they impact the customer, how we measure them (very briefly), and an overview of strategies to reduce them.

How Low VOC / FOG TPEs Can Support Vehicle Interior Air Quality Requirements

Liang Xu*, John Voyce, Thomas Schlegel
PolyOne



Automotive OEMs seeking to proactively prepare for regulations have looked to PolyOne for material alternatives to thermoset elastomers, including newly developed low VOC / FOG TPE technology. Tested to VDA 278 and DIN 75201, these TPEs can be used in various interior applications to help satisfy Vehicle Interior Air Quality (VIAQ) requirements.

Origin and Component of Odor Emitted from the Automative Polypropylene Materials

Liang Lei*, Juanxia Su, Gang Sun, Bo Yang, Zhongfu Luo
Kingfa Sci. & Tech (USA), Inc.

At present, the air quality in cars is widely concerned. The VOCs emission and odor level are becoming stricter. It is necessary to produce the automotive materials with low emission. The most important things are to know the origin and component of odor and VOCs emitted from materials. Only in this way, we can effectively reduce the VOCs emission and odor level of materials by modification of formula and processing technology.

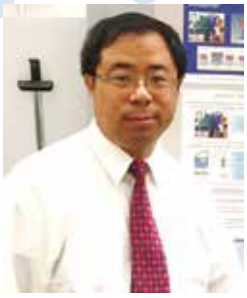
Low VOC Stabilization Systems for PP and PP-based TPO Automotive Applications

J.D. Kim*
Songwon International Americas
K. Keck
Songwon Industrial
T. Schmutz
Songwon International Switzerland

Emissions from polypropylene gain more and more attention, in particular in automotive interior applications. Emissions can be generated by the quality (purity) of the polyolefin, the degradation of the polyolefin as well as the solubility and inertness of the additives used. This paper presents how different stabiliser packages potentially can influence the emission level and introduces new advanced stabilizer solutions to reduce emission level for exterior and interior PP-based TPO automotive applications.

CAE Methodology for Sunload and Heat Aging Prediction of Automotive Interior Components

Hui Wang*, Li Lu
Ford Motor Company



Most of the automotive interiors major subsystems are made with engineering plastics. The thermal effects of the solar radiation at the instrument panels, console and door trims cause distortion effects. Designers need to evaluate the impact of heat load from solar radiation on fit-finish and inter-material interaction. Temperature rise of above 1000C due to solar radiation (wavelengths 290-2480nm) are expected as documented during Ford solar studies. Visual and quantitative gap measurements (fit) between trim panels, applique parts, on instrument panel, door trims and console are recoded, pre and post testing. This paper describes CAE simulation modeling practices for sunload and heat aging analysis. The CAE results show good correlation to test data and thus helping design in the early development cycle before prototype testing.

2017 Sponsors

2017 Sponsors

MITSUI PLASTICS, INC.

Mitsui Plastics, Inc. provides a full range of global solutions for the Automotive and Plastics Industries.

PRODUCTS
- PP & PP Compounds
- TPO Products
- Engineering Plastics
- Metallic Film Laminates
- Polymer Additives
- Color Concentrate & Master Batch Products

SERVICES
- Supply Chain Management
- Environmental Support
- Global Logistical Support

Mitsui Plastics, Inc. Your *First Choice* for Innovative Automotive Solutions

www.mitsuiplastics.com

Adhesives & Coatings for TPOs

Session Co-Chairs: **Hoa Pham,** *Freudenberg Performance Materials* **Dr. Pravin Sitaram,** *Haartz Corporation*

3D Spraying of Hot Melt Adhesive For Delicate Stitched Decors - Actual Challenges and Technical Solutions

Sebastien Meliot
Jowat Corporation

High-value materials, such as leather, are design highlights in almost all high-end automotive interior equipment. When high volumes are required, conventional state of the art press lamination technology is pushed to its limits. Hot melts sprayed on the substrates offer a solution, but new materials and delicate designs require a new approach in adhesive application. Actual challenges in hot melt spray technology will be discussed, along with newly designed adhesives for spray application.

Using Wetting Envelope to Fine-tune and Troubleshoot Surface Treatment

Marlen Valverde
H. B. Fuller

TPO materials with low surface energy (LSE) often require some type of surface pre-treatment to improve an adhesive's affinity and performance. This additional process step could open the door to quality issues if it isn't fully understood or fully under control. This presentation addresses the science behind surface treatment and the use of wetting envelop calculation to verify or in some cases predict the surface energy values needed in a substrate or adhesive used in trim applications.

Qualifying Hot Melt Adhesives for Automotive Interior Door Panels

David Speth*, Jeff Swoboda, Chris White
Evans Adhesives

Andres Sustic, Scot Wakefield
REXtac LLC

George Cozzan, Josh Miller
Radiant Energy

A non-reactive, thermoplastic hot melt adhesive has been introduced for use in laminating automotive interior bilaminates to TPO substrates. Results have shown that the lamination process parameters are critical in producing a successful panel. These parameters for the lamination process differ from those used in the existing process such as heat lamination. In this presentation, we will discuss how the process and the product must work together to produce a successful part.

Lamination with Olefin Adhesives on Polar and Non-Polar Substrates

Helmut Doyen
Sika Corporation

The lamination of automotive interior components has always been a challenge for the adhesive industry. While the design changed from simple surfaces to more shaped substrates, a focus is on light weight. NF-PP and other alternatives are making their way into the market. The presentation shows the adhesive development for all substrates and applications, simplifying processes and options to laminate ABS and PP with non-reactive hot melts.

1K Water-Based Adhesive for Laminating TPO Foam-Backed Skins to TPO Substrates for Automotive Interior Applications

Jim Weir
Sunstar Engineering Americas

As automotive interior components move to TPO-based laminates and substrates, the adhesive technologies have transitioned from solvent-based to 2K water-based adhesives, which require TPOs to be treated or primed. In an effort to make processing interior components easier, a 1k water-based adhesive was developed, which eliminates the processing issues of the current 2K adhesives, while still passing the requirements of the automotive manufacturers. In this presentation, the performance and processability of the adhesive are discussed.

A New Path for Lamination Adhesives: Leaping Time Barriers and Erasing Steps

John White
Henkel

Automotive manufacturers use primarily two-component waterborne reactive hot-melt, and solvent-borne adhesives for laminating TPO, PVC and leather skins to PE and PP foams. They use similar systems for laminating foils to rigid substrates, such as for interior door panels, consoles and instrument panels.

This paper describes the development of a new one-component waterborne adhesive that transforms preparation and application processes, erasing some of the most error-prone, complex, costly and physically messy steps involved in 2K formulations.

2017 Sponsors

WARDSAUTO™

INSIGHTS

Sales, Production & Powertrain Forecasts

Analytics

In-Depth Reports

ANALYSIS

Award Winning Online Resource

eNewsletter Series

Commentary & Perspective

CONNECTIONS

Outlook Conference

Interiors/UX Conferences

Wards 10 Best Awards

To subscribe or learn more, contact:

Lisa Williamson - LWilliamson@WardsAuto.com - 248.799.2642

Intelligence.WardsAuto.com

ALL ABOUT THERMOPLASTIC ELASTOMERS

Dr. Gupta Verlag

Our technical magazines and books create your expertise

Tel. +49 2102 9345-0 · Fax +49 2102 9345-20
www gupta-verlag com · info@gupta-verlag.de

Plastics Engineering

It's More Than Just Print!

our past. our present. **Your Future.**

www.4spe.org

Most plastics industry decision-makers get their information from *Plastics Engineering* – but we are much more...

We Connect to the Plastics Marketplace Through Digital Media

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

Talk to us to discuss your marketing needs for NPE 2018. And our promise is to DELIVER!!

***See How Powerful the right marketing can be in* Plastics Engineering**

CONTACT: ROLAND ESPINOSA
E-mail: respinosa@wiley.com

Washington Penn Plastic Co., Inc.
Engineering Polyolefin Compounds®

MATERIAL SOLUTIONS

What can Washington Penn design for you?

Custom compounding through WPP can lead to:

Weight Savings
Improved Performance
Cost Savings

Key Technologies:

- Mineral Reinforced
- Glass Fiber Reinforced
- TPO
- Soft Touch TPE
- Pro-Touch™
- Lightweight
- Scratch & Mar
- Low Blush
- UV Stabilization
- Masterbatches
- Flame Retardants
- Custom Colors

www washingtonpenn com
+1 724-228-1260

Salute 2017 TO OUR SPONSORS

SPE DETROIT TPO AUTOMOTIVE ENGINEERED POLYOLEFINS CONFERENCE

The SPE TPO Automotive Engineered Polyolefins Conference would not exist without the gracious support of our sponsors, who underwrote the cost of facilities and equipment rentals, food and beverages, production and printing of our program guide, and many other items, large and small. Hence, it is with great appreciation that we thank and acknowledge the contributions of our 2017 sponsors, exhibitors, and other patrons in making this event a success.

PLATINUM SPONSORSHIP

Advanced Composites, Inc. ✻
Braskem ✻
Formosa Plastics Corporation, U.S.A. ❖
Sumitomo Chemical America, Inc. ❖
Trinseo LLC ❖
Washington Penn Plastics Co., Inc. ❖

GOLD PLUS SPONSORSHIP

A. Schulman
Albis Plastis Corp.
Asahi Kasei Plastics North America, Inc.
Autodesk Inc.
Borealis AG
CIMBAR Performance Minerals ❖
Clariant Plastics & Coatings
Continental
The Dow Chemical Company ❖
Enplast Americas
ExxonMobil Chemical Co. ✢
Haartz Corportion
H.B. Fuller
Imerys Talc
Inteva Products LLC ✢
Kingfa Sci. & Tech (USA), Inc. ◆
LyondellBasell
Mitsubishi Chemical Performance Polymers, Inc
Mitsui Plastics, Inc.
Mytex Polymers US Corp. ❖
PolyOne
Robert Eller Associates
SABIC
Sirmax North America. Inc. ❖

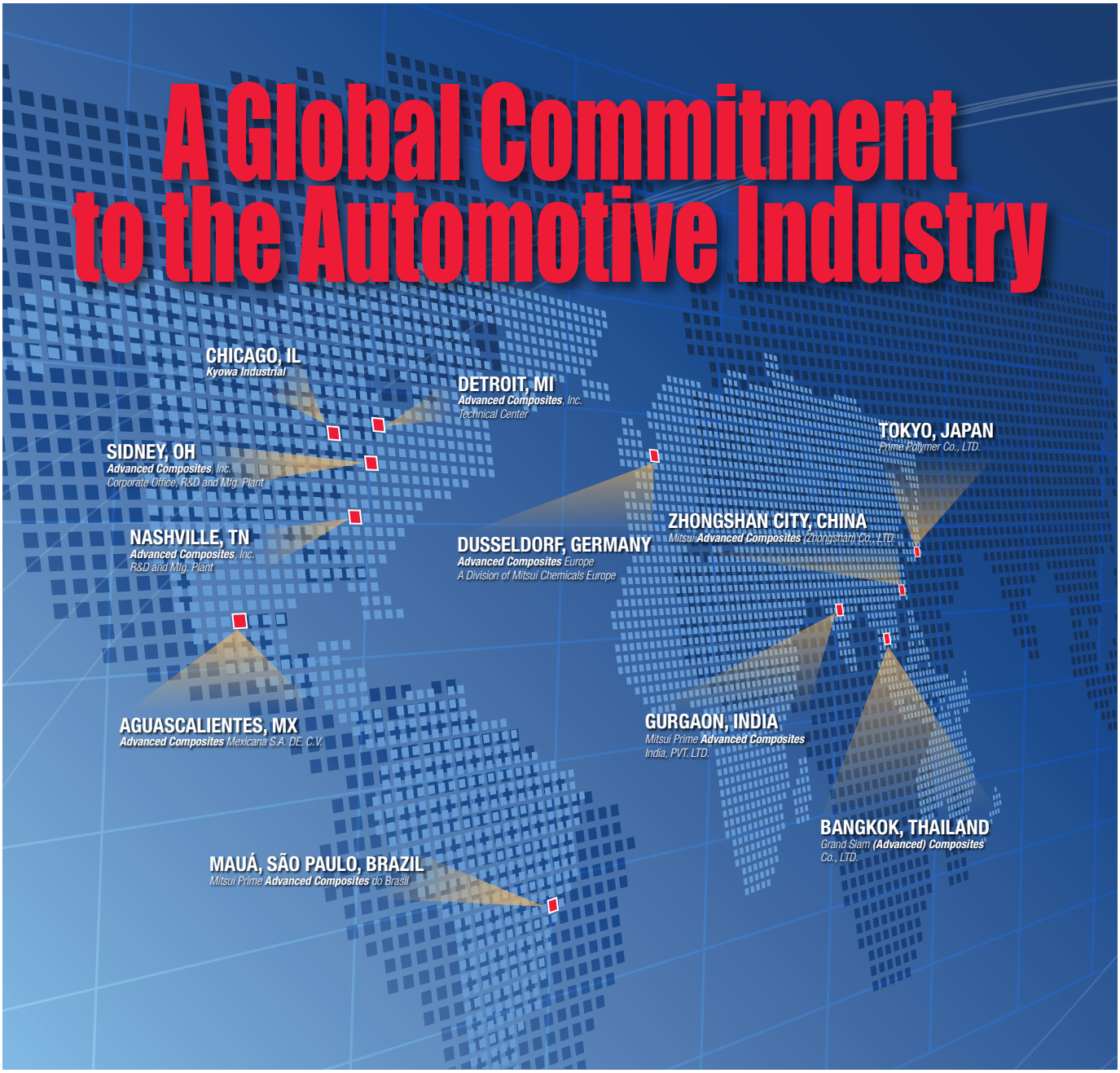
MEDIA / ASSOCIATION SPONSORSHIP

China Plastic & Rubber Journal
China Plastics & Rubber Journal International
Plastics Engineering Magazine
TPE Magazine
WardsAuto.com

EXHIBITORS

Adell Plastics Inc.
Alterra Holdings
American Chemistry Council - Plastics Div. ▲✢
Americhem, Inc.
Arctic Minerals, LLC
Branson Ultrasonics Corp., a Business of Emerson Electric Co.
BYK
Canuck Compounders Inc.
Chase Plastic Services, Inc. ◆
Croda International Plc
Datapoint Technical Center for Material
Elastron USA, Inc.
Henkel Corp.
International Automotive Components (IAC Group) ❖✢
IMI Fabi LLC
Jowat AG
JSR Corporation
Kal-Polymers Inc.
Krüss Scientific Instruments
Lotte Chemical Alabama Corp.
MRC Polymers ◆
Maroon Group LLC
Milliken & Co.
Neutrex, Inc.
Nexeo Solutions
Noble Polymers
NOF America
Plasmatreat US LP
Prochimir Inc
Ptogressive Components
Quantum Analytics ◆
Reliable Analysis, Inc.
RheTech, Inc.
RTP Company
SACO AEI Polymers
Songwon Industrial Co., ltd
Specialty Minerals Inc
Struktol Company of America
Sunstar Engineering America, Inc ◆
Sushrut Polymers
Techmer PM
Total Cray Valley
Uniform Color Company
United Paint & Chemical Corp.
Zoltek

✻ Reception Sponsor ❖ Lunch or Break Sponsor ◆ Ad Upgrade ▲ Advertising Sponsor ✢ No Exhibit



Advanced Composites

Mitsui Chemicals Group

Advanced Composites is proud to be a member of the Mitsui Chemicals & Prime Polymers commitment to the Global Automotive Market. With compounding resources throughout the globe (North America, South America, Japan, Europe, Thailand, China and India), the Mitsui Chemicals group is well positioned to service your engineered PP requirements.

www advcmp com
(937) 575.9800